Structured Notes According to

SURGERY

Revision friendly **Fully Colored Book/Structured Notes**

For Best results, watch the video lectures along with reading notes

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SURGERY VOLUME - I

LIST OF IMPORTANT TOPICS

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Risk Factors for Breast Cancer; Breast Cancer: Clinical Presentation; Investigations; 8th AJCC TNM Classification; Management of Breast Cancer; Chemotherapy & Hormone Therapy; Types of Mastectomy; Complications of Mastectomy; Breast Conservation Surgery; Breast Reconstruction; Prognostic Factors; Inflammatory Breast Cancer; Cystosarcoma Phyllodes; Luminal criteria; Van-Nuys Prognostic Index; BRCA Mutation; Fibroadenoma

THYROID

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STOMA

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RECTUM AND ANAL CANAL

Hemorrhoids; Rectal Prolapse; Anorectal Abscess; Fistula-in-ano; Goodsall's Rule; Fissure-in-ano; Pilonidal Sinus; Carcinoma Rectum & Anal Canal

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Renal Stones & Ureteric Stones; ESWL; PCNL; URS; Emphysematous & Xanthogranulomatous Pyelonephritis; Genitouri-nary TB; RCC; Wilm's Tumor; ADPKD; PUJ Obstruction; Retrocaval Ureter; Horse-Shoe Kidney; Ureterocele; Duplication of Ureter; VUR

URINARY BLADDER

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URETHRA AND PENIS

Hypospadias; Epispadias; Posterior Urethral Valve; Phimosis; Paraphimosis; Urethral Injury; Stricture Urethra; Carcinoma Penis

TESTIS AND SCROTUM

Undescended Testis; Epididymo-orchitis; Testicular Torsion; Hydrocele; Varicocele; Testicular Tumors

LEARNING OBJECTIVES

Unit 1 ENDOCRINOLOGY

BREAST

- Anatomy, Nipple discharge, Etiology: malignant and benign
- Investigations in suspected breast cancer, WHO classification of breast cancer
- Pathway of spread of breast cancer, investigation for screening
- Signs and symptoms of metastasis, BIRAD score
- Types of TNM classification, Staging and management
- Levels of lymph nodes
- Breast conservation surgery, breast reconstruction
- Prognostic factors in breast cancer, sentinel LN biopsy
- Inflammatory Breast Cancer, Breast Cancer in Pregnancy, Male Breast Cancer
- Paget's Disease of Nipple, Phyllodes Tumor
- Molecular Classification of Breast Cancer, Multigene Tests, BRCA I and BRCA II. ANDI
- Mastalgia, Breast Cysts, Breast Abscess

Thyroid

- Anatomy & Physiology, Thyroglossal Cyst, Radio Isotopes, Radioactive Ablation
- RAIU, Types of Thyroidectomies, Solitary Thyroid Nodule (STN)
- Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)
- Features of Hypothyroidism and Hyperthyroidism, Grave's Disease, Hashimoto's Thyroiditis
- Acute Suppurative Thyroiditis, Subacute Thyroiditis, Reidel's Thyroiditis
- Papillary Carcinoma Thyroid, Follicular Carcinoma Thyroid, Well Differentiated Thyroid Cancer
- Medullary Carcinoma Thyroid, Thyroid Lymphoma, Thyroidectomy, Hyperparathyroidism, Complications of Thyroidectomy, MIVAT

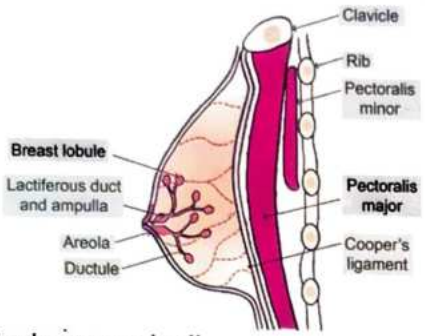
Parathyroid and Adrenal gland

- Introduction - MEN Syndrome, MEN – 1, MEN – 2, MEN – 3, MEN – 4
- Parathyroid Hormones & Gland Disorders
- Primary Hyperparathyroidism, Clinical Features, Diagnosis, Management
- Secondary hyperparathyroidism, Causes, Pathophysiology, Clinical Features & Management
- Tertiary hyperparathyroidism
- Carcinoma, Adrenocortical Carcinoma, Pheochromocytoma
- Pathophysiology of Pheochromocytoma
- Malignant Pheochromocytoma
- Neuroblastoma
- Esthesioneuroblastoma

1 BREAST PART-1

ANATOMY

00:00:44



- Modified sebaceous gland
- Extend from
  - 2-6 rib
  - Lateral border sternum to anterior axillary line
- 10-100 breast lobules drain into 1 ductule
- Number of lactiferous ducts is 15-20
- Large sebaceous glands around nipple during pregnancy k/a Montgomery tubercles
- Cooper's ligament involvement lead to dimpling of skin overlying the carcinoma

NIPPLE DISCHARGE

00:04:47

Cause

- Bloody nipple discharge
  - Duct papilloma (MC)
  - Duct carcinoma
  - Duct ectasia

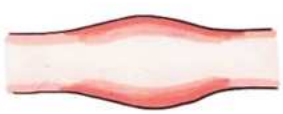
On Ductography/ Galactography

Duct Papilloma

Single, smooth, Intra-luminal filling defect.

Carcinoma

Multiple, irregular, Intra- luminal filling defect.



Duct Ectasia

Ducts appear dilated.

- Serous nipple discharge
  - Fibrocystic disease (MC)
  - Carcinoma
  - Duct ectasia
- Greenish, Blackish, grumous or Pultaceous discharge
  - Duct ectasia
  - Any kind of nipple discharge is possible for duct ectasia

Benign Etiology

- Majority of cases
- Young Female (< 40 years)
- Bilateral serous nipple discharge
- Multiple ducts
- No mass
- Bilateral cyclical mastalgia

Malignant Etiology

- > 40 years age
- Bloody nipple discharge from single duct
- Associated with mass

IOC

- First investigation done Cor suspected cases of breast cancer → Mammography
- For bloody nipple discharge → Ductography

Bloody discharge Deferential Diagnosis

Findings	Probable diagnosis	Treatment
• Single, smooth intraluminal filling defect.	Duct papilloma (Benign)	Microdochectomy (excision of involved duct)
• Multiple, irregular intraluminal filing defect	Breast carcinoma	
• Dilated duct	Duct ectasia	HADFIELD's operation (conical excision of involved duct)

Risk Factors (based on high socio-economic status)

- Advancing Age
- Western countries
- High socio-economic status
- Alcohol intake
- High Fat diet, obesity
- State of hyperestrogenemia (early menarche, late nulliparity, late first full-term pregnancy)
- Positive family history
- Personal H/O malignancy
  - Ovarian cancer
  - Endometrial cancer
- Genetic mutations
- BRCA mutations
  - Both BRCA 1 and BRCA 2 are Cor breast cancer in both males and females.
  - But BRCA 1 is mainly responsible for breast cancer in females
  - And BRCA 2 is mainly responsible breast cancer in males.
- Hormone replacement therapy
- History of therapeutic radiation exposure
  - Total therapeutic radiation: 40-60 gray
  - 1.8-2 gray/ day
  - 5 days a week for 4 – 6 weeks
- OCP's & smoking are not the significant risk factor for breast cancer.
- Long duration of breast feeding is protective breast cancer

CA Breast

Risk assessment models of CA Breast

CLAUSE model	GAIL model
• MC used	• More information about family history

• Includes NANA
  ○ No. of breast biopsy
  ○ Age of menarche
  ○ No. of first degree relative with CA breast
  ○ Age at first live birth
	• Based on
	  ○ Decade of life
	  ○ Based on first and second degree relative with CA breast
	  ○ Their age at diagnosis

WHO classification of Breast cancer

- Divides breast cancer into three types
  - In situ carcinoma
    - → DCIS
    - → LCIS
  - Invasive carcinoma
  - Paget's disease

1. Invasive carcinoma

- Ductal carcinoma: M/c
- Lobular carcinoma
- Tubular (cribriform carcinoma)
- Mucinous (colloid) carcinoma
- Medullary carcinoma
- Papillary carcinoma: Least common
- Metaplastic carcinoma
- Inflammatory breast cancer

Most Frequently asked Questions

- Least common type: Papillary carcinoma of breast
- Most malignant having worst prognosis: Inflammatory breast cancer
- Least malignant and best prognosis: Tubular carcinoma
- Excessive mucin production is associated with: Mucinous / colloid carcinoma

2. DOS (Ductal carcinoma insitu) 00:28:12

- Rf for I/I Invasive ductal cancer
- Ducts are present in breast of males and females: Hence Ductal carcinoma is common in both males and females
- Lobules are seen in females only: Hence lobular carcinoma is common in females exclusively.

Classification of DCIS

- It is based on
  - Nuclear grade
  - Necrosis

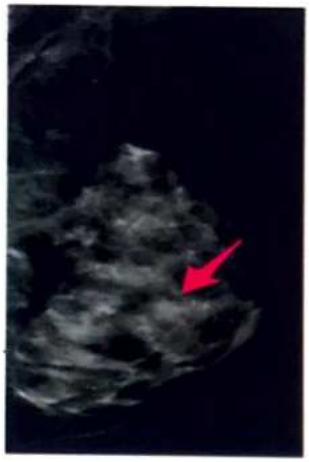
Types of DCIS

1. Low grade DCIS
- Cribriform
- Papillary
- Micropapillary

2. High grade DCIS
- Solid
- Comedocarcinoma

Investigations

- On mammography: Presence of Microcalcification due to necrosis
- Most sensitive investigation DOS: MRI
- Most sensitive investigation diagnosis of micro calcification in DOS: Mammography



Treatment

- Non palpable DCIS: Excision by needle localization with specimen mammography
- For Low grade DCIS: Lumpectomy
- For DCIS with limited disease: Lumpectomy + RT

3. LCIS (Lobular carcinoma insitu) 00:34:27

- Originates from terminal duct lobular units
- Only seen in females
- Multicentric and bilateral: Increased risk bilateral breast cancer
- It is a marker for increased risk of bilateral breast cancer

Pathology

- Cytoplasmic mucoid globules
- Histologic hallmark: Indian file pattern (Tendency of tumor cells to invade in linear strands)

Clinical features

- Mc presentation: Lump with ill-defined margins

Diagnosis

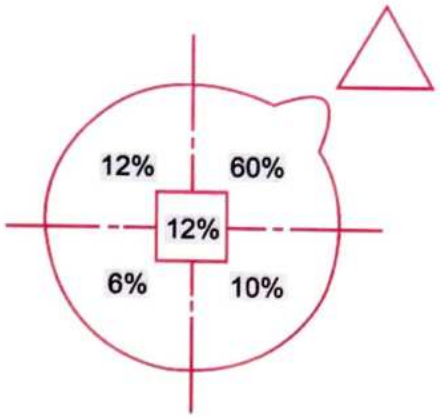
- Characteristic feature of LCIS: Neighbourhood calcification

Treatment

- Observation/chemoprevention by tamoxifen/ Raloxifene
- Prophylactic bilateral mastectomy

BREAST CANCER

00:38:50



- MC type histological type: Adenocarcinoma
- MC histological subtype: Invasive Ductal cancer
- Least common type: Papillary carcinoma of breast
- Most malignant and Worst prognosis: Inflammatory breast cancer
- Least malignant and best prognosis: Tubular carcinoma of breast

Site Breast Cancer

- Breast cancer is more common in left breast compared to right breast
- MC Site: Upper outer Quadrant (due to maximum amount of breast tissue at this quadrant)
- LC site: Lower inner quadrant

Route of spread

- MC route spread in CA Breast: Lymphatic
- MC site of metastasis: Bones (due to hematogenous spread)
- M/c bone: Lumber vertebra > Femur > thoracic vertebra
- Both Osteolytic and osteoblastic secondaries
- MC secondaries: Osteolytic > Osteoblastic
- MC primary both osteolytic and osteogenic secondaries in females: CA breast
- MC cause of death: Malignant pleural effusion

Pathway of spread breast cancer

Breast cancer cells
↓
Invade Posterior intercostal vein
↓
Invade BATSON PLEXUS

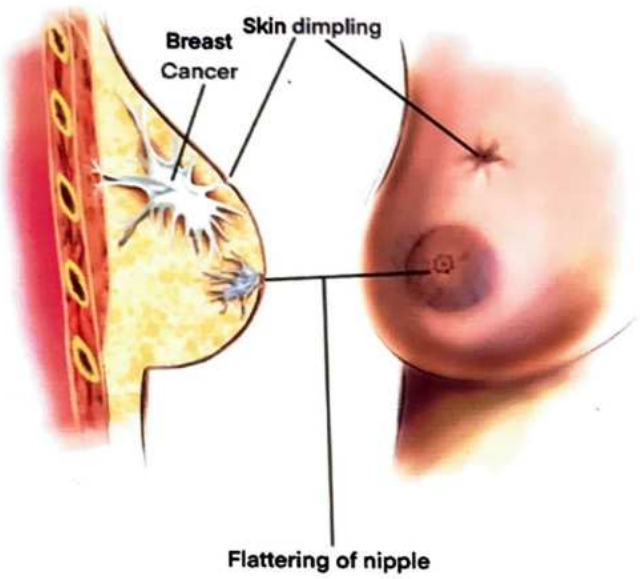
Invade Lumbar Vertebra

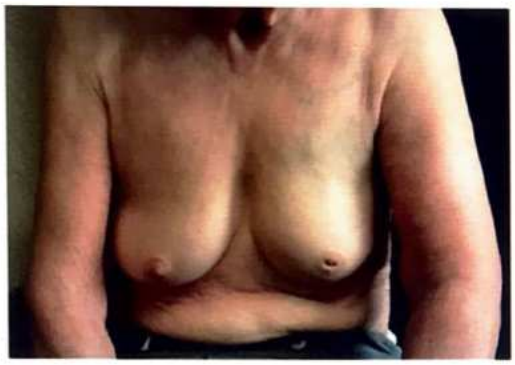
Dural venous Sinuses
↓
Leptomeninges
↓
Brain metastasis

- MC primary cancer responsible for leptomeningeal metastasis: CA Breast
- MC Primary responsible for brain metastasis: CA Lung > CA breast

Clinical Features

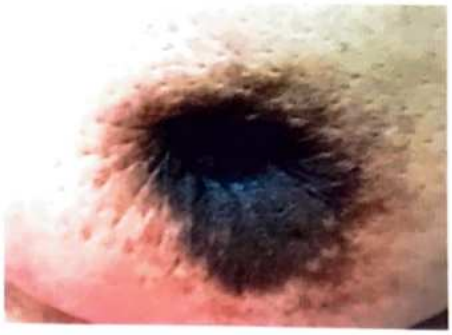
- MC presentation: Breast lump
- In advanced cases
  - Architectural distortion of breast
  - Asymmetry
  - Skin fixity
  - Fixity to chest wall
  - Involvement of nipple Leading to nipple retraction, nipple deviation, nipple ulceration





PEAU-D-ORANGE

- Most conspicuous sign of breast cancer Timor cells enter lymphatics
- Lymphatic obstruction/ lymphatic permeation by tumor cells leading to Cutaneous edema (PEAU - D - ORANGE)



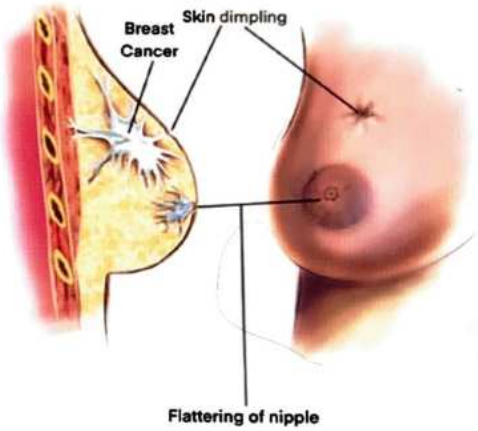
Previous Year's Questions

Q. Which is the most conspicuous sign in breast cancer? (AIIMS Nov 2018)

A. Nipple retraction
B. Peaud'orange
C. Duckering
D. Both nipple retraction and puckering

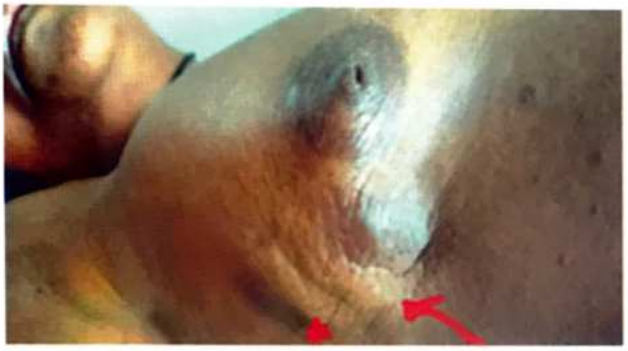
Dimpling

- Skin depression due to involvement of ligament cooper



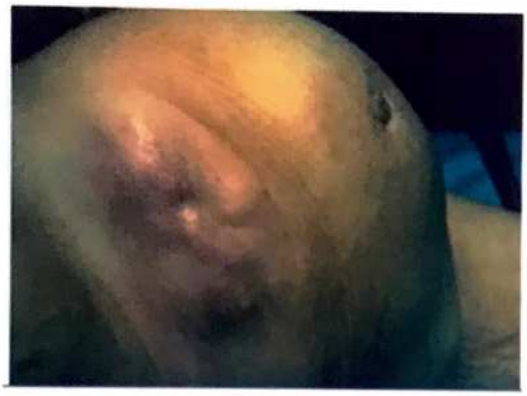
Puckering

- Wrinkling/skin fold due to involvement of ligament of cooper.



Cancer en-cuirasse

- Multiple nodules and ulceration in breast skin due to involvement of breast skin and chest wall



Sign and symptoms of metastasis

- Backache/ bony pains
- Headache
- Jaundice
- Anorexia
- Weight loss

Triple Assessment

- Components
  - Clinical: signs and symptoms
  - Imaging: Ultrasound or mammography
  - Tissue sampling: FNAC or biopsy
- Positive predictive value/ accuracy of triple assessment: 99.9%

Investigations

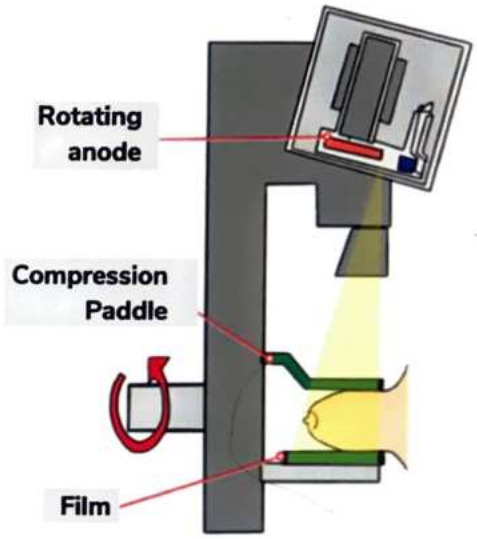
- First investigation done in suspected case of breast cancer: Mammography
- IOC diagnosis of breast cancer: Biopsy/ True cut biopsy/ Core cut biopsy/ Needle biopsy

FNAC	BIOPSY
• Size of needle: 22-26 gauge	• Size of needle: 14-16 gauge
• Experience cytopathologist is required	• Diagnosis is made easily
• High risk of false positive or false negative results (Difficult to differentiate DCIS from invasive ductal cancer)	• Easy to differentiate DCIS from invasive ductal cancer
• Difficult to assess hormone receptor status	• Hormone receptor status level can be assessed easily
	• More painful

MAMMOGRAPHY

01:05:38

- IOC for screening of breast cancer
- Screening mammography should be started at 45 years of age
- Annual mammography is recommended
- BREM STRAH LUNG X- RAY is used in mammography
- Radiation exposure in Mammography: 0.1 centi-gray per study
- One mammography: 4 chest X ray
- Compression paddle moves up and down and compresses the breast to better delineate the lesions that cannot be appreciated by flabby breast.

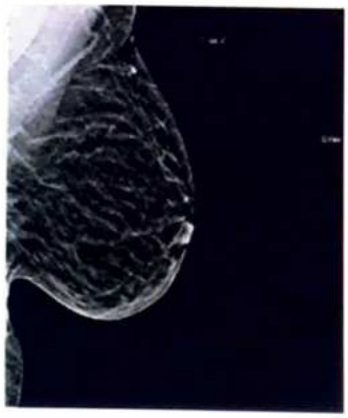


Mammography has two views

Craniocaudal view	Mediolateral oblique/ MLO view
• Medial aspect of breast is best assessed	• Maximum amount of breast tissues is assessed
• Breast compression is assessed	• Axillary tail of spence is assessed

Advantage of Mammography

- Diagnosis of non-palpable cancer
- Diagnosis of malignancy at early stage
- Better prognosis
- By early detection, mammography decreases mortality and increases survival by > 33% due to early detection of breast cancer.



In mammography film, the following are assessed

- Nipple retraction/ deviation
- Skin thickening
- Obliteration of retro mammary space
- Microcalcification
- Opacity

Features	Benign	Malignant
Opacity	• Regular smooth margin • Homogenous • Low density • Thin Halo	• Irregular margins o Stellate o Spiculate o Comet tail • Heterogenous • High density • Wide halo
Calcification	• Macro calcification > 0.5 mm	• Micro calcification < 0.5 mm
Associated changes in breast	• Absent	• Present • Nipple retraction • Skin thickening • Obliteration of retromammary space

BIRADS/ BREAST IMAGING REPORTING AND DATA SYSTEM

01:20:33

Category	Description	Risk of malignancy
0	• Incomplete assessment addition imaging is required	N/A
1	• Mammography is -ve • Annual mammography is recommended	0%
2	• Benign • Annual mammography is recommended	0%
3	• Probably benign • Short term follow up is recommend	> 0 – 2%
4	• Suspicious • Biopsy is recommended	
4A	• Low suspicion • Biopsy is recommended	> 2 – 10%
4 B	• Moderate suspicion biopsy is recommended	> 10 – 50%
4 C	• High suspicion • Biopsy is recommended	> 50 – 95%
5	• Highly suggestive of malignancy • Intervention is recommended	> 95%
6	• Biopsy proven malignancy	

Role MRI in Breast cancer

- IOC for screening of breast CA in high-risk female: MRI (High risk females: females having positive history or BRCA mutation)
- IOC of implant related complication: MRI
- IOC used to differentiate lesions: MRI

Role of Ultrasound

- First Investigation done in young females age < 35 years with breast lump because these patients have dense and glandular breast for which sensitivity of mammography is low.
- First investigation done in females < 35 years of age with breast lump: ultrasound

Role of PET Scan in Breast cancer

- IOC for diagnosis of distant metastasis
- Differentiates recurrence Breast CA from scarring, fibrosis, and necrosis.

Role of BONE Scan in breast cancer

- IOC for diagnosis of bone metastasis
- Samarium-153 is useful painful bony metastasis

Role of Biopsy in breast cancer

- IOC for Breast Cancer: BIOPSY

Staging of breast cancer

- cTNM: Clinical
- pTNM: Pathological
- rTNM: Recurrent
- mTNM: Multiple
- yTNM: Staging done when patient has received NACT

8th AJCC TNM CLASSIFICATION FOR BREAST CANCER

01:36:41

Stag	Size of tumor and other characteristics of
T1	• Up to 2 cm
T2	• > 2 – 5 cm
T3	• > 5 cm
T4a	• Extension to chest wall (chest wall is formed by Ribs, Intercostal muscles, Serratus Anterior)
T4b	• Ulceration • Edema including Peau-D-Orange • Satellite nodules • These changes are confined to the same breast.
T4c	• T4a + T4b
T4d	• Inflammatory breast cancer

Not included in T4

- Involvement of dermis alone
- Nipple retraction/ deviation
- Involvement of Pectoralis major/ Pectoralis minor

Lymph node (N)	Staging
N1	• Metastasis to ipsilateral axillary lymph node level I and II • Mobile
N2a	• Metastasis to ipsilateral axillary LN – I and II • Fixed / matted lymph nodes
N2b	• Clinically apparent internal mammary nodes • Detected on clinical examination /grossly visible pathologically/detected on radiological examination except lymphoscintigraphy
N3a	• Metastasis to ipsilateral infraclavicular LN
N3b	• Metastasis to ipsilateral axillary + internal mammary LN
N3c	• Metastasis to ipsilateral supraclavicular LN

Metastasis

M0	• No metastasis
M1	• Distant Metastasis

Staging of Ca Breast

Stage I	• T1
Stage IIA	• TO-1 N1 T2
Stage IIB	• T2 N1 • T3
Stage IIIA	• To-2 N2 • T3 N1-2
Stage IIIB	• T4 N0-2
Stage IIIc	• T any N3
Stage IV	• T any N any M1

Management of breast cancer

- Early invasive breast cancer (Stage I, IIA, IIB): Breast conservation surgery +Sentinel LN biopsy + Radiotherapy.
- If breast conservation surgery is contraindicated: Simple l total mastectomy +Sentinel LN biopsy (Axillary Lymph node sampling)

Indications of adjuvant chemotherapy

- Size >1cm
- Lymph node +ve
- Size >0.5 cm & lymph node -ve with adverse prognostic factors.
- The following are the adverse prognostic factors
  - High histological grade
  - Lymph vascular invasion
  - Hormone receptor – ve (Estrogen receptor / Progesterone receptor-ve)
  - Her-2-neu +ve

Treatment for locally advanced breast cancer (LABC)

- Stage IIIA
- Stage IIIB
- Stage IIIC

} Neo-adjuvant Chemotherapy (NACT) + Modified Radical Mastectomy (MRM) + Radiotherapy (RT)

Treatment for metastatic breast cancer (Stage IV)

- Prolong the survival of patient
- Improve the quality of life
- Hormone therapy is preferred over chemotherapy (due to lesser side effects)

Indications

Hormone Therapy	Chemothera
• ER/PR +ve	• ER/PR- ve
• Asymptomatic visceral	• Symptomatic visceral metastasis
• Bony or soft tissue metastasis	• Hormone refractory (patient not responding for hormone therapy)

Indications of radiotherapy in CA Breast

- Breast conservation surgery
- Locally advanced breast cancer
- 4 or more +ve LN
- Positive margins

Chemotherapy regimen in CA Breast

- C - Cyclophosphamide
- M - Methotrexate
- F - 5- FU

How to remember

- CMF

- C - Cyclophosphamide
- A - Adriamycin (doxorubicin) (anthracycline derivative)
- F – 5 – FU

How to remember

- CAF

- The preferred form of chemotherapy for CA breast: CAF or Adriamycin or Anthracycline based Chemotherapy.
- Usually, 6 cycles are given
- For Adriamycin resistant breast cancer: Taxanes are given (Docetaxel, Paclitaxel)
- Chemotherapy agent given in Adriamycin & Taxane resistant breast cancer: IXABEPILONE
- LAPATINIB: 2nd line agent for HER-2-NEU + ve breast cancer
- HERCEPTIN /TRASTUZUMAB: 1st line agent for HER-2-neu +ve breast cancer
- Drug given in metastatic and refractory breast cancer: SUNITINIB

Important Information

- 1st line agent for advanced and metastatic RCC: SUNITINIB
- Drug of choice for Imatinib resistant GIST: SUNITINIB

Hormone therapy

- Estrogen has positive effect on breast cancer cells
- In hormone therapy either source of production of estrogen (ovary) is cut surgically or medically.
- Surgical method of stopping estrogen production: Bilateral oophorectomy
- Medical method of stopping estrogen production: Medical oophorectomy (block receptor of estrogen)
- In premenopausal females, ovary is the main site of estrogen production

- In postmenopausal females, estrogen is produced by peripheral aromatization from adipose tissues. (so, aromatase inhibitors are used in post-menopausal females).

Treatment

- Ovarian ablation
- Bilateral oophorectomy
- LH/ RH agonist (Goserelin, Leuprolide)
- **SERM** (Selective estrogen receptor modulator)
  - Tamoxifen
  - Raloxifene
- **Aromatase Inhibitors** (useful only in post-menopausal females)
  - Non- steroidal (Letrozole, Anastrozole)
  - Steroidal: Exemestane
- Anti- estrogens
  - Fulvestrant
- Progestins
  - Megesterol
  - Medroxy progesterone acetate
- Drug of choice for hormone therapy in pre- menopausal patients: Tamoxifen
- Drug of choice for Hormone therapy in post-menopausal patients: Aromatase inhibitors

Tamoxifen

- Dose – 10 mg BD x 5 years
- Potent antagonistic activity against (BB)
  - Breast cancer cells
  - Blood vessels
- Partial agonistic action
  - **PIT** - Pituitary
  - **B** - Bone
  - **U** - Uterus (Tamoxifen ↑se risk of endometrial cancer in postmenopausal pts.)
  - **L** - Liver

How to remember

- PITBUL

Previous Year's Questions

Q. All of the following are true regarding inferior pedicle breast surgery except? (JIPMER MAY 2019)

A. It is a technique used for reduction mammoplasty
B. This procedure is contraindicated in smoking females
C. Lactation is possible always after the surgery
D. The removed breast tissue is sent for pathological study always

CLINICAL QUESTIONS

Q. A healthy 28-year-old woman with no previous pregnancies noted a painless breast mass while attempting to conceive. She had no family history of breast or ovarian cancer. She underwent an ultrasound and a fine needle biopsy that revealed an invasive Ductal carcinoma. Three days following the biopsy results she found out she was pregnant. She was offered termination, but declined. She subsequently underwent lumpectomy and axillary node dissection, placing her at stage IIB (T2N1MX), estrogen receptor-positive (ER1), HER2 negative (HER2–). She had positive surgical margins and had to undergo a second lumpectomy. Due to her young age at diagnosis, she was offered and consented to BRCA testing; her BRCA test result was negative. Following are true about breast cancer in pregnancy:-

A. Occurs in 1 of every 3000 pregnant women
B. MC non-gynecologic malignancy associated with pregnancy
C. Ductal carcinoma is MC type, accounting for 75-90% of breast cancer in pregnancy
D. All of the above

Answer: D

Solution

Breast cancer during pregnancy

- **MC non-gynecologic malignancy associated with pregnancy[Q].**
- **Ductal carcinoma is MC type, accounting for 75–90%[Q] of breast cancer in pregnancy.**

Clinical Features

- Presents as **painless palpable mass[Q]** with or without nipple discharge

Diagnosis

- **USG and needle biopsy[Q] are used for diagnosis**

Treatment

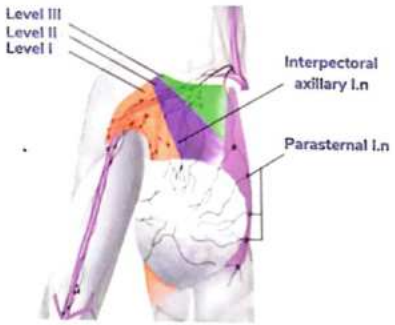
Stage I and II	• **Mastectomy with axillary dissection[Q]**
LABC	• **Neo Adjuvant Chemotherapy after 1st trimester + Modified Radical Mastectomy in 2nd trimester + Radiotherapy after delivery[Q]**

2 BREAST PART-2

LN LEVELS IN RELATION TO PECTORALIS MINOR

00:00:13

- Level I: Below and lateral to pectoralis minor
  - A -Anterior
  - P – Posterior
  - L – Lateral
- Level II: behind pectoralis minor
  - Central LN
  - Interpectoral LN (Rotter's Nodes)
- Level III : Medial and above pectoralis minor
  - Apical group of lymph nodes.



MASTECTOMY

00:03:01

Types of Mastectomy

Simple / Total mastectomy

- Elliptical Incision (skin overlying the lump included in incision)

Extended mastectomy

- Simple Mastectomy + Removal of level 1 LN

Modified Radical Mastectomy (MRM)

- En-bloc removal of nipple, areola, skin, breast tissue,

Halsted Radical Mastectomy

- En-bloc removal of nipple, areola, skin, breast tissue, breast mass + level I, II and III LN + Excision of pectoralis major and minor muscle.
- Structures spared in Halsted radical mastectomy
  - A - Axillary vein
  - B - Bell's nerve (long thoracic nerve)
  - C - Cephalic vein

How to remember

- ABC

Extended radical mastectomy

- Radical mastectomy + Removal of Internal mammary nodes (RIM)

Super radical mastectomy

- Radical mastectomy + Removal of Supraclavicular lymph node + Internal mammary lymph node + Mediastinal lymph node (SIM)

Modifications of modified radical mastectomy / variant of MRM

AUSCHINCLOSS

- similar as MRM

PATEY'S modification

- En bloc removal of nipple, areola, skin, breast tissue, breast mass + level, I, II, III LN + Excision of pectoralis minor.

SCANLON'S modification

- En block removal of nipple, areola, skin breast tissue, breast mass + level, I II, III + division of pectoralis minor (not excision of pectoralis minor)

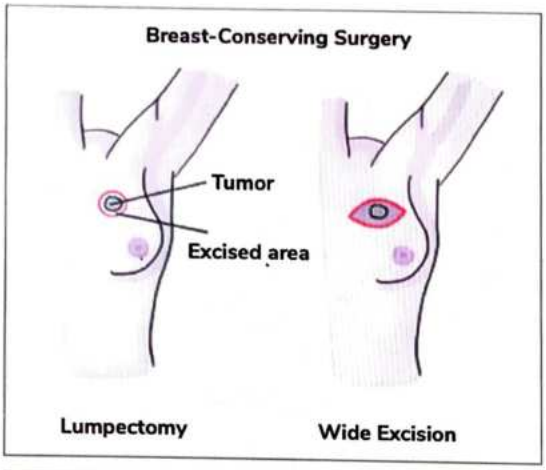
Complications of mastectomy

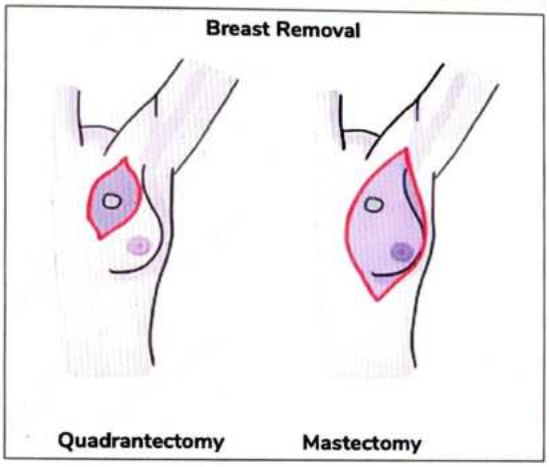
- Seroma – seen in 30% of patients (MC complication)
- Wound infection / flap necrosis
- Injury of long thoracic nerve → Winging of Scapula
- Injury of thoracodorsal nerve
- Reduntant axillary fat pad
- Lymphedema
- Patients with lymphedema, approximately after 10.5 years it may progress to Angiosarcoma. These patients of breast cancer with MRM and RT done and diagnosed to have angiosarcoma is known as Stewart Treves Syndrome.

BREAST CONSERVATION SURGERY (BCS)

00:18:33

- Performed for early invasive breast cancer (Stage I, IIA, IIB)
- Treatment options
  - Excision of lump: Lumpectomy
  - Wide local excision with 1 cm margin
  - Whole quadrant excision (Quadrantectomy)





Contraindications of Breast conservation surgery

Absolute contraindications	Relative contraindications

• Pregnancy	• H/ O Collagen vascular disease
	  ○ Scleroderma
	  ○ Active lupus erythematosus

• 2 or >2 tumors in different quadrants or diffuse malignant appearing diffuse micro-calcification.	• Multiple tumors in same quadrant
• Persistently +ve margins	• Large tumor in small breast
• History of exposure of therapeutic	• Large pendulous breast (difficult to give uniform dose of radiotherapy) • Centrally located tumor (excision of nipple and areola should also be done for centrally located tumor but reconstruction of nipple of areola is difficult

- If there is contraindication for Breast conservation surgery, Simple/Oblique/Total Mastectomy is preferred

BREAST RECONSTRUCTION

00:26:51

Methods of Breast Reconstruction

1. Autogenous methods (reconstruction of breast using own tissues)
2. Alloplastic methods (reconstruction of breast using silicone implants)
3. Combined methods (reconstruction of breast using both Autogenous and Alloplastic methods)

1. Autogenous methods

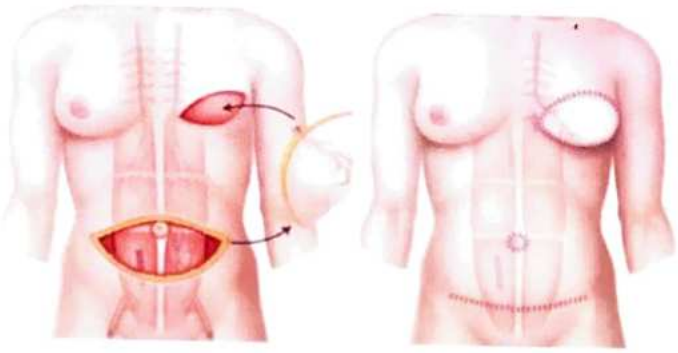
- TRAM Flap: Transverse Rectus Abdominis muscle flap
- LD Flap: Latissimus dorsi flap
- Thoraco-epigastric flap
- Lateral thigh flap
- Gluteal flap
- Ruben's flap - based on deep circumflex iliac artery

2. Alloplastic methods

- Silicone gel implants
- Silicone implants with saline refill
- Most used method for breast augmentation and breast reconstruction

3. Combined methods

- For females with large breast– after mastectomy, symmetry cannot be restored with flap. so, flap + silicone implants used.
- To restore symmetry: TRAM FLAP + IMPLANT, LD FLAP + IMPLANT
- Most used flap for Breast Reconstruction: TRAM Flap.
- Best flap used for breast reconstruction: DIEP Flap (Deep Inferior epigastric artery perforator Flap)

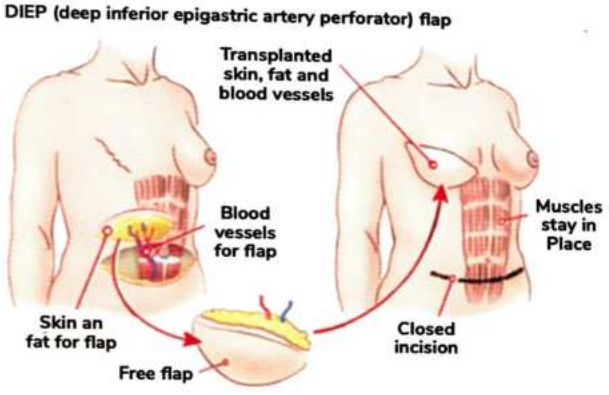


TRAM flap

- Internal mammary artery and vein are anastomosed with Inferior Epigastric artery and vein respectively.
- It is a free flap.
- Disadvantage of TRAM flap: Transverse rectus abdominis muscle is excised from lower abdominal area and so there will be a weakness which can further lead to Hernia

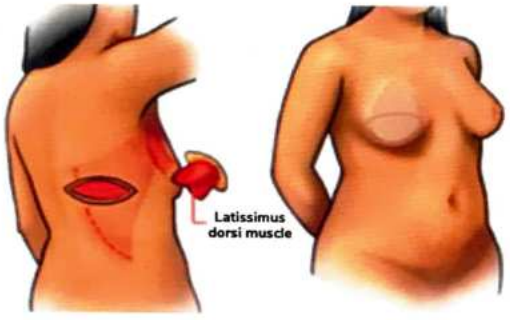
DIEP flap

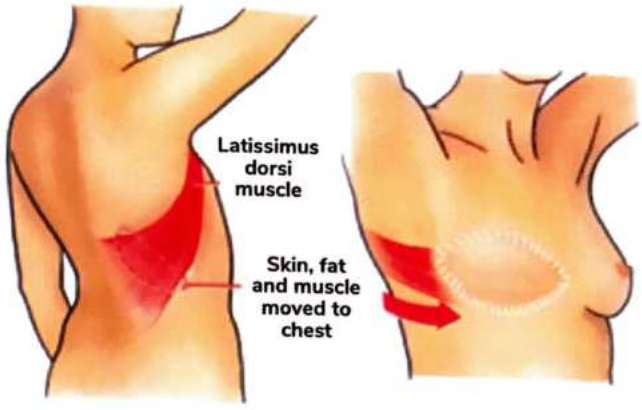
- Only abdominal skin and fat along with deep inferior epigastric artery and vein are used
- Abdominal muscle is spared
- So, there will be no weakness or hernia and so it becomes the best method.



LD flap

- Latissimus dorsi muscle is excised and subcutaneous tract is created.
- It is subcutaneous flap for reconstruction of breast.

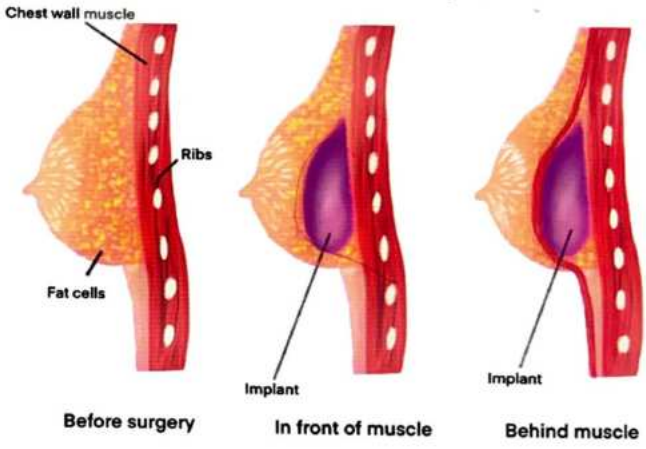




Silicone implants

- Most used method for breast augmentation and breast reconstruction is silicone Implants.
- Placement of implant
  - For breast augmentation, silicone implants are placed in front of muscle.
  - For breast reconstruction, behind the muscle is most preferred
  - IOC for implant related complications– MRI

Placement of Breast implants



Breast cancer follow up

- History + physical examination
  - Every 3 to 6 months for first 3 years
  - Every 6 to 12 months for 4th and 5th year
  - Annually thereafter
- Mammography
  - Annually
  - Beginning no earlier than 6 months of Radiotherapy
- Breast self-examination - Monthly
- Pelvic examination - Annually

- Co-ordination of care in various health care providers

Investigations that are not recommended for routine surveillance of breast cancer patients

- Blood investigations
  - CBC
  - LFT
- Imaging
  - CXR
  - USG- Liver
  - Bone scan
  - PET scan
  - CT scan
  - MRI breast
- Tumor markers
  - CA antigens
  - CEA

Prognostic factors in CA breast

- Most important prognostic factor in most of the malignancies: Stage (TNM Staging)
- Exceptions for staging as prognostic factor
  - For Wilms tumor: histology > staging
  - For Soft tissue sarcoma: tumor grade
- Most important prognostic factor in breast cancer: Stage (TNM Staging)
- Single most important prognostic factor in breast cancer: Axillary Lymph node status
- Most important prognostic factor in metastatic breast cancer: ER/PR status

Nottingham Prognostic Index

- NPI - (0.2 * Tumor size) + LN stage + Tumor grade
- To select patients for adjuvant treatment

Bloom Richardson Grading

- **T** - Tubule formation
- **N** - Nuclear pleomorphism
- **M** - Mitosis

Van- Nuys Prognostic Index (VNPI)

- For Patients of DCIS who do not require radiotherapy
- It is based on
  - **Micro** – Microcalcification
  - **S** - Size of tumor
  - **W** - Width of margin
  - **A** -Age of patient
  - **G** - Grade of tumor

How to remember

- Micro SWAG

SENTINEL LYMPH NODE BIOPSY

00:48:58

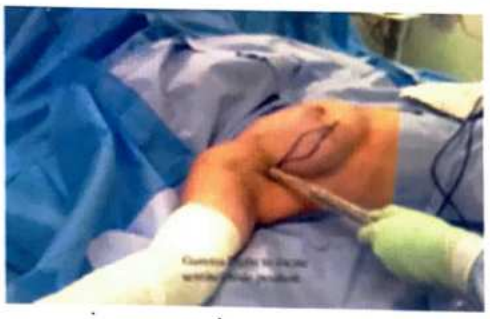
- SLN is first LN which receives lymph directly from tumor
- First described by: Cabana in Carcinoma penis
- SLN Biopsy in Carcinoma Penis: Cabana procedure
- Established role of SLN Biopsy in
  - Carcinoma Breast
  - Carcinoma Penis
  - Malignant melanoma
  - Head and neck malignancies
  - Vulvar carcinoma
- Indication of SLN biopsy: clinically non-palpable axillary lymph nodes
- There are two techniques followed for sentinel lymph node biopsy.
  - Blue dye technique - Using 1% LYMPHAZURIN (aka Isosulphan blue, Paten V blue, Methylene blue)
  - Radioactive colloid technique - Using Tc-99 labelled Sulphur
- Maximum accuracy of detection in sentinel lymph node biopsy: when both techniques are combined.

SLN biopsy in breast cancer

Refer Image 2.1

Procedure of technique

- A dye and radioactive substance are injected around the tumor or subcutaneously around areola.
- The lymph nodes that is immediately linked to the tumor becomes blue.
- Generally, in CA Breast, there are >1 sentinel lymph node.
- Simultaneously gamma probe is also inserted for detecting the radioactivity.
- The lymph node with maximum radioactivity will have maximum uptake of radioactive substance and hence this lymph node is the sentinel lymph node.
- Bluish sentinel lymph node will be removed and sent for pathological examination.



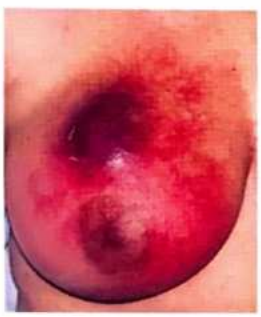
Contraindications of SLN biopsy in CA breast

- Palpable lymphadenopathy
- Prior axillary surgery, Chemotherapy, Radiotherapy
- Multi focal breast cancer

Complications of sentinel lymph node biopsy

- MC: Skin tattooing
- Necrosis
- Urine discoloration
- Anaphylaxis
- MC injured nerve: Intercostobrachial nerve injury

INFLAMMATORY BREAST CANCER



- Aka Mastitis Carcinomatosa
- Corresponds to Stage T4D = Stage IIIB
- Behaves like LABC (locally advanced breast cancer)
- Involvement of > 33% of breast skin by inflammatory changes
  - Erythema
  - Brawny induration
  - Early Onset of Peau -D -orange (Early lymphatic Permeation by tumor cells) due to early LN metastasis and Early Distant metastasis

Clinical features

- Presence of inflammatory changes in breast skin
- 75% patients present with axillary LN metastasis
- 25% patients present with distant metastasis
- Presence of lump is not mandatory for diagnosis of Inflammatory Breast cancer and Paget's diseases of nipple

Investigations

- IOC - Skin Biopsy (Lump not present)
- On skin biopsy – presence of tumor cells in the lymphatics
- Inflammatory breast cancer is the only cancer of breast where skin biopsy is the IOC

Treatment

- NACT + MRM + RT
- It is the most malignant type of breast cancer & worst prognosis

BREAST CANCER IN PREGNANCY

⏱ 01:08:52

- Incidence of breast cancer in pregnancy: 1: 3000 pregnancies
- Most common type of non-gynecological malignancy of pregnancy
- Most common type - invasive ductal cancer.

Clinical features

- Mc presentation during pregnancy: Breast Lump
- Breast changes during pregnancy mask the sign and symptoms of Breast cancer. so patient is in the advanced stage at the time of presentation
- 75% patient: Axillary LN metastasis at the time of presentation

Investigations

- First investigation done: Ultrasound
- Mammography is not preferred as first investigation (due to radiation exposure)
- IOC for diagnosis: Biopsy

Treatment

- Early invasive breast cancer: Simple mastectomy
- Locally advanced Breast cancer: Neoadjuvant chemotherapy (NACT) + MRM + Radiotherapy

- General Anesthesia: Increased risk of abortion in 1st trimester so MRM done in 2nd trimester.
- Maximum Organogenesis occurs in 1st trimester: No chemotherapy can be given → Congenital malformations can occur
- Radiotherapy is contraindicated in pregnancy
- NACT is given after completion of 1st trimester
- MRM: 2nd trimester
- RT: After delivery

Previous Year's Questions

Q. Which of the following is not true regarding breast cancer in pregnancy? (JIPMER MAY 2019)

A. Mammography is a diagnostic modality in breast cancer
B. Behaves in a similar way to breast cancer in a non-pregnant young woman
C. Most tumors are hormone receptor negative
D. Ductal carcinoma is most common

Previous Year's Questions

Q. All are management options for carcinoma breast in 2 trimesters except? (JIPMER MAY 2018)

A. Chemotherapy doxorubicin + cyclophosphamide+5-FU
B. Mastectomy
C. Focal 3D
D. Breast conservative surgery is a valid option

MALE BREAST CANCER

01:16:23

- Responsible for 1% of breast cancer
- Mc type: Invasive ductal cancer
- In male breast: Only ducts are present; only invasive ductal cancer can occur in males
- In female breast: Both ducts and lobules are present, so invasive ductal cancer and lobular cancer can occur.
- Lobular carcinoma of breast - exclusively seen in females
- Generally seen in 6th decade
- ER/PR +ve in 80% cases
- HER-2-NEU + ve in 35% cases
- Endogenous / exogenous estrogen – Increases risk

Risk factors for male breast cancer

- State of Hyper-estrogenemia
  - CLD/ Cirrhosis of liver
  - Infertility
  - Bilateral undescended testis
  - Androgen insensitivity syndrome/testicular feminization syndrome
- Klinefelter's syndrome
- BRCA 2 mutation.

Clinical features

- MC Presentation: Lump
- Early involvement of nipple, breast skin, chest wall due to scanty breast tissue in males

Investigations

- IOC: Biopsy

Treatment

- Stage by stage treatment and prognosis is like female Breast cancer

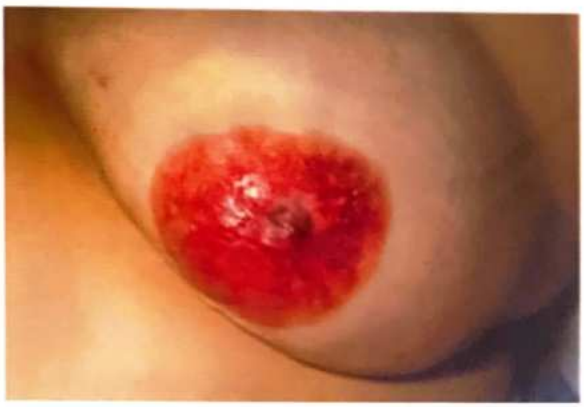
Previous Year's Questions

Q. Regarding breast cancer all are true except? (JIPMER NOV 2018)

A. Increased incidence with increase in age
B. Medullary carcinoma with high mitotic index has poorest prognosis
C. Involvement of subdermal lymphatics carries poor prognosis
D. Increase in incidence with estrogen exposure

PAGET'S DISEASES OF NIPPLE

Paget's Disease of Nipple



- Chronic eczematous lesion or eruption of nipple.
- Associated with underlying malignancies are Ductal carcinoma in-situ and Invasive ductal cancer
- CEA positivity differentiates Paget's disease of nipple from superficial spreading of melanoma whereas melanoma is positive for S-100

Clinical features

- Chronic Eczematous lesions
- Presence of lump not mandatory for diagnosis

Investigations

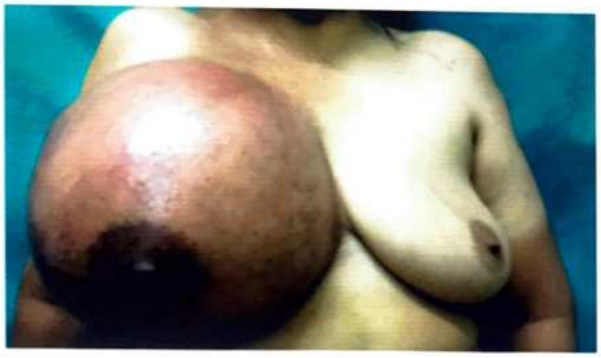
- For diagnosis: Complete mammography + Biopsy (to rule out occult multicentric disease and presence of Paget cells are diagnostic)

Treatment

- Simple mastectomy

PHYLLODES TUMOR

⏱ 01:27:10



- Aka
  - Cystosarcoma phyllodes
  - Serocystic disease of Brodie (Phyllodes- leaf like appearance on cut section)
- Characterized by Biphasic proliferation of Mammary epithelium and Connective tissue (stroma)

Pathology

- On cut section
  - Leaf like appearance
  - Monoclonal stroma
- Cystic areas - because of hemorrhage + necrosis

Clinical features

- Affected breast is massively enlarged
- Bosselated appearance (like in lipoma)
- Pressure atrophy /Necrosis of skin
- No Skin fixity (because breast skin is not involved)
- No Fixation of tumor to the chest wall as chest wall is not involved. (tumor is mobile over the chest wall).
- No nipple retraction/ulceration/deviation (because nipple is also not involved)

Route of spread

- Most common route of spread: Hematogenous spread (Lymphatic route of spread is not seen)
- Most common site of metastasis: Lungs

Investigations

- IOC: Biopsy

Treatment

- Benign appearing Cystosarcoma phyllodes: WLE (wide local excision with 2cm margin)
- Malignant appearing Cystosarcoma phyllodes: Simple mastectomy
- MRM not performed because it is not associated with LN metastasis
- Usually, sarcomas are not spread via lymphatics.
- Few Sarcomas with lymphatic spread are
  - M - Malignant fibrous histiocytoma
  - A - Angiosarcoma
  - R - Rhabdomyosarcoma
  - C - Clear cell sarcoma
  - E – Epithelial sarcoma
  - S – Synovial sarcoma

How to remember

- MARCES

MOLECULAR CLASSIFICATION OF BREAST CANCER

- Based on Gene expression profiling

Luminal criteria

- LUM A (Double positive): ER , PR , HER-2-NEU negative (M/C), Best prognosis
- LUM B (Triple positive): ER , PR , HER-2-NEU
- Normal Breast like: ER , well differentiated
- Basal cell type: ER negative, PR negative, HER-2-NEU negative, Positive for EGFR, myoepithelial markers, cytokeratin's (5, 6, 17)
- HER-2-NEU Type: ER negative, PR negative, HR-2-NEU⊕: Worst prognosis

Multigene Tests

- Based on expression of multiple genes: Predicts
  1. Responsive to chemotherapy
  2. Likelihood of survival
  3. Likelihood of recurrence rate

Tests

I. Oncotype Dx – 21 genes are assessed: Used for breast Ca, colon Ca, prostate Ca
II. PAM: 50 – 50 genes are assessed
III. Mammaprint: 70 genes are assessed

BRCA - 1	BRCA – 2
• Located on Ch. 17	• Located on Ch. 13
• HR	• HR
• Poor differentiated	• Well differentiated
• Risk of ○ Ovarian Ca ○ Colon Ca ○ Prostate Ca	• ↑ Risk of ○ Ovarian Ca ○ Colon Ca ○ Prostate Ca ○ Pancreatic Ca ○ GB Ca ○ Stomach Ca ○ Melanoma
• Lifetime risk of development of ○ Ca Breast: 60 – 80% ○ Ca Ovary: 30 – 40%	
• A /w Female Breast Ca	• A /w male breast Ca

Benign conditions of breast

- Cancer risk associated with Benign breast disease and carcinoma in situ

Abnormality	Relative risk
• Non proliferative lesions	• No increased risk
• Sclerosing adenosis	• No increased risk
• Duct papilloma	• No increased risk
• Florid hyperplasia	• 1.5-2 :fold increased risk
• Atypical ductal hyperplasia	• 4 : fold increased risk
• Atypical lobular hyperplasia	• 4 : fold increased risk
• Ductal involvement by cells of Atypical ductal hyperplasia	• 7 : fold increased risk
• LCIS	• 10 : fold increased
• DCIS	• 10 : fold increased

ANDI (Aberrations in normal development & Involution)

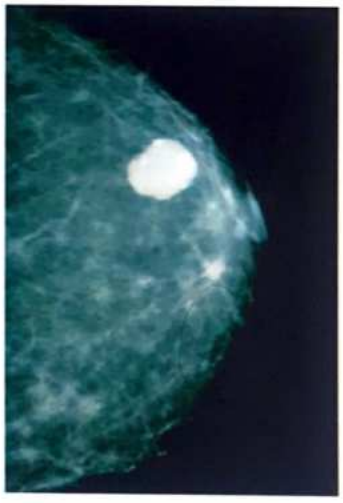
- 15 - 25 years: Fibroadenoma
- 25 - 40 years: Fibro adenosis
- > 40 years: Fibro adenosis > Duct ectasia

FIBROADENOMA

- Benign tumor
- Seen in young patients of age 15-30 years
- Aka: Breast mouse (tumor is highly mobile)

Clinical features

- Lump - highly mobile, firm
- Most common presentation: Lump



Investigations

- IOC: FNAC
- On mammography: Popcorn calcification

Treatment

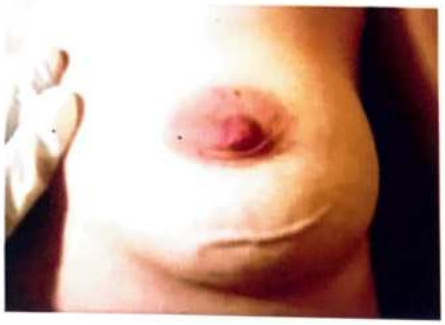
- Observation (benign tumor)
- Alternative treatment - Surgical excision is done for suspicious lesions or for cosmetic reasons

MASTALGIA

01:59:05

1. Non- Cyclical mastalgia

- Due to musculoskeletal causes
- TIETZ syndrome
  - Aka Costochondritis: Inflammation of one or more costal cartilages
  - Treatment: Intralesional injection of Triamcinolone
- Mondor's disease
  - Aka String phlebitis
  - Characterized by superficial thrombophlebitis of inframammary veins
  - Veins involved - lateral thoracic > thoraco epigastric veins.



Treatment

- NSAIDS
- For non-responding patients, Excision of thrombosed vein is done

2. Cyclical mastalgia

- Seen in Fibroadenosis / Fibrocystic disease
- Pain follows the cyclical pattern of menses
- Maximum pain before menses
- 25- 40 years
- Bilateral serous nipple discharge arising from multiple ducts.
- Diagnosed on Ultrasound
- Lumpy breast on examination/ palpation
- Treatment
  - Weight reduction & regular exercise
  - Decrease caffeine intake
  - Vitamin E
  - Primrose oil capsule: for a maximum of 3 months
  - If no improvement - Low dose Tamoxifen is given

BREAST CYST

- Seen in last decade of reproductive life
- Due to nonintegrated involution of stroma and epithelium

Clinical features

- Multiple
- Can be bilateral
- Can mimic malignancy: Sudden presentation can be used to differentiate from malignancy

Investigation

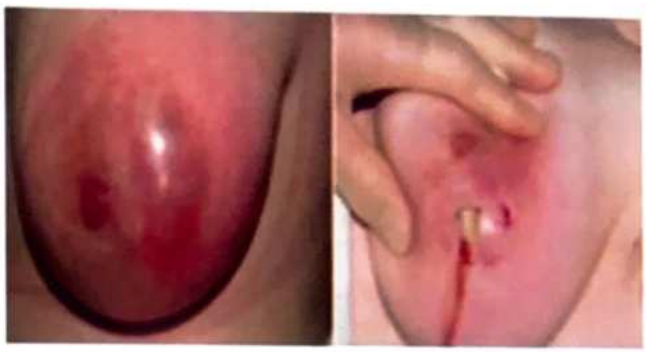
- Aspiration ± Ultrasound

Treatment

- Aspiration → Re-aspiration
- If residual lump: Core biopsy + excision

BREAST ABSCESS

02:10:32



- MC in lactating females
- MC in Primi females - because of faulty technique of breast feeding, injury to nipple by which the staph aureus from the overlying skin penetrates to produce breast abscess.
- MC organism responsible is Staph Aureus

Clinical features

- Pain & tenderness over the affected breast
- Fever with chills and rigor
- Breast is engorged
- Skin erythema

Treatment

- Incision and drainage + Antibiotics
- 1st line agent: Cloxacillin / Dicloxacillin for 10 -14 days

ZUSKA'S DISEASE

02:14:14

- Aka Recurrent periductal mastitis
- More common in female smokers

Clinical features

- Recurrent breast abscess

Treatment

- Incision and drainage + Antibiotics

Practice Questions

Q. What is the method of breast examination depicted in the video? (The clinician was palpating with tips of finger except thumb started from 2 o'clock posterior palpated at 3 points on line Joining periphery to nipple. Then again went to 3 o'clock point directly and came back centripetally while palpating at 3 points again on the line joining periphery and nipple)?
(AIIMS NOV 2018)

A. Vertical strip method
B. Concentric method
C. Dial of Clock method
D. Quadrant method

Practice Questions

Q. A 40 year old women presented to the clinic with a 4 cm mass in the upper outer quadrant. Biopsy from the mass showed densely packed cells with bland nuclei and mucin infiltrating the stroma. Most probable diagnosis is? (NEET JAN 2020)

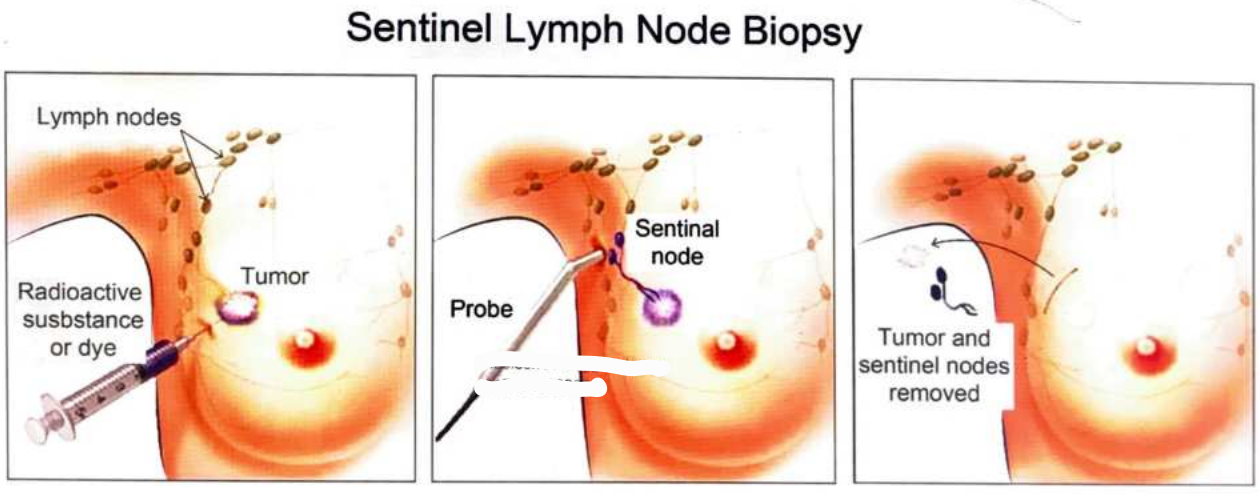
A. Colloid carcinoma
B. Tubular carcinoma
C. Papillary carcinoma
D. Medullary carcinoma

Practice Questions

Q. A 50 years old lady presented with lump in the left breast. which has developed suddenly in weeks. Perimenstrual symptoms are present. No associated family history. On examination. the lump is well circumscribed. fluctuant. 1.5 cm oval. Most likely diagnosis? (JIPMER MAY 2018)

A. Breast cyst
B. Galactocele
C. Fibroadenoma
D. Breast cancer

Image 2.1



3 THYROID PART-1

ANATOMY AND PHYSIOLOGY

00:00:23

- Normal weight of Thyroid - 20-25 grams
- Storage site of iodine - Thyroid (90% of body's iodine is stored in thyroid)
- Normal daily iodine requirement - 100 -150 microgram/day
- Weight of thyroid is inversely proportional to iodine intake
- Father of Thyroid Surgery - Theodor Kocher
- Isthmus in relation to 2nd, 3rd and 4th tracheal rings (mainly 3rd)

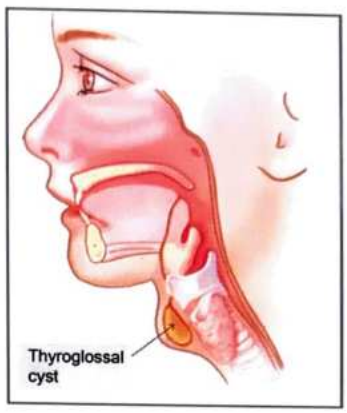
• Wolf-Chaikoff effect	• Iodine induced Hypothyroidism
• Jod Basedow's effect	• Iodine induced Hyperthyroidism
• Pendred syndrome	• Congenital sensorineural hearing loss + Goiter • Gene is located on chromosome no.1q2 (long arm)
• Reftoff syndrome	• End organ resistance to T4

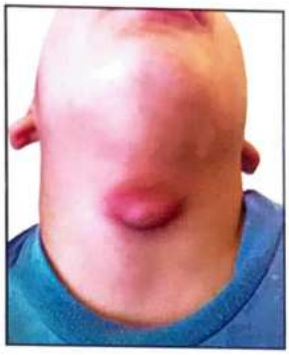
CONGENITAL DISORDERS OF THYROID

Thyroglossal Cyst

00:05:02

- Congenital
- Age of presentation - 15-30 years
- There is cyst in connection to thyroid and tongue. So, on protrusion of tongue, the cyst moves up
- MC location - Subhyoid
- Other common locations
  - Suprahyoid
  - Near thyroid cartilage
  - Near foramen cecum
  - In floor of mouth





Clinical features

- Midline swelling in anterior part of neck
- Thyroglossal cyst moves with deglutination
- Moves up on protrusion o tongue

Complications of Thyroglossal cyst

- Infection cause Abscess formation if Incision and Drainage

  ↓

  Thyroglossal fistula (acquired condition)
- Long standing thyroglossal cyst has an Increased risk of papillary carcinoma of thyroid

Treatment

- TOC- Sistrunk operation
- The cyst passes via body of hyoid bone - so excision is made
- Enbloc removal of central part of body of hyoid bone+ cyst

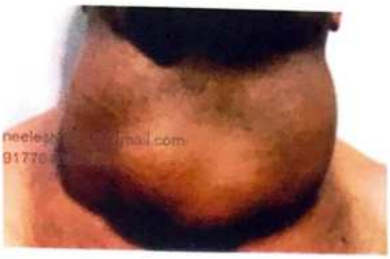
GOITER

00:09:29

- Endemic Goiter
  - If >5% people in population have goiter

Retrosternal goiter / substernal goiter/ Mediastinal goiter

- If > 50% of thyroid tissue is located below the opening of thoracic cage.
- In majority of cases Goiter is small and asymptomatic
- Incidental diagnosis



- MC symptom - Dyspnea (due to compression of trachea), in night
- Dysphagia (due to compression of esophagus)
- Hoarseness of voice (due to compression of Recurrent laryngeal nerve)
- Dilated veins over Anterior chest wall.
- Pemberton sign is positive
  - If bilateral upper limb elevated above forehead, facial puffiness and facial congestion seen
- Treatment
  - Thyroidectomy by cervical incision
  - Radioisotopes used
    - → T1/2 of Iodine123 is 13 hours (shorter fall life) - so used or diagnostic purposes (RAI SCAN)
    - → T1/2 of iodine 131 is 8 days (Longer half -life) -so used or therapeutic purposes (RAI ABLATION)
- Radioactive Iodine Ablation
  - Iodine 131 emits beta- rays (90%) and gamma- rays (10%)
  - Beta rays are responsible or Therapeutic effects (ablation)
  - Depth of penetration of beta rays - 0.5 mm (Ablates only thyroid, even parathyroid are safe)
  - Gamma rays are responsible for side effects
  - Gamma rays are used in Tracer studies - Gamma probe can be used or identifying the area that emits gamma rays. So, useful in Radioactive Iodine scan
  - Absolute contraindication of RAI Ablation (because gamma rays are emitted)
    - → Pregnancy
    - → Lactation
- Radioactive Iodine uptake: Amount of Radioactive iodine taken by thyroid gland within stipulated period of time (6-24 hours)
- RAL Scan
  - Aka Thyroid scan
  - Scanning of cervical region with gamma probe

Previous Year's Questions

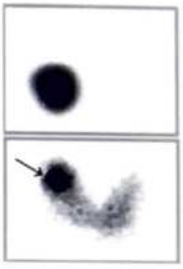
Q. Which of the following statements is true regarding retrosternal goiters? (NEET JAN 2020)

A. Operated only if patient is symptomatic
B. Sternal incision is always required
C. Majority of the goiters derive their blood supply from mediastinal vessels
D. Majority of the retrosternal goiters can be removed by a neck incision

Hot Nodule

- Nodule with relatively increased uptake as compared to surrounding tissue
- Risk of malignancy in hot nodule - 1 to 3 %

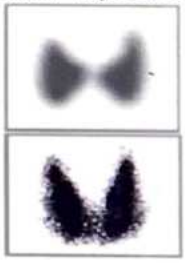
Hot Nodule



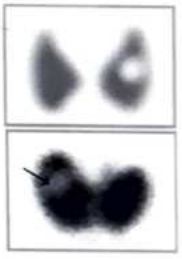
Cold Nodule

- Nodule with relatively decreased uptake as compared to surrounding tissue
- Risk of malignancy or cold nodule - 11 to 20%

Normal Thyroid scan



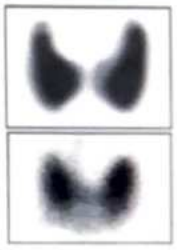
Cold Nodule



Grave disease (Diffuse toxic goiter)

- Increased uptake of RAI on all

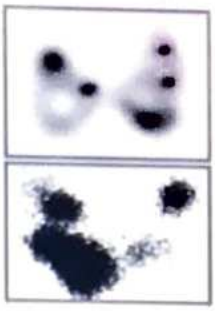
Grave disease



Toxic multinodular goiter

- Increased uptake and decreased uptake at certain areas

Toxic multinodular goiter



Autonomous Nodule

- Increased uptake in one nodule with suppression of remainder of gland.

Thyroiditis

- Damaged thyroid gland
- Decreased RAI uptake (RAI<5%)

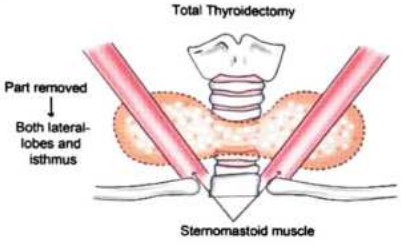
Thyroiditis

THYROIDECTOMY

00:22:50

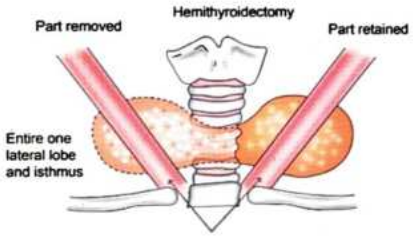
Total Thyroidectomy

- Removal of all visible Thyroid tissue



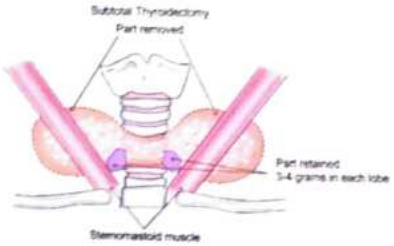
Hemi Thyroidectomy

- Removal of one lobe with isthmus



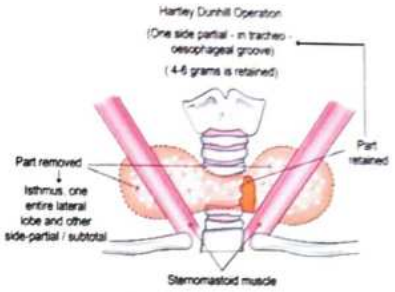
Subtotal Thyroidectomy

- Leaving 3-4 grams of thyroid tissue in each lobe superiorly with removal of rest of thyroid gland.



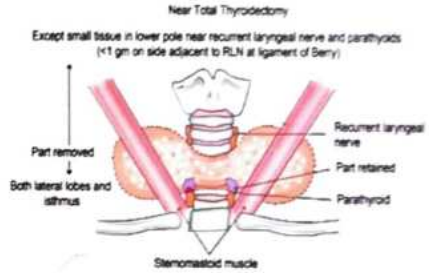
Hartley Dunhill Procedure

- Leaving 4-6 grams of thyroid in one lobe with removal of rest of thyroid gland.



Near total Thyroidectomy

- Leaving < I gram of thyroid tissue adjacent to recurrent laryngeal nerve near ligament of berry.



- Hemi Thyroidectomy - Benign disorder involving one lobe.
- Total Thyroidectomy - Preferred or Thyroid malignancy and Benign disorders involving both lobes
- For Multinodular goiter earlier subtotal thyroidotomy was performed. But after prolonged follow up (20- 30 years) recurrence was noted rom thyroid remnant. So, now a days even for multinodular goiter - Total thyroidectomy preferred (easy to manage patients lifelong on Levothyroxine than getting recurrence which is more dangerous)
- However, subtotal thyroidectomy is performed for patients with multinodular goiter only in elderly (as recurrence at long term is not expected in elderly due to short life expectancy)
- Therefore, only indication or subtotal thyroidectomy is MNG in elderly population

SOLITARY THYROID NODULE (STN)

00:30:13

- MC Solitary Thyroid Nodule - Colloid goiter> Follicular adenoma
- 1st investigation or STN - Thyroid Function Test (T3, T4, TSH)
- TSH
  - Most in formative among thyroid function test parameters because of ultra-sensitivity
  - Can detect subclinical hypothyroidism a subclinical hyperthyroidism
  - Hypothyroidism - TSH ↑
  - Hyperthyroidism - TSH ↓

Investigations

- IOC or Diagnosis of STN- FNAC (Fine needle Aspiration cytology)

Limitation of FNAC

- Follicular Neoplasms
  - Cannot differentiate follicular adenoma from follicular carcinoma
  - Diagnosis follicular carcinoma is based on vascular invasion/ capsular invasion that can be seen on biopsy only and not on FNAC
- REIDEL'S Thyroiditis
  - All Thyroid tissue is replaced by fibrosis even if FNAC is performed there is no yield
- Thyroid lymphoma
  - For lymphoma anywhere in the body, IOC- Biopsy (because markers are put over tissue specimen to confirm the diagnosis of lymphoma)

Important Information

- **Most of cases of thyroid problem - FNAC is pre erred except the 3 limitations are mentioned above.**
- **All thyroid gland related problems (benign / malignant) – more common in females.**

Management

- For Solitary thyroid nodule, using FNAC, it can be either
  - Inconclusive: repeat FNAC
  - Benign
  - Suspicious
  - Malignant

Refer diagram 3.1

BETHESDA SYSTEM REPORTING THYROID CYTOPATHOLOGY (TBSRTC)

00:39:25

- THY 1- Non diagnostic
- THY 1C- non-diagnostic (cystic lesion)
- THY 2 - Non neoplastic
- THY 3 - Follicular
- THY 4 - Suspicious malignancy
- THY 5 - Malignant

Function of Thyroid hormones

- Conversion of mass into energy.
- Thyroid Hormone controls basal Metabolic rate
- Hyperthyroidism- Too much of energy, very low mass (weight loss)
- Hypothyroidism - Too much of mass, but very low energy (weight gain)

HYPOTHYROIDISM	HYPERTHYROIDISM
• Weight gain	• Weight loss
• Decreased appetite	• Increased appetite
• Confusion	• Tachycardia
• Middle ear effusion	• Increased sweating
• Bradycardia	• Heat intolerance
• Diastolic hypertension	• Diarrhea
• Constipation	• Amenorrhea
• Menorrhagia	• Increased risk of abortions
• Loss of hair	• Infertility

- MC cause of hypothyroidism worldwide - Hashimoto's thyroiditis
- MC cause of hyperthyroidism worldwide - Graves' disease

GRAVES' DISEASE

00:44:26

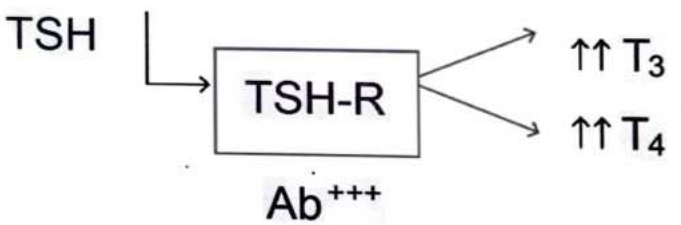
- Aka Diffuse toxic goiter
- Associated with HLA B-8/ DR- 3
- Auto immune disorder
- Thyroid stimulating auto antibody against TSH -receptor

Characteristic features

- Thyrotoxicosis
- Ophthalmopathy

- Exophthalmos - collection of loose areolar area tissue behind the eyeball
- Dermopathy
- Aka Pretibial myxedema
- Deposition of glycosaminoglycan
- Also found in Hypothyroidism
- Acropachy
  - Subperiosteal new bone formation in metacarpals
- Gynecomastia

In Graves' disease



- Excessive stimulation of autoantibody on TSH receptor increase release of T3 and T4.
- Excessive release of T3 and T4 causes feedback inhibition of TSH. So,

  ↑T3
  ↑T4
  ↓TSH
  } in Graves' disease
- These patients have increased expression of -receptor - Signs and symptoms of sympathetic stimulation
- So, Treatment - Nonselective - blockers (to block sympathetic stimulation) + Antithyroid hormone medication

Clinical features

- Signs and symptoms of sympathetic stimulation
  - Tachycardia
  - Palpitation
  - Excessive sweating
  - Tremors - Fine tremors in fingers a tongue
- Signs a symptom of thyroid stimulation
  - Increased BMR - Increased Appetite and Weight loss
  - Excessive sweating
  - Heat intolerance
  - Diarrhea (MCGI symptom In Hyperthyroidism)
- In females
  - Amenorrhea
  - ↑Risk of abortion
  - Infertility
- In children - Early growth and Maturation
- In young patients - CNS symptoms are predominant
- In elderly- CVS symptoms (AF and CHF) are predominant

Findings in thyroid gland in Graves' disease

- Hyperactive - Increased Radioactive uptake
- Hypervascularity- Most prominent at upper pole
- Palpable thrill
- Audible bruit
- Audible venous hum

Investigations for diagnosis

- Presence of eye signs in patients of hyperthyroidisms is diagnostic
- Single investigation used to confirm the diagnosis (confirmation)
  - Presence of autoantibodies: LATS

Management

- For sympathetic stimulation, first drug given is Propranolol
- Antithyroid drugs
  - Symptomatic improvement within 2 weeks
  - Patient becomes euthyroid within 6 weeks
- Antithyroid drugs
  - Methimazole
  - Carbimazole
  - Propylthiouracil
- Side effect of Methimazole
  - Increased risk of Choanal Atresia
  - Increased risk of Aplasia cutis
  - So, not used in pregnancy
  - Agranulocytosis
- Side effect of Propylthiouracil
  - Increased risk of hepatic failure in females and children. (Not to be used in females and children until and unless there is like threatening situation like thyrotoxic crisis)
  - In Thyrotoxic crisis, Propylthiouracil is used because it blocks the peripheral conversion of T4 to T3
- Anti-thyroid DOC
  - In Graves' disease - Methimazole
  - In Pregnancy - Carbimazole
  - In Thyrotoxic crisis - Propylthiouracil
- TOC- Total Thyroidectomy for grave's disease
- Alternative treatment - Radioactive Iodine Ablation
- Indications of RAI Ablation
  - Elderly Patients
  - Patient with surgical co-morbidities
  - Recurrence after surgery Contraindications o RAI ablation

Contraindications o RAI ablation

Absolute	Relative contraindications
• Pregnancy	• Young patient (to decrease exposure of gamma rays to young patients)
• Lactation	• Smokers
	• Ophthalmopathy **(RAI** ablation leads to worsening of ophthalmopathy)

Previous Year's Questions

Q. Which of the following statements about Grave's disease is false? (NEET JAN 2018)

A. Results in hyperthyroidism
B. Autoimmune disorder
C. Common in male
D. Referred as toxic diffuse goiter

HASHIMOTO'S THYROIDITIS

01:01:29

- Aka Struma Lymphomatosa (conversion of thyroid tissue into lymphoid tissue)
- Auto immune disorder
- Anti- TPO (anti thyroid peroxidase) autoantibody
- Associated with HLA B- 8/ DR-3, DR-5

Etiopathogenesis

CD4 mediated CD8 cytotoxicity
↓
Permanent destruction of Thyroid follicles
↓
Permanent hypothyroidism

- Lifelong Levothyroxine should be given for these patients.
- Associated with increased risk of Thyroid Lymphoma a Papillary carcinoma

Clinical features

- Signs a symptoms of Hypothyroidism
- Mild enlargement of thyroid gland so Increased circumference of neck

Investigations

- Diagnosis is done by detection of anti TPO antibodies
- FNAC
  - Increased lymphocytic infiltration
  - Presence of Hurthle cells/ Askanazy cells.

Treatment

- Lifelong levothyroxine
- Increased Suspicion of malignancy - Total thyroidectomy

Previous Year's Questions

Q. A 30 years old female presents with a diffuse thyroid swelling. On investigations. TSH levels were elevated. Post-operative HPE reports showed intense lymphocytic infiltration and Hurthle cells. Which of the following is the most likely diagnosis? (NEET JAN 2020)

A. Grave's disease
B. Hashimoto's thyroiditis
C. Follicular carcinoma
D. Medullary thyroid carcinoma

ACUTE SUPPURATIVE THYROIDITIS

01:07:03

- Suppurative infection of thyroid
- MC organism - staph aureus > streptococci
- MC in children because of persistent Pyriform sinus (connection between oropharynx and thyroid)
- Preceded by otitis media and URTI
- Thyroid is resistant to infection - Because of
  - Rich vascular and lymphatic supply
  - High iodide content
  - Fibrous capsule

Routes of infection

- Hematogenous or lymphatic route
- Direct spread from pyriform sinus fistula or from thyroglossal duct cyst
- Penetrating trauma
- Immuno compromised

Clinical features

- Pain and tenderness over thyroid
- Fever, chills, and rigor

Lab investigation
- ↑ESR
- ↑WBC count

Diagnosis
- FNAC - Presence of neutrophils
- Culture and sensitivity - Organism and antibiotic sensitivity

Treatment
- Incision and drainage+ antibiotics
- Recurrence - rule out persistent pyriform sinus by barium swallow (if present, then excision should be done)

SUBACUTE THYROIDITIS

01:12:56

- Aka
  - Dequervain's thyroiditis
  - Viral thyroiditis
  - Granulomatous thyroiditis
  - Giant cell thyroiditis

- Characterized by
  Upper respiratory tract infection caused by virus
  ↓ leading to
  Granulomatous inflammation
  ↓ leading to
  Follicular destruction & giant cell formation
- Associated with HLA B-35

Stages
- Initially - Hyperthyroid due to follicle destruction → T3 & T4 released
- After - Euthyroid (Released T3 & T4 used up)
- Later - Hypothyroid (follicular destruction → No further T3 & T4)
- Again- Euthyroid (due to spontaneous resolution - 90%)

Clinical features
- Pain & Tenderness - over thyroid region
- Associated with signs and symptoms of hyperthyroidism and hypothyroidism(depending upon the stage of presentation)

Lab investigations
- ↑ESR (inflammation)
- ↓RAI uptake (because follicles are destroyed)

Diagnosis
- IOC or diagnosis – FNAC
- Presence of Multinucleated giant cells

Treatment
- NSAIDS to control inflammation
- Steroids or non-responding patients
- In 90% of patients - spontaneous resolution occurs

RIEDEL'S THYROIDITIS

01:17:35

- Aka Invasive Fibrous thyroiditis
- Characterized by complete replacement of thyroid and parathyroid glands by fibrous tissue
- Associated with
  - Retro orbital fibrosis
  - Periorbital fibrosis
  - Retroperitoneal fibrosis
  - Sclerosing cholangitis

Clinical features
- Signs and symptoms of Hypothyroidism and Hypoparathyroidism (permanent)
- On examination - Thyroid becomes hard a woody.
- Signs and symptoms of compression like dyspnea (tracheal compression), dysphagia (esophageal compression), hoarseness of voice

Investigations
- FNAC is not sufficient for diagnosis (Riedel's thyroiditis is a limitation)
- IOC or Diagnosis - Wedge shaped excision biopsy

Management
- Toc - Wedge shaped excision biopsy (it can also relieve the compression symptoms)
- Lifelong levothyroxine for permanent hypothyroidism
- Lifelong calcium and Vitamin D supplementation for permanent hypoparathyroidism

CLINICAL QUESTIONS

Q. A 45-year-old housewife presented to the emergency department with complaints of excessive drowsiness decreased oral intake for the past 3 days. In the last three years, she also had difficulty getting up from the squatting position, combing her hair, and dressing. These difficulties were gradually progressive with no diurnal variations or periodic fluctuations. She complained of increased sensitivity to cold, dryness of skin, increased hair loss, hoarseness of voice, and easy fatigability. She had no history of intake of any prescribed or over-the-counter medications. She also had no history or family history of any major illnesses. On physical examination periorbital puffiness and dry, coarse skin noted. No tremors or fasciculations were elicited. Your probable diagnosis would be

A. Hypothyroidism
B. Hyperthyroidism
C. Anemia of unknown cause
D. Underlying malignancy

Answer: A

Solution

Probable diagnosis is hypothyroidism. Deficiency of circulating levels of thyroid hormone leads to hypothyroidism

Hypothyroidism signs and symptoms may include:

- Fatigue
- Increased sensitivity to cold
- Constipation
- Dry skin (due to reduced conversion of carotene to vitamin A)
- Weight gain
- Puffy face (Patients with severe hypothyroidism or myxedema develop characteristic facial features due to the deposition of glycosaminoglycans in the subcutaneous tissue leading to facial and periorbital puffiness)
- Hoarseness
- Muscle weakness
- Elevated blood cholesterol level
- Muscle aches, tenderness, and stiffness
- Pain, stiffness, or swelling in your joints
- Heavier than normal or irregular menstrual periods
- Infertility
- Thinning hair
- Loss of outer two thirds of eyebrow
- Slowed heart rate
- Depression
- Impaired memory
- Enlarged thyroid gland (goiter)
- Cardiovascular changes include bradycardia, cardiomegaly, pericardial effusion, reduced cardiac output and pulmonary effusion
- Hypothyroidism in children leads to cretinism and characteristic facies

4 THYROID PART-2

- M/c thyroid malignancy: papillary > follicular > medullary> anaplastic

PAPILLARY CARCINOMA OF THYROID

00:00:25

- MC thyroid malignancy
- Commonly seen in iodine sufficient areas
- Low dose radiation exposure during childhood increases the risk
- Thyroglossal cyst & Hashimoto's thyroiditis also Increases the risk

Pathology

- Papillary projections
- Optically clear nuclei - aka Orphan Annie eye nuclei
- Pseudo inclusion bodies
- Dystrophic calcification - Psammoma Bodies
- Other conditions or psammoma bodies (Mnemonic - PSM)
  - **P- P**apillary carcinoma of thyroid, Papillary variant of RCC
  - **S- S**erous cystadenoma ovary
  - **M- M**eningioma

Clinical Features

- Midline swelling in anterior part of neck
- Lateral aberrant thyroid (palpable lateral cervical lymph node with metastatic deposit rom papillary carcinoma of thyroid)

Route of spread

- Most common route of spread – lymphatic
- Most common site of metastasis - lungs

Investigations

- IOC or Diagnosis- FNAC

Treatment

- Total thyroidectomy + removal of enlarged central group of lymph node ± ipsilateral modified radical neck dissection MRND (if any LN is positive)

Previous Year's Questions

Q. Mr. Ramu 30-year-old male with papillary carcinoma in thyroid with a nodule <3 cm confined to neck with2 lymph node palpable in neck along with lung micro-metastasis. How will you stage this according to AJCCS 8th Edition?

(JIPMER MAY 2019)

A. I
B. II
C. III
D. IV

FOLLICULAR CARCINOMA OF THYROID

00:06:43

- Seen in Iodine deficient areas
- MC malignancy in long standing goiter
- Common among 5th - 6th decade
- Mutation of
  - PAX-8/PPAR-1
  - PTEN
  - P-53
  - RAS

Clinical presentations

- Sudden increase in size of swelling
- Minimal /no pain over the swelling
- No evidence of compression of trachea, esophagus or RLN
- Lymphatic spread is not seen (So lymph node need not be removed during surgery)
- MC route of spread – Hematogenous
- MC site of metastasis - Bones (Thoracic vertebra > Ribs > Pelvis > skull)
- Follicular carcinoma thyroid & Renal cell carcinoma leads to pulsatile secondaries (osteolytic and hyper vascular)

Investigations

- FNAC cannot differentiate follicular adenoma from follicular carcinoma.
- So, IOC- Biopsy (Diagnosis of follicular carcinoma thyroid is based on vascular invasion / capsular invasion)

Treatment

- TOC - Total thyroidectomy (LN dissection not needed as there is no lymphatic spread)

WELL-DIFFERENTIATED THYROID CANCER

00:13:13

- Papillary carcinoma thyroid
- Follicular carcinoma thyroid

Postoperative management of well differentiate thyroid cancer

- Thyroxine suppression
  - High dose thyroxine or 6 weeks → to suppress TSH
  - TSH is suppressed to prevent proliferation of thyroid remnant preoperatively (TSH will be elevated after thyroidectomy)
- Whole body scan - L131 is used
  - Stop thyroxine at least or 6 weeks
  - Switch T4 to T3 and then stop T3 or 2 weeks
  - Recombinant TSH is given 48 hours before whole body scan (because Na+/1- Symporter is required or radioiodine uptake a or expression of this symporter, TSH must be raised)
- Advantage of I131
  - It diagnoses and ablates the thyroid remnant
  - It makes thyroglobulin a better marker or postoperative follow up

Investigations useful for follow up

- Thyroglobulin should be < 2 ng /ml (after thyroidectomy)
- USG-Neck
- CXR

Indication of PET scan

- Rising thyroglobulin with normal USG-Neck and CXR

Management for recurrence

- Radio-active Iodine Ablation

Prognostic indicators of well-defined thyroid cancer

AGES	AMES	MACIS
• A - Age • G - Grade • E - Extra thyroid invasion • S - Size	• A - Age • M - Metastasis • E - Extra thyroid invasion • S – Size	• M - Metastasis • A - Age • C - Completeness of original surgical resection • I - Invasion (extra thyroid) • S - Size

Bad prognosis

- Sizes > 4 cm
- Extracapsular spread

Good prognosis

- Size <1cm
- Age < 40 years

MEDULLARY CARCINOMA OF THYROID (MCT)

00:25:05

- Arise form para follicular 'C ' Cells
- Para follicular 'C' Cells
  - Derived from - Ultimobranchial bodies
  - Secretes - calcitonin
- In medullary carcinoma of thyroid, level of calcitonin is raised
- Despite of raised calcitonin, the level of calcium is normal in these patients (Normocalcemia)

Types of Medullary carcinoma

Sporadic	Familial
• 80% of cases	• 20% of cases • Associated with MEN/ NonMEN • If ass. with MEN, it is MEN 2A/2B
• Seen in 6th decade	• Young patients
• Single	• Multiple
• Unilateral	• Bilateral

Similarity between sporadic and Familial MCT - Both have RET Proto oncogene mutation

Clinical Features

- Midline swelling in anterior part of neck
- Characteristic features
  - Raised calcitonin
  - History of diarrhea
  - Presence of amyloid stroma
  - Positive family history of Pheochromocytoma Hyperparathyroidism (due to association with MEN 2A & MEN 2B)

Route of spread

- Both hematogenous and lymphatic spread are seen
- MC site of metastasis – Liver
- MCT is TSH independent - So, doesn't take RAI (hence, Radioactive Iodine Ablation is not effective or MCT)
- Chemotherapy has limited role in
  - Thyroid malignancies
  - Salivary gland tumors

Investigation

- IOC- FNAC

Management

- Total thyroidectomy + Routine central LN dissection + Ipsilateral MRND (Tumor> 1cm) ± Bilateral MRND (if any lymph node is positive)
- Has Poor prognosis (because it does not respond to radioactive iodine ablation)

Previous Year's Questions

Q. RET proto oncogene is associated with development of? (NEET JAN 2018)

A. Medullary carcinoma thyroid
B. Astrocytoma
C. Paraganglioma
D. Hurthle cell tumor thyroid

ANAPLASTIC CARCINOMA

00:32:58

- Rare
- Seen in 7th - 8th decade
- There are two malignancies that appear during 7th-8thdecade
  - Anaplastic carcinoma of thyroid
  - Carcinoma prostate

Clinical features

- Sudden increase in the size of swelling
- Severe pain over the swelling
- Most common route of spread- Direct invasion
- Evidence of compression of
  - Trachea – Dyspnea
  - Esophagus – Dysphagia
  - Recurrent laryngeal nerve - Hoarseness of voice
- Most common site of metastasis - Lungs

Investigations

- IOC or Diagnosis - FNAC

Treatment

- For Resectable tumor - Total thyroidectomy
- For unresectable tumor - Tracheostomy (lifesaving procedure when tumor is obstructing trachea)
- Poor prognosis

THYROID LYMPHOMA

00:36:05

- MC type: non-Hodgkin lymphoma (diffuse large BCell lymphoma)
- Risk actor
  - Hashimoto's thyroiditis
  - Chronic lymphocytic thyroiditis

Clinical features

- Rapid growing tumors
- Painless & Fever (Characteristic features)
- Associated with cervical lymphadenopathy
  ↓Leads to
- Compression
  - Dyspnea
  - Dysphagia
- Invasion of recurrent laryngeal nerve leads to hoarseness of voice
- Some patients develop hypothyroidism (associated with Hashimoto)

Investigation

- IOC or diagnosis - Biopsy

Treatment

- External beam radiotherapy (EBRT) + Chemotherapy
- Chemotherapy Regimen
  - **C** – **C**yclophosphamide
  - **H** - **H**ydroxydaunorubicin(doxorubicin)
  - **O** - **O**ncovin (vincristine)
  - **P** - **P**rednisone
- In cases of compression symptoms - Thyroidectomy + LN dissection

How to remember

CHOP

THYROIDECTOMY

00:40:43

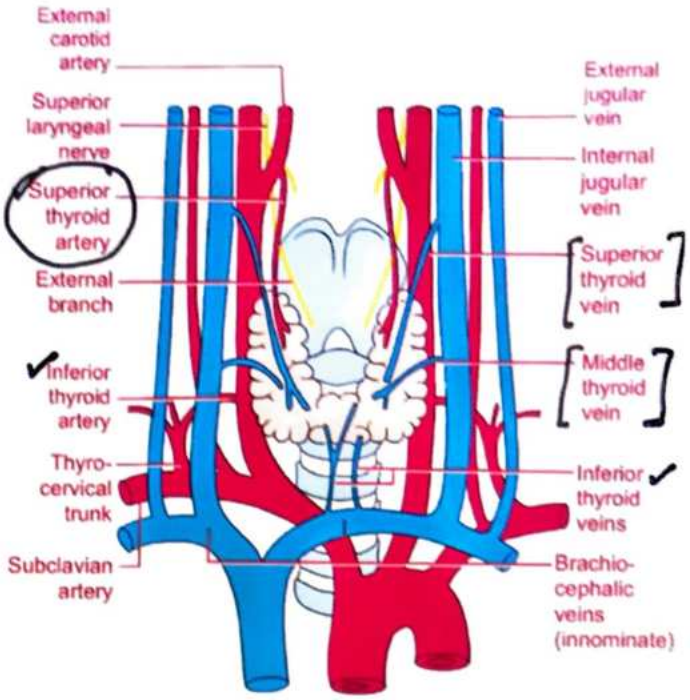
- Position - Rose position / Barking dog position
  - Head is extended
  - 30° head-up
  - Towels below shoulder blade
  - Advantage - Bloodless field
  - Disadvantage - increased risk of embolism
- Incision
  - Kocher's transverse cervical collar incision
  - 1cm below cricoid cartilage
- Subcutaneous tissue and platysma incised sharply
- Sub platysma laps are raised
  - Superiorly till thyroid cartilage
  - Inferiorly till suprasternal notch
- Incise strap muscles in midline and retract them laterally - Thyroid gland is exposed

- **Middle thyroid vein**
  - First structure ligated and divided to prevent avulsion
  - Avulsion of middle thyroid vein leads to air embolism

- **Superior thyroid vessels**
  - Artery and vein ligated separately a close to thyroid
  - To prevent injury of external branch of superior laryngeal nerve

- **Inferior thyroid vessels**
  - Ligated close to thyroid
  - To prevent vascular infarction of parathyroid gland (because PG is supplied by Parathyroid artery which is an end artery a br. of inferior thyroid artery)

- **Recurrent laryngeal nerve**
  - Most vulnerable to injury in vicinity of ligament of berry
  - Bleeding in this region is controlled with gentle pressure (use of electrocautery should be avoided)
- After division of ligament, thyroid is separated from trachea by sharp dissection



Previous Year's Questions

Q. Most common cause of recurrent laryngeal nerve palsy is? (AIIMS NOV 2017)

A. Bronchogenic carcinoma
B. Thyroid surgery
C. Mediastinal tumors
D. Pancoast tumor

PARATHYROID GLANDS

00:49:29

- Color of parathyroid glad - golden brown / canary yellow
- Accidental removal of Parathyroid gland
  - They are divided into 1mm pieces and auto transplanted in belly of sternocleidomastoid muscle
  - Site of auto transplantation should be marked with silk suture (non-absorbed) or with a clip.
- Hyperparathyroidism caused by parathyroid hyperplasia
  - 3 ½ glands are removed and
  - Remaining ½ gland is auto transplanted in brachioradialis of non-dominant arm

COMPLICATIONS OF THYROIDECTOMY

00:52:48

1. Hemorrhage
- Caused by
  - Bleeding from muscular artery
  - Slippage of ligature from superior thyroid vessels

- Massive bleeding - leads to Tension hematoma (Patient may experience respiratory distress after surgery)
- Management in case of tension hematoma
  - Shift the patient to OT
  - Open the sutures
  - Control bleeding by Ligating the bleeding vessel
  - Drain the hematoma
  - Close wound after drain insertion

2. Respiratory obstruction
- MC cause - Laryngeal edema (due to Extubation injury)
- Other causes - RLN Palsy / Tension hematoma

3. Nerve injuries
- MC injured nerve - External branch of superior laryngeal nerve (aka External laryngeal nerve)
- Other nerves injured are
  - Recurrent laryngeal nerve
  - Cervical sympathetic trunk

4. Parathyroid insufficiency
- Most commonly occur on 2nd - 5th day of surgery
- MC cause - Vascular infarction of parathyroid gland
- Manifestations
  - Carpopedal spasm
  - Tingling / numbness over perioral region
- Treatment
  - Mild to moderate symptoms (calcium level >8gm/dl) – Oral calcium supplementation
  - Severe symptoms (<8gm /di) - IV calcium gluconate

5. Thyroid insufficiency
6. Thyrotoxic crisis

- MC cause- Inadequate preoperative preparation

MIVAT (MINIMALLY INVASIVE VIDEO ASSISTED THYROIDECTOMY)

01:00:34

- Length of cervical incision - 1.5 to 2 cm or placement of
  - Endoscopic camera
  - Instruments or retraction and dissection
- Performed for
  - Benign – lobectomy
  - Malignant - Total thyroidectomy (generally performed or papillary carcinoma thyroid)

Indications of MIVAT
- Benign thyroid nodules< 3 cm
- Papillary carcinoma < 2 cm

Contraindication of MIVAT
- Thyroiditis

5 PARATHYROID & ADRENAL GLANDS

MEN-1

00:00:19

- AKA Wermer syndrome
- Autosomal dominant
- Characterized by triad of tumors involving
  1. Parathyroid tumors
  2. Pituitary tumors
  3. Pancreatic neuroendocrine tumors
- Gene responsible
  - Mutation of MEN-1 gene located on chromosome no. 11
  - Encodes tumors suppressor protein "MENIN"

Characteristic features

Common Manifestations	Less Common
• Parathyroid hyperplasia or adenoma	• Adrenocortical tumors
• Pancreatic Neuroendocrine tumors	• Bronchial of thymic carcinoids
• Pituitary Adenoma	• Collagenomas
	• Facial cutaneous angiofibroma
	• Subcutaneous / Visceral lipomas

PARATHYROID TUMORS

00:04:05

- MC endocrine abnormality in MEN 1 - Multiglandular parathyroid tumor
- Cardinal sign of MEN 1 - Parathyroid adenoma of multicentricity
- MC manifestation of MEN 1 - Hyperparathyroidism
- MC cause of hyperparathyroidism – Parathyroid hyperplasia
- 1st biochemical abnormality detected in MEN 1 - Hypercalcemia

Pancreatic Neuroendocrine Tumors

- MC Entero pancreatic NET seen in MEN 1 - PPoma (pancreatic polypeptide secreting tumor) > Gastrinoma > Insulinoma
- MC Functional Entero pancreatic NET in MEN 1 - Gastrinoma
- In MEN – 1, m/c site of gastrinoma - Duodenum

Previous Year's Questions

Q. Most common pancreatic endocrine neoplasm? (NEET JAN 2020)

A. Insulinoma
B. Gastrinoma
C. VIPoma
D. Glucagonoma

Pituitary Adenoma

- MC pituitary tumor in MEN 1 – Prolactinoma > Somatotrophinoma > Corticotrophinoma

MEN-2

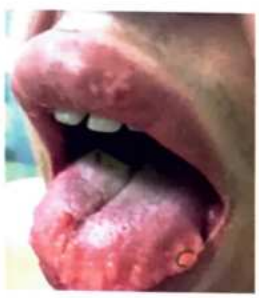
- Aka MEN 2A / Sipple syndrome
- Autosomal dominant
- Characterized by
  - Medullary carcinoma thyroid
  - Pheochromocytoma
  - Parathyroid hyperplasia / Adenoma
  - Hirschsprung disease
  - Cutaneous lichen amyloidosis
- Gene responsible
  - Mutation of RET oncogene located on chromosome 10
  - Mutated codon - Cysteine codon

Previous Year's Questions

Q. In a patient with parathyroid adenoma, how do we confirm the removal of the correct gland after surgery? (NEET JAN 2020)

A. 50% reduction in PTH within 10 mins of gland removal
B. 50% reduction in PTH within 5 mins of gland removal
C. 25% reduction in PTH within 10 mins of gland removal
D. 25% reduction in PTH within 5 mins of gland removal

MEN-3 / MEN -2B



- Autosomal dominant
- Characterized by
  - Medullary carcinoma thyroid
  - Pheochromocytoma
  - Mucosal neuroma
  - Megacolon
  - Marfanoid features
  - Intestinal ganglioneuromas
- Gene responsible
  - Mutation of RET oncogene located on chromosome 10
  - Mutated codon - Tyrosine kinase codon
- Age of prophylactic Thyroidectomy in RET mutation carriers
  - In MEN 2A – Before 5 years
  - In MEN 2B – Before 1 year

MEN-4 (MEN X)

- Autosomal dominant
- It is MEN-1 associated tumors with CDNKIB mutation (Cyclin dependent kinase inhibitor gene)
- CDNKIB gene is located on chromosome 12
- Characterized by
  - Hyperparathyroidism
  - Pancreatic NET
  - Target tumors
  - Adrenal tumor
  - Renal tumor
  - Gonadal tumor

DISORDERS OF PARATHYROID GLAND

00:17:12

Functions of Parathyroid Hormone

1. ↑ Bone resorption - ↑ S. Ca^{2+}
2. PCT (Kidney) - ↓ S. PO_4^{3-} (Phosphate wasting)
3. ↑Bone turnover – ↑S. alkaline phosphate

Manifestations of 1° HPT

- ↑PTH causing ↑S. Ca^{2+} (hyper calcemia) and ↓S. PO_4^{3-} (Hypophosphatemia)
  - In Hypercalcemia
    - → Majority of patients are asymptomatic and diagnosed incidentally
    - → In Symptomatic cases, the patients are having high levels of calcium → Malignancy (Not always)

Manifestations of 2° HPT

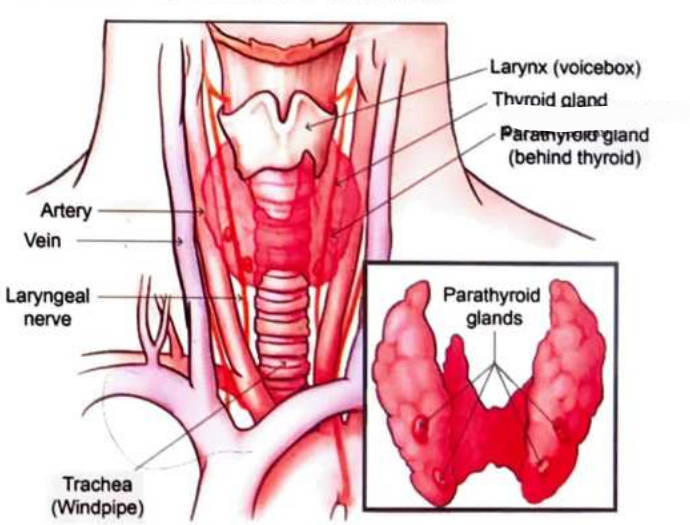
- M/c cause: Chronic renal failure
- CRF patients develop Hypocalcemia due to which there is increased secretion of Parathyroid hormone

Manifestations of 3° HPT

- Long Standing 2° HPT (CRF) → Autonomous PTG FN → ↑↑ PTH → ↑ S. Ca^{2+}

1. Primary Hyperparathyroidism (PHPT)

- Caused by increased secretion of Parathyroid hormone (PTH) from abnormal parathyroid gland
- More common in females
- MC cause of PHPT – Solitary Adenoma (80% of cases)
  - MC location – Inferior parathyroid gland
- ↑sed PTH leads to hypercalcemia
- Mechanism that can leads to hypercalcemia
  - Increased GI absorption of calcium
  - Decreased renal calcium clearance
  - Increased production of vitamin D3



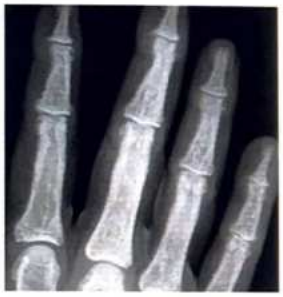
Clinical features

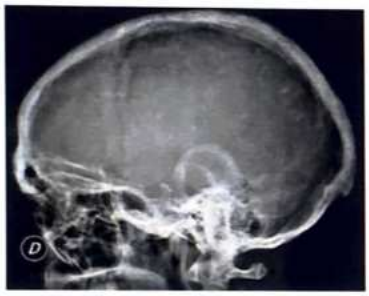
1. Kidney

- Nephrolithiasis: ↑Urinary Execration of Ca^{2+} causing Kidney stones
  - Ca Phosphate
  - Ca Oxalate
- Nephrocalcinosis
- ↑S. Ca^{2+} inhibits ADH causing
  - Polyuria
  - Poly dipsia
  - Nocturia

2. Bones → ↑PTH → ↑Bone Resorption causing Osteoporosis

- Subperiosteal Resorption
  - Radial Side
  - Middle Phalanx
  - 2^{nd} / 3^{rd} fingers
- Cystic Lesion → Hemorrhage → Osteitis Fibrosa Cystica (Brown Tumor)
  - OFC is seen in pts having advanced primary Hyperparathyroidism
- Skull - Salt & Pepper App.





- Joints: there is chondrocalcinosis → joint pain

3. Abdomen

- Hypercalcemia cause
  - Inhibitory effect on GI smooth muscle Contraction and Spasm of Sphincters
  - Manifestations include
    - → Nausea
    - → Vomiting
    - → Constipation

- Abdominal groans: ↑S. Ca^{2+} → ↑Gastrin → ↑PUD

4. CNS

- ↑S. Ca^{2+} → Depress nervous system leading to Confusion, Anxiety, and Psychosis

5. Muscle

- ↑S. Ca^{2+} → ↓ Muscle Activity leading to Weakness and Fatigue

Classical pentad

- Kidney stone
- Painful bones
- Abdominal groans
- Psychic moans
- Fatigue over tones

Diagnosis 00:35:39

- ↑PTH will lead to hypercalcemia and Hypophosphatemia
- Most widely used and accurate investigation for localization of parathyroid adenoma – Tc 99 Sestamibi scan
- X-ray findings of hands
  - Subperiosteal resorption – Most apparent on radial aspect of middle phalanx of 2nd & 3rd finger
  - Bone cyst
  - Tufting of distal phalanges

Management

1. SERM (Selective estrogen receptor modulator) or Bisphosphonates (IV ibandronate)

- To decrease Ca2+ level
- To increase bone mineral density

2. Parathyroidectomy – if patient has

- Classical pentad (or)
- Age < 50 years

Steps in management of PHTP

1. Correction of Hypercalcemia - by IV normal saline followed by Forced diuresis with furosemide
2. Neck exploration

- Single adenoma (80-85% cases) - Resection
- Two adenomas (5% cases) – Resection
- Hyperplasia of all 4 glands (10-15% cases)
  - Excision of 3 and half gland or
  - Excision of all 4 glands

Important Information

- Accidentally removed parathyroid gland during thyroidectomy - should be auto transplanted into belly of sternocleidomastoid muscle. (PTG are broken into 1 mm pieces for placing into SCM)
- Site of transplantation is marked with suture / Cli

2. Secondary Hyperparathyroidism

- ↓S. Ca^{2+} → ↑PTH

Causes

1. CRF [M/C]
2. Vit D deficiency
3. Malabsorption / Steatorrhea

Pathophysiology of 2° HPT in patients of CRF

- Hyperphosphatemia & Resultant hypocalcemia
- Deficiency of 1,25 – Dihydroxy vitamin D → Hypocalcemia → ↑sed PTH
- Low calcium intake & Low calcium absorption

Clinical features

- Signs & symptoms of Hypocalcemia
- In some patients – Normocalcemia

Management

- Low phosphate diet advised
- Phosphate binders
- Adequate intake of calcium & vitamin D
- High calcium, low Aluminum dialysis bath
- Parathyroidectomy – If PTH remains high despite of above management

3. Tertiary Hyperparathyroidism 00:47:07

- Due to development of autonomous parathyroid gland function - After long standing secondary hyperparathyroidism, most often in renal disease → ↑↑ PTH → ↑S. Ca^{2+}

Management

- Subtotal parathyroidectomy / Total parathyroidectomy with auto transplantation

PARATHYROID CARCINOMA 00:49:05

- Responsible for 1% of Primary hyperparathyroidism

Clinical features

- Parathyroid carcinoma can be suspected pre-operatively by presence of
  - Severe symptoms
  - Serum calcium levels > 14 mg / dl
  - ↑ PTH (> 5 times of normal levels)
  - Palpable parathyroid gland

Route of spread

- MC route of spread – Local invasion
- Lymph node metastasis in 50% cases: I/L MRND
- Distant metastasis in 33% cases

Treatment

- Bilateral neck exploration + Enbloc resection of tumor with ipsilateral thyroid lobe ± Modified radical neck dissection (MRND) if LN is positive
- Reoperation should be done for
  - Local recurrence
  - Metastatic disease
- Cinacalcet
  - Controls hypercalcemia in refractory parathyroid carcinoma
  - Decrease PTH by directly acting on CASR (Calcium sensing receptors) of parathyroid

ADRENAL INCIDENTALOMA 00:54: 36

- These are incidentally detected adrenal masses through imaging performed for unrelated disease
  - Non-functioning adenoma (MC) – 82% of incidentaloma
  - Preclinical Cushing's – 5%
  - Pheochromocytoma – 5%
  - Adreno cortical carcinoma – 5%
  - Metastatic carcinoma – 2%
  - Aldosterone producing adenoma – 1%

Diagnostic work up for incidentaloma

- To identity patient who would benefit from adrenalectomy
- Work up includes
  1. Hormonal evaluation
  2. Size of tumor
  3. History of previous malignancy
  4. Hypertension (MC manifestation of pheochromocytoma)
  5. Symptoms of Glucocorticoid or sex-corticoid excess

- CT guided FNAC
  - Rarely performed
  - Performed for patients with history of extra-adrenal malignancy - to rule out metastatic disease
  - Pheochromocytoma should always be ruled out before performing FNAC

Treatment

- Surgery is done for
  - Hormonally active tumor
  - Masses carrying significant risk of malignancy
- Most incidentalomas – can be removed Laparoscopically (Avoided if masses are suspected of malignancy in imaging)

- Management based on size of masses
  - Size > 5 cm – Surgical removal
  - Size 3-5 cm – Strongly consider patients for surgery
  - Size < 3 cm – Follow up with CT every 6 months

- Indications for surgery in incidentaloma of size 3-5 cm
  - Suspicious lesion on imaging
  - Young patients
  - Few surgical risks
  - Interval tumor growth
  - Patient preference for surgery

ADRENOCORTICAL CARCINOMA 01:02:20

- Rare tumor
- >50% of tumors are functional
- Leads to Cushing syndrome > Virilization

Clinical features

- Seen in 4th to 5th decade
- Size of tumor at the time of presentation - 9 to 12 cm

Investigations

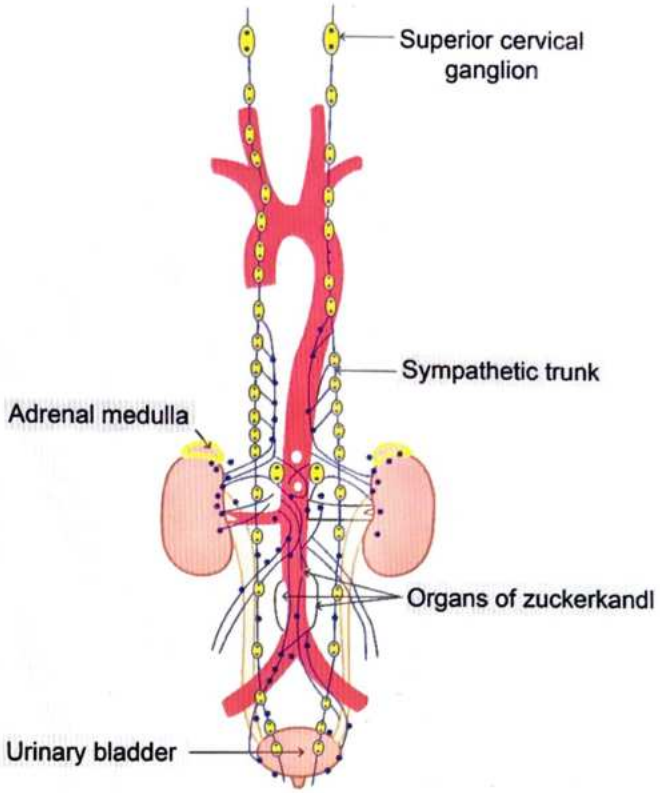
- IOC for diagnosis – CECT
- Single most important criteria for malignancy – size of tumor

Treatment

- Radical open surgery - Enbloc removal of tumor + Adjacent organs or regional lymphadenectomy or Both
- Drugs given to control steroid hypersecretion
  - Ketoconazole
  - Aminoglutethimide
  - Metyrapone
- Mitotane
  - Used as adjuvant to surgery
  - Primary therapy in unresectable or metastatic disease
- Most important predictor of survival - Adequacy of resection
- Most important prognostic factor - Adequacy of resection

PHEOCHROMOCYTOMA 01:06:41

- Arises from chromaffin cells in adrenal medulla
- Usually seen in 4th to 5th decade
- Equally common in males & females
- Paraganglioma
  - Aka Extra adrenal pheochromocytoma
  - MC site of extra adrenal pheochromocytoma – Organ of Zuckerkandl



- AKA 10% tumor
  - 10% malignant
  - 10% Bilateral
  - 10% seen in pediatric population
  - 10% familial
  - 10% extra-adrenal

Risk factors

- Sporadic / familial
- Syndromic / Non-syndromic
- Syndromes associated with Pheochromocytoma
  - MEN 2A / 2B
  - VHL syndrome
  - Von-Recklinghausen syndrome (Aka NF-1) - MC associated with pheochromocytoma
  - Sturge–Weber syndrome
- Non-syndromic familial association of Pheochromocytoma
  - MC associated with - Succinyl dehydrogenase D & B mutation

Pathology

- Most of Pheochromocytoma's are unilateral and solitary
- Pheochromocytoma in multiple endocrine neoplasia (MEN) – rarely malignant

- In succinyl dehydrogenases D & B mutation – High propensity for Extra adrenal & Malignant pheochromocytoma
- Pheochromocytoma - secrete both Nor-Adrenaline and Adrenaline (NA > A)
- Extra adrenal Pheochromocytoma - Secrete Nor-Adrenaline and exclusively due to deficiency of PNMT (Phenyl ethanolamine N-methyl transferase)
- Pheochromocytoma associated with MEN - Secrete Adrenaline only
- Malignant pheochromocytoma – secrete
  - Dopamine
  - HVA (Homovanillic acid)

Clinical features

- Classical triad
  - Headache
  - Diaphoresis
  - Palpitation
- MC symptom of pheochromocytoma – Headache
- MC manifestation of pheochromocytoma – HTN

Pathophysiology

- In Pheochromocytoma - Release of NA & Adrenaline → Sympathetic stimulation
- Blood pressure = Cardiac output x Total peripheral resistance
- Cardiac output = Stroke volume x Heart Rate
- ↑ HR leads to ↑CO
- Vasoconstriction leads to ↑ TPR
- ↑ BP
- Body tries to normalize blood pressure - Decreases stroke volume by decreasing fluid in vascular compartment
- Hence, Pheochromocytoma is a state of volume depletion
  - ↓sed Blood volume
  - ↓sed Plasma volume

Important Information

- **Criteria of malignancy is based on - Metastasis**
- **Because vascular invasion & capsular invasion is also seen in benign tumors of pheochromocytoma**

Clinical features

- Classical Triad
  - Palpitations
  - Bounding headache
  - Diaphoresis
- Other's symptoms – Chest pain, and anxiety
- ↑Catecholamines
  - Carbohydrate intolerance
  - Weight loss - Due to increased energy expenditure
  - Cardiac manifestations
    - → Sinus tachycardia
    - → Supraventricular arrythmia
    - → Ventricular premature contractions

Investigations

- COMT converts Nor-epinephrine / Epinephrine into Nor metanephrine / metanephrine which is again converted to VMA by an enzyme MAO
- Catecholamines and VMA gets excreted into urine
- Most sensitive Screening test – 24 hrs Urinary catecholamines & VMA level
- Best test for diagnosis – Fractionated plasma metanephrine
- Radiological IOC for Adrenal pheochromocytoma, Extra adrenal pheochromocytoma and pheochromocytoma in pregnancy is MRI
- MIBG scan - useful for diagnosis of extra adrenal pheochromocytoma
- Gold standard investigation for definitive staging - FDG-PET
- FNAC and biopsy - contraindicated in pheochromocytoma as they can lead to hypertensive crisis

Biochemical and Imaging AMethods Used for Diagnosis of Pheochromocytoma and Paraganglioma

DIAGNOSTIC METHOD	SENSITIVITY	SPECIFICITY
24h urinary tests		
Catecholamines	+++	+++
Fractionated metanephrines	++++	++
Total metanephrines	+++	++++
Plasma tests		
Catecholamines	+++	++
Free metanephrines	++++	+++
Imaging		
CT	++++	+++
MRI	++++	+++
MIBG scintigraphy	+++	++++
Somatostatin receptor scintigraphy	++	++
Fluoro-DOPA PET/CT	+++	++++

Values are particularly high in head and neck paragangliomas.

Abbreviations MIBG, metaiodobenzylguanidine; PET/CT, positron emission tomography plus CT for the biochemical tests, the ratings corresponds globally to senstivity and specificity rates as follows; ++ <85%; +++, 85-95%, and ++++, >95%

Treatment

- Volume depletion: give Crystalloid and Colloids
- Pre-operatively non-selective alpha blockers

- To control blood pressure
- DOC – Phenoxybenzamine

- Beta blockers
  - Indicated only if tachycardia develops after α-blockers
  - ß-blockers should not be given until patient is fully alpha blocked - to avoid hypertensive crisis that may develop due to unopposed α-stimulation
- TOC for Pheochromocytoma – Adrenalectomy
- Laparoscopic adrenalectomy can be performed for Tumor size < 5 cm

MALIGNANT PHEOCHROMOCYTOMA

⏱ 01:32:22

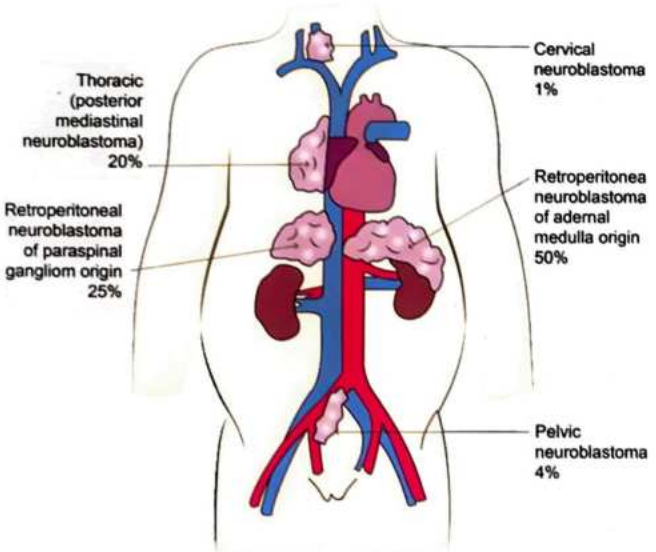
- Risk of malignancy increases with size
- Malignant tumor express p53, BCL-2 & have activated Telomerase
- Diagnosis of malignancy is based on - Metastasis
- MC site of metastasis – Bone > Liver > Lymph node
- Malignant pheochromocytoma secretes - Dopamine & Homovanillic acid

Treatment

- Resection followed by chemotherapy
- Chemotherapy agents used are
  - V – Vincristine
  - C – Cyclophosphamide
  - D – Dacarbazine

NEUROBLASTOMA

⏱ 01:34:12

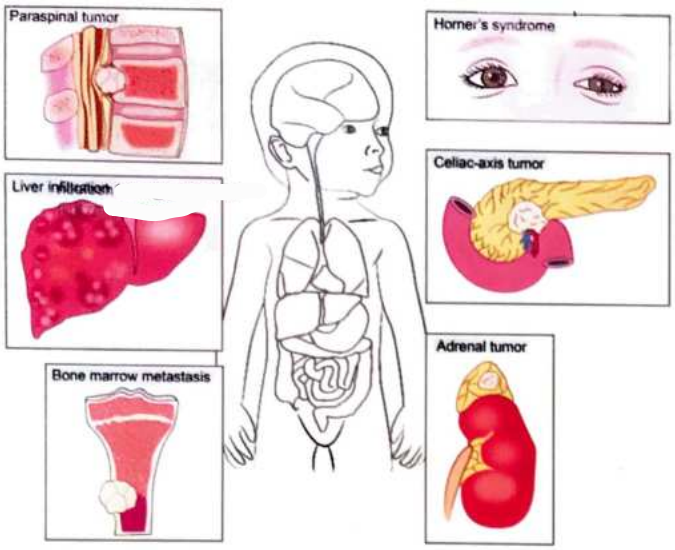


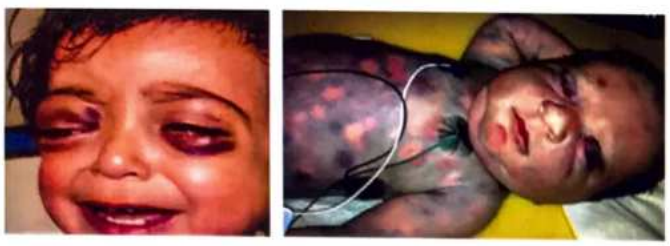
- Arises from neural crest
- It can originate anywhere along the sympathetic chain
- MC site of Neuroblastoma - Adrenal > Paravertebral > Retroperitoneal > Posterior Mediastinum > Pelvis > Cervical area
- It is the MC tumor diagnosed in infants < 1 year of age
- It is the MC intraabdominal malignancy of children
- Unique feature of neuroblastoma - Spontaneous regression (Especially, Stage 4s)
- Malignancies with spontaneous regression
  - Neuroblastoma
  - Choriocarcinoma
  - Retinoblastoma
  - Malignant melanoma
  - Renal cell carcinoma

Clinical features

- MC presentation – Fixed, lobular mass extending from the flank towards midline of abdomen
- Peak incidence - 2 years of age
- Most patients present - before 4 years
- Orbital metastasis – present as Periorbital ecchymosis + Proptosis (Racoon eyes)
- Infants with stage 4s - may develop Cutaneous metastasis known as blue berry muffin lesions
- Unusual paraneoplastic manifestations
  - Chronic watery diarrhea (Increased secretion of VIP)
  - Opsoclonus – Myoclonus: Dancing eye, Dancing feet
- 60-70% of patients have metastasis at the time of diagnosis
- MC site of metastasis in neuroblastoma in older children – Long bones
- In skull – Sphenoid bone is involved
- In Infants - metastasis is confined to liver / Subcutaneous tissue
- Lung metastasis is rare in neuroblastoma

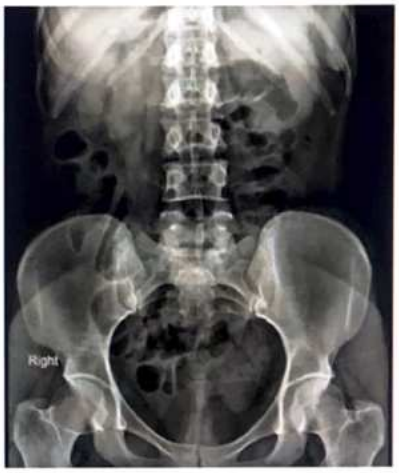
Symptoms of Neuroblastoma





Laboratory investigation

- Lab. findings
  - Anemia
  - Thrombocytosis
  - ↑LDH
  - ↑Ferritin
  - ↑Urinary catecholamines
  - ↑Neuron specific enolase
- On X-ray/CT – Stippled calcification
- On IVP - Drooping Lilly sign (Neuroblastoma displaces kidney inferolaterally)



- In assessment of the following - MRI > CT
  - Vascular invasion / encasement
  - Patency
  - Spinal cord compression
  - Bone marrow involvement
- MIBG scan – Single best study to document presence of metastasis

Treatment

- Localized neuroblastoma – Excision
- Unresectable neuroblastoma – Do biopsy and then downstage the tumor by chemotherapy & Radiotherapy of followed by surgical resection.
- In cases of disseminated disease – Chemotherapy

ESTHESIONEUROBLASTOMA

01:50:36

- Olfactory neuroblastoma
- It's a rare tumor with neural crest origin
- Arises from Basal neural cells of olfactory mucosa of
  - Cribriform plate
  - Upper nasal wall
  - Superior turbinate

Clinical features

- Unilateral polypoidal mass located on upper third of nose
- Associated with symptoms of
  - Nasal obstruction
  - Anosmia
  - Epistasis (Vascular tumor that bleeds profusely on biopsy)

Treatment

- Surgical excision followed by radiotherapy

CLINICAL QUESTIONS

Q. An 8-year-old male child presents with complaints of circumoral tingling and numbness. On further evaluation, serum calcium levels were found to be low. X-ray feature suggestive of truncus arteriosus and absent thymic shadow in the superior mediastinum. The above clinical features are suggestive of which of the following syndrome?

A. Autoimmune polyglandular syndrome
B. Pendred syndrome
C. Di George syndrome
D. Lesch-Nyhan syndrome

Answer: C

Solution

Circumoral tingling and numbness are the earliest signs of hypocalcemia. This associated with truncus arteriosus and thymic hypoplasia are features of DiGeorge syndrome

DI-GEORGE SYNDROME

Characterized by

- **Congenital cardiac defects**, particularly those involving great vessels
- **Hypocalcemic tetany** due to failure of parathyroid development
- **Absence of normal thymus**, T-cell immunodeficiency
- Midline developmental abnormalities like cleft lip and palate, tracheo oesophageal fistula

Due to failure of development of third and fourth pharyngeal pouches , structures that give rise to the thymus, parathyroid glands and portions of the face and aortic arch

Due to deletion of chromosome 22

LEARNING OBJECTIVES

UNIT 2 HEPATOBILIARY

Liver

- Anatomy and Physiology of Liver
- Couinaud's Liver Segment, Types of Hepatectomy, Caudate Lobe
- Pringle's Maneuver
- Pyogenic, Amebic Liver Abscess
- Hydatid Cyst, Gharbi's Classification of Hydatid Cyst
- Liver Tumors, Liver Metastasis, Hemangioma
- Focal Nodular Hypoplasia, Hepatic Adenoma, Risk Factors of Hepatocellular Carcinoma
- Hepatocellular Carcinoma, Fibrocellular Variant of HCC, Hepatoblastoma

Portal Hypertension

- Introduction, Causes of Portal Hypertension, Etiology of Portal Hypertension, Diagnosis, and Investigations
- Porto Systemic Anastomosing Sites, Variceal Bleeding, Veno-occlusive Disease
- Sengstaken-Blakemore Tube, TIPSS
- Shunt and it's Classification, Non-Selective Shunt, Selective Shunt, Peritoneo Venous Shunt
- Non-Cirrhotic Portal Hypertension
- Budd-Chiari Syndrome

Gall Bladder

- Important points Related to GIT
- Anatomy and Physiology of Gall Bladder
- Gall Stones and it's Types
- Biliary Colic and Acute Cholecystitis and its Management
- Medical Management of Gall Stones
- Prophylactic Cholecystectomy
- Gall Stone Ileus
- Acalculous Cholecystitis
- Mirizzi's Syndrome
- Types of Gall bladder Polyp
- Similarities in Carcinoma Gall bladder and Cholangio Carcinoma
- 8th AJCC TNM Classification for Carcinoma Gall bladder
- Organs and Lymph nodes removed in Cholecystectomy

Bile Duct

- Anatomy, Blood Supply of Bile Duct, Sphincters
- Choledochal Cyst, Classification System of Choledochal Cyst
- MRCP, ERCP, PTC, CBD Stone
- Cholangitis, Autoimmune Disorders
- Primary Sclerosing Cholangitis

- Bile Duct Injury
- Bismuth Classification, Strasberg Classification
- Management of Post-Op Diagnosed case of Bile Duct Injury.
- Cholangiocarcinoma, Courvoisier's Law
- Ampullary and Periampullary Carcinoma
- Investigations of Cholangiocarcinoma
- Management of Cholangiocarcinoma
- Hemobilia

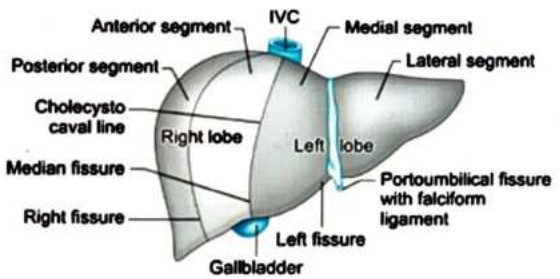
- Pancreas
  - Pancreas Divisum, Annular Pancreas
  - Acute Pancreatitis, Ranson's Prognostic Criteria
  - Pancreatic Abscess, Pseudocyst
  - Chronic Pancreatitis, Risk Factors for Ca Pancreas
  - Survival in Ca Pancreas, Neuroendocrine Tumors of Pancreas

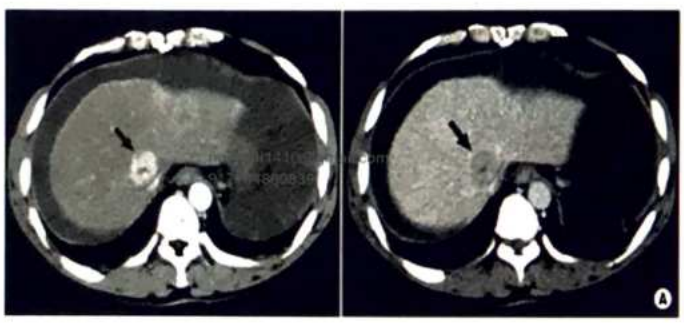
6 LIVER PART-1

NORMAL ANATOMY

00:00:16

- Normal weight
  - Male - 1800 gm
  - Female - 1400 gm
- Glycogen storage capacity is 65 gm/kg of liver tissue
- Liver has
  - Dual blood supply (also in lungs)
    - → 75% from Portal vein
    - → 25% from Hepatic artery
  - Unique property of regeneration
- Portal venous blood is mainly deoxygenated therefore despite of 75% blood supply, O2 supply is only 50%-70% while hepatic artery gives 30%-50% O2.
- If branch of PV is ligated, hepatic artery increases blood supply to the liver but not vice versa
- HCC are exclusively supplied by branches of hepatic artery
- Hence on TRIPLE-PHASE CT (IOC for HCC)
  - Non-contrast phase
  - Arterial phase: Shows Dx. Feature of HCC
  - Venous phase: Arterial hypervascularization with venous washout





- Portal triad on USG appears like Mickey mouse known as Mickey mouse view
- Physiological demarcation of Liver: Cholecysto-caval line

Previous Year's Questions

Q. Ligation of common hepatic artery will impair blood supply in? (NEET - Jan - 2020)

A. Right gastric and right gastroepiploic artery

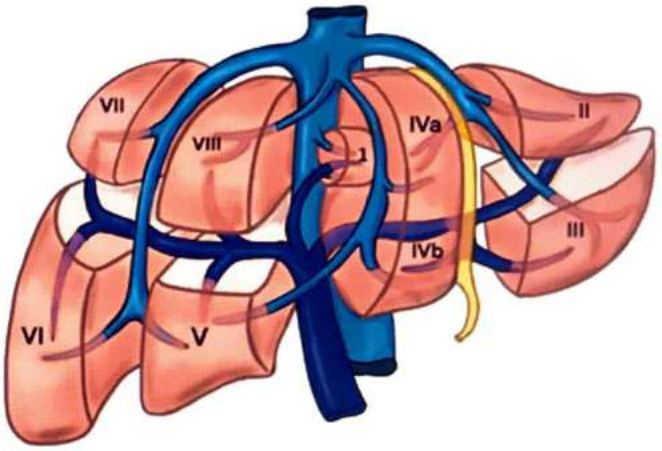
B. Right gastric and left gastric artery

C. Right gastroepiploic artery and short gastric vessels

D. Right gastric and short gastric vessels

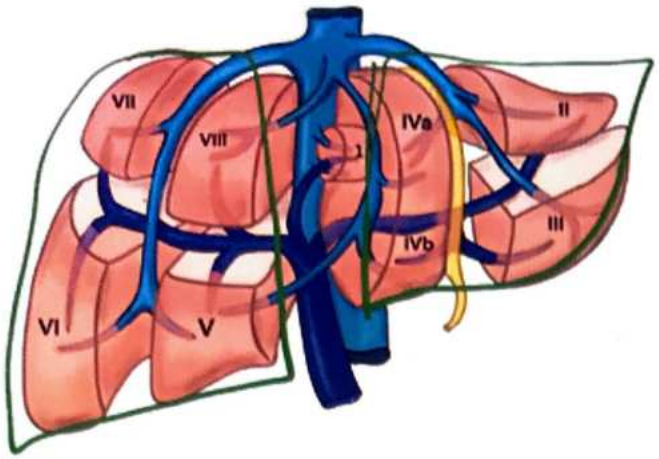
COUINAUD SEGMENTS

00:08:53

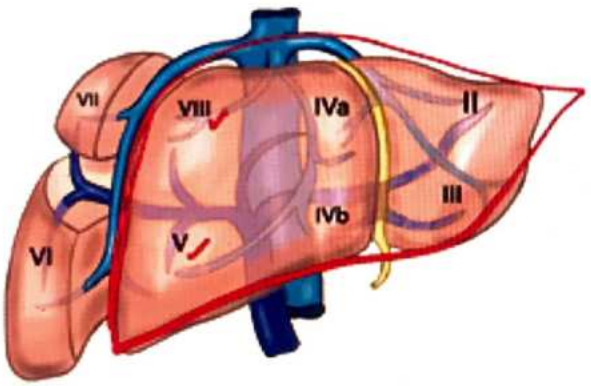


- COUINAUD divides liver into 8 Segments on basis of Portal vein and Hepatic Vein (PV> HV)
- Gall bladder is in relation with 2 segments (IV_b & V)
- Hence in Ca Gall bladder, Segments IV_b and V are involved early and they are removed in extended cholecystectomy.
- Right lobe of liver contains segments V, VI, VII, VIII
  - Right Anterior Sector → V, VIII
  - Right posterior Sector → VI, VII
- Left lobe of liver contains segments II, III, IV
  - Left Anterior Sector → III, IV_a, IV_b
  - Left posterior Sector → II

- Hemi Hepatectomy
  - In Right Hemi Hepatectomy - V, VI, VII, VIII removed
  - In Left Hemi Hepatectomy - II, III, IVa, IVb removed



- Trisegmentectomy (Extended Hepatectomy)
  - Right Trisegmentectomy aka Extended Right Hepatectomy we remove segment V, VI, VII, VIII and IVa, IVb
  - Left Trisegmentectomy aka Extended Left Hepatectomy we remove segment II, III, IVa, IVb and V, VIII
- Extra
  - Segment I → Caudate lobe
  - Segment IV → Quadrate



CAUDATE LOBE

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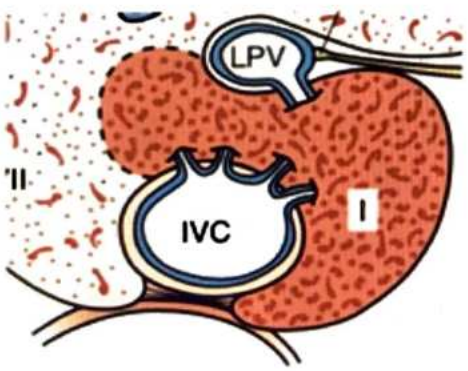
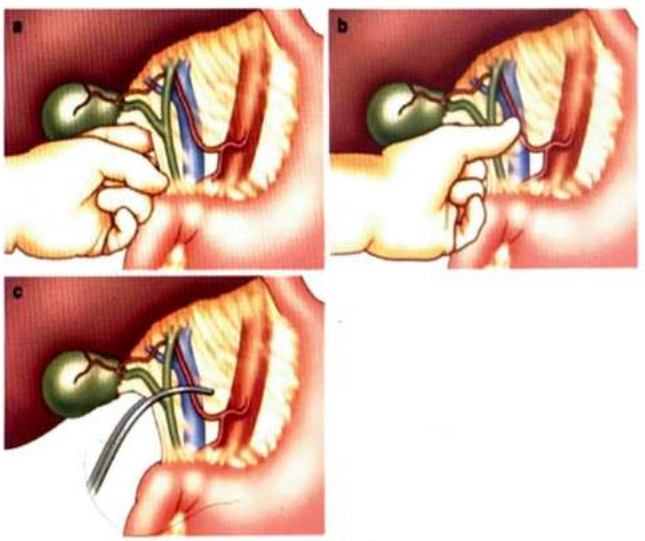


- According to latest study total 9 segments are there - Segment IX is Paracaval portion of caudate lobe.
- Parts of caudate lobe
  - Spiegel lobe (segment I)
  - Paracaval portion (segment IX)
  - Caudate process
- Unique properties
  - Receives blood supply from both left and Right branch of portal Vein (Mainly Left branch)
  - It gives biliary drainage to - both Left and Right Hepatic duct (Mainly Left Hepatic duct)
  - Venous drainage directly into IVC
- Advantage of caudate lobe
  - In BUDD-CHIARI Syndrome caused by Hepatic vein Thrombosis whole liver is affected except caudate lobe (In chronic cases, whole liver – atrophied; Caudate lobe – Hypertrophied)
  - Hypertrophy of caudate lobe on Scintigraphy: Central hotspot sign
- Disadvantage of caudate lobe
  - Routine Caudate lobectomy is done in "Hilar Cholangiocarcinoma" (due to Early Involvement of the lobe in this carcinoma)

PRINGLE's Maneuver

- Aka Total Inflow Occlusion
- Clamping in foramen of Winslow and we occlude the Portal triad.
- It controls bleeding from Portal Vein and Hepatic Artery.
- Bleeding is effectively controlled from Portal Vein as compared to Hepatic Artery.
- It doesn't control bleeding from IVC and Hepatic Vein



LIVER ABSCESS

00:29:35

Pyogenic Liver Abscess

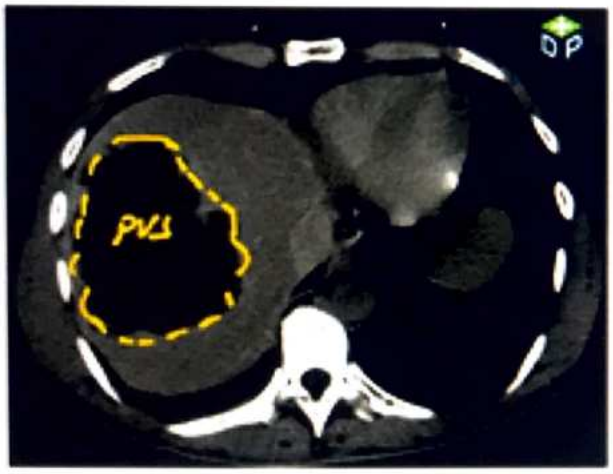
- M/C type of liver Abscess, Liver is the MC solid organ involved by pyogenic abscess
- Present in 5th/6th Decade and commonly in Alcoholic Males.
- M/C organism
  - Worldwide →E. Coli
  - Asia →Klebsiella
  - Children (Suffering from Chronic granulomatous disease) →Staph Aureus
- Routes of infection

1. Bile duct/Biliary tract (MC route)
   - Cholangitis
     - → CBD stones: M/c cause of cholangitis
     - → Hilar cholangiocarcinoma
     - → In PLA–obst. Jaundice is common (seen in 25% cases)
     - → M/C LFT Abnormality - ↑↑ ALP

2. Portal vein (2nd MC)
   - Appendicular perforation or Diverticulitis can increase the risk of Pyogenic liver abscess

3. Hepatic artery
   - Children suffering from Chronic granulomatous disease there is defective Neutrophil function ↑sed risk of SABE (Sub-Acute Bacterial Endocarditis) Infection reaches liver via Hepatic artery Pyogenic liver abscess

4. Direct extension of infection from



   - Pyothorax
   - Sub-diaphragmatic abscess
   - Acute suppurative cholecystitis
   - Perinephric abscess

- **Clinical features**
  - M/C Symptom - fever with Chills and Rigor
  - Abdominal pain
  - Anorexia
  - Fatigue (most characteristic symptom)
  - 20%-25% cases present with Jaundice

- Lab parameters: In any kind of CBD obstruction - 3 parameters are raised
  - ALP (M/C LFT Abnormality)
  - GGT
  - 5' Nucleotidase

- **Diagnosis**
  - First investigation done - USG
  - Dx. Is highly suggested by USG or CT
  - Diagnosis is confirmed by/ IOC is Aspiration and culture
- **Treatment**: Percutaneous Catheter drainage + Systemic Antibiotics

AMOEBIC LIVER ABSCESS

00:45:45

- Caused by Entamoeba Histolytica
- M/C in developing Countries
- M/C route - Feco-oral
- Common in young patients
- Infective stage: Quadrinucleate Cyst

↓

Octanucleate cyst

↓

8 Trophozoites released

↓

Cause Flask Shaped Ulcers

- Caecum and Ascending Colon is the M/c location of
  - Flask Shaped Ulcer
  - Amoebic Colitis
  - Ameboma
- E. Histolytica reaches liver via Superior Mesenteric Vein or Portal Vein - it causes, Histolysis of Hepatocytes and necrosis by WBC - "Anchovy Sauce pus" is accumulated


Aspirating "anchovy paste" pus from amebic liver abscess

- **Clinical features**
  - M/C Symptom: Abdominal pain
  - Fever
  - Anorexia
  - Fatigue
  - Jaundice is rare
  - M/C LFT Abnormality - ↑↑ PT

- **Diagnosis**
  - First investigation done - USG
  - Dx. Is suggested by - USG or CT
  - Dx. Is confirmed by IOC - Amoebic Serology (ELISA)

- **Treatment**: High dose Oral Metronidazole 750mg TDS for 10-14 days
- Indications of Aspiration in Amoebic Liver Abscess
  - No Improvement after Medical Mx within 3-5 days
  - High Risk Abscess I.e. Left Lobe Abscess and size > 5cm
  - Diagnostic Uncertainty
  - Bacterial Super infection
  - Pregnancy (high dose metronidazole is not safe)

- Treatment for Carriers
  - Carriers – asymptomatic cyst passers
  - Intraluminal agents are used for cyst passers. They are
    - → Paromomycin
    - → Iodoquinol
    - → Diloxanide furoate
- **Complications**
  - Rupture into Peritoneal Cavity (M/C site of rupture)
    - → Rx: Exp. Laparotomy + Peritoneal Lavage + Drain insertion
  - Rupture into pleural cavity (2nd M/C)
    - → Rx: ICD insertion
  - Rupture into pericardial cavity (3rd M/C)
    - → Rx: Needle pericardiocentesis F/B Pericardiotomy

HYDATID CYST

01:01:34

- Hydatid disease is a zoonosis, occurs primarily in sheep rearing areas of the world
- Endemic in Mediterranean countries, South America, Australia, New Zealand & east Africa
- Caused by
  - E. Granulosus (M/C)
  - E. Multilocularis
    - → Responsible for "Malignant Hydatidosis"
    - → Slow growing alveolar like tumor
  - E. Vogeli
  - E. Oligarthus
- Host
  - Definitive Host (sexual phase occurs inside the host) – DOG
  - Intermediate Host - Sheep
  - Man
    - → Accidental Host
    - → Dead-End Host
    - → Intermediate Host
    - → Without Human-to-Human transmission

Previous Year's Questions

Q. Slow growing alveolar like tumour in liver is caused by:? (AIIMS Nov 2019)

A. E. granulosus
B. E. multilocularis
C. Amoebic liver abscess
D. Cysticercuscellulosae

- Route of infection is Feco-oral
  - Infective Stage is Eggs of Echinococcus

↓

Concerted into Hexacanth Larva (Oncosphere)

↓

Penetrate duodenal capillaries

Portal vein	IVC
↓	↓
Liver	Lungs & other solid organs

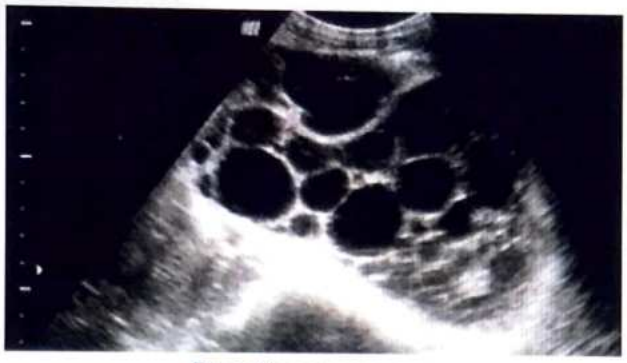
- Involves: Liver > Lungs > Spleen > Kidney > Brain > Bone

Clinical features

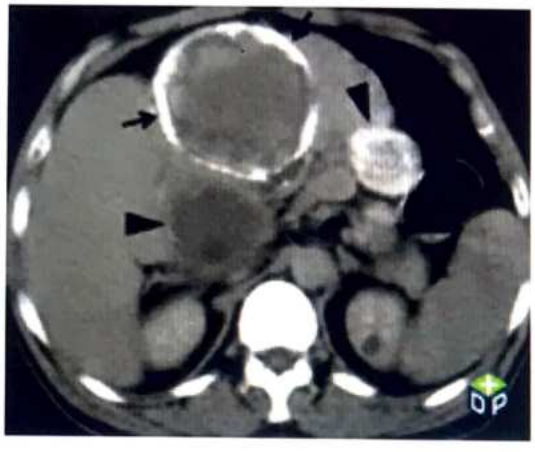
- Equal distribution (Male = Female)
- Most patients – Asymptomatic
- M/C presentation is Asymptomatic palpable Intra-Abdominal mass (Hepatomegaly).
- In symptomatic patients
  - Abdominal pain (M/c)
  - Abdominal discomfort
  - Dyspepsia
- M/C Complication - Intra-biliary Rupture

Diagnosis

- First investigation done: USG
- Dx. is Highly suggested by
  - USG – Rosette appearance
  - CT – Ring like calcification



Rosette appearance



Ring like Calcification

1. IOC is Hydatid Serology
   - ELISA
   - ARC – 5
   - Immunoblot

   } >95% Sensitivity & Specificity

2. Casoni's Test - Obsolete because of
   - Low sensitivity (55-60%)
   - Risk of Anaphylaxis

Treatment

1. DOC for perioperative chemoprophylaxis: Albendazole > Mebendazole
2. Albendazole is
- Scolicidal
- Shrinks the size of cyst

SURGICAL INTERVENTION

01:16:00

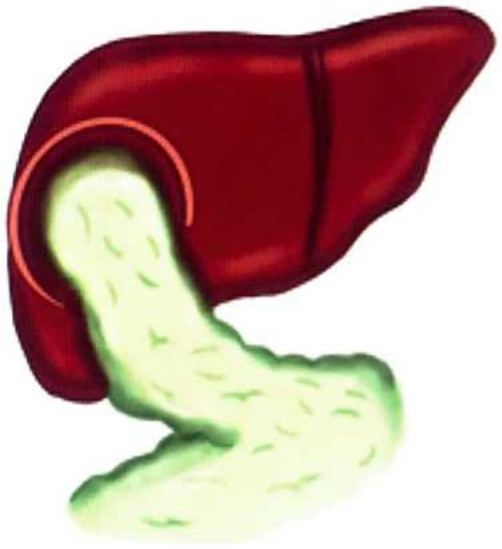
1. PAIR (Most preferred technique for Anatomically & Surgically appropriate lesions)
   - Puncture, Aspiration of Content, Instillation of Scolicidal Agents, Reaspiration
   - Scolicidal Agent used:
     - Hypertonic Saline (20%) is M/C used
     - 0.5% cetrimide with 0.05% chlorhexidine
     - 10% povidone iodine
     - Absolute alcohol

Important Information

- Formalin and Silver Nitrate are not used now because of toxicity

   - Contraindications for PAIR:
     - Inaccessible cyst
     - Peripherally located cyst
     - Multiloculated cyst
     - Cysto-biliary communication
     - Cyst in lungs & brain (does not have pericyst)
     - Calcified cyst (dead cyst)

2. Cyst Evacuation + Omentopexy

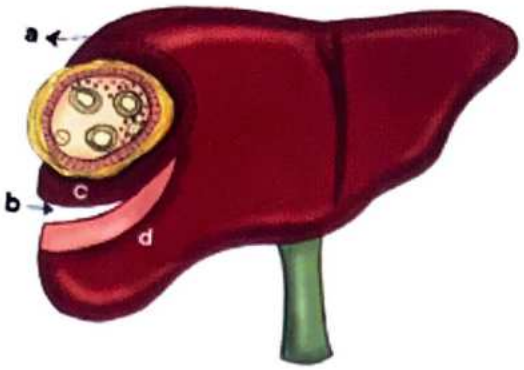


Cyst Evacuation

Important Information

- If the surgeon doesn't want to attach the omentum obliteration to the cyst cavity with sutures is done, this is known as cartilage / intro flexion

3. Peri-cystectomy
- Most effective treatment
- Excision of cyst outside of Pericyst



Peri-Cystectomy

4. Hepatic Resection
- Most Radical Treatment

GHARBI'S CLASSIFICATION FOR HYDATID CYST BASED ON USG

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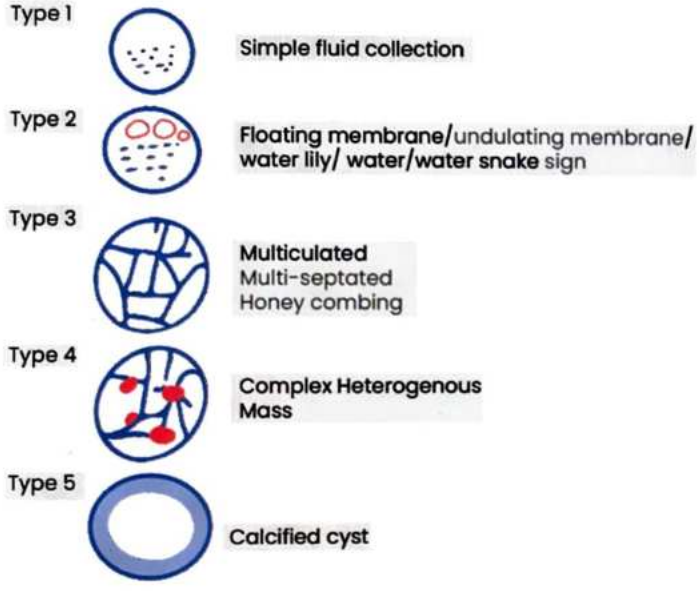


Important Information

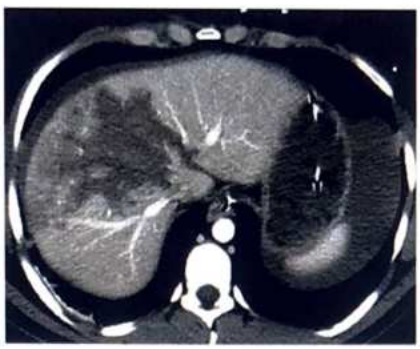
- Honeycomb liver is seen in Actinomycosis

Similarities among Pyogenic liver abscess, Amoebic liver abscess & hydatid cyst

- In all these conditions Cyst is usually single cavity and involves Right lobe of liver
- Chest X-ray changes are similar
  - Raised right dome of Diaphragm
  - Collapse of right lung (Atelectasis)
  - Reactive pleural effusion

CLINICAL QUESTIONS

Q. An 18 year old boy came to your hospital with c/o severe abdominal pain with no other associated symptoms. On examination, you noted several old and new bruises all over the body. After establishing a rapport with the patient, he gives a history of being bullied and punched in the abdomen multiple times by his classmate. The CT abdomen of the patient showed the following findings. The next step in management is



A. Conservative management
B. Emergency Laparotomy
C. Elective Laparotomy
D. None of the above

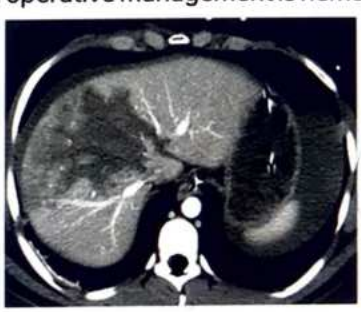
Answer: A

Solution

Bear claw appearance on CECT abdomen is seen in hepatic laceration

HEPATIC INJURY

- Most common organ injured in blunt abdominal trauma: Spleen> liver
- Most liver injury bleeding is venous, and therefore low pressure, tamponade is readily performed
- Stable patient - CECT abdomen
- **Bear claw laceration: Multiple Linear (large stellate)laceration of liver on CECT**
- Non operative management advocated for stable patients
- The only absolute contraindication to non operative management is hemodynamic instability



7 LIVER PART-2

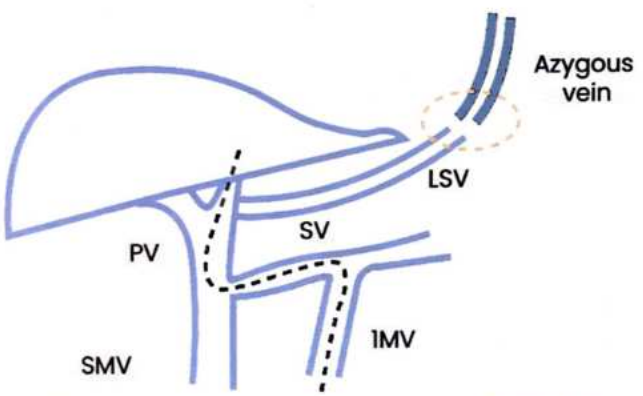
LIVER TUMORS

00:00:13

- M/C Malignancy of Liver: Metastasis
- M/C primary Malignancy of Liver: HCC
- M/C primary Malignancy of Liver in Children: Hepatoblastoma
- M/C Benign tumour of liver: Hemangioma

LIVER METASTASIS

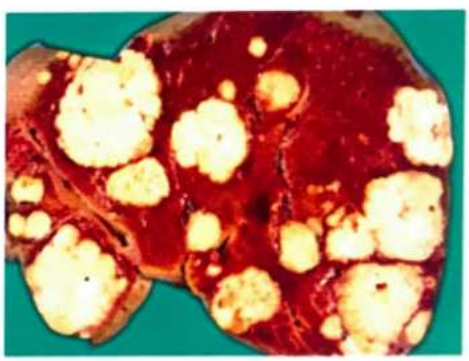
- GIT develops from foregut, midgut & hind gut
  - Foregut extends from crico pharynx to 2nd part of duodenum
  - Midgut extends from 2nd part of duodenum to 2/3rd of transverse colon
  - Hindgut from 1/3rd of transverse colon to Anorectal junction
- Blood supply of foregut: Celiac trunk
  - Celiac trunk has 3 branches
    - → Left gastric artery
    - → Splenic artery
    - → Common hepatic artery
  - All these branches have their corresponding veins which drains into portal vein directly or indirectly
- Blood supply of Midgut: Superior mesenteric artery (Superior mesenteric vein → Portal vein)
- Blood supply of Hindgut: Inferior mesenteric artery (Inferior mesenteric vein → Portal vein)
- Liver acts as a filter organ for most of GI venous drainage. So, if the blood has any malignant cells it gets filtered in liver.



Portosystemic anastomosis between LGV & AV

- Therefore, for malignancies of GIT from esophagus to rectum having hematogenous spread, the MC site of metastasis is liver
- For non-GI malignancies having hematogenous spread, the MC site of metastasis is lung.
  - Example: for Carcinoma anal canal the venous drainage is IRV, MRV→ I. Iliac vein → Common iliac → IVC → Bypass Liver → RA → RV → Lungs
  - Examples

1. CA anal canal
2. RCC
3. CA penis
4. Testicular tumor
5. Soft tissue sarcoma
6. HCC
7. Hepatoblastoma
8. Wilm'stumor
9. CA oral cavity



Liver Metastasis

- MC primary for liver metastasis: Colorectal cancer followed by CA lung
- CA lung is the MC primary for metastasis to 6 organs
  - **K** - Kidney
  - **E** - Esophagus
  - **P** - Pancreas
  - **A** - Adrenal
  - **B** - Brain (MC site of metastasis in CA lung)
  - **S** - Skin

- M/c site of metastasis in CA Lung: **B**rain > **B**one > **L**iver > **A**drenal > **L**ungs

How to remember

- **B B L A L**

- CA Breast is the MC primary for metastasis to
  - Thyroid
  - Lungs, Lumbar vertebra
  - Leptomeninges
- Metastasis to heart
  - MC primary in male – CA lung
  - MC primary in female – CA breast
- MC primary for metastasis to Spleen: Malignant melanoma
- MC primary for isolated secondaries to Spleen: CA ovary
- MC primary for metastasis to Testes: CA prostate
- MC primary for metastasis to penis: CA bladder

BONE METASTASIS

00:18:46

- MC primary for bone metastasis
  - Male – CA prostate
  - Female – CA breast
- Overall MC primary for bone metastasis CA breast > CA prostate
- CA Breast: Osteolytic> Osteoblastic
- MC primary for both Osteolytic & Osteoblastic secondaries in female: CA breast
- MC primary for Osteoblastic secondaries in male: CA prostate
- MC primary for Osteolytic secondaries in male: RCC
  - RCC has Pulsatile, Osteolytic &hypervascular secondaries
  - Pulsatile secondaries are also seen in follicular carcinoma of thyroid
- Overall MC site of bone metastasis: Thoracic vertebra (Dorsal spine)
- IOC for bone metastasis: Bone scan
  - Radioisotope SAMARIUM 153 is used for painful bony metastasis

HEMANGIOMA

00:23:40

- MC benign tumor of liver
- More common in Females and associated with OCP use
- It is of two types
  - Capillary
  - Cavernous
- Usually they are small (< 5cm)
- If size of Hemangioma is > 5cm: Giant Hemangioma
- Hemangioma increases its size by Ectasia and not by neoplasia like other tumors

Clinical features

- Usually Asymptomatic: incidentally diagnosed by radiological investigations
- In symptomatic patients: Abdominal discomfort & abdominal pain
- It is rarely associated with Kasabach - Meritt syndrome
  - Manifestations of Kasabach - Meritt syndrome
    - → Microangiopathic Hemolytic anemia
    - → Platelet trapping anemia
    - → Consumptive coagulopathy
    - → Thrombocytopenia

Diagnosis

- Hemangioma is a vascular tumor, so FNAC/Biopsy are contraindicated
- IOC for diagnosis is MRI: Shows peripheral nodular enhancement

Treatment

- TOC for Hemangioma is Enucleation

Important Information

- **Enucleation is the Treatment of choice for**
  - **Hemangioma liver**
  - **Leiomyoma esophagus (MC benign tumor of Esophagus)**
  - **Chylo-lymphatic cyst**
  - **Insulinoma head of pancreas**

FNH-FOCAL NODULAR HYPERPLASIA

00:31:33

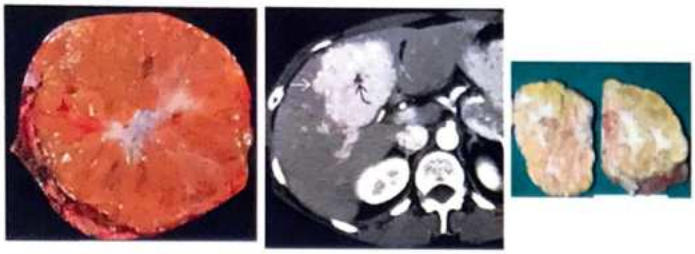
- 2nd M/C Benign tumour of liver
- More common in Females and associated with OCP use (less strong)
- Hepatic architecture is maintained in FNH

Clinical features

- Usually Asymptomatic – incidentally diagnosed

Diagnosis

- IOC is CECT
- On CECT, gives Central Stellate Scar because of central feeding arteriole with multiple peripheral branches
- On Angiography due to Abnormal Vascularity, there is Spoke Wheel / Cartwheel Pattern



Central Stellate Scar

Treatment

- Observation
- Excision in case of diagnostic uncertainty

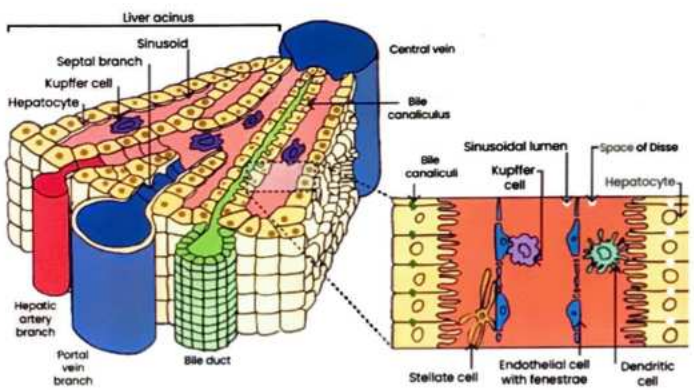
Important Information

- **Central stellate scar is also seen in:**
  - **FNH**
  - **Fibrolamellar variant of HCC**
  - **Serous cystadenoma of pancreas**
  - **Renal oncocytoma**

HEPATIC ADENOMA

00:36:04

- Benign proliferative disorder of hepatocyte
- Has Low risk of malignant transformation to HCC
- More common in Females and associated with OCP use
- Hepatic architecture is not maintained
- Poorly supported peripheral Blood vessel
  - ↑sed risk of Hemorrhage& Necrosis
  - Causes symptoms – Abdominal pain
  - High risk of tumor Rupture (in HCC 3-5%)
- Risk of Tumor rupture increases in pregnancy



Clinical features

- Most patients are symptomatic
- MC symptom – Abdominal pain
- Tumor Rupture leads to Hemoperitoneum and shock

Diagnosis

- IOC is CECT: Shows Peripheral hypervascularization

Treatment

- Excision

HEPATOCELLULAR CARCINOMA

00:42:05

Risk Factors

Cirrhosis	Metabolic disorders	Environmental factors
• HBV • HCV • Alcohol • NAFLD • PBC • Chronic active hepatitis	• Hemochromatosis • Wilson's Disease • Glycogen Storage Disorder • α1 AT deficiency • Porphyria cutanea tarda • Citrullinemia • Orotic aciduria • Alagille's syndrome	• Cigarette Smoking • Anabolic steroids • Aflatoxin • Thorotrast: also ↑se risk of ○ Cholangiocarcinoma ○ HCC ○ Angiosarcoma ○ Hepatic Fibrosis

Risk factors for Angiosarcoma

- **T** - Thorotrast
- **A** - Arsenic
- **P** - PVC

How to remember

- **TAP Angio**

HCC

- MC 1° Malignancy of liver M >> F
- Common in Male, 5th – 6th decade
- Max. incidence in Asia & Sub-Saharan Africa
- MCC of HCC – HBV
- HBV induced HCC is decreasing because of Vaccination
- HCV induced HCC-increasing in western countries because of
  - Blood transfusion
  - Sexual transmission

- Associated with HIV

Pathological types of HCC

1. Hanging: best prognosis
2. Pushing
3. Infiltrative: MC, Worst prognosis

- HCC has propensity for Vascular Invasion (also in RCC) → Tumor invades from one branch of portal vein to other causing "Multicentric & Bi-lobar" spread (in 75%-80
- This happens because PORTAL VEINS are valveless
- Valveless veins are

I - IVC
P - PV
S - SVC
B - Batson plexus
D - Dural venous sinuses

How to remember

- IPSBD

Clinical features of HCC 00:54:44

- M/C Symptom: Abdominal pain > Weight loss
- Significant weight loss definition
  - 5% weight loss in 1 months
  - 10% weight loss in 6 months
  - 20% → 1 year

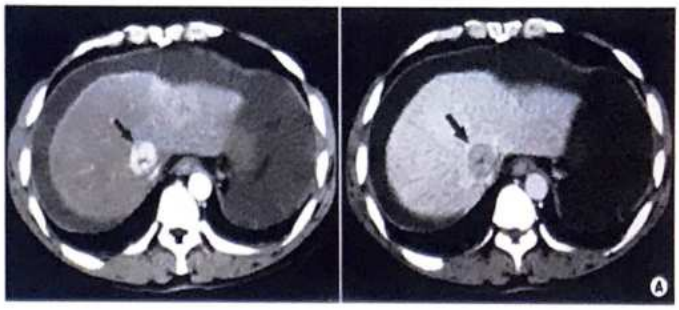
- Other symptoms
  - Anorexia, fatigue
  - Jaundice (10%)
  - Tumour Rupture (3-5%)
  - Hyper vascular → Audible BRUIT (20-25%)
  - Paraneoplastic Manifestation
    - → Hypercholesterolemia (M/C)
    - → Hypoglycemia (2ndM/C)
    - → Erythrocytosis
    - → Hypercalcemia

Tumour Markers

- AFP > 20 ng/ml (seen in 70% of HCC)
- ↑se in PIVKA-2 (Protein induced by Vitamin-K Absence-2)

Diagnosis

- First investigation done in a suspected case of HCC – USG
- IOC – Triple Phase CT (Arterial Hypervascularization with Venous Washout)
- Investigation of choice for screening – USG



Arterial Hypervascularization with Venous Washout

Important Information

- IOC HCC – Triple phase CT
- Cholangiocarcinoma – MRI +MRCP
- CA Gallbladder – CECT
- CA Pancreas – CECT

STAGING FOR HCC 01:03:20

1. OKUDA Classification (MC used)
- **B** - Bilirubin
- **A** - Albumin
- **T** - Tumour size
- **A** - Ascites

2. CLIP (Cancer Liver Italian Program)
- **P** - Portal Vein Thrombosis
- **A** - AFP
- **C** - Child Turcotte Pugh Score (CTP Score)
- **T** - Tumour Extension

3. CUPI (Chinese University Prognostic Index)
- **B** - Bilirubin
- **A3** - AFP, Ascites, ALP
- **T** - TNM Staging
- **S** - Symptoms

Previous Year's Questions

Q. What is the Child-Pugh class for patient who has a serum bilirubin of 2.5 mg/dl, serum albumin of 3 g/dl, INR of 2 along with Mild ascites but no encephalopathy? (NEET - Jan - 2020)

A. CP class A
B. CP class B
C. CP class C
D. CP class D

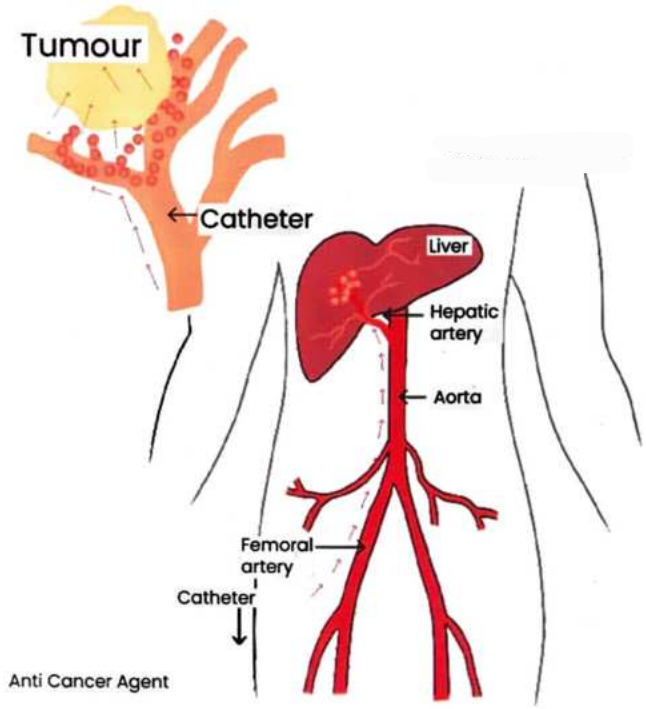
MANAGEMENT

01:06:55

- BCLC (Barcelona clinic for Liver Cancer): This Criteria is based on OKUDA Staging & patients performance status.
- For unresectable tumor – Palliation
- For Resectable tumor
  - With adequate hepatic reserve: Resection
  - With inadequate hepatic reserve: Transplantation
- Milan's criteria for Liver transplantation in HCC

1. Single tumor<5cm in size
2. Multiple tumors (NO. 2-3) & size <3cm
3. No Extrahepatic/ Vascular spread

- If a person fulfils this criterion, then 5-year survival in 70%
- Methord of palliation for unresectable tumors
  - Percutaneous ethanol injection
  - Percutaneous acetic acid injection
  - Radiofrequency ablation
  - Microwave ablation
  - Cryoablation (liquid nitrogen used)
  - TACE (Trans Arterial Chemo Embolization)
    - → Only palliative method that has Survival advantage
    - → With local delivery of chemotherapy agent-it obstructs the hepatic artery giving Survival advantage (HCC is exclusively supplied by hepatic artery)
    - → Chemotherapy agents used
- Cisplatin
- Doxorubicin



- For Advanced & metastatic HCC –SORAFENIB

Other Drugs used for chemotherapy

1. Imatinib
   - DOC for GIST & CML
   - 1st line agent for DFSP
2. Sunitinib
   - DOC for Imatinib resistant GIST
   - 1st line - for Advanced/Metastatic RCC
   - Refractory and Metastatic Breast Ca
3. Regorafenib
   - Third line Agent for GIST
4. Vandetanib
   - Only drug (US-FDA approved) for Advanced and progressive Medullary Thyroid Ca
5. Lapatinib
   - 2nd Line Agent for HER – 2 neu positive Breast Cancer.
6. Geftinib
   - Used for "Adenocarcinoma Lung" in female who are non-smokers

FIBROLAMELLAR VARIANT OF HCC

01:21:47

- SE Asia / India: F>M
- World: F=M
- Well Circumscribed and Non – Encapsulated Tumour
- Has fibrous stroma with lamellar structures
- Has slow growth and present in Young Patient.
- Not Associated With
  - HBV Infection
  - HCV Infection
  - Cirrhosis
- Good Prognosis
- Pathology of Fibrolamellar variant of HCC
  - Has fibrous stroma with Lamellar structure
  - AFP is normal, but raised Neurotensin and B12 binding globulin
- Diagnosis
  - IOC: CECT, shows Central stellate scar
  - Rx: In Majority of Cases it has good prognosis and tumour is Resectable.

HEPATOBLASTOMA

01:25:35

- M/C 1° Malignancy of Liver in children
- LBW (Low Birth rate) increases the risk.
- Associated with

- FAP - Familial Adenomatous Polyposis
- BWS - Beckwith Wiedemann Syndrome

- Not associated with
  - HBV
  - HCV
  - Metabolic disorders
  - Cirrhosis
- AFP raised in 90% patients

Clinical features

- Most patients are <18 months and all patients are <3yrs of Age.
- M/C presentation - Asymptomatic palpable l/A Mass
- Characteristic Laboratory Abnormality – Thrombocytosis
- M/C route of spread – Hematogenous
- M/C Site of Mets – Lungs

Diagnosis

- IOC for diagnosis - Biopsy
- Radiology IOC – CECT

Management

- Resection
- But in cases of Metastatic Disease
  - Neo Adjuvant Chemotherapy (NACT) + Surgery is done
  - Chemotherapy agent used
    → Vincristine
    → Cisplatin
    → 5-FU
  - Prognosis: Good
  - >50% of pts. – Pulmonary metastasis disappears after chemotherapy

8 PORTAL HYPERTENSION

00:00:15

- Normal portal pressure: 5-10 mmHg or 10-15 cm of saline
- Definition of portal HTN: Pressure more than 10 mmHg
- Universal manifestations of portal HTN
  1. Esophageal Varices
  2. Splenomegaly

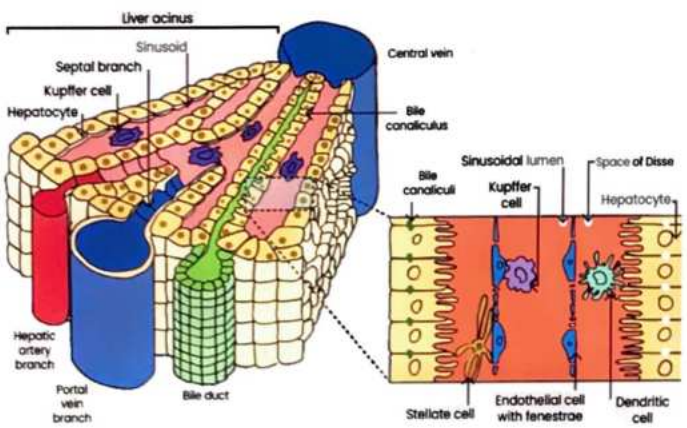
Important Information

- **Esophagus variceal bleeding occurs when pressure is >12 mmHg**
- **Variceal formation when pressure >10 mm Hg**

- Most common cause of portal HTN worldwide – Cirrhosis
- M/C/C of portal HTN in children: Extra hepatic portal venous obstruction (EHPVO)
- Causes of increased pressures
  1. Increased resistance
  2. Increased flow

ANATOMY OF LIVER

- The region where blood from portal vein & hepatic artery mixes is known as Sinusoid
- Sinusoid is surrounded by hepatocytes, Kupffer cells & bile canaliculi
- **Anything that causes portal HTN**
  - Before sinusoid → pre-sinusoidal
  - After sinusoid → post – sinusoidal
  - In sinusoid → Sinusoidal
  - Outside liver → Extra hepatic
  - Inside liver → intra hepatic



CAUSES OF PORTAL HTN

00:06:10

- Pre sinusoidal extrahepatic
  - Splenic vein thrombosis
  - Splenic AV fistula
  - Splenomegaly

- Pre sinusoidal intrahepatic
  - Schistosomiasis (MC)
  - Sarcoidosis
  - Nodular regenerative hyperplasia
  - Graft vs. host disease

- Sinusoidal causes: causes of cirrhosis are included, which includes
  - HBV, HCV infection
  - Alcohol
  - PBC (10 biliary cirrhosis)
  - PSC (10 Sclerosing cholangitis)

- Post sinusoidal intrahepatic
  - VOD (Veno-occlusive disease)

- Post sinusoidal extrahepatic
  - Budd Chiari syndrome
  - IVC obstruction
  - Right heart failure
  - Constrictive pericarditis

Important Information

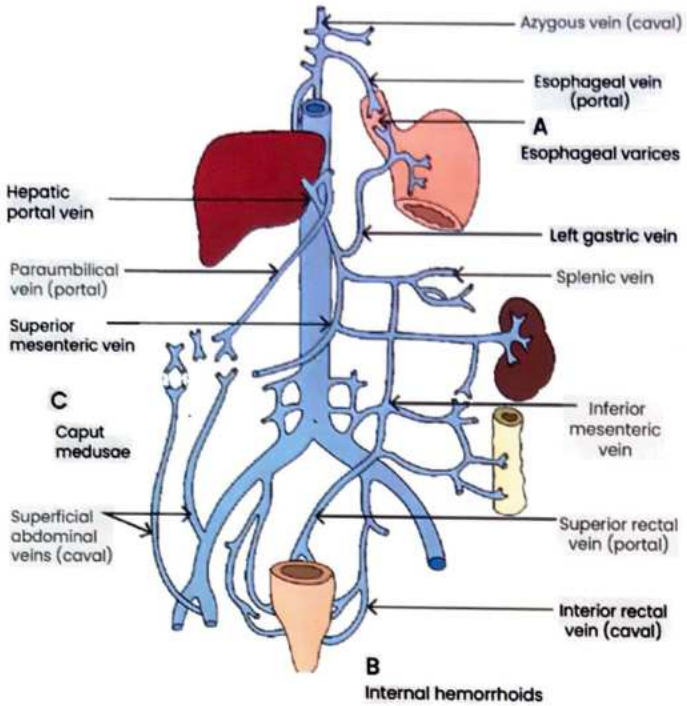
- **USG used for – Anatomy**
- **Doppler – flow**
- **Duplex – both flow & Anatomy**

Diagnosis

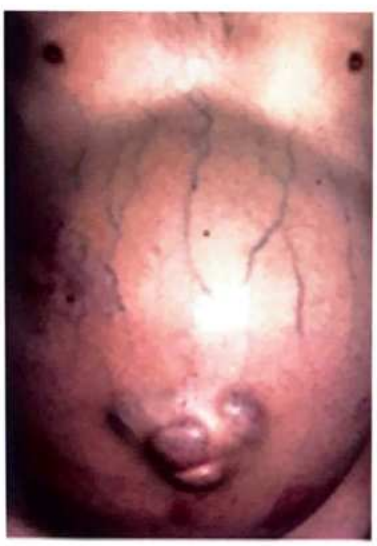
- Doppler is IOC for diagnosis of
  1. Portal HTN
  2. Testicular torsion
  3. Varicocele

- Duplex is IOC for diagnosis of
  1. Varicose vein
  2. DVT

PORTAL SYSTEMIC ANASTOMOTIC SITES

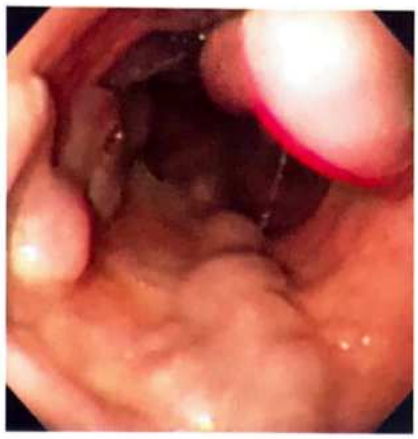


- Between LGV (coronary vein) & Azygous vein -Esophageal varices
- Between superior, medial & inferior rectal vein- Rectal varices
- Between superior epigastric vein, inferior epigastric vein &paraumbilical vein k/a Caput medusae
- Audible venous hump at caput medusae is known as Cruveilhier-Baumgarten murmur



- Most common cause of death in cirrhosis: Hepatic failure >variceal bleeding

VARICEAL BLEEDING



- M/C site – lower 3cm of esophagus
- Coffee colored bleeding (as venous blood is mixed with acid in stomach)
- **Management**
  - As patient goes to shock after 2-3 episodes of variceal bleed
    - → Put two large bore IV cannulas
    - → Start IV fluid
    - → Fluid of choice – RL
    - → Cut off BP – 100 mmHg
    - → Cut off Hb – 8 gm%
  - Indication of blood transfusion –Hb<8gm%

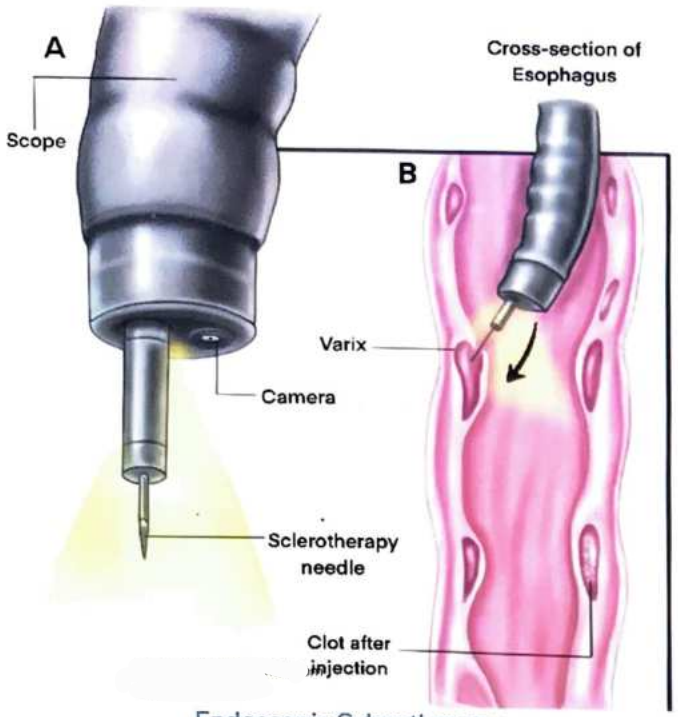
- Pharmacotherapy
  - Drug of choice for controlling bleeding-Octreotide >Terlipressin + nitrates
  - Gastric lavage: room temperature saline

Important Information

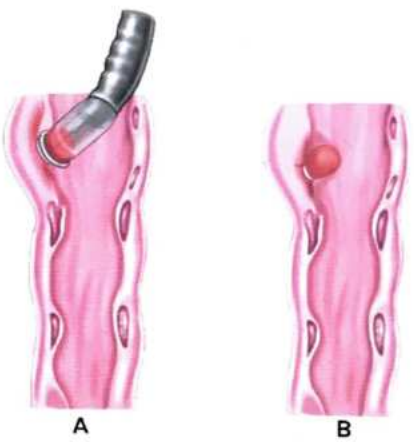
- Cold saline should not be used as it Cause
- hypothermia. Causing (platelet dysfunction) reversible coagulopathy

- 1st Invenstigation in any upper GI bleed – Endoscopy
  - Endoscopy: EVL (Endoscopic variceal ligation) > Endoscopic sclerotherapy

→ Endoscopic sclerotherapy: Easy to perform but increased risk of esophageal perforation



Endoscopic Sclerotherapy



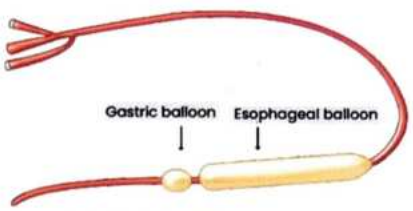
Endoscopic Variceal Ligation

- IV antibiotics is given for 7 days
  - ↓ risk of infections
  - ↓ duration of hospitalization
  - ↓ risk of rebleeding
- If bleeding is not controlled, then
  - Repeat endoscopy
  - Surgical intervention – TIPPS / shunt
- IF 2 attempts of endoscopy failed (failed endoscopy) then we go for surgical intervention like TIIPS / shunt

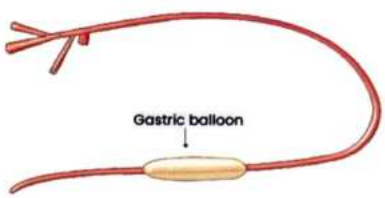
For transportation of pts, from rural areas

00:32:40

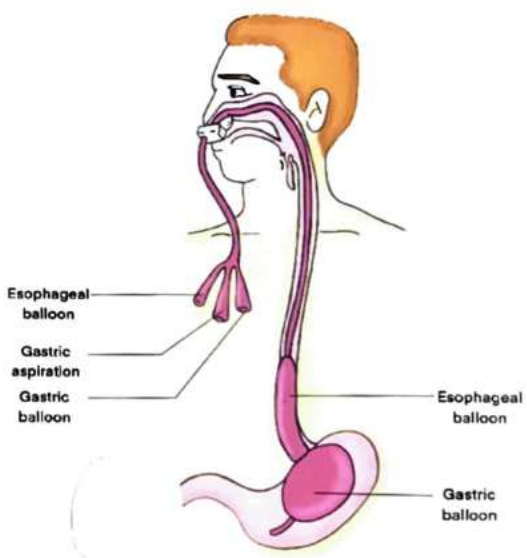
- Sengstaken Blakemore tube used
  - It is a triple lumen double balloon tube
  - Control variceal bleeding during transportation
  - First gastric balloon is inflated with 50 ml of air then esophageal balloon is filled with 250 ml of air.
  - Only air is used to inflate balloon
    - → Water
    - → Saline } contraindicated
    - → Contrast
  - 50 ml + 250 ml = 300 ml Air
  - MC complication – Aspiration
  - Max pressure used →35 – 40 mmHg
  - Every 12 hourly used esophageal balloon should be deflated to prevent esophageal ischemia



Sengstaken Blakemore tube



Linton Nachlas tube

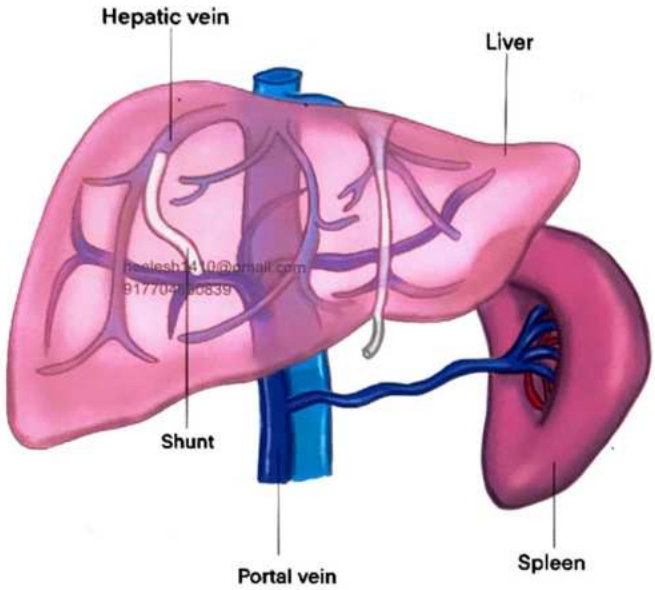


Sengstaken Blakemore tube

- Linton's Nachalas tube
  - It is a single balloon tube
  - Linton's tube capacity →400 – 700ml
  - Use: - isolated gastric varices

TIPSS (TRANS JUGULAR INTRAHEPATIC PORTO SYSTEMIC SHUNT) 00:37:37

- Nonselective shunt
- Stent is inserted between right hepatic vein & right branch of portal vein
- For cannulation right internal JV is preferred
- For cannulation of portal vein, Rosch needle is used
- Stent name - VIATORR



Complications of TIPS

1 Encephalopathy (due to NH3) (M/C)
2. Stent stenosis
3. Stent thrombosis

Contraindications of TIPSS

Absolute	Relative
• Right heart failure • Pulmonary HTN • Hepato pulmonary syndrome • Polycystic liver disease	• Portal vein thrombosis • Hypervascular liver tumor • Encephalopathy

Indications of TIPSS

1. Prevention of acute variceal bleeding (MC)
2. Refractory variceal bleeding
3. Refractory ascites
4. Refractory hepatic hydrothorax
5. Hepatorenal syndrome
6. Budd Chiari syndrome
7. Veno-occlusive disease
8. Portal hypertensive gastropathy

SHUNTS 00:46:24

- Types of shunts
  1. Non selective
  2. Selective
  3. Partial

Non-selective shunts

1. Eck fistula
2. Side to side porta-caval shunt (SSPCS)
3. Inter position graft
   a. Porto caval
   b. Mesocaval
   c. Meso renal
4. Proximal splenorenal shunt (PSRS)/Linton's shunt

Selective shunt

1. DSRS (Warren shunt) – distal splenorenal shunt
2. INOKUCHI shunt

PARTIAL SHUNT 00:49:20

- Any shunt with diameter < 10 mm

Non-selective shunts

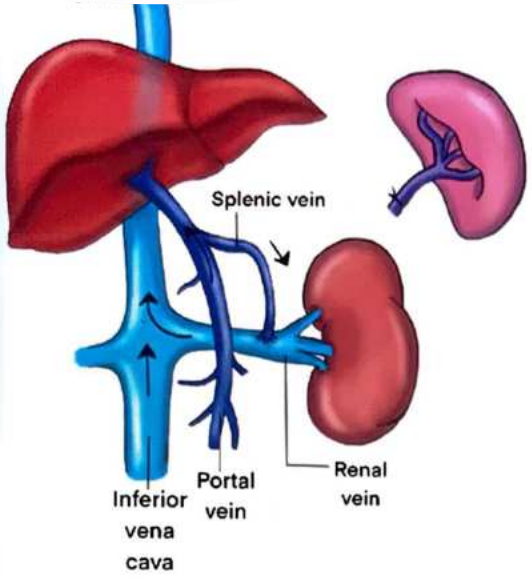
1. Eck fistula
- End to side portocaval shunt
- Portal vein is divided
  - Proximal part is ligated
  - Distal part is anastomosed with IVC.
- No blood flow from PV – liver
- Increased risk of hepatic ischemia
- Historical importance only
- Obsolete shunt

2. Side to side portocaval shunt (SSPCS)
- Portal vein is divided into Proximal & distal part – both are anastomosed with IVC
- MC performed shunt
- Shunt of choice for

a. Refractory ascites
b. Budd Chiari syndrome
c. Veno-occlusive disease

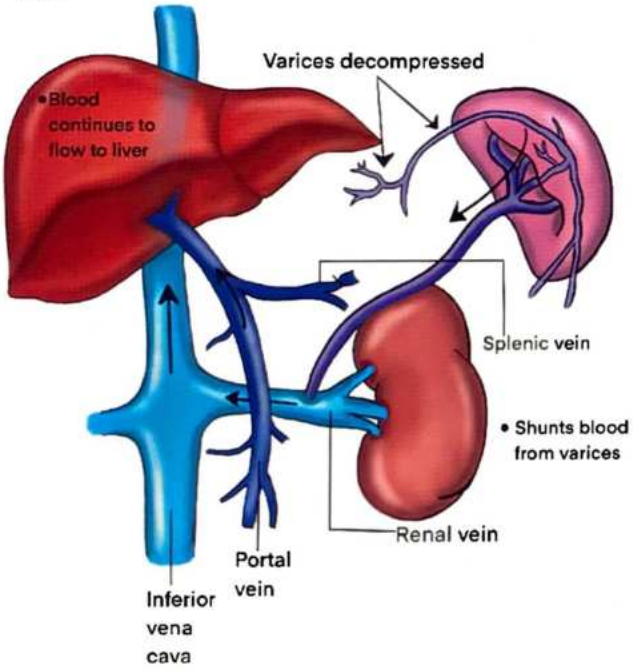
3. Interposition graft
- Types
  - Porto canal – between portal vein & vena cava
  - Mesocaval– between portal SMV & vena cava
  - Mesorenal– between SMV & splenic vein

4. PSRS / Linton's shunt
- Performed after splenectomy
- Suture proximal part of splenic vein into renal vein

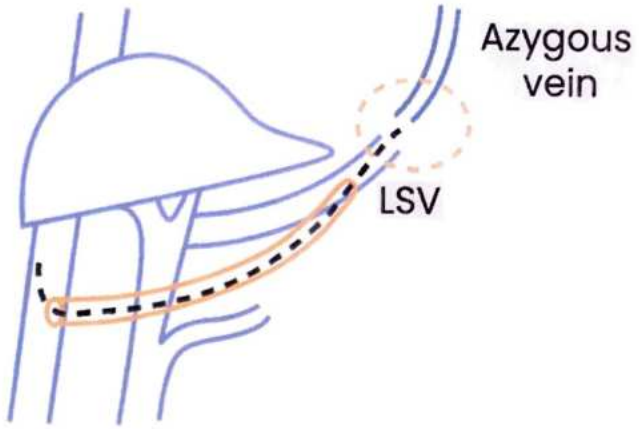


SELECTIVE SHUNT

1. DSRS / warren shunt
- Distal Spleno renal shunt (warren shunt)
- Type of selective shunt
- Distal part of splenic vein is divided & sutured with renal vein

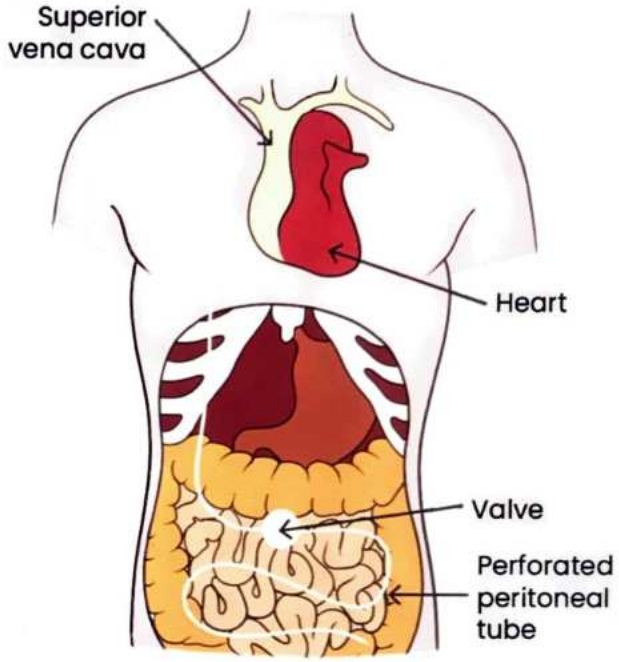


2. Inokuchi shunt
- IP graft between left gastric vein (coronary vein) & IVC is done.
- Interposition graft



PERITONEO-VENOUS SHUNT

01:02:27

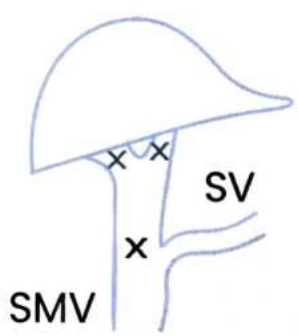
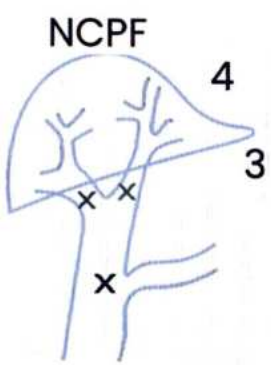


- Shunts used
  1. Denver
  2. LE-VEEN
  3. Minnesota
- Used in patients having refractory ascites
- Valves are present in this shunt so that only unidirectional flow should be there
- Preferred vein – Right Internal Jugular Vein > Superior vena cava

NON-CIRRHOTIC PORTAL HTN

- In these patients there will be
  - No Cirrhosis
  - No Ascites
  - No jaundice
  - No Encephalopathy
- Due to portal HTN
  - Variceal bleeding: M/c presentation and M/c cause of death
  - Splenomegaly
- It includes
  - EHPVO (Extra Hepatic Portal Venous Obstruction)
  - NCPF (Non-Cirrhotic Portal Fibrosis)
- Similarities Between EHPVO and NCPF
  - No ascites
  - No jaundice
  - No encephalopathy
  - No hepatic failure
  - Varices present

DIFFERENCE BETWEEN EHPVO AND NCPF

EHPVO	NCPF
	

• 1st and 2nd order branches are involved
• M/C site of obstruction: Confluence of splenic vein and Superior mesenteric vein
• Seen in 1-2nd decade
• Splenomegaly is less common (Mild to Moderate)
	• Involvement of 3rd and 4th outer branches.
	• Seen in 2nd-4th decade
	• Substances that increases the risk of NCPF
	  o V - Vinyl chloride
	  o A - Arsenic
	  o C - Copper
	• Splenomegaly is more common (Moderate to Massive)

BUDD CHIARI SYNDROME

01:11:59

- Hepatic venous outflow obstruction
- Cause: HVT or IVC obstructions
- Etiology: Polycythemia Vera (has hypercoagulability – cause Hepatic venous thrombosis (HVT)
- M/C/C is western countries – HVT
- In India, China, Japan, south Africa – IVC obstruction

Clinical features

- Characteristic triad
  - **As - A**scites
  - **H - H**epatomegaly
  - **A - A**bdominal pain
- Other features include
  - Abdominal pain
  - Ascites
  - Jaundice
  - Encephalopathy
  - Anorexia and fatigue
- In BCS caused by HVT, caudate lobe is spared (as it has its own venous drainage).
- In chronic case, liver is atrophied& caudate lobe is hypertrophied giving Central hot spot sign on scintigraphy

Diagnosis

- IOC
  - Venography (if problem in hepatic vein) – shows spider web collaterals (in BCS)
  - Venocavagraphy (if problem in IVC)

Important Information

- In Buerger's disease /Thromboangiitis obliterans investigation of choice is Angiography
- On Angiography: Cork screw collaterals are seen

Treatment 01:19:19

- Thrombolysis (window period 2 – 3 weeks)
- Anticoagulants
- Most patients present to hospital only after 2 – 3 weeks. Hence thrombolysis is not useful
- In HVT
  - SSPCS can be performed
- In IVC obstruction
  - Trans cardiac membranotomy (or)
  - Excision with grafting (in stenosis)

- In IVC obstruction with HVT
  - SSPCS + Cavo-atrial shunt
- In hepatic failure
  - Liver transplantation (TOC)

VENO-OCCLUSIVE DISEASE

01:23:41

- Hepatic venous outflow obstruction
- Caused by endothelial sclerosis of sub lobular hepatic vein or venules.

Etiology

- M/C/C in western countries – BM transplantation
- Chemotherapy agents
  - C - Cytarabine
  - T - Thioguanine
  - G - Gemtuzumab
  - O - Ozogamucin
- Immunosuppressive agents: Azathioprine
- Consumption of Bush Teas
  - Crotalaria and scenacio
  - Contains Pyrrolizidine Alkaloid

Clinical features

- T - Tender hepatomegaly
- H - Hyperbilirubinemia
- R - Retention of fluids

Diagnosis

- IOC - Biopsy

Management

- Only hepatic venous outflow obstruction - SSPCS
- If patient has hepatic failure - Liver transplantation
- Defibrotide– improve survival

CLINICAL QUESTIONS

Q. A 22 year old male presented with repeated episodes of hematemesis. There is no history of jaundice or liver "decompensation. On examination the significant findings include massive splenomegaly and presence of esophageal varices. There is no ascites or peptic ulceration. The liver function tests are normal. The most likely diagnosis is:-

A. Extrahepatic portal venous obstruction
B. Non-cirrhotic portal fibrosis
C. Cirrhosis
D. Hepatic venous outflow tract obstruction

Answer: B

Solution

Non-Cirrhotic Portal HTN

Types

- EHPVO (Extra Hepatic Portal Venous Obstruction)
- NCPF (Non-Cirrhotic Portal Fibrosis)

Similarities Between EHPVO and NCPF

- No ascites
- No jaundice
- No encephalopathy
- No hepatic failure
- Varices present
- Splenomegaly

Difference Between EHPVO and NCPF

EHPVO	NCPF

• 1st and 2nd order branches are involved
• M/C site of obstruction - Confluence of splenic vein and Superior mesenteric vein
• Seen in 1-2nd decade
• Splenomegaly is less common (Mild to Moderate)
	• Involvement of 3rd and 4th outer branches.
	• Seen in 2nd-4th decade.
	• Substances that increases the risk of NCPF
	  ○ **V** - Vinyl chloride
	  ○ **A** – Arsenic
	  ○ **C** – Copper
	• Splenomegaly is more common (Moderate to Massive)

9 GALLBLADDER

BASIC ANATOMY OF GIT

00:00:16

- 4 layers of GIT
  - Mucosa: has 3 layers
    - → Epithelium
    - → Lamina propria
    - → Muscularis mucosa
  - Submucosa
  - Muscularis propria
    - → Inner circular
    - → Outer longitudinal
  - Serosa

- There are two kinds of plexus in GIT

Auerbach plexus	Meissner's plexus
• Peristaltic function • Location between inner circular & outer longitudinal layer	• Villous motility & intestinal secretion • Location between inner circular layer & muscular mucosa

Important Information

- In Esophagus there is no serosa. No villi, no secretions, no Meissner's plexus
- Unique feature of Esophagus-Lymphatics in Lamina propria
- Strongest layer of GIT-Submucosa (Catgut-prepared from submucosa of sheep's ileum)

- Muscularis mucosa & submucosa are missing in gall bladder
- Maximum absorptive capacity – jejunum
- Maximum absorptive capacity per unit surface area - gall bladder

GALL BLADDER

00:07:05

- Maximum absorptive capacity seen in jejunum
- Maximum absorptive capacity per unit surface area: Gall bladder
- Pyriform in shape
- Sea green in color
- Thin and elastic
- 30 – 50 ml capacity
- Lined by tall columnar epithelium

Functions of GB

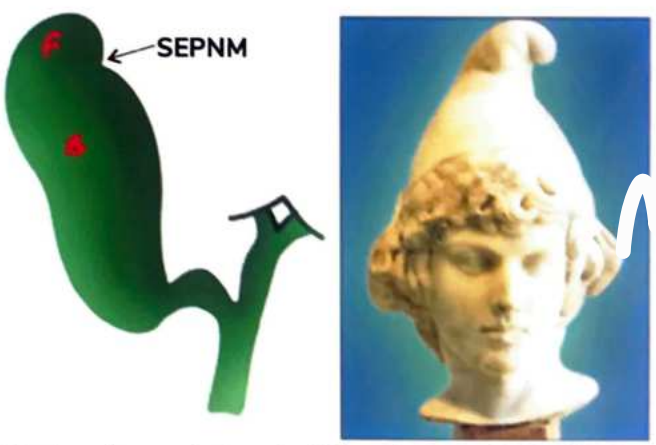
- Storage
- Concentration: 5 – 10 times
- Acidification of bile

Anatomy of cystic duct

- In the cystic duct there are Mucosal spiral folds
- Spiral valve of Heister
- And there's an ill-defined sphincter k/a Sphincter of Lutkans

Parts of GB

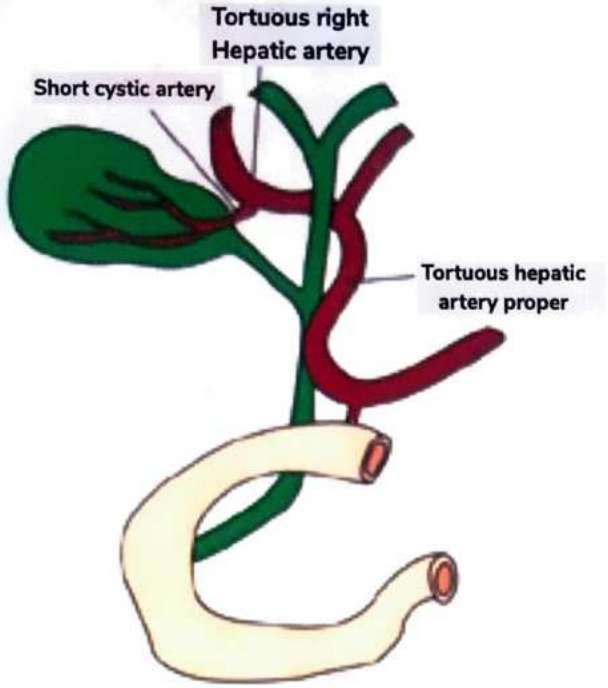
1. Fundus
2. Body
3. Neck: contains tubulo-alvelolar glands which secrets Mucus



- Hartman's pouch: Acquired diverticulum of infundibulum or neck at GB
- M.C. congenital anomaly of GB: Phrygian CAP
  - Characterised by infolding of septum b/w Fundus & Body
  - Functions of GB are normal
  - Cholecystectomy not indicated

CATERPILLAR'S TURN / MOYNIHAN'S HUMP

- Most dangerous anomaly
- Hepatic Artery takes a tortuous turn at the origin of CD
- Tortuous RHA with short cystic artery



Previous Year's Questions

Q. Which of the following is true regarding Delta bilirubin? (JIPMER - Nov - 2018)

A. Found in hemolytic jaundice
B. Has shortest half life
C. Bound to albumin
D. Excreted in urine

GALL STONES

00:15:12

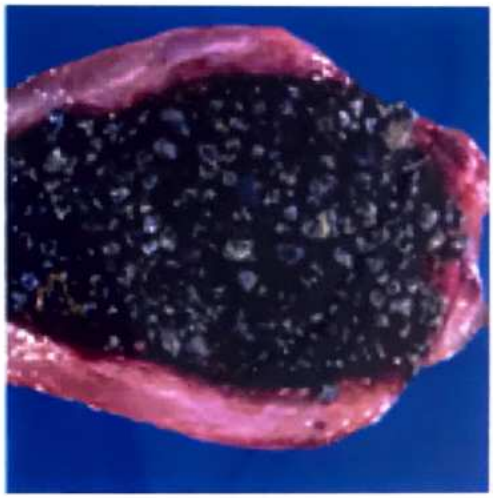
1. Cholesterol gall stone

- Most common type of gall stone: cholesterol gall stone
- Cholesterol gall stone formation requires 3 mandatory factors
  - Lithogenic bile
    - → Increased biliary cholesterol
      - Obesity
      - High cholesterol intake
      - Clofibrate therapy
    - → Decreased Bile acid
      - Ileal resection (as terminal ileum is involved in B12 reabsorption & Enterohepatic circulation of bile salt)
      - Ileal disease
      - Bile acid sequestrants → cholestyramine & Colestipol
      - CYP7A – 1 gene mutation
    - → Decreased Lecithin
      - MDR – 3 gene mutation
  - Nucleation
    - → Promoting factors are
      - Infection
      - Mucin glycoproteins
  - Stasis: Promoting factors are
    - → Prolonged fasting
    - → Prolonged TPN required
    - → Pregnancy
    - → Octreotide intake
    - → OCP's
    - → Massive burns

- Composition of cholesterol Stones: Crystalline cholesterol Monohydrate

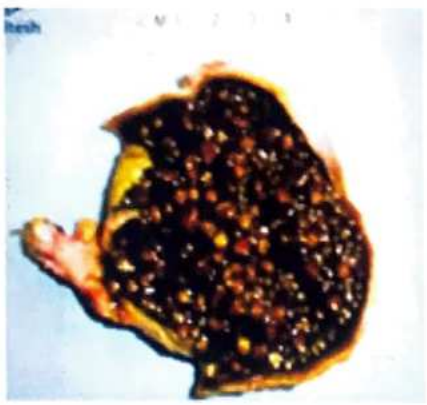
2. Pigmented gall stones

- They are of 2 types
  - Black
  - Brown
- Black pigmented stones



- Insoluble bilirubin pigment-polymer of calcium phosphate & calcium bicarbonate
- Properties
  - → Hard
  - → Radiopaque
- Risk factors
  - → Chronic hemolytic conditions
  - → Hereditary spherocytosis
  - → Prosthetic heart valves
  - → Gilbert syndrome

- Brown pigmented stones



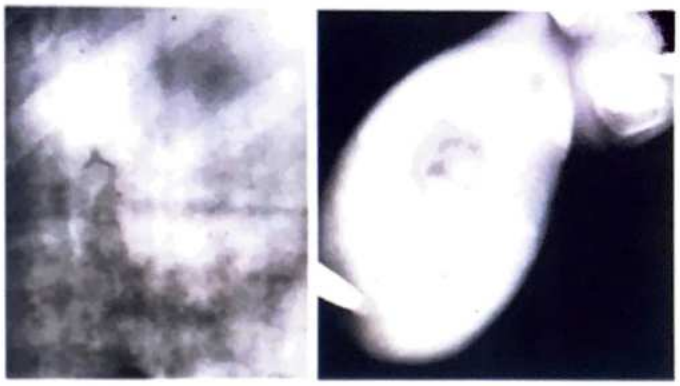
  - Composed of
    - → Calcium bilirubinate
    - → Calcium palmitate
    - → Calcium stearate
  - MC in CBD
  - Rare in gall bladder
  - MC in developing countries because of increased risk of worm infestation like ascaris, Clonorchis sinensis

PATHOPHYSIOLOGY

- Dead product in CBD (dead worms trapped in CBD).
  ↓
- Infection by E. coli & klebsiella
  ↓
- β-glucuronidase is produced
  ↓
- Converts conjugated → unconjugated bilirubin
  ↓
- Brown stone are produced

Commonly asked questions

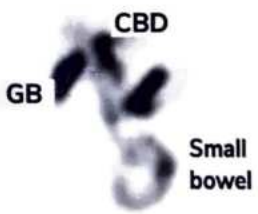
- MC type of gall stone worldwide: Mixed > Cholesterol stones
- MC type of gall stone in Asia: Pigmented stones (combined incidence of black & brown)
- Gall stones having triradiate fissure known as Mercedes Benz sign
- Gall stones having Biradiate fissure known as Sea gull sign

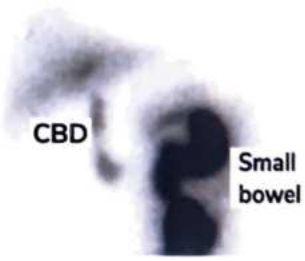


Investigation

- Investigation of choice for
  - Gall stone: Ultrasound
  - Acute cholecystitis: Ultrasound
  - Acute acalculous cholecystitis: Ultrasound
  - Chronic cholecystitis: Ultrasound

- Gold standard investigation for diagnosis of acute cholecystitis: HIDA SCAN
  - Dx. criteria for acute cholecystitis in HIDA scan: Non - visualization of GB





Important Information

- A fat fertile flatulent female of forty, complaining of pain in right upper quadrant or epigastrium after taking fatty food is biliary colic.
- It is of
  - Short duration (4-6 hours)
  - Not associated with fever
  - Usually relieved on its own

ACUTE CHOLECYSTITIS

00:43:38

- Characterized by a triad of
  - Right upper quadrant pain
  - Fever
  - Leukocytosis
- Minimum duration 24 hour
- Not relieved on its own
- When right 9th costal cartilage is pressed there is catch in inspiration & this is known as Murphy's sign / Naunyn's sign
- Hyperesthesia at inferior angle of right scapula is BOA's sign
- Tokyo guidelines used for severity grading
- Diagnosis
  - Investigation of choice is Ultrasound (> 4mm thickness of GB wall)
  - Gold standard investigation – HIDA scan

- **Treatment**
  - Patient presents within 72 hours of attack: Conservative management followed by in hospital or same siting cholecystectomy
  - After 72 hours of patient presenting, then: Conservative management followed by interval lap cholecystectomy (after 4 – 6 weeks)

MEDICAL MANAGEMENT OF GALL STONE

00:50:38

- UDCA – Ursodeoxycholic acid
- CDCA – Chenodeoxycholic acid
- Mechanism of action

They inhibit HMG–Co–A reductase (rate limiting enzyme)

↓

Decrease cholesterol synthesis

↓

Dispersion of cholesterol occurs by physio-chemical means

- Indications for medical management
  - For cholesterol stones
  - Size < 10mm
  - Non- Acute symptoms
  - Functioning GB
- Medical management is not usually recommended because of
  - Long duration of treatment
  - Increased cost
  - High recurrence

PROPHYLACTIC CHOLECYSTECTOMY

00:53:44

- **Indications**
  - Heart transplant recipient: Cyclosporine is given that increases the risk of gall
  - Lung transplant recipient: Cyclosporine is given that increases the risk of gall stone
  - Prolonged TPN requirement
  - Biliopancreatic diversion
  - Non-functioning Gall bladder
  - Trauma to gall bladder
  - Chronic typhoid carrier
  - Gall Stone ≥ 3.0cm (>2.5cm)
  - Adenomatous polyp with stone
  - Children with Hemoglobinopathy
  - Incidentally detected gall stone during elective surgery
  - Porcelain gall bladder
  - Gall stone in the relative of carcinoma gall bladder patient
- DM is not indication for prophylactic cholecystectomy: because incidence rate is similar to normal population

Absolute contraindications at lap cholecystectomy

1. Unable to tolerate GA
2. Refractory coagulopathy
3. Suspicion of carcinoma

Important Information

- Most common organism for emphysematous cholecystitis: Clostridium perfringens (anaerobe)
- 2nd most common organism for emphysematous cholecystitis: E. Coli (Aerobe)
- What is the most common organism for emphysematous pyelonephritis: E. coli (aerobe)
- Most common organism for Xanthogranulomatous pyelonephritis: Proteus associated with staghorn calculi
- Xanthogranulomatous cholecystitis is caused by: Rupture of Rokitansky Aschoff sinuses → cause bile leak → Xanthogranulomatous cholecystitis

EFFECTS OF GALL STONES ON VARIOUS ORGANS

01:05:00

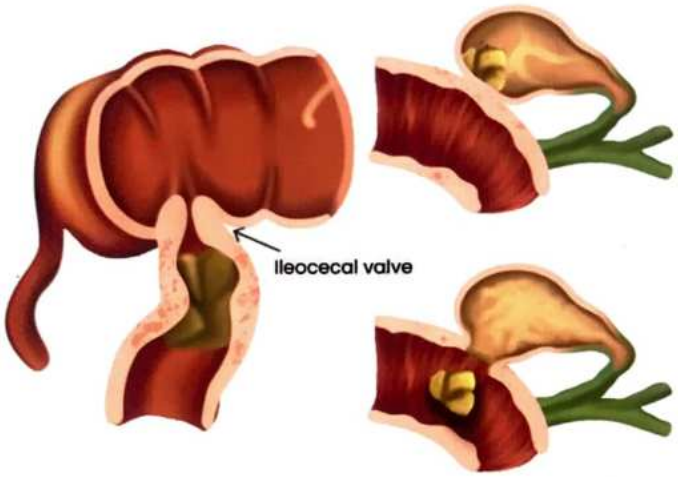
Gall bladder	CBD & Pancreas	Small intestine
• Asymptomatic • Acute cholecystitis • Chronic cholecystitis • Mucocele • Empyema • Necrosis • Perforation • Carcinoma GB	• Jaundice • Acute pancreatitis	• Gall stone ileus

GALL STONE ILEUS

01:06:51

- Misnomer: Characterised by mechanical obstruction
- More common in elderly (> 70 years)
- Have single large stone
- Asymptomatic
- Most common site of fistula: Cholecysto duodenal
- 2nd most common site of fistula – Cholecysto cholic
- MC site of obstruction → Terminal Ileum

Pathophysiology



- Large stone in GB →Causes inflammation and the erosion of GB wall leads to fistula formation between GB & Duodenum
- Stone moves to GIT & cause obstruction in its narrowest part (terminal ileum) causing
  - Small bowel obstruction
  - Ectopic gall stone
  - Pneumobilia

  } Plain x-ray triad K/a
  Riegler's triad

Sign & symptoms of small bowel obstructions

- Colicky pain
- Multiple episodes if bilious vomiting & Non passage of feces

Diagnosis

- X-Ray – dilated bowel loops with multiple air fluid levels
- Ultrasound – gall bladder empty detects presence of air

Treatment

- Enterotomy & removal of obstruction
- Cholecystectomy is performed only in young & stable pts.

ACALCULOUS CHOLECYSTITIS

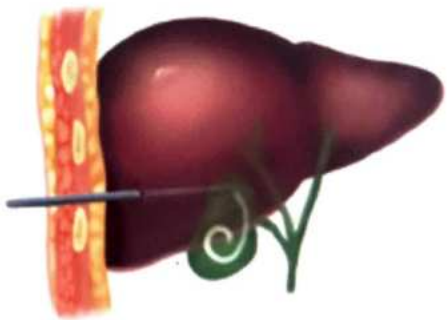
01:15:05

- Inflammation of GB in absence of gall stone
- Two important factors
  - GB stasis
  - GB ischemia
- Predisposing factors
  - Prolonged TPN requirement
  - Prolonged hospitalization
  - Prolonged ICU stays
  - Long duration surgeries-CABG, THR (Total Hip Replacement) / Aneurysm Repair)
  - Massive burns
  - Bacterial infection
    - → **S**- Streptococcus
    - → **L**- Leptospira
    - → **V**- V. cholera

Investigation

- Investigation of choice – Ultrasound
- Gold standard investigation – HIDA scan

Treatment



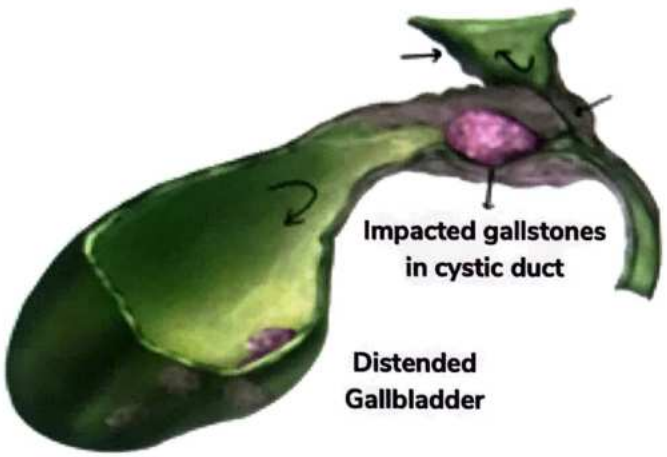
Percutaneous cholecystostomy

- Lap cholecystectomy (TOC)
- But for unstable patient treatment of choice is Percutaneous cholecystectomy

MIRIZZI'S SYNDROME

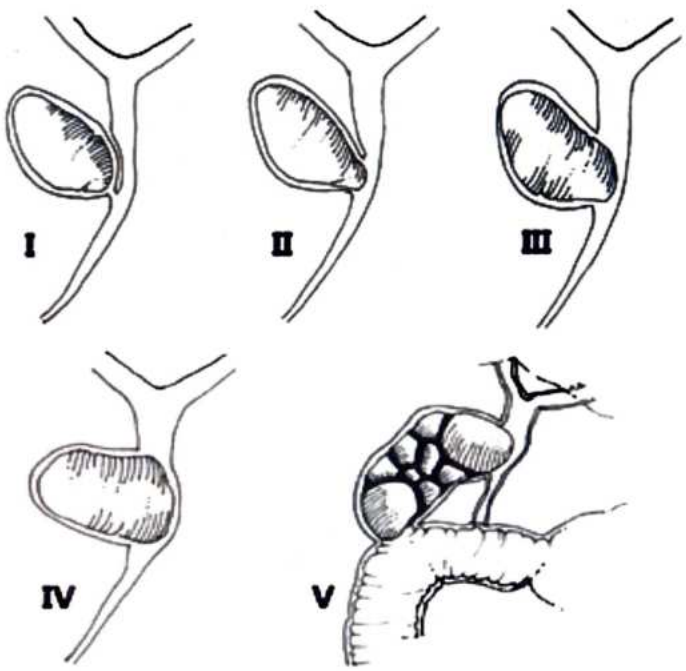
01:23:23

- Aka functional hepatic syndrome
- Characterized by external compression of common Hepatic duct / common Bile duct
- Erosion of stone into Hartmann's pouch / cystic duct



CSENDES CLASSIFICATION

- Type I: External Compression only
- Type II: Erosion of < 1/3rd of circumference of the duct
- Type III: Erosion of > 2/3rd of circumference of the duct
- Type IV: There is total (or) near total circumferential destruction of the duct
- Type V: Erosion of the duct with Cholecysto enteric fistula



- Rx:
  - Type I: Partial cholecystectomy
  - Type II, III: Partial cholecystectomy with choledochoplasty
  - Type IV, V: Bilio enteric Anastomosis

- Stenosis of Biliary tract: Resolves spontaneously and choledochotomy is not required

GB POLYP

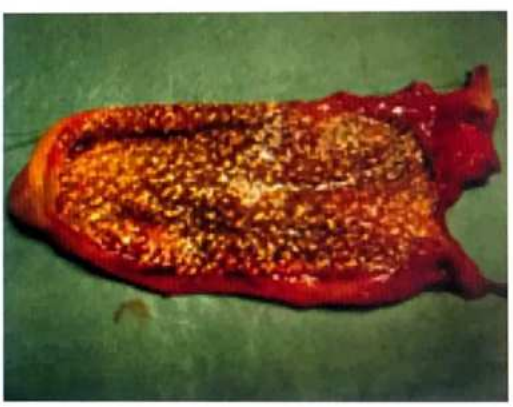
01:30:57

Cholesterol polyp	Adenomatous polyp
• More common	• Less common
• Small <10 mm	• Large
• Multiple	• Single
• Benign	• Premalignant
• Pedunculated	• Sessile

Factors which increase risk of invasive cancer in adenomatous polyp

- Age > 60 years
- Presence of gall stone
- Size of polyp > 1cm
- Documented increase in size on repeated scan

STRAWBERRY GALL BLADDER



- Aka Cholesterolosis
- Caused by deposition of cholesterol ester & triglyceride in epithelial macrophages of gall bladder
- Acquired condition
- Hyper cholesterolemia
- Presence of cholesterol stones
- Presence of cholesterol polyp

Management

- Lap cholecystectomy in symptomatic patient & patients having gall stones

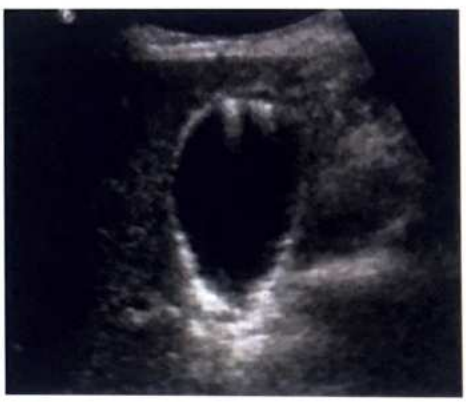
ADENOMYOMATOSIS

01:37:25

- Characterized by
  - Hyperplastic changes in GB wall
  - Mucosal hyperproliferation

Diagnosis

- On ultrasound there is diamond ring sign/ 'comet tail artefacts' / V shaped artefact.

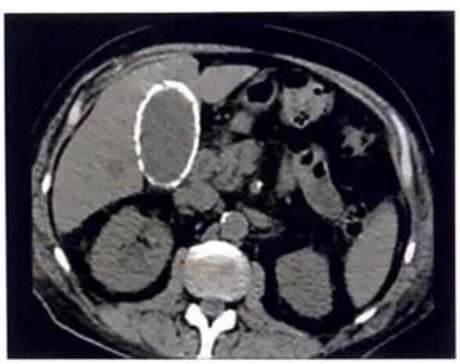


Treatment

- Lap cholecystectomy in symptomatic patients

PORCELAIN GALL BLADDER

- Aka Calcified gall bladder
- Characterized by extensive calcium encrustation in the gall bladder wall
- On surgery-bluish appearance of GB & Brittle in consistency is noted
- Most patient are asymptomatic
- Seen in 5th – 6th decade
- > 90 % patients have gall stone
- Generally diagnosed incidentally on X-Ray or CT
- It increases the risk of malignancy by 6%
- Treatment – Early cholecystectomy



CARCINOMA GALL BLADDER

- Smoking is not a risk factor for carcinoma gall bladder
- Smoking is a risk factor for all GI Malignancy and all Hepato biliary pancreatic tract
- Risk factors are
  - Choledochal cyst
  - Obesity
  - Gall stone > 3cm
  - Primary sclerosing cholangitis
  - Adenomatous polyp
  - Chronic typhoid carrier
  - Porcelain gall bladder
- Maximum incidence of C.A gall bladder is seen in India > Pakistan
- In India, max incidence is in UP > Bihar
- More common in females (6th – 7th decode)
- M/C site: fundus (60%) > Body (30%) > Neck (10%)
- Most common route of spread is direct hepatic invasion (hepatic > lymphatic > perineural)
- Segment of liver involved in early stage: 4_b and 5
- CA gallbladder patient have gall stone in 75 – 98% cases
- Gall stone patient develop CA gallbladder in 0.3 – 3 % cases (large gall stones are risk factor for C.A gall bladder i.e., > 3 cm)

Carcinoma gall bladder & Cholangioma have following similarities

- Both are adenocarcinoma
- CEA (non-specific marker)
- CA-19-9 (specific marker)
- Chemotherapy regimen: gemcitabine + cisplatin
- Histological types are also same
  - Diffuse infiltrative / sclerosing (most common type, worst prognosis)
  - Nodular
  - Papillary – best prognosis

Clinical features

01:55:04

- Long history of repeated attacks of biliary colic
- Associated with
  - ↑ Frequency of attack
  - ↑ Severity of pain
  - Sudden change in character of pain i.e., persistent dull aching pain
  - Anorexia & weight loss
  - RUQ- Mass Hard

Investigation

- First investigation – ultrasound
- Investigation of choice for Ca gall bladder – CECT
- Findings on CECT:
  - GB wall thickened associated with gall stones
  - GB replaced by a mass (growth arising from fundus – protruding into lumen)
  - LN @ Porta hepatis
  - + Ascites

STAGING OF CA GALL BLADDER

01:59:40

8TH AJCC (2017) TNM classification	
T1A	• Involvement of lamina propria
T1B	• Involvement of muscularis propria
T2A	• Invasion of peri muscular connective tissue towards peritoneal side without direct extension to serosa
T2B	• Invasion of peri muscular connective tissue towards hepatic side without direct hepatic invasion
T3	• Serosal perforation or direct hepatic invasion or involvement of single extrahepatic organ
T4	• Involvement of portal vein or hepatic artery or two or more extrahepatic organ
N1	• Metastasis to 1 – 3 Regional lymph nodes
N2	• Metastasis to 4 or more regional lymph nodes
M0	• No metastasis
M1	• Distant metastasis

Staging	Treatment
• Ia – T1a	• Lap cholecystectomy
• IB – T1b • IIA – T2a • IIB – T2b • IIIA – T3 • IIIB – T1-3 N1	• Extended cholecystectomy
• IVA: T4 N0-1	• Extended cholecystectomy + Extended R hepatectomy
• IVB: T any N2 or T any N any M1	• Palliation (we give chemotherapy)

Extended cholecystectomy

- Enbloc removal of segment IV b & V of liver + gall bladder + lymph node along
  - Cystic duct
  - CBD (peri-choledochal lymph node)
  - Periportal
  - Retro-pancreatic

Important Information

- In a patient with gall stone disease, lap cholecystectomy is performed & specimen taken is send to the pathology lab.

1. Report came back positive for Adenocarcinoma (stage IA / T1a. what is the next best step
   - Observation and followup
   - Extended cholecystectomy
   - Port site excision
   - Chemotherapy
2. if stage IIA / T2A. what is the next best step?
   - Extended cholecystectomy
   - Port site excision is also performed.
     - → Not an isolated procedure
     - → Performed with Extended cholecystectomy
     - → No survival advantages
     - → Only prognostic importance

- Ist lap cholecystectomy was performed by ERIC MUHE
- Ist video assisted lap cholecystectomy was performed by Philip Mouret
- Ist lap appendectomy: KURT SEMM also known as father of pelviscopy (modern laparoscopy)

Previous Year's Questions

Q. In carcinoma gallbladder stage MI, which of the following lymph nodes are involved?
(JIPMER - Nov - 2018)

A. Superior mesenteric lymph nodes
B. Aortic lymph nodes
C. Celiac lymph nodes
D. Pancreatico-duodenal lymph nodes

CLINICAL QUESTIONS

Q. A 45-year-old female presents with complaints of abdominal pain for the past 3 days. She localizes the pain to her epigastric area and states that it radiates to her right upper quadrant. She notes that it became markedly worse after eating dinner last night. She recalls a past history of similar pain but has never had any diagnostic workup. She gives history of total abdominal hysterectomy 1 year ago. Her abdominal exam is significant for tenderness to palpation to her epigastric and right upper quadrants without rebound tenderness. Bowel sounds are normal. Based on USG and CT a diagnosis of choledocholithiasis was made. The patient was operated and the stones were removed (shown in the image). What is the composition of the stone?

A. calcium oxalate + calcium phosphate + calcium stearate
B. calcium bilirubinate+ calcium palmitate + calcium stearate
C. Insoluble bilirubin polymer + calcium phosphate + calcium bicarbonate
D. Insoluble bilirubin polymer + calcium phosphate + Calcium carbonate

Answer: B

Solution

The stones shown in the image are brown stones

Gallstones

The major organic solutes in bile are bilirubin, bile salts, phospholipids and cholesterol. Gallstones are classified by their cholesterol content as either cholesterol stones or pigment stones. Pigment stones can be further classified as either black or brown

- In the USA and Europe, 80% are cholesterol or mixed stones, whereas in Asia, 80% are pigment stones
- Cholesterol or mixed stones - 51-99% pure **cholesterol** plus an admixture of calcium salts, bile acids, bile pigments and phospholipids
- Pigmented stones contain <20% of cholesterol and are dark because of the presence of calcium bilirubinate
- Black stones - Insoluble bilirubin polymer + calcium **phosphate** + calcium **bicarbonate**

- Brown pigment stones- calcium bilirubinate + calcium palmitate + calcium stearate+ **cholesterol**

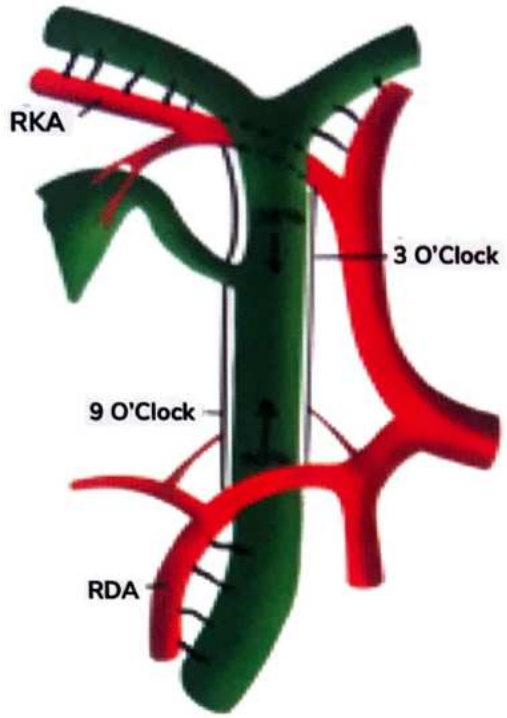
Black pigment stones are usually small, brittle, dark and sometimes spiculated. They are formed by supersaturation of unconjugated bilirubin within the bile which occurs due to its increased production (haemolytic disorders) or in cirrhosis. The insoluble unconjugated bilirubin will then precipitate with calcium as insoluble calcium bilirubinate, forming a pigment stone. Pigment stones are often radiopaque. They are found almost exclusively in the gallbladder. More prevalent in Asian population

Brown stones are brownish yellow, soft and mushy. They may form either in the gallbladder or in the bile ducts secondary to bacterial infection and bile stasis. Bacteria such as Escherichia coli secrete β glucuronidase that enzymatically cleaves conjugated bilirubin to produce the insoluble unconjugated bilirubin which then precipitates with calcium, and along with dead bacterial cell bodies forms soft brown stones in the biliary tree. Brown stones occur due to parasitic infection with Ascaris lumbricoides(roundworm) or Clonorchis sinesis (liver fluke)

10 BILE DUCT PART-1

ANATOMY

00:00:22

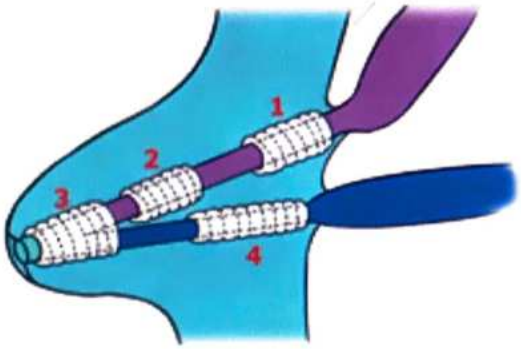


- Common hepatic duct:
  - Length → 1 – 4 cm
  - Diameter → 4 mm
- Common bile duct:
  - Length → 7 - 11cm
  - Diameter → 5 – 10mm
- Blood supply
  - Has Co-axial blood supply
    - → Blood supply is present at 3 O'clock & 9 O'clock position
    - → Hence, longitudinal incision is given in bile duct
  - Supra duodenal bile duct gets blood supply

Inferior (60%) from	Superiorly (38%) from
• Pancreatic duodenal artery • Retro duodenal artery	• Right hepatic artery • Cystic duct artery

Sphincter of Oddi complex

1. Superior choledochal sphincter
2. Inferior choledochal sphincter
3. Sphincter ampullae
4. Sphincter pancreaticus



CHOLEDOCHAL CYST

00:05:22

- Dilatation of bile duct
- Congenital
- M/C in children (female)

Pathophysiology

- Most accepted hypothesis: - APBDJ (abnormal Pancreatico biliary duct junction)
- Has long common channel → Reflux of pancreatic enzyme → Digestion of bile duct wall → wall Dilatation

CLASSIFICATION

00:08:36

TODANI MODIFICATION OF ALONSO-LEJ CLASSIFICATION

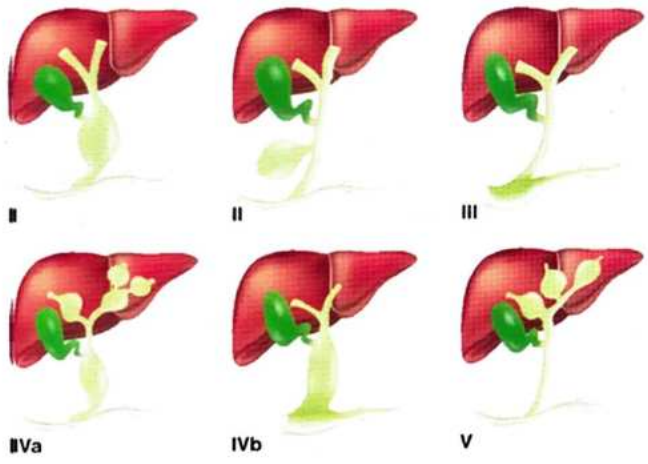
Type I	Ia	Cystic dilatation of extra hepatic bile duct (most common)
	Ib	Focal segmental dilatation of extra hepatic bile duct
	Ic	Fusiform dilatation of extra hepatic bile duct

Type II	Diverticular dilatation of extra hepatic bile duct	
Type III	Dilatation of intraduodenal part of bile duct (choledochocele)	
Type IV	IV a	Dilatation of both intra and extra hepatic bile duct
	IV b	Multiple cysts involving only extra hepatic bile duct
Type V	Multiple cysts involving only intra hepatic bile duct (Caroli's disease)	

- Type I – MC In
  1. Choledochal cyst
  2. Hiatus hernia
  3. Gastric ulcer
  4. Fistula in Ano
  5. Post. Urethral valve
- Type A is most common in
  1. Strasberg classification
  2. Luminal criteria

Important Information

- **Most common type of choledochal cyst - Type I > Type 4 > Type 3**
- **Type VI - cystic dilatation of cystic duct (not a part of Todani's classification)**



Treatment

• Type IVA and V	• Liver transplantation
• Type I, II, IVB	• Roux-en-Y Hepatico- jejunostomy
• Type III	• Endoscopic sphincterotomy with cyst unroofing

Clinical features

- Mass + pain + jaundice (intermittent jaundice)
- Most common symptom in < 2 years of age - Jaundice
- Most common symptom in > 2 years of age - Abdominal pain
- Most common site of cholangiocarcinoma - Posterior wall of cyst

Important Information

- **Stones in gall bladder – cholelithiasis**
- **Stones in bile duct – choledocholithiasis**
- **Stones in cyst – cystolithiasis**

Choledochal cyst increases the risk of following organ malignancies

1. Liver
2. Gall bladder
3. Bile duct: has max. risk of malignancy
4. Pancreas
5. Duodenum

Investigation 00:25:28

- Investigation of choice – MRCP (Magnetic Resonance Cholangiopancreatography)
  - Purely diagnostic

1. MRCP

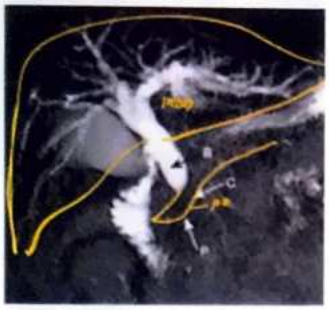
MRCP

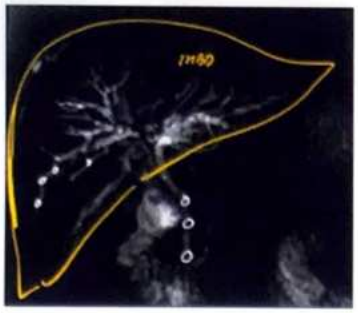
T2 phase of MRI

Fast moving fluid, tissue, fat	Slow moving fluids like bile, pancreatic juice
↓	↓
Gives no signal	High signal intensity
↓	↓
Appears black	Appears white (no contrast needed)

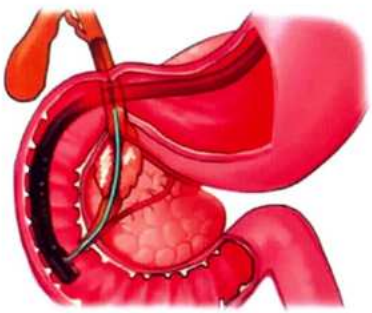
- MRCP is IOC for
  1. CBD stone
  2. Choledochal cyst
  3. Biliary stricture
  4. Cholangiosarcoma: MRI + MRCP is IOC for Cholangiocarcinoma

5. Primary sclerosing cholangitis
6. Pancreatic Divisum
7. Chronic Pancreatitis





2. ERCP: Endoscopic Retrograde Cholangio Pancreatography
- Diagnostic + Therapeutic
- Side viewing endoscope is used
- After reaching the ampullae using the endoscope, both bile duct & pancreatic ducts are cannulated & dye is injected to detect stone or stenosis
- ERCP is used to:
  1. Removed stone from distal part of bile duct
  2. Put stent mainly for distal biliary stricture



3. PTC: Percutaneous Transhepatic Cholangiography
- Diagnostic + therapeutic
- Used to:
  1. Remove stone from proximal part of bile duct, intrahepatic bile duct.
  2. Locate stent for proximal biliary strictures

CBD STONE (AKA CHOLEDOCHOLITHIASIS)

⏱ 00:36:48

- Present in 6-12% patients of gall stones have CBD stones
- 2 Types
  - Retained CBD stones
    → Detected within 2 years of cholecystectomy
  - Recurrent CBD stones
    → Detected after 2 years of cholecystectomy

Primary stones	Secondary stones
• Formed inside CBD • Most common stone – brown • More common in developing countries • Worm infestation. 1. Ascaris 2. Clonorchis sinensis	• Formed in gall bladder • Slips into CBD • Most common type: - cholesterol stone • More common in western countries

Lab parameters
- ↑ALP
- ↑GGT
- ↑5 nucleotidase

Clinical features
- Two types of presentation
  1. Asymptomatic - Asymptomatic elevation of ALP, GGT, 5' nucleosidase
  2. Jaundice with or without complication

Complications
- Increased risk of infection (cholangitis)
- Increased risk of pancreatitis
- Increased risk of cholangiocarcinoma

Investigation
- Gold standard investigation – ERCP
- IOC – MRCP

Treatment
- ERCP + stone removal
  - Maximum size of stone removed by ERCP - 1.5 cm
- Stones >1.5cm - Choledochotomy
- When distal obstruction is suspected: Choledocho-duodenostomy
- ESWL → Renal stones → 2.0 cm

Previous Year's Questions

Q. An 80 years old female presented with colicky pain and jaundice. Serum bilirubin and GGT was raised. MRCPMRCP image shows gall stones and CBD stones with dilated biliary radicles. Next step in the management: (NEET - Jan - 2020)

A. Cholecystectomy
B. ERCP
C. CECT
D. PET scan

CHOLANGITIS

00:48:10

- Mandatory principles
  - Obstruction
  - Infection

Predisposing factors

- Choledocholithiasis (most common)
- Biliary stricture
- Choledochal cyst
- Cholangio carcinoma
- Worms

Pathophysiology

- Most common organism: E. Coli > klebsiella
- Normal CBD pressure: 10 – 12 cm of H2O
- When obstruction occurs CBD pressure rise
- When CBD pressure becomes > 25cm of H2O, two reflexes occur
  - Cholangio venous
  - Cholangio lymphatic

Clinical features

- Charcot's Triad: Pain + Jaundice + fever
- Reynold's Pentad (if delayed t/t): Charcot's triad + Shock + Mental status changes
- > 50% of pts have positive blood culture
- M.C symptom of sepsis in cholangitis is chills.

Management

- Put 2 large IV cannula
- Start IV fluids + IV antibiotics
- If no improvement: ERCP with stone extraction / stenting
- If it's not available / failed: PTC with stone extraction / stenting
- If PTC is not available / failed: Open biliary decompression

Open biliary decompression

- Give Longitudinal incision on bile duct
  ↓
- Stone removed
  ↓
- T- Tube inserted
  ↓
- T-tube cholangiogram (after 7th to 10th day)
  ↓
- Retain T-tube (if presence of distal filling defects) for 4-6 weeks
  ↓
- Percutaneous stone extraction is performed via Burhenne Technique

Important Information

- Primary sclerosing cholangitis - more common in males
- Primary biliary cirrhosis (Autoimmune disorder) - more common in females

AUTOIMMUNE DISORDERS

01:00:24

• Primary biliary cirrhosis	• Anti – mitochondrial (auto antibody)
• Grave's disease	• LATS – long-acting Thyroid stimulator/ Thyroid stimulation Ab against TSH – R
• Hashimoto's thyroiditis	• Anti – TPO
• Pernicious anemia	• Ab against parietal cells

1. PCB- primary biliary cirrhosis

- Autoimmune disorder
- M/C in females
- Anti- mitochondrial antibody is the autoantibody

- **Pathology**
  - Progressive destruction of intrahepatic bile ducts only
  - Diagnostic appearance-florid duct lesion with lymphocytic infiltration and granulomatous inflammation

- **Clinical features**
  - Pruritis precedes jaundice
  - Pruritis and fatigue – characteristic symptoms
  - Pruritis – most bothersome in evening

- **Associated with**
  - Hyperlipidemia
  - Xanthoma, Xanthelasma
  - Melanosis
- **Diagnosis**
  - Anti-mitochondrial Ab - Can confirm diagnosis
  - Investigation of choice – Biopsy
- **Treatment**
  - Liver transplantation (severe pruritus & fatigue are indications for LT)

11 BILE DUCT PART-2

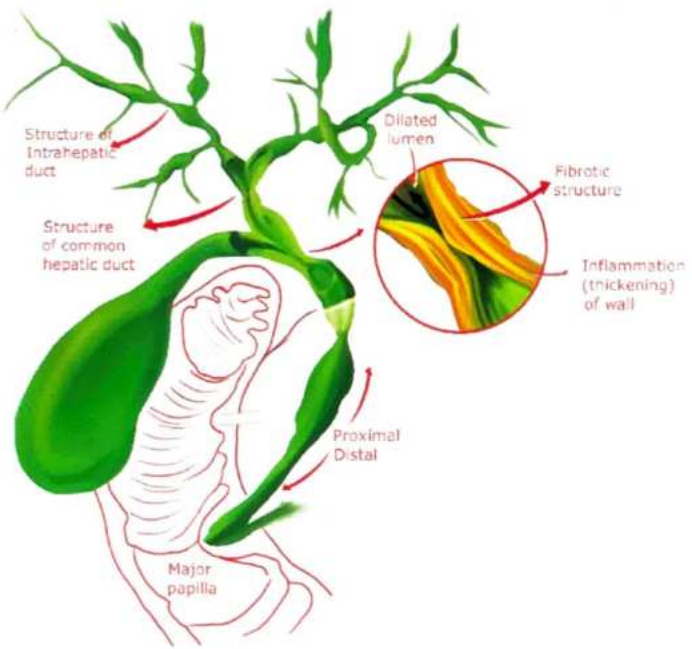
PRIMARY SCLEROSING CHOLANGITIS

00:00:25

- More common in males
- Characterized by multiple strictures in both Intra hepatic & Extra hepatic
- Associated with
  - HLA B - 8/DR - 3
  - Ulcerative colitis (UC)
- Ulcerative colitis
  - PSC seen in 5 – 6 % cases of UC
  - UC seen in 70 – 80% cases of PSC
- Smoking is protective in
  - UC
  - PSC
  - Parkinson's
  - Alzheimer's ds.

Pathophysiology

- Target cell of injury in PSC is Cholangiocytes (cells living bile duct)
- Stricture formation in both intrahepatic & extrahepatic bile duct: beaded or pseudo diverticular appearance
- Gives onion skin appearance on cut section
- Destruction of terminal intra-hepatic branches
- Gives Pruned tree appearance (selective destruction of terminal intra-hepatic branches)



Clinical features

- Asymptomatic: elevation of gamma-Glutamyl transpeptidase (GGT) initially
- Symptomatic: Formation of multiple strictures leads to
  1. ↑↑ Risk of cholangitis
  2. CBD stones
  3. Acute pancreatitis
  4. Cholangio carcinoma

Investigation

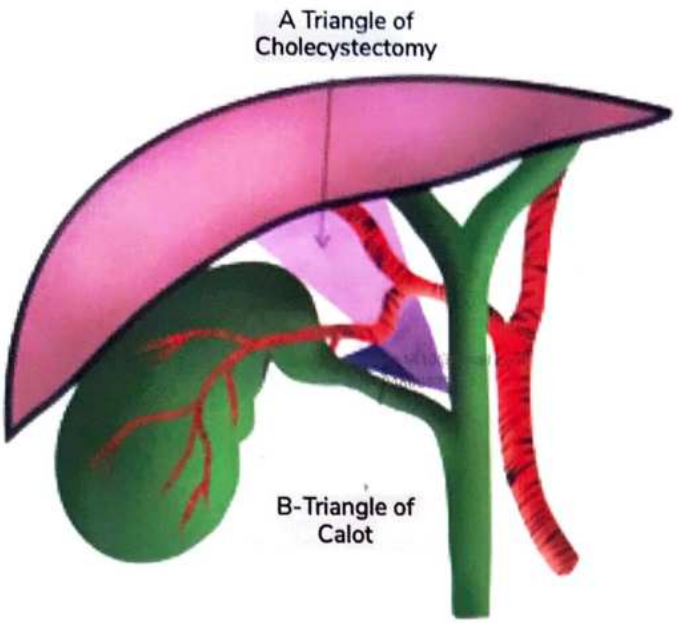
- IOC - MRCP
- Gold standard investigation – ERCP
- Characteristic appearance in ERCP
  - Beaded appearance
  - Pseudo-diverticula appearance
  - Pruned Tree appearance

Treatment

- Rx of choice is Liver Transplantation
- Control of inflammation-High dose UDCA (URSO-DEOXY CHOLIC ACID)
- Cholestyramine / cholestipol for pruritis

BILE DUCT INJURY

00:09:46



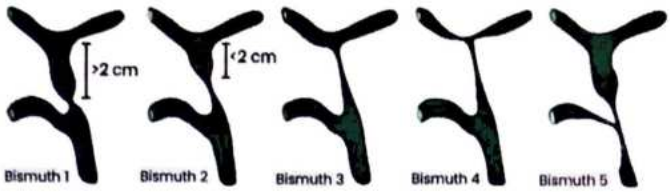
- Incidence of BDI in lap cholecystectomy (0.3 – 0.85%)
- Incidence of BDI in open cholecystectomy (0.1 – 0.2%)
- Triangle cholecystectomy/ Hepatocystic triangle
  - Superior – inferior liver edge
  - Medial – common hepatic duct
  - Lateral – cystic duct
- Content of calot's triangle:
  - Lymph node of Lund
- Content of hepato-cystic triangle: Cystic artery

CLASSIFICATION OF BILE DUCT INJURIES

1. Bismuth classification for biliary strictures:

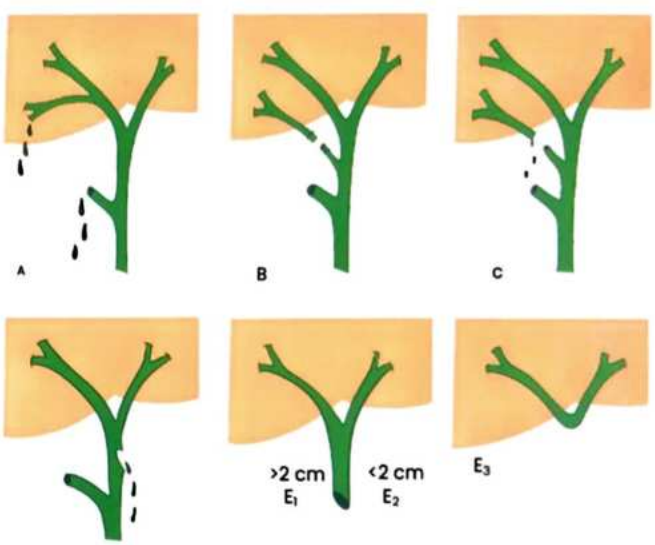
Type I	• CHD stump > 2 cm • Stricture is low
Type II	• CHD stump < 2cm • Stricture
Type III	• Hilar stricture with intact confluence • Stricture is high
Type III	• Hilar stricture with intact confluence • Stricture is high
Type IV	• Hilar stricture with destroyed confluence
Type V	• Stricture involving aberrant right sectoral duct with or without involvement of common hepatic duct.

- Drawback of BISMUTH classification: No idea about intraoperative bile leak



2. Strasberg classification for laparoscopic bile duct injuries

Type A	Cystic duct stump leak or leak from sub-vesical duct of Luschka
Type B	Ligation or occlusion of aberrant right sectoral duct transection c
Type C	Transection without occlusion of aberrant right sectoral duct
Type D	Injury to lateral wall of CHD
Type E	E1 to E5 Bismuth classification



Previous Year's Questions

Q. Which artery should be saved while operating common bile duct stricture?

(JIPMER - Nov - 2018)

A. Common hepatic artery
B. Right hepatic artery
C. Left hepatic artery
D. Celiac trunk

MANAGEMENT OF POST-OP DIAGNOSED BILE DUCT INJURY

00:25:12

1. Physical examination

- Tachycardia (indirect evidence of bile leak)
- Tenderness on RUQ
  - Step 1 – Control the infections → IV antibiotics
  - Step 2 –Drain the biloma
    - → USG / CT guided Percutaneous aspiration
    - → Drain insertion / digital catheter insertion
  - Step 3 – complete cholangiography – MRCP
  - Step 4 - Definitive treatment
    - → ERCP with stenting
    - → Hepatico-jejunostomy

Important Information

- **In post operative case of bile duct injury**
  - **I. If drain output ↓↓ sing - Observation**
  - **II. If drain output ↑↑ sing or constant - ERCP with stenting**

CHOLANGIOCARCINOMA

00:31:00

- **Risk factors**
  - Choledochal cyst
  - Choledocholithiasis
  - PSC
  - UC
  - Cirrhosis
  - Clonorchis sinensis and Opisthorchis viverrini
  - HBV
  - HIV
  - HCV
  - Asbestos
  - Nitrosamines
  - Dioxin
  - DM / obesity / OCPs / Smoking
  - Thorotrast
  - Isoniazid
- Most common site of cholangiocarcinoma is hilum – Hilar cholangiocarcinoma
- It is also known as Klatskin tumor

Similarities between Cholangiocarcinoma and GB carcinoma

- Both are adenocarcinoma
- CEA increased (non-specific marks)
- CA 19 – 9 (specific marker)
- Chemotherapy regimen – gemcitabine + cisplatin
- Histological types are also same
  a. Diffuse infiltrative / sclerosing: Most common having worst prognosis
  b. Nodular/ mass forming
  c. Papillary: best prognosis

Clinical features

- Most common presentation/symptom is Painless progressive jaundice > weight loss
- Symptoms of painless progressive jaundice
  - Anorexia
  - Fatigue
  - Pruritis
  - Passage of clay-colored stools

Courvoisier's law

- In a case of obstructive jaundice due to stone disease, Gall bladder is not palpable due to stone disease because GB is shriveled / fibrosed due to chronic inflammation
- In a case of obstructive jaundice, if GB is palpable it is due to Peri–ampullary carcinoma
- Exceptions of CURVOISIER'S LAW
  - Double impaction of stone
    - → One stone in cystic duct
    - → One stone is CBD
  - Mucocele
  - Oriented cholangiohepatitis (hepatolithiasis)
  - Stone impacted at ampulla of Vater

Ampullary and Peri ampullary carcinoma

- Ampullary-malignancy arising from ampulla itself
- Periampullary-malignancy arising within 2cm of ampulla
- Malignancies in Peri-ampullary area
  - Ampullary carcinoma
  - CA head of pancreas: Worst prognosis
  - Distal cholangiocarcinoma: GB palpable
  - Duodenal cholangiocarcinoma: Best prognosis

Previous Year's Questions

Q. Pancreaticoduodenectomy is not indicated in?
(JIPMER - Nov - 2018)

A. Multiple cyst and calcifications in head of the pancreas
B. Duodenal cancer
C. Failed drainage procedure for chronic pancreatitis
D. Ampullary carcinoma with secondaries in peritoneum

Diagnosis

- IOC - MRI + MRCP > CECT
- Complication of CECT - Increased risk of hepatorenal syndrome, Contrast involved nephropathy

Management 00:45:58

- For hilar cholangiocarcinoma: CBD resection + routine caudate lobectomy + lymphadenectomy
- For distal cholangiocarcinoma: Pylorus preserving Whipple's procedure
- For advanced and metastatic stage: Palliation by chemotherapy – gemcitabine + cisplatin

HEMOBILIA 00:47:37

- Blood in bile duct

Causes

- MC cause – Iatrogenic trauma (PTC)
- Trauma (Blunt)
- Gall stones
- Vascular pathologies
  - AV malformations,
  - Angiodysplasia
- Most common source of Hemobilia is arterial source

Clinical features

- Quincke's Triad / Sand blom's Triad
  - GI hemorrhage (upper / lower)
  - Clot colic
  - Jaundice
- Melena (MC symptom)
  - Seen in 90 % cases
  - Minimal bleeding to cause melena is 40 – 60ml

Investigation

- Upper GI endoscopy - 1st investigation done for diagnosis of melena
- Investigation of choice for Hemobilia-Angiography (diagnostic & Therapeutic)

Treatment of Hemobilia

- Conservative management - in most patients
- Angiography + embolization - for rest of the pts.
- If not available/ failed: Open surgical ligation of bleeding vessel

CLINICAL QUESTIONS

Q. 38 year old female came to the OPD with complaints of generalised pruritus and the patient was found to be deeply icteric. USG revealed dilated intrahepatic biliary radicals. The patient was further evaluated and diagnosed as a case of perihilar cholangiocarcinoma. According to the Bismuth-Corlette classification system, perihilar cholangiocarcinomas extending into the right secondary intrahepatic ducts are classified as

A. Type II
B. Type III b
C. Type III a
D. Type IV

Answer: C

Solution

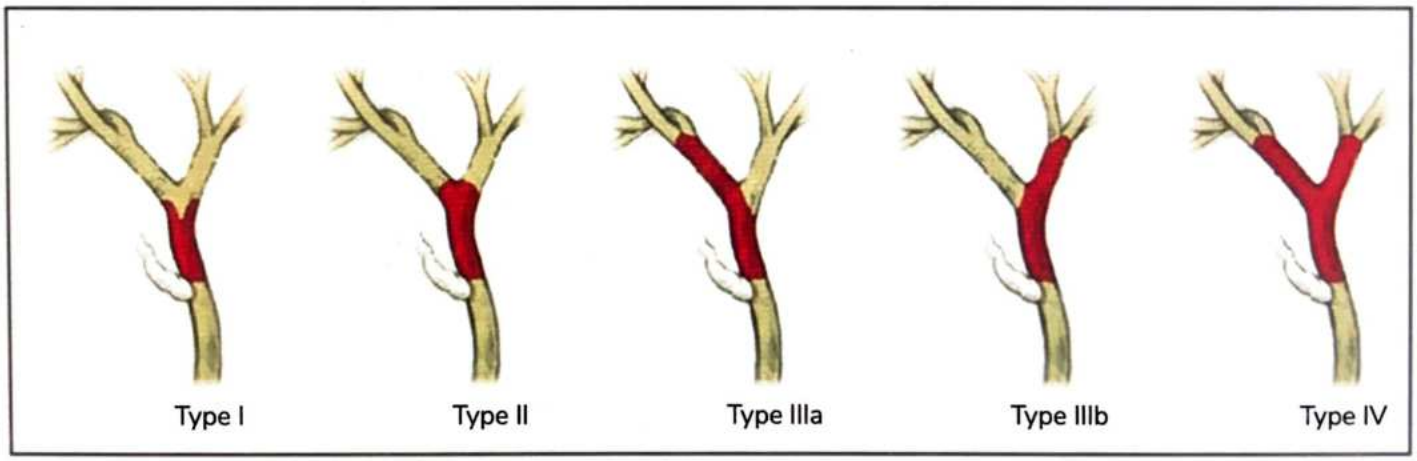
Perihilar cholangiocarcinomas, also referred to as Klatskin tumors, are further classified based on anatomic location by the Bismuth-Corlette classification

Type I tumors are confined to the common hepatic duct

Type II tumors involve the bifurcation without involvement of the secondary intrahepatic ducts

Type III a and III b tumors extend into the right and left secondary intrahepatic ducts, respectively

Type IV tumors involve both the right and left secondary intrahepatic ducts



12 PANCREAS

PANCREAS DIVISUM

- MC congenital anomaly of pancreas
- Characterized by divided drainage
- From Dorsal bud
- Part of head
- Body & Tail
- From ventral bud
- Part of head
- Uncinate process

Refer Diagram 12.1

- Major part of pancreas (part of head, body & tail) is drained by Accessory duct of Santorini via Minor papillae
- Small part of pancreas (part of head &uncinate process) is drained by major duct of Wirsung via Major papilla

Clinical features

- Recurrent attacks of Acute pancreatitis (because of relative obstruction)

Investigation

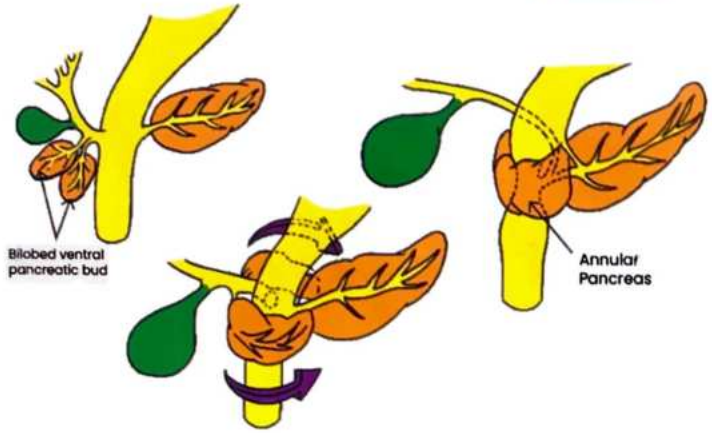
- IOC for diagnosis – MRCP
- Gold std. investigation – ERCP

Treatment

- Endoscopic Sphincterotomy
  - Dorsal duct Sphincterotomy or Dorsal duct Sphincteroplasty

ANNULAR PANCREAS

00:05:26



- Ring of ventral pancreas present around 2nd part of Duodenum
- Located proximal to ampulla
- Associated with Down Syndrome and Duodenal Atresia

Clinical features

- Non-Bilious Vomiting (as obstruction is proximal to ampulla)

Investigation

- IOC for Dx: ERCP

Management

- TOC: Duodeno-duodenostomy > Duodenojejunostomy

DUODENAL ATRESIA

00:07:46

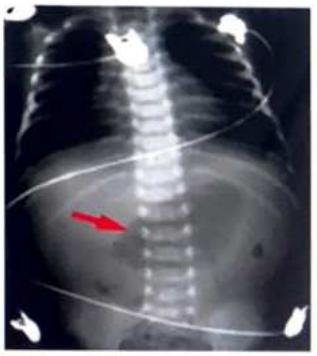
- MCC of neonatal intestinal obstruction
- Located distal to ampulla
- Have bilious vomiting

Management

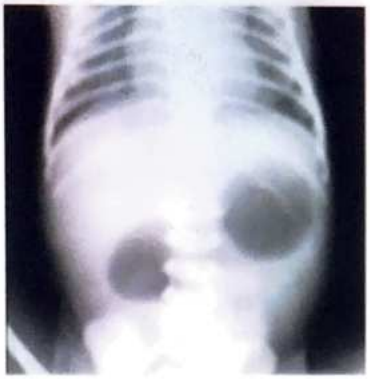
- TOC – Duodeno-duodenostomy > Duodenojejunostomy
- Duodenojejunostomy is Rx of choice for superior mesenteric artery syndrome

In abdominal X-ray

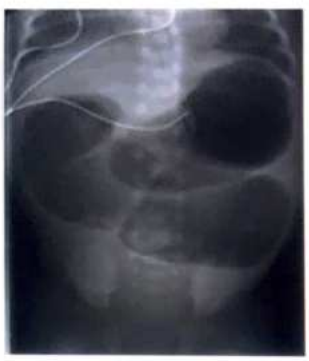
- Single bubble appearance=Congenital Hypertrophic Pyloric Stenosis
- Double bubble appearance = Duodenal atresia & Annular pancreas
- Triple bubble appearance = Jejunal atresia
- Multiple air fluid levels = Ileal atresia



Single bubble appearance



Double bubble appearance



Triple bubble appearance

ACUTE PANCREATITIS

00:12:50

- M/C/C: Gall stones > Alcohol
- Other Causes
  - Blunt trauma
  - ERCP
  - Hypertriglyceridemia
  - Hyperparathyroidism
  - Hypercalcemia
  - Ca pancreas
  - Cystic fibrosis

- Viral Infections
  - Cytomegalovirus
  - COX-Sackie
  - Mumps
  - Echo Virus

- Drugs Having Definite Association with Acute Pancreatitis
  - 6-Mercaptopurine
  - Azathioprine
  - Deoxy inosine
  - Cytarabine
  - Amino salicylic Acid
  - Tetracycline
  - Pentamidine
  - Estrogen
  - Trimethoprim-
  - Sulfamethoxazole
  - Thiazide
  - Valproate
  - Furosemide
  - Metronidazole

How to remember

- MAD CAT PET TV FM

- Drugs Having Possible Association with Acute Pancreatitis: L-Asparaginase and Acetaminophen

PATHOPHYSIOLOGY

- Abnormal intra-pancreatic activation of Pancreatic enzymes

↓

- These pancreatic enzymes have lipase which digest the fat of greater omentum

↓

- Fat is converted to fatty acid and glycerol

↓

- Fatty acids combine with calcium & forms chalky white deposits-Saponification

↓

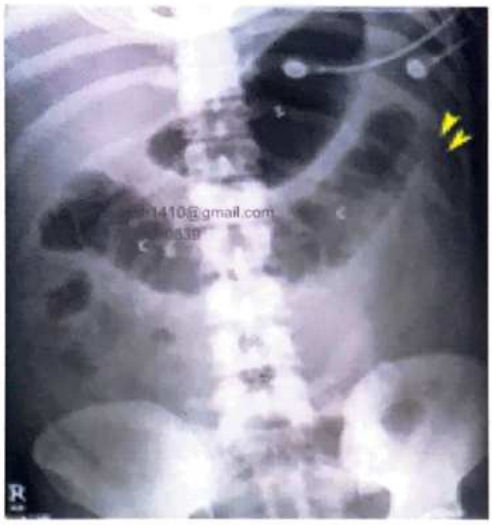
- Hypocalcemia

- It is mild & self-limited in majority of cases
- Mild AP: <1% mortality
- Severe AP: 10-30% mortality
- Gallstones induced pancreatitis has best prognosis.
- M/C/C of Death in Acute Pancreatitis
  - Within 2 weeks of Hospitalization-MODS (Multi Organ Dysfunction Syndrome)
  - After 2 weeks of Hospitalization - Sepsis
- Initial Sign of MODS
  - Impaired lung function (ARDS)

Clinical features

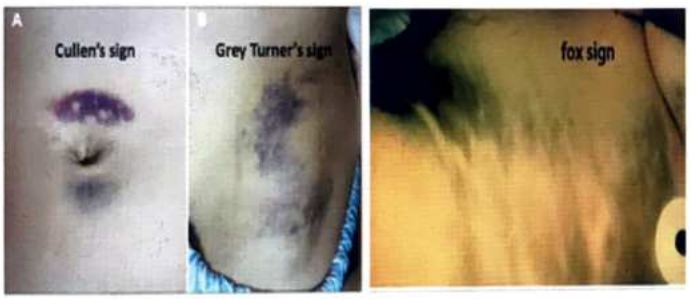
- Pain in Epigastrium, radiating to Left side of back and partially relieved by sitting or bending forward.

- Due to Paralytic Ileus - there is Nausea, Vomiting and Abdominal distention
- Signs of Paralytic Ileus in X-ray abdomen



  - Gasless abdomen
  - Ground glass appearance
  - Sentinel loop sign
  - Colon cut off sign

- It is associated with left sided pleural effusion
- Cullen sign - ecchymosis around umbilicus
- Grey turner sign - ecchymosis around flank
- Fox sign - ecchymosis around inguinal region



Diagnosis

- IOC: CECT (Reserved for complication; Best time – After 72 hrs.)
- Diagnosis is usually made by clinical findings and laboratory Investigation
- Amylase (not very specific)
  - Raised in non-pancreatic causes
  - No correlation between level of amylase & severity of AP
- Lipase (More specific)
- CECT is the IOC for diagnosis of most of retroperitoneal organs

1. Pancreas related

- CECT is the IOC for
  - Acute pancreatitis
  - Pancreatic pseudocyst
  - Pancreatic abscess
  - Pancreatic necrosis
  - CA pancreas
- MRCP is the IOC for chronic pancreatitis

2. Kidney related

- CECT is the IOC for
  - Autosomal dominant Polycystic kidney disease
  - Renal TB
  - RCC
  - Angiomyolipoma
  - Renal oncocytoma

3. CECT is the IOC for

- Retroperitoneal fibrosis
- Retroperitoneal sarcomas

Management:

- Fluid resuscitation – Fluid of choice is Ringer lactate
- O2 supplementation
- Analgesics
  - NSAIDS → Metamizole
  - OPOIDS → Buprenorphine

- Nutrition: Enteral Nutrition > TPN
- Indication for TPN
  - Shock
  - Severe Acute Pancreatitis
- Prophylactic antibiotics should not be given

ASSESSMENT OF SEVERITY IN A. PANCREATITIS

00:35:08

1. RANSON'S score
2. Modified Glasgow score } Score < 3 in severe Acute Pancreatitis
3. BISAP Score
4. Q-SOFA
5. APACE – II → Score ≥ 8 in severe acute pancreatitis
6. CT Severity index: Components are Balthazar CT grading + Necrosis Score.
7. CRP ≥ 130 mg/ml

1. RANSONS'S Prognostic Criteria (for Non-Gall Stone Induced Pancreatitis)

At the Time of Admission	After 48 Hours
• Age > 55 years	• Fall in Hematocrit > 10 points
• WBC count > 16,000/mm3	• BUN Elevation > 5mg/dL
• RBS > 200 mg/dl	• S. Ca2+ < 8 mg/dL
• LBH > 350 IU/L	• Base deficit > 4 mEq/L
• AST > 250 U/L	• Arterial PO2< 60 mm Hg
	• Fluid Sequestration > 6 L.

- Out of 11 if ≥ 3 present – "Severe Acute Pancreatitis"
- Minimum time for complete Evaluation – 48 hrs.

2. BISAP Score (Bed site Index for Severity of Acute Pancreatitis)

- B → BUN > 25 mg/dL
- I → Impaired Mental Status
- S → SIRS (2 of 4)
  a. Temperature (core) >38°C or <36°C
  b. Heart rate >90 beats/min
  c. Respiratory rate >20 breaths/min
  d. WBC count >12,000 cells/mm3 or <4000 cells/ mm3 or >10% immature (band) cells in the peripheral blood smear
- A → Age > 60 years
- P → Pleural Effusion

- If Score 3 → Severe Acute pancreatitis
- If Score is 0-2 <2% mortality
- If Score is 3-5 >15% mortality

3. Q-SOFA (Quick Sequential Organ Failure Assessment)

- Respiratory Rate ≥ 22/min
- Systolic BP ≤ 100 mmHg
- Alteration in Mental Status

SCORE	MORTALITY
0	< 1%
1	2-3%
≥ 2	≥ 10%

4. APACHE II → Acute Physiology and Chronic Health Evaluation – II

a. BP e. S. Creatinine j. Oxygenation
b. Temp f. WBC count k. PH
c. HR g. Glasgow Coma scale l. Potassium
d. RR h. Sodium
l. Hematocrit

- Score ≥ 8 is suggestive of Severe Acute pancreatitis

LOCAL COMPLICATIONS OF AP ACCORDING TO REVISED ATLANTA CLASSIFICATION

00:44:51

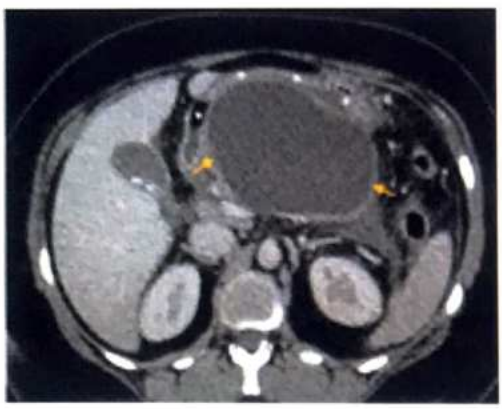
Acute (<4weeks, no defined wall)	Chronic (>4weeks,
• Acute pancreatic fluid collection (APFC)	• Pseudocyst
○ Resolve spontaneously	• Walled off necrosis
○ Some cases, after 4 weeks develops into Pancreatic pseudocyst	

- Pancreatic abscess
  - ○ Pus collection in peripancreatic region
  - ○ Rx: USG/CT guided Percutaneous aspiration + Antibiotics
- Pancreatic necrosis
  - ○ Non-viable pancreatic tissue or peripancreatic fat
  - ○ It is a sterile condition
  - ○ MC complication is infection
  - ○ MC organism responsible is E. coli
  - ○ Drugs with good pancreatic penetration power is Carbapenems
    → Imipenem
    → Meropenem
  - ○ Management-Repeated Necrosectomy/ Surgical debridement with ongoing lavage

- **Pancreatic Pseudocyst** 00:50:31
  - ○ MC cystic lesion of pancreas (75%)
  - ○ It is a false cyst (Not lined by Epithelium, but with granulation tissue)
  - ○ MCC of pseudocyst – Alcohol
  - ○ MC site – Lesser sac
  - ○ Pseudocyst can be seen in both Acute pancreatitis and Chronic pancreatitis, but the difference is

In Acute pancreatitis	In Chronic pancreatitis
• Single	• Multiple
• Large	• Small
• Extra pancreatic	• Intra pancreatic
Incidence	
• 10 – 12 %	• 20 – 40%

- Clinical features of pancreatic pseudocyst
  - → In most patients, pseudocyst is small, so it is Asymptomatic
  - → In symptomatic patients



Pseudocyst

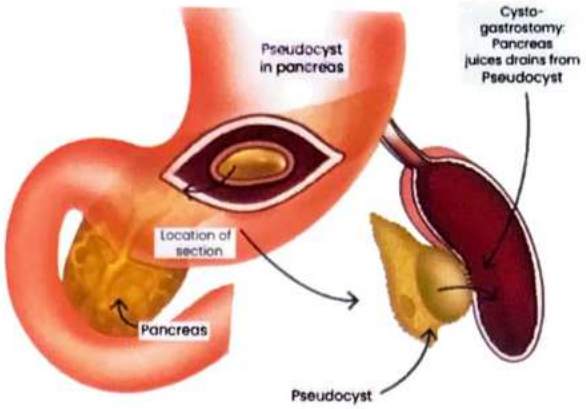
- M/C symptom - Abdominal pain
- Vomiting (Non-Bilious) containing undigested food particles

- **Complication**
  - → MC complication is Infection (14%) >Hemorrhage (10%)

- **Diagnosis**
  - → IOC – CECT

- **Treatment**
  - → Observation-most of pseudocyst resolve spontaneously
  - → Indications of surgery
    - Duration > 6 weeks
    - Size ≥ 6 cm
  - → Surgery
    - Cysto-jejunostomy – TOC (Gives best results)
    - Cysto-gastrostomy - M/C performed procedure
    - Cysto-duodenostomy

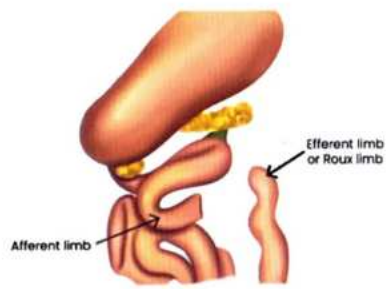
CYSTO GASTROSTOMY



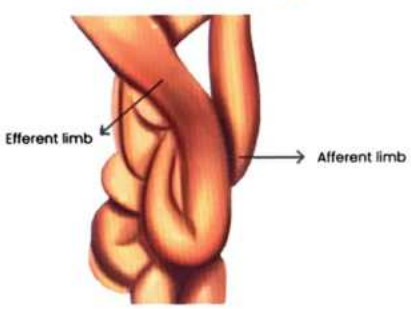
- **Disadvantages**
  - Drainage against gravity
  - Since the drainage is against gravity, food particles may enter pseudocyst and cause infection (bacterial overgrowth) leading to SUMP Syndrome

CYSTOJEJUNOSTOMY/ ROUX-EN-Y-CYSTOJEJUNOSTOMY

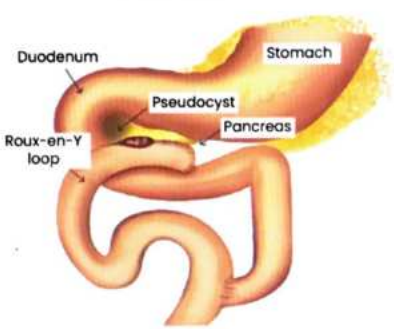
a) Jejunum is divided into proximal (afferent limb) & distal (efferent limb or Roux-en-Y limb)



b) Proximal part is anastomosed with the lower part of Roux-en-Y limb



c) Roux-en-Y limb is pulled up and anastomosed with cyst



- Advantages
  - Drainage along gravity
  - No formation of SUMP syndrome

- Disadvantages:
  - Long duration of surgery
  - Inreased blood loss

Mutations associated with Clinical pancreatic syndrome

- Hereditary pancreatitis-PRSS1 gene (cationic trypsinogen gene)
- Idiopathic chronic pancreatitis – CFTR gene
- Tropical calcific pancreatitis – SPINK1 (PTSI)

CHRONIC PANCREATITIS

01:04:04

- Characterized by irreversible fibrosis of pancreatic parenchyma with ongoing inflammation

Exocrine insufficiency	Endocrine insufficiency	Chronic pain

• It precedes Endocrine insufficiency
• >90% acini permanently destroyed
• Leads to
  ○ Indigestion
  ○ Malabsorption
  ○ Steatorrhea (fecal fat >7gms/day)
	• >90% of islet cells permanently destroyed
	• Leads to Diabetes mellitus	

- Causes
  - M/C/C-Heavy alcohol consumption (Smoking have Synergistic Effect)

Previous Year's Questions

Q Common cause of chronic pancreatitis?

(NEET - Jan - 2018)

A. Chronic alcohol intake
B. Trauma
C. Pancreas divisum
D. Gallbladder stones

Clinical features

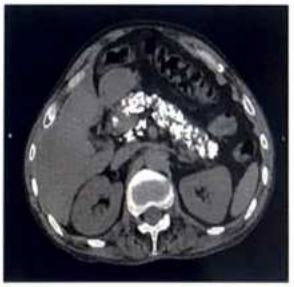
- MC symptom is Abdominal pain
- Characterized by Triad
  - **D** - Diabetes Mellitus
  - **P** - Pancreatic Calcification (calcifications present in 30-40% cases)
  - **S** - Steatorrhea

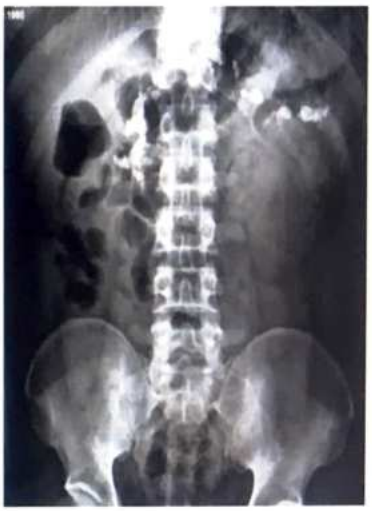
TIGARO Classification of Etiology of Chronic Pancreatitis

- T → Toxic – Metabolic
- I → Idiopathic
- G → Genetic
- A → Auto Immune
- R → Recurrent sever
- 0 → Obstructive

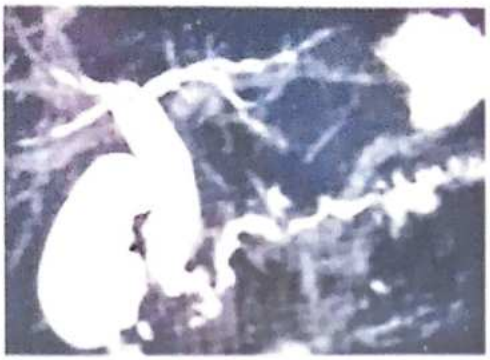
Diagnosis

- IOC - MRCP
- Gold Standard investigation-ERCP (Both Diagnostic/ Therapeutic)
- On ERCP
  - Shows alternate stricture & dilatation of pancreatic duct with pancreatic stones enclosed giving String of pearls/ Chains of lakes Appearance/ Beaded Appearance
  - Composition of stone - Calcium carbonate
- Endoscopic ultrasound – most accurate investigation for diagnosis of minimal change in chronic pancreatitis
- ROSEMONT criteria is based on Endoscopic ultrasound findings for diagnosis of chronic pancreatitis





Pancreatic calcifications



Chians of lakes Apperance

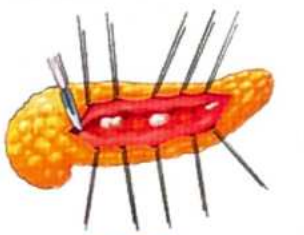
MANAGEMENT

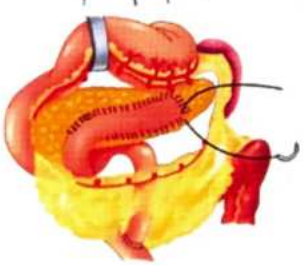
01:13:50

- Exocrine Insufficiency-Enteric coated Pancreatic Enzyme Supplementation
- Endocrine Insufficiency - Insulin
- Pain - Analgesics
  - NSAIDS – Metamizole
  - Opioids - Buprenorphine
- If Pain not relived with analgesics: ERCP stenting/ oblique stone removal
- Pain not relieved with ERCP and stenting: Celiac Ganglion Blockade
- Pain not relived with Celiac Ganglion Blockade: Surgery

SURGERY

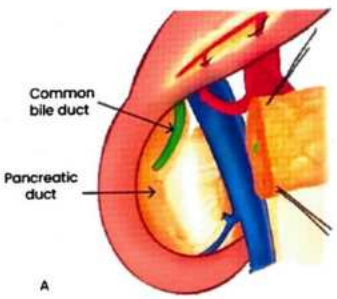
Drainage Procedure	Resection Procedure
Puestow's procedure • AKa LPJ (Longitudinal Pancreaticojejunostomy) • Opening pancreatic duct and suture with jejunum.	• BEGER's procedure • FREY'S procedure

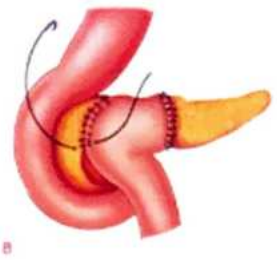




BEGER'S Procedure

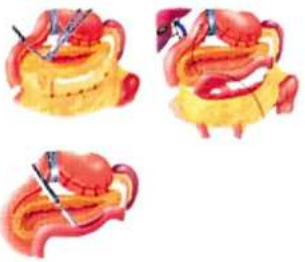
- Aka DPPHR - Duodenal preserving pancreatic head resection.
- After shaving the pancreatic Head suture the body with jejunum.
- Has maximum Pain Relief





FREY'S Procedure

- AKa LRLPJ → Local resection of Pancreatic head with Longitudinal Pancreatic – jejunostomy.



Previous Year's Questions

Q. A patient underwent complicated surgery for chronic pancreatitis. The most preferred route for supplementary nutrition in this patient would be:? (JIPMER May 2019)

A. Total parenteral nutrition
B. Feeding gastrostomy
C. Feeding jejunostomy
D. Oral feeding

CA-PANCREAS

01:21:23

- MC genetic mutation in Ca pancreas/ Cholangiocarcinoma → K-RAS > p–16
- MC genetic mutation in Ca- GB → P53 > K-RAS
- MC genetic mutation in Ca stomach → P53 > COX – II

Risk Factors

Established	Associations
• Smoking/tobacco • Hereditary Factors /genetic susceptibility [H_3-AFP] ○ Hereditary pancreatitis - AD ○ HNPCC- AD ○ Hereditary Breast and Ovarian Ca (BRCA - 2) - AD	• DM • Obesity • Chronic pancreatitis

- Ataxia Telangiectasia - AR
- Familial atypical multiple mole melanoma (FAMMM) syndrome - AD
- Peutz-Jeghers Syndrome – AD
  → Maximum risk of malignancy

- M/C type - Adenocarcinoma
- Non-specific Tumour Marker - CEA
- Specific Tumour Marker - CA 19.9
- Chemotherapy Regimen - Gemcitabine
- MC site of metastasis – Liver
- M/C site for CA pancreas - Head > Body > Tail
- Pathology: it is associated with intense Desmoplastic reaction → Increased fibrosis around the tumor

Clinical features 01:27:49

- MC symptom - Jaundice > weight loss
- Ca head of pancreas – Jaundice > weight loss
- Ca Body and Tail Pancreas - Weight loss
- Ampullary Carcinoma
  - MC symptom is Jaundice
  - Waxing and waning of jaundice with melena (seen every 2-3 months in 1/3rd cases)

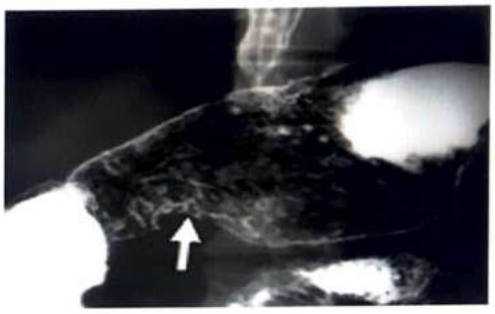
Important Information

- TROUSSEAU Syndrome - Migratory Superficial Thrombophlebitis seen in Malignancy
- TROUSSEAU Sign - Carpopedal Spasm in Hypocalcemia
- TROISIER'S sign - Left Supraclavicular LN (Virchow's Node/signal node) involvement in
- Malignancy (Ca pancreas)

Diagnosis

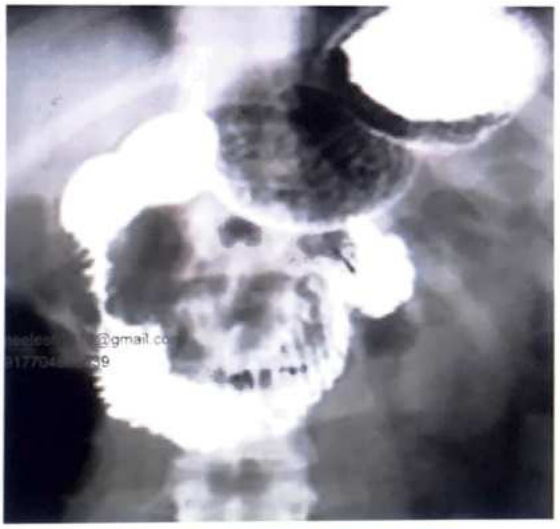
- IOC for Ca pancreas – CECT

Radiological Signs



Antral pad sign

- Ca head of pancreas on Barium study
  1. Antral pad sign
  2. Widening of C loop
  3. Reverse 3 Sign of Frost Berg
  4. Double Duct Sign
- Other signs in Ca pancreas
  1. Rose-thorn Appearance
  2. Mucosal Irregularity
  3. Scrambled Egg Appearance



Reverse 3 sign of frost berg

Double duct sign

Management

- Ca Body and Tail Pancreas – Distal pancreatectomy
- Benign tumor in head of Pancreas – Enucleation
- Ca head of Pancreas
  - Whipple's procedure-Pancreaticoduodenectomy (PD)
  - Longmire traverso procedure-Pylorus preserving Whipple's procedure
- For advanced /metastatic stage - Gemcitabine

Refer Table 12.1

- MC site of anastomotic leak: PJ > GJ > HJ
- MC complication of Pancreaticoduodenectomy – Delayed gastric emptying
- MC cause of death after Pancreaticoduodenectomy – Cardio-pulmonary complications
- Most important predictor of survival – Ro resection
- Types of resections
  - Ro resection – negative margin
  - R1 resection – microscopic positive margin
  - R2 resection – macroscopic positive margin
- Most important margin in Pancreaticoduodenectomy – Uncinate margin/ Retroperitoneal margin/ SMV margin
- Survival in Ca Pancreas
  - Stage I and II→ 16-20 months
  - Stage III→ 6-10 months
  - Stage IV→ 3-6 months

NEUROENDOCRINE TUMORS (NET) OF PANCREAS

01:47:34

- M/C NET of Pancreases - Non-Functional (PPOMA)
- M/C functional NET of Pancreas – Insulinoma
- M/C functional & Malignant NET of Pancreas – Gastrinoma
- Neuroendocrine Tumors are symptomatic because of production of active substances. So, patients are
  - Symptomatic at early stage
  - Diagnosed at early stage
- Treated at early stage
  - Better prognosis - NET > Adenocarcinoma
  - Diagnosis
- Diagnosed in Lab by measuring active substance or its by product
- IOC for localization of NET: SRS (Somatostatin receptor Scintigraphy) (as all NET express Somatostatin receptors except Insulinoma)
- M/c site of metastasis: Liver

INSULINOMA

- Mostly Benign
- M/C site - Head = Body = Tail = equally distributed
- In 5% cases it is associated with MEN-1

Clinical features

- Characterized by Whipple's Triad
  - Symptoms of Hypoglycemia
  - Blood glucose (45 – 50 mg/dl)
  - Improvement in symptoms after taking oral glucose
- Neuroglycopenic symptoms
  - Dizziness
  - Headache
  - Confusion
  - Coma
- Sympathetic overactivity leading to
  - Tachycardia
  - Palpitation
  - Excessive sweating
  - Tremors
- Painless condition associated with weight gain

Diagnosis

- Gold Standard Investigation: 72 hours fasting
- Insulin/ Glucose (ratio) > 0.4 is diagnostic
- Best pre-op Test for localization- Intra Arterial Ca+ injection with portal venous blood sampling
- Overall best Investigation for localization – EUS along with "Intra-Op Palpation"

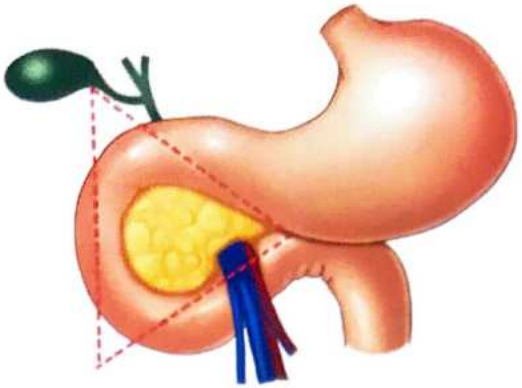
Management

- For preoperative preparation
  - Diazoxide
- For Body and Tail Tumour - Distal Pancreatectomy
- For head Tumor– Enucleation (since it's benign)

GASTRINOMA / ZOLLINGER ELLISON SYNDROME

01:59:07

- M/C functional & Malignant NET of Pancreas
- M/C site - Duodenum > Pancreas
  - In Duodenum M/c site is 1st part > 2nd part > 3rd part (4th part not Involved)
- 75% sporadic and 25% associated with MEN 1
- 90% of gastrinoma are present in Triangle of Passaro's /Gastrinoma triangle
  - Boundaries of Passaro's Triangle
  - Junction of Cystic duct and CBD
  - Junction of Second and third part of duodenum
  - Junction of neck and body of pancreas
- Has ↑↑Gastrin production → ↑ Acid → Peptic Ulcer Disease



Gastrinoma Triangle

Clinical features

- M/C symptom - Abdominal pain
- Other symptoms include
  - Retrosternal heart burn
  - Dyspepsia
  - Diarrhea (acid induced): Nasogastric aspiration halts Acid induced Diarrhea
  - Has large ulcers / multiple ulcers / Jejunal ulcers / Refractory ulcers

Diagnosis

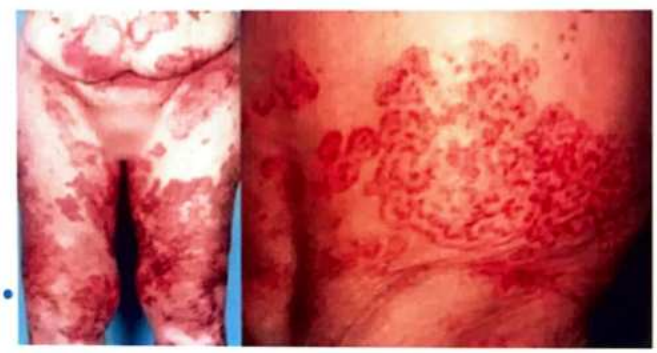
- Gastrin > 1000 Pg/ml is diagnostic
- Basal Acid Output (BAO) > 15 mEq/hr. is also diagnostic
- Best Provocative Test- Secretin Stimulation Test (release of gastrin >200 Pg/ml)
- IOC for localization - Somatostatin receptor scintigraphy (SRS)

Treatment

- DOC - Proton pump inhibitors
- TOC – Pylorus preserving Whipple's procedure

GLUCAGONOMA/ HYPERGLYCEMIC CUTANEOUS SYNDROME

02:06:32



- Diabetes Mellitus
- Dermatitis-Necrolytic Erythema Migrans (M/C symptom)
- DVT
- Depression

- M/C site of Tumour - Body and Tail of Pancreas

Diagnosis

- IOC - ↑↑ Glucagon levels
- IOC for localization-SRS (Somatostatin Receptor Scintigraphy)

Treatment

- Distal Pancreatectomy

VIPOMA

- Aka Verner Morrison Syndrome / Pancreatic Cholera / WDHA Syndrome
- WDHA Syndrome
  - Watery Diarrhea (4 – 6 Liters) – cause
    → ↓ Na, ↓ Cl-, ↓ K+, ↓ HCO3
    → ↑ RBS, ↑ Ca2+ (Hyperglycemia/ Hypercalcemia)
  - Hyperkalemia
  - Achlorhydria
- M/C site – Tail
- It is a medical emergency

Diagnosis

- Dx. is based on VIP (Vasoactive Intestinal Peptides) levels
- IOC for localization-SRS (Somatostatin Receptor Scintigraphy)

Management

- Fluid resuscitation + Correction of Dyselectrolytemia
- TOC - Distal Pancreatectomy

CYSTIC NEOPLASM OF PANCREAS

02:11:59

- M/C Cystic lesion of Pancreas – Pseudocyst (75%)
- M/C Cystic Neoplasm of Pancreas - Mucinous Cystic Neoplasm

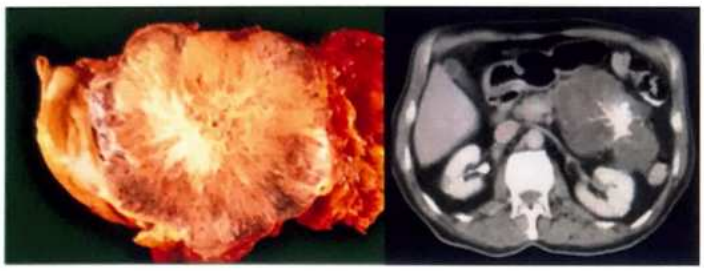
Serous Cyst Neoplasm/Adenoma (SCN)

- Benign
- M/C site - Head of Pancreas

- M/C seen in females (5th -6th decade)
- Pathological features
  - Individual cyst in SCN is
    - → Microcystic
    - → Sponge-like/ honeycomb appearance

- **Clinical features**
  - Most patients are asymptomatic
  - In symptomatic patients – Vague abdominal pain

- **Diagnosis**
  - IOC – CECT
  - On CECT
    - → Central Stellate scar
    - → Central Sunburst Calcification



- **Treatment**
  - Observation
  - Resection is indicated if
    - → Diagnostic uncertainty
    - → Symptomatic
    - → Size > 4cm
- On aspiration of Cyst content
  - Content – Serous
  - CEA – decreased
  - Amylase – decreased

MUCINOUS CYST NEOPLASM/ADENOMA

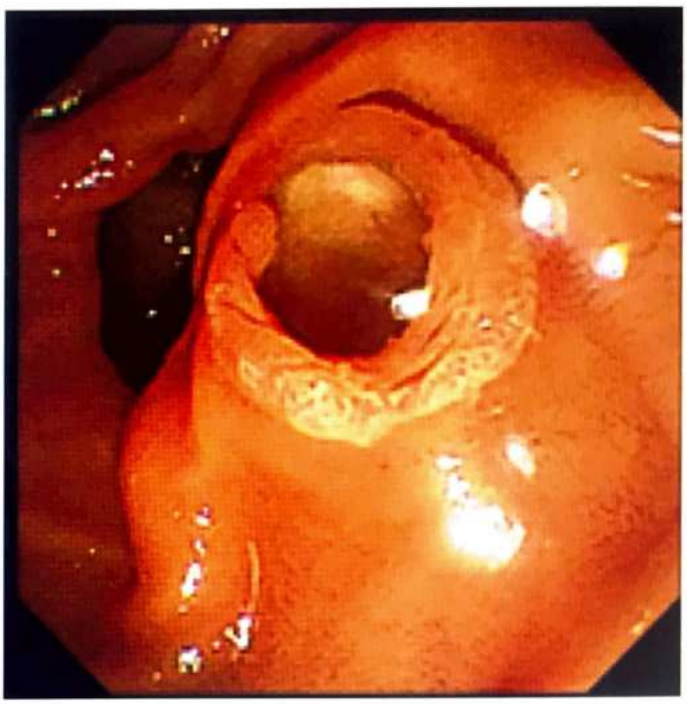
02:17:06

- M/C cystic Neoplasm of pancreas
- It is a pre-malignant condition
- M/C in females (5th -6th decade)
- M/C site - Body and Tail of Pancreas
- Macrocytic
- Most patients are symptomatic – Vague abdominal pain
- Diagnosis
  - IOC - CECT (shows Peripheral Egg Shell Calcification)
- Treatment
  - Surgical Resection of Tumour in all the cases
- On aspiration of Cyst content
  - Content – mucin
  - CEA – increased
  - Amylase – decreased

IPMN – INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM

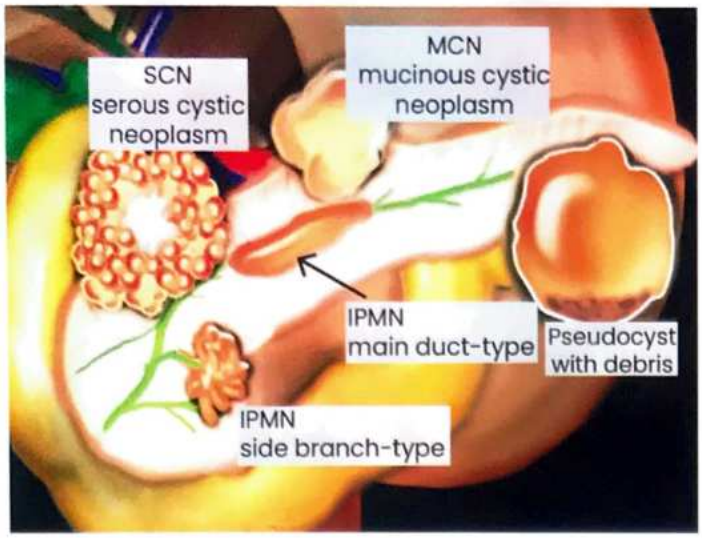
- Pre-malignant
- Common in both male and Female (6th/7th decade)
- MC site – Head &Uncinate process
- **3 Types**
  - Main duct variety
  - Side branch variety
  - Mixed variety

- **Clinical features**
  - Recurrent attack of acute pancreatitis
  - Abdominal pain



- **Diagnosis**
  - IOC - Endoscopy
  - On Endoscopy - Mucin extruding through large Fish-Mouth Opening (ampulla)

- Treatment



Important Information

- Head of pancreas is the M/c site for
  - Carcinoma pancreas
  - PPOMA
  - Somatostatinoma
  - Serous cyst adenoma
  - Intraductal Papillary Mucinous neoplasm
- Body and tail is the **M/C site for**
  - mucinous cyst **adenoma**
  - Glucagonoma
- Tail is the M/c site in VIPOMA
- Insulinoma: equally distributed in Head, body and tail.
- Gastrinoma: **Duodenum > pancreas**

  - Partial pancreatectomy
- On aspiration of Cyst content
  - Content – mucinous
  - CEA – increased
  - Amylase – increased

Diagram 12.1

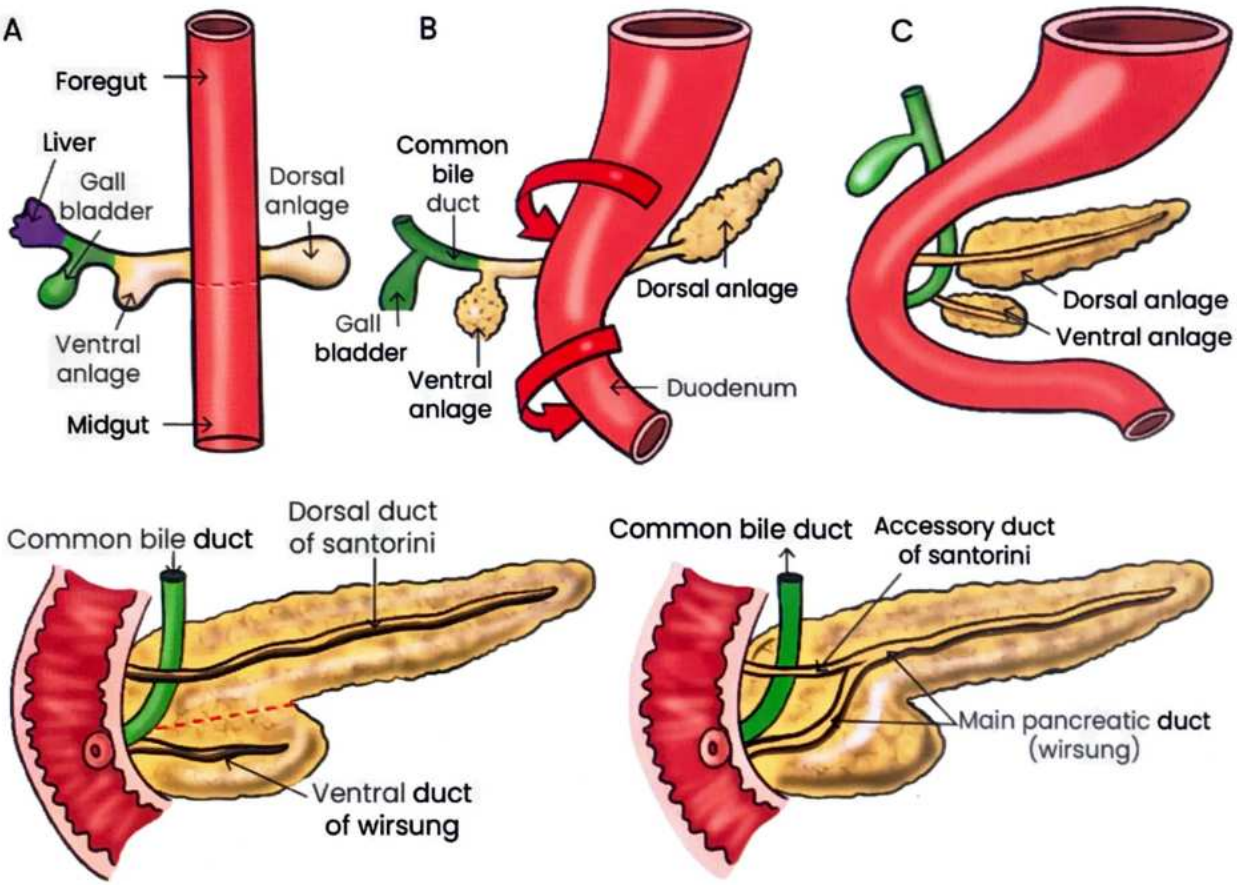
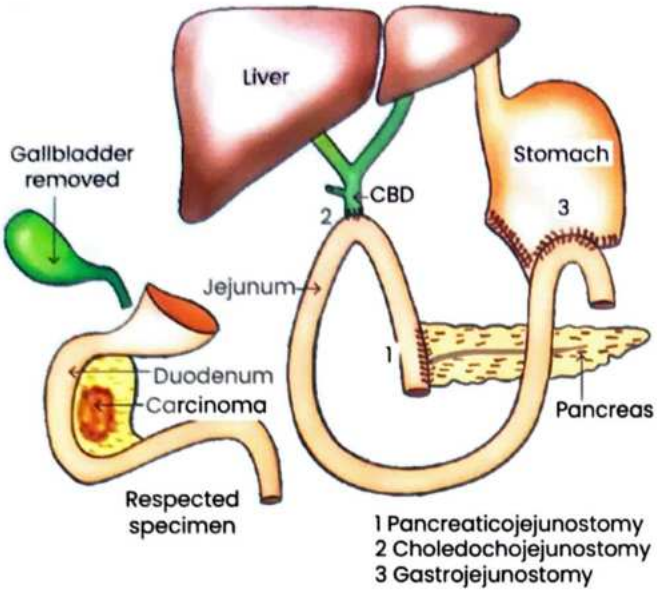


Table 12.1

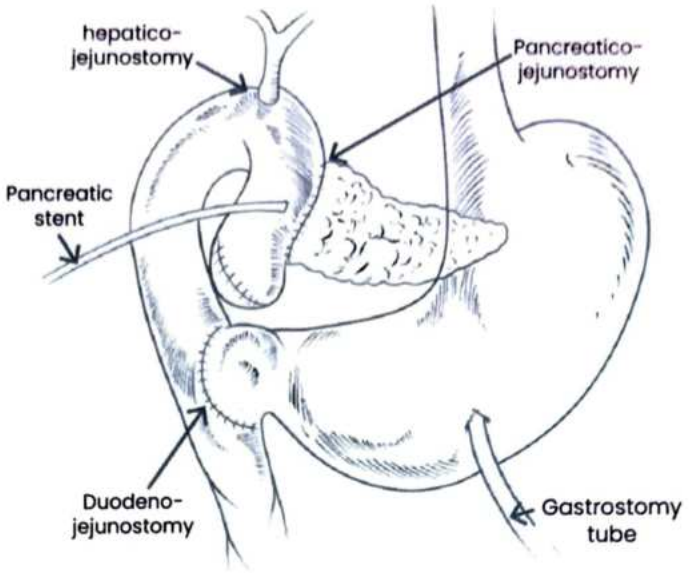
Whipple's procedure

- 1st anastomosis: Pancreatico - jejunostomy
- 2nd: Hepatico - jejunostomy
- 3rd: Gastro – jejunostomy
  - performed in anticlockwise fashion



Long wire traverso procedure (pylorus preserved)

- 1st: Pancreatico - jejunostomy
- 2nd: Hepatico - jejunostomy
- 3rd: Duodeno - jejunostomy



CLINICAL QUESTIONS

Q. A 33-year-old chronic alcoholic female presented with complaints of pain in epigastric region and multiple episodes of vomiting. The patient was admitted and after extensive evaluation, diagnosed as a case of chronic pancreatitis. The patient had severe abdominal pain which did not resolve on medical therapy. To get better pain relief in the case of chronic pancreatitis which nerve should be blocked?

A. Celiac ganglia
B. Vagus nerve
C. Anterolateral column of spinal cord
D. None of the above

Answer: A

Solution

Celiac plexus blockade in chronic pancreatitis is used for Pain Relief

Cause of pain in chronic pancreatitis

- inflammatory changes of pancreatic parenchyma with intrapancreatic and peripancreatic neural alterations
- ductal and intraparenchymal hypertension
- altered nociception of pain

Medical treatment options for pain

- Alcohol abstinence and diet
- Enzyme therapy
- Antioxidant therapy
- Analgesics

40% to 70% of patients seem to benefit from medical treatment

Interventional procedure to treat pancreatic pain

Celiac plexus neurolysis and celiac block

- Injecting an agent at celiac axis to destroy celiac plexus or block it temporarily
- Agents commonly used - alcohol or phenol for neurolysis

Bupivacaine and triamcinolone for a temporary block

- Methods of administration - CT guided, percutaneous or endoscopic ultrasound

LEARNING OBJECTIVES

UNIT 3 GIT

Esophagus

- Anatomy of Esophagus, Carcinoma Esophagus
- Congenital Diaphragmatic Hernia, Esophageal Perforation
- Fundoplication, Hiatus Hernia, Leiomyoma
- Motility Disorders of Esophagus, Nutcracker's Esophagus
- Schatzki Ring, Stress Ulcers
- Upper Esophageal Sphincter, Zenker's Diverticulum

Stomach and duodenum

- Anatomy and Physiology
- Peptic Ulcer
- Treatment of Bleeding DU Ulcer
- Gastric Outlet Obstruction
- Gastrectomy
- Dumping Syndrome
- Metabolic Complications of Gastrectomy
- Upper GI Bleeding, Blatchford Score
- Mallory Weiss Syndrome
- Watermelon Stomach, Risk Factors for Carcinoma Stomach
- Lauren's Classification, Carcinoma Stomach
- Linitis Plastica
- 8th AJCC TNM Classification for Carcinoma Stomach
- Management of Carcinoma Stomach
- GIST
- CARNEY's TRIAD
- Bezoars, Gastric Volvulus, Tea - Pot stomach, Hour - Glass Stomach

Peritoneum

- Types of Peritonitis
- Spontaneous Bacterial Peritonitis, Secondary Bacterial Peritonitis, Peritonitis in CAPD
- Hepato-Morison Pouch and Pelvis, Pelvic Abscess
- Difference b\w Chylolymphatic and Entero lymphatic Mesenteric Cyst
- Anatomy and Clinical Features of Mesenteric Cyst
- Pseudomyxoma Peritonei
- Retroperitoneal Fibrosis, Types, Causes of Secondary Retroperitoneal Fibrosis

Intestinal obstruction

- Introduction, Small Bowel Obstruction, SBO vs LBO
- Simple Obstruction vs Strangulation Obstruction, Paralytic Ileus, Intussusception

- Sigmoid Volvulus, Cecal Volvulus
- Cecal Bascule

Small intestine

- Concepts Related to Bowel Diverticula
- Meckel's Diverticulum, Anatomy of Meckel's Diverticulum
- SMA Syndrome, Management
- Strong's Procedure
- Duodenojejunostomy
- Small Bowel Tumor, Carcinoid Tumors and Types
- Carcinoid Heart Diseases, Small Bowel Carcinoid
- Short Bowel Syndrome
- Bianchi Procedure
- STEP
- GI Tuberculosis, BMFT in GI Tuberculosis

Large intestine

- Anatomy & Physiology of Large Intestine
- Hirschsprung's disease, Colonic Diverticulosis, Colorectal Polyps, Juvenile Polyps
- Peutz-Jegher's Syndrome
- Inflammatory Polyp, Adenomatous Polyp
- HNPCC
- Cowden's disease
- Cronkhite-Canada Syndrome
- Screening of Colorectal Cancer, Modified Duke's Staging, 8th AJCC TNM Classification
- Pseudomembranous colitis, Ischemic Colitis
- Lower GI Bleeding, Heydes Syndrome

Ileostomy and colostomy

- Introduction
- Indications
- Sites of Stoma
- Difference between Ileostomy and Colostomy
- Types of Stoma
- Stomal Complications

Inflammatory bowel disease

- Inflammatory Bowel Disease, Risk Factors of IBD
- Crohn's Disease (CD), Extra-intestinal Manifestations of CD
- Ulcerative Colitis, Modified Truelove & Witt's Severity index of UC, Extra- intestinal Manifestations of UC
- Drugs used in the Management of Inflammatory Bowel Disease, Indication of Surgery
- Indication of Surgery in Crohn's Disease
- Indication of Surgery in Ulcerative Colitis
- Crohn's Disease of Anorectum
- Staged Approach for Perianal Crohn's Disease
- Toxic Megacolon, Large Bowel Obstruction, Pouchitis

- **Vermiform Appendix**
  - Anatomy of Appendix
  - Acute Appendicitis
  - Alvarado or MANTRELS Score
  - Appendicular Perforation
  - Ochsner-Sherren Regime
  - Tumors of Appendix
  - Incisions of Appendectomy

- **Rectum and anal canal**
  - Rectum & Anal Canal: Anatomy
  - Hemorrhoids
  - Internal Hemorrhoids: Classification & Management
  - Rectal Prolapse
  - Anorectal Abscess
  - Fistula -in-Ano
  - Pilonidal Sinus
  - Carcinoma Rectum
  - Carcinoma Anal Canal

- **Hernia and abdominal wall**
  - Introduction
  - Nyhus Classification, Gilbert Classification, Classification of Indirect Inguinal Hernia
  - Irreducible Hernia, Incarcinated hernia, Obstructed hernia
  - Diagnosis of Hernias
  - Treatment of Hernias
  - Herniotomy, Herniorrhaphy, Hernioplasty
  - Inguinal floor reconstruction
  - Bassini's Repair, Shouldice Repair, Lichtenstein Repair, Laparoscopic Hernia Repair
  - Crown of death
  - Complications of Groin Hernia Repair
  - Strangulated Hernia Management
  - Femoral Hernia, Spigelian Hernia, Lumbar Hernia, Obturator Hernia, Epigastric Hernia
  - Omphalocele & Gastroschisis
  - Incisional Hernia. Desmoid Tumor, Richter's Hernia

- **Spleen**
  - Important Points related to Anatomy and Physiology
  - Splenectomy, ITP (Immune Thrombocytopenic Purpura)
  - PSI (Overwhelming Post Splenectomy Infection)
  - Splenic Cyst, Splenic Tumors, Splenic Abscess

13 ESOPHAGUS

ANATOMY OF ESOPHAGUS

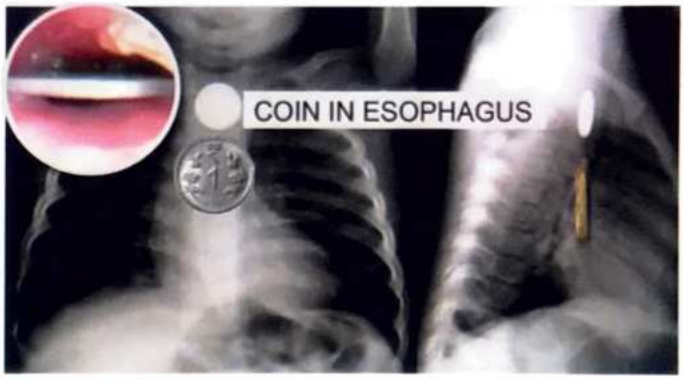
00:00:20

- Length of esophagus – 25cm
- Extent of esophagus - C6 - T11
- On endoscopy, 3 narrowing's are seen from upper incisors

Refer Table 13.1

- Lining epithelium of esophagus - Stratified squamous nonkeratinized epithelium.
  - Upper 1/3rd – stratified muscle fibers
  - Lower 1/3rd – smooth muscle fibers
  - Middle 1/3rd – slow transition from stratified muscle fibers to smooth muscle fibres

- Characteristic features of esophagus
  - Lacks serosa
  - No villi
  - No secretions
  - No Meissner's plexus.
  - Has single plexus only – Auerbach's plexus.
- Unique feature of esophagus - Presence of Lymphatics in Lamina propria
- Other Features
  - Narrowest tube of GIT
  - Narrowest part of esophagus- Crico pharynx (Diameter – 1.5 cm/15mm)
    - → Any foreign body that can cross crico pharynx, can cross other GIT parts and is excreted in stool
    - → Exceptions: sharp foreign bodies and button batteries, intervention has to be performed
    - → On chest X-ray: In AP view Can see the edge of coin and In Lateral view, front of the coin is seen then the coin is in trachea and vice versa



Refer Table 13.2

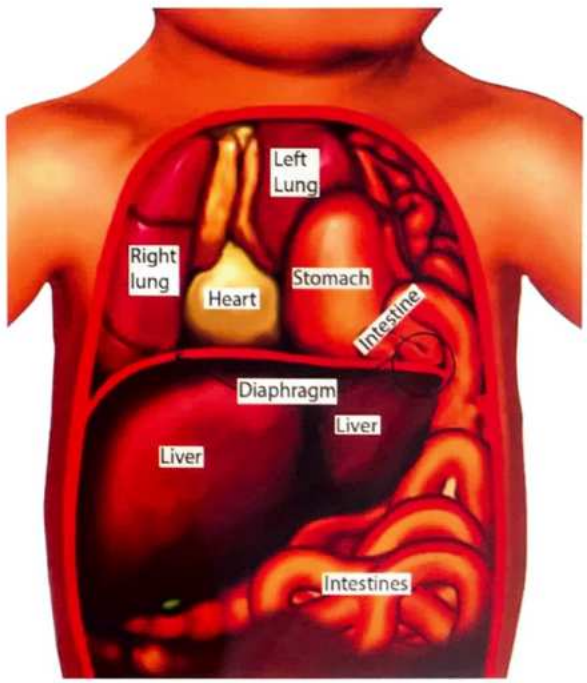
CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

00:08:05

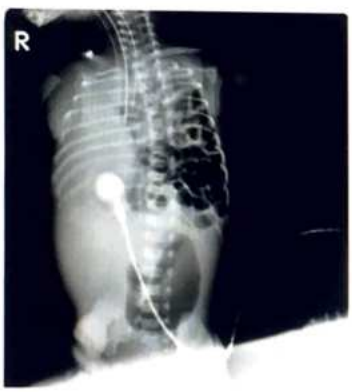
- Protrusion of viscous / part of viscous through the wall of its containing cavity.

Bochdalek Hernia

- Most common type of CDH
- Aka left sided posterolateral Hernia
- Incidence – 1 in 2000-5000 live births
- Cause - Failure of fusion of pleuro peritoneal canal at left side
- The left-out space at the abdomen due to herniation, causes the scaphoid abdomen.



- M/c organ herniated: small intestine > Stomach
- Because there is failure of fusion of pleuro peritoneal canal at left side, left sided structures like spleen, stomach and transverse colon herniate above causing ipsilateral collapse of lung and shifting of heart to right side (dextrocardia)
- Triad of CDH
  - **R** - **R**espiratory distress
  - **D** - **D**extrocardia
  - **S** - **S**caphoid Abdomen
- Bag and mask ventilation are contraindicated. In Bag & Mask ventilation, there will be massive amount of air collected in stomach.
- Most important prognostic factor Pulmonary Hypoplasia > Pulmonary hypertension.
- Most common cause of death Pulmonary Hypoplasia > Pulmonary hypertension
- Diagnosis
  - During pregnancy - mother will experience Polyhydramnios.
  - After delivery - On Chest X-ray
    - → Presence of gastric bubble in thorax
    - → Presence of bowel loops in thorax
    - → Coiling of Ryle's Tube in thorax (as stomach is present in thorax region)



- Management
  - Principle of Treatment - Reduce the herniated organs back in the abdominal cavity and close the defect
  - For large defects: use the prosthetic patch for closure of defect (Mesh should not be used in children as children will grow)
  - If sac is present - Excision is done.

MORGAGNI HERNIA

00:16:39

- In between the right side of xiphoid process and central tendon of diaphragm, there is a shape known as space of Larrey
- Aka Larrey's Hernia
- Aka Right sided/ retrosternal Hernia
- Superior epigastric vessels are passing via the space of Larrey
- MC in right side
- MC organ herniated - Transverse colon
- Incidental finding
- Management
  - Principle of treatment- Reduce the herniated organ and close the defect

HIATUS HERNIA

00:18:23

- Acquired hernia
- Common in adults
- Types of Hiatal Hernia

Refer Table 13.3

- Most common type of Hiatus hernia - Siding Hernia (Type I)
- Most common type of Paraesophageal hernia - Type III (Mixed Paraesophageal hernia)
- Signs & Symptoms
  - Type I - Reflux
  - Type II - Herniation of fundus leading to ischemia which can cause abdominal pain
  - Type III - Reflux and Abdominal pain
  - Type IV - High risk of ischemia and strangulation (Abdominal pain + increased risk of complications)
- Investigation
  - IOC for diagnosis - Barium swallow
- Treatment
  - Laparoscopic Hiatal Hernia repair via abdominal route
- In patients if Sliding Hernia, due to sliding of GE junction up and down there will be formation of ulcer at the lesser curvature known as Riding ulcer / Cameron's ulcer

STRESS ULCERS

00:24:45

- Aka Stress gastritis /Hemorrhagic gastritis
- Cushing ulcer - due to Head injury
- Curling ulcer - due to Burns (Develops when > 1/3rd of body surface area involved)
- MC site of stress ulcer in Stomach (Fundus > Body > Antrum > Pylorus)
- MC site of stress ulcer in Duodenum: 1st part > 2nd part > 3rd part > 4th part of duodenum

Refer Table 13.4

Previous Year's Questions

Q. Most common site of Curling ulcer is?
(JIPMER - May - 2019)

A. Stomach
B. I part of duodenum
C. 2 part of duodenum
D. Junction between 2 and 3 part of duodenum

Refer Table 13.5

Incompetent LES

- Characterized by
  - Total length of LES < 2cm
  - Intra-abdominal length of LES < 1 cm
  - LES pressure < 6mm Hg
- Incompetent LES can lead to GERD

GERD

00:32:40

- Incompetent LES leads to GERD
- Sequence of events

Incompetent LES – Reflux of Gastric content
↓
Esophagitis
↓
Ulceration
↓
Fibrosis
↓
Stricture formation
↓
Columnar Metaplasia (On long term exposure)
(BARRET'S Esophagus)
↓
↑sed risk of Adenocarcinoma

Clinical features

- Classical triad of
  - Retrosternal Heart burn
  - Epigastric pain
  - Regurgitation
- MC Presentation - H/o long standing heartburn with shorter h/o regurgitation

Diagnosis

- IOC for Dx: 24 hours ambulatory PH monitoring and DE-MEESTER's score is calculated
  - Normal - < 14.7
  - GERD - > 14.7

Management:

- Lifestyle modifications:
  - Cessation of smoking
  - Decrease caffeine intake
  - Avoid large meals just before lying down
- For symptomatic improvement
  - Double dose of PPI
- TOC: surgery
- Before performing surgery, following investigations are mandatory.
  1. 24 hours Ambulatory PH monitoring
  2. Barium swallow (to rule out sliding Hernia)
  3. Endoscopy with biopsy (to rule out Barret's esophagus)
- Gold standard treatment of GERD: Laparoscopic Nissen fundoplication (360°)

Fundoplication

Refer Table 13.6

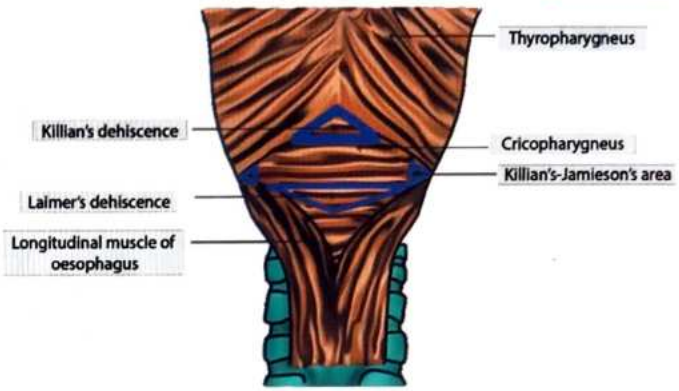
Previous Year's Questions

Q. All of the following are associated with Barrett's esophagus except? (JIPMER - Nov - 2018)

A. Overproduction of epidermal growth factor receptors in saliva
B. Decreased esophageal pain
C. Decreased esophageal motility
D. Duodenogastric reflux

UPPER ESOPHAGEAL SPHINCTER

00:42:11



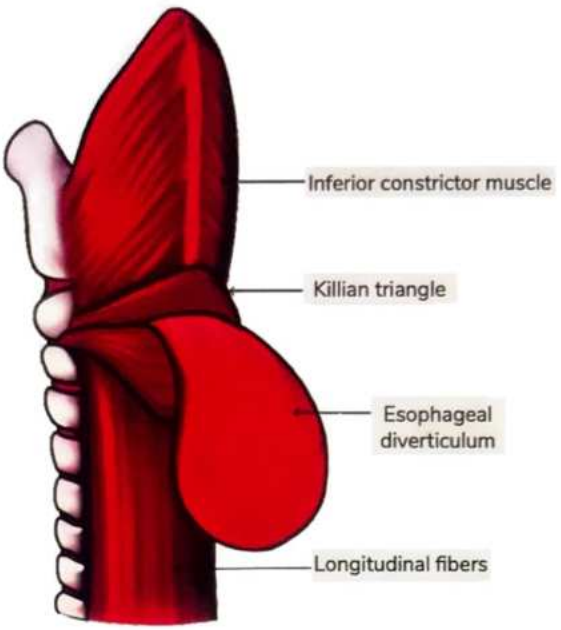
- It is composed of oblique fibers of thyropharyngeal and transverse fibers of cricopharyngeal muscle
- Dehiscence between the fibers of thyropharyngeal and cricopharyngeal muscle - Killian's dehiscence
- Dehiscence below cricopharyngeal muscle – Laimer's dehiscence
- Area below and laterally to cricopharyngeal muscle - Killian-Jamieson's area
- Esophageal diverticula
  - Herniation in Killian's dehiscence is called Zenker's diverticulum
  - Herniation in Killian-Jamieson's area is called Killian-Jamieson's diverticulum
- Other esophageal diverticula are
  - Mid esophageal / Traction diverticulum
  - Epiphrenic diverticulum (located above diaphragm)

Refer Table 13.7

ZENKER'S DIVERTICULUM

00:46:31

- MC type of esophageal diverticulum
- It is a false diverticulum (mucosa & submucosa)
- MC in Elderly / Diabetic / Males
- Inferior constrictor muscle has Dual nerve supply
  - Thyropharyngeous - supplied by Pharyngeal Plexus
  - Cricopharyngeous - supplied by RLN
  - Due to this **dual** nerve supply - **Neuromuscular** incoordination during swallowing **leads to herniation** through killian's dehiscence **due to increased pressure**



Symptoms

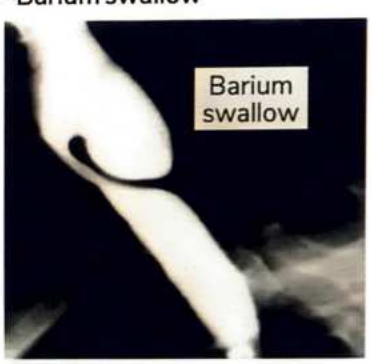
- MC symptom – Dysphagia
- 50% of cases- Zenker's diverticula is associated with cervical web.
- Halitosis
- Regurgitation

Complications

- MC complication: Lung abscess
- Increased risk of SCC (due to chronic inflammation at Zenker's diverticula)

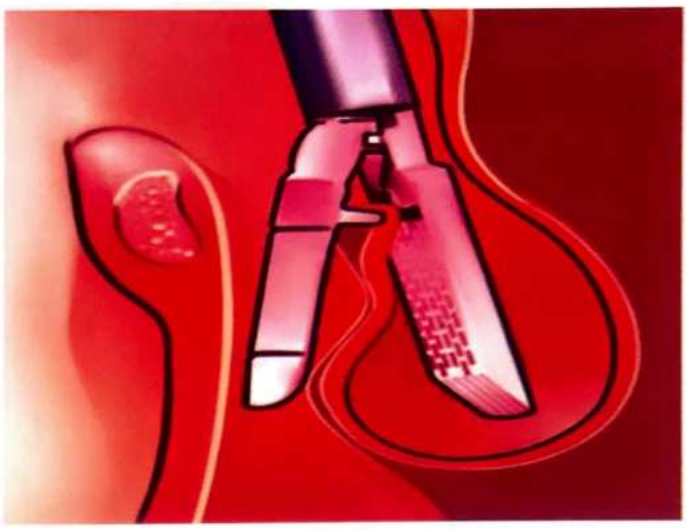
Investigation

- IOC for Dx - Barium swallow



Treatment

- Treatment of choice - Cricopharyngeal Myotomy + Diverticulopexy
- Other alternative procedures:
  - Diverticulectomy (for larger diverticula's > 4cm)
  - Dohlman's procedure



Dohlman's procedure

- Aka Diverticulo-esophagostomy
- It is Endoscopic stapling of septum located between Esophagus & Diverticula

MOTILITY DISORDERS OF ESOPHAGUS

00:53:00

- Includes
  - Achalasia cardia
  - Diffuse esophageal spasm
  - Nutcracker esophagus
  - Hypertensive LES
- MC motility disorder of esophagus - Achalasia cardia
- MC hypomotility disorder of esophagus - Achalasia cardia
- MC hypermotility disorder of esophagus - Nutcracker esophagus
- Most painful motility disorder of esophagus - Nutcracker esophagus
- Investigation of choice for motility disorders – Manometry

ACHALASIA CARDIA

00:55:06

- Characterized by absence of LES relaxation
- Equal distribution (M = F)
- Pathophysiology
  - Only Auerbach's plexus is present in esophagus
  - It has 2 types of neurons
    - → Stimulatory – Responsible for contraction
    - → Inhibitory - Responsible for relaxation
- **Types of Achalasia**
  - Primary

- Secondary (Pseudo Achalasia): Secondary to malignancy or Chagas disease

- **Clinical features**
  - MC symptom - Dysphagia (Liquid > Solid) > weight loss

- **Triad**
  - Dysphagia
  - Regurgitation
  - Weight loss

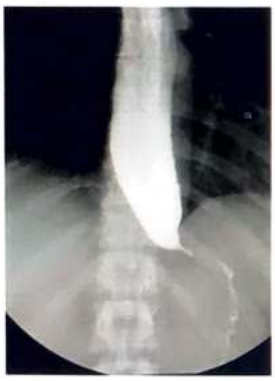
- **Complication**
  - Increased risk of aspiration (due to regurgitation) → Increased risk of pneumonitis→ Increased risk of lung abscess (MC complication → Lung abscess)
  - Increased risk of SCC

- Triple "A" Syndrome (Algrooves Disease)
  - Achalasia
  - Alacrimia
  - ACTH Resistant Adrenal Insufficiency

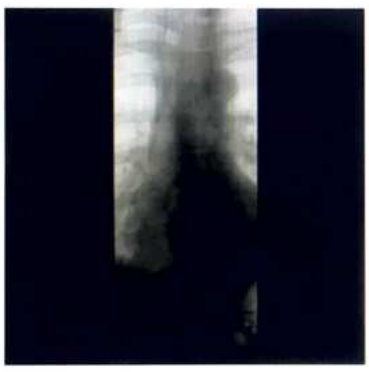
- **Investigation**
  - IOC – Manometry
  - Findings of Manometry

Refer Table 13.8

- On Barium Swallow
  - Bird beak appearance
  - Pencil tip appearance
  - Rat tail appearance
- Rat tail filling defects - seen in CA esophagus

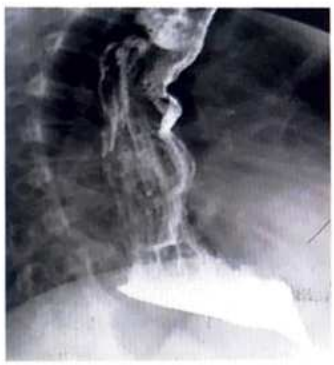


RAT TAIL APPEARANCE

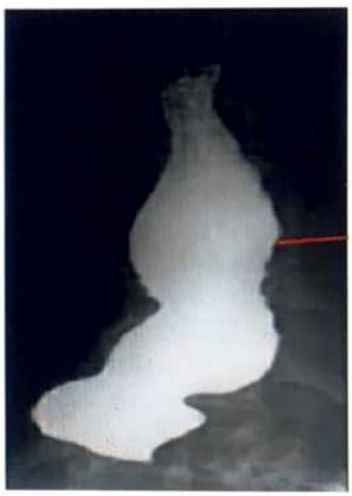


Bird Beak Sign

- Management
  - Drugs
    - → Calcium channel blockers
    - → Nitrates
  - Botox injections (Botulinum toxin)
  - Bougie dilatation or Balloon dilatation (insert bougie and rupture circular muscle fibres to relax LES)
  - Treatment of choice - Laparoscopic Heller's cardio myotomy (Myotomy extended till cardia or 1 cm of stomach)
  - After Heller's cardio myotomy - Partial fundoplication needs to be performed
    - → DOR Fundoplication
    - → Toupet Fundoplication



  - POEM (Per- Oral Endoscopic Myotomy) – New treatment of Achalasia cardia
  - In Chronic cases: Massive dilated esophagus k/a Mega-esophagus (or) Sigmoid Esophagus
    - → Tx: ESOPHAGECTOMY



Previous Year's Questions

Q. On esophageal manometry, abnormal spastic contractions in esophagus >450 mmHg s' cm in the body is suggestive of? (NEET - Jan - 2020)

A. Type I achalasia
B. Type II achalasia
C. Type III achalasia
D. Jackhammer esophagus

Previous Year's Questions

Q. In which of the following condition, patient becomes completely symptom-free after surgery? (JIPMER - Nov - 2018)

A. Diffuse esophageal spasm
B. Achalasia cardia
C. Nutcracker esophagus
D. Hiatus hernia

Previous Year's Questions

Q. Which of the following is reduced in achalasia? (NEET - Jan - 2020)

A. NO and VIP in lower esophagus
B. Diameter of esophagus
C. Tone
D. Esophageal pressure

Previous Year's Questions

Q. Heller's myotomy is done for? (NEET - Jan - 2018)

A. Zenker's diverticulum
B. Achalasia
C. GERD
D. Duodenal stenosis

TYPES OF ESOPHAGEAL CONTRACTION

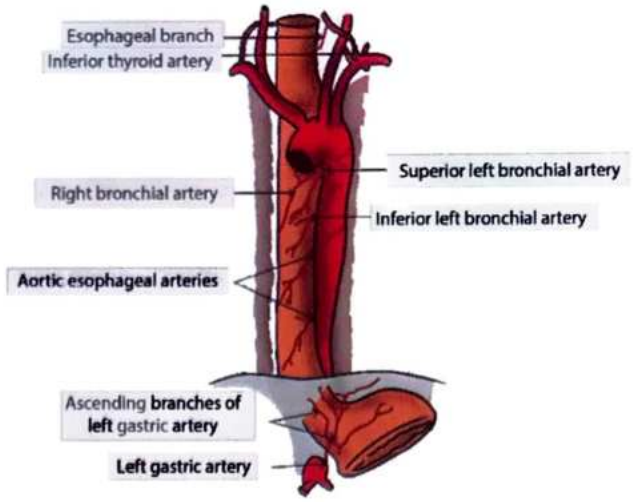
01:08:20

Refer Table 13.9

BLOOD SUPPLY OF ESOPHAGUS

01:10:06

- Esophagus does not have own blood supply
  - In lower neck - Inferior thyroid Artery
  - In thorax, behind trachea - Bronchial artery
  - Below T4, anterior to aorta - Direct branches from Aorta
  - Below diaphragm - Inferior phrenic artery
  - Near JE Junction - Left gastric artery
- Arteries penetrate the muscularis at right angle

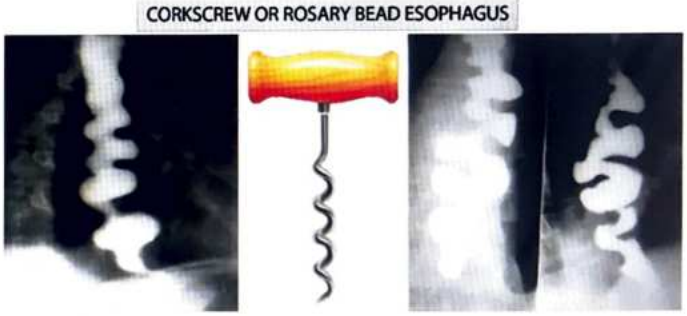


DIFFUSE ESOPHAGEAL SPASM

01:12:42

- Caused by Tertiary contraction / spasmodic contraction → Spasm →Esophageal blood supply cut off – Ischemia →Left sided chest pain/ pain in lower part of neck (mistaken as angina)
- Clinical features
  - Chest pain
  - Dysphagia
- Investigation
  - IOC - Manometry
- Diagnostic criteria
  - Amplitude of contraction > 120 mm Hg
  - Duration of contraction > 2.5 sec
- On Barium Swallow
  - Corkscrew appearance
  - Pseudo diverticula appearance
  - Rosary bead appearance

CORKSCREW OR ROSARY BEAD ESOPHAGUS



- Treatment
  - Antispasmodics
    - → Calcium channel blockers (CCB)
    - → Nitrates
  - If no improvements - Esophagomyotomy

NUT CRACKER'S ESOPHAGUS

01:15:14

- MC Hypermotility disorder
- Most painful motility disorders

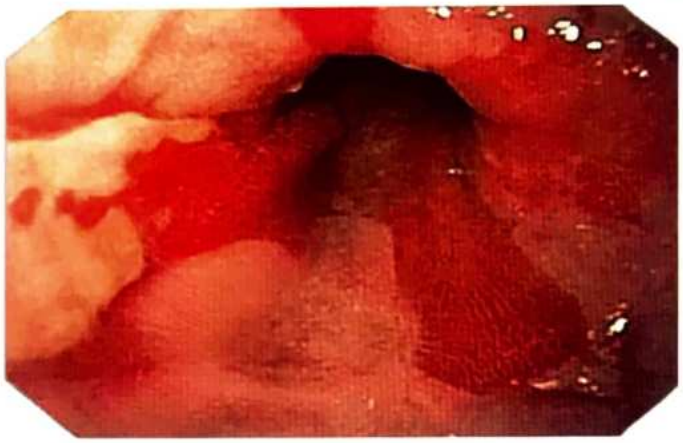
- Clinical features
  - Chest pain
  - Dysphagia

- Investigations
  - IOC - Manometry
- Diagnostic criteria
  - Amplitude of contraction > 180 mm Hg
  - Duration of contraction > 6 sec

- Treatment
  - Antispasmodics
    → calcium channel blockers (CCB)
    → Nitrates
  - If no improvements - Esophagomyotomy

BARRETT'S ESOPHAGUS

01:16:51



- Characterized by Columnar metaplasia
- In lower part /distal esophagus – Squamous mucosa is replaced by columnar mucosa
- MC Columnar epithelium - Intestinal Epithelium (hence, aka Intestinal metaplasia)

Etiology
- Chronic GERD
- Ass. With Sliding Hernia

Clinical Features
- Long history of Heart Burn

Investigation of choice for Dx
- Endoscopy (red velvety GI mucosa) + Biopsy (intestinal metaplasia + Goblet Cells)

Treatment
- Anti- reflux treatment
- 1-2 year - Endoscopy + Biopsy (to detect Dysplasia and Adenocarcinoma)

CA ESOPHAGUS

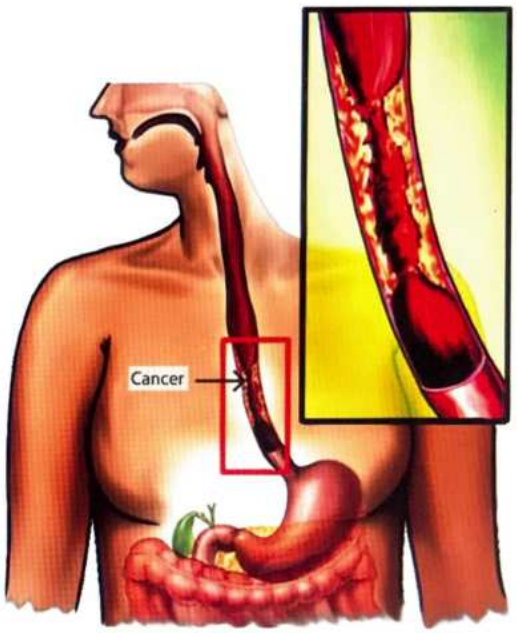
01:20:36

- MC type of CA Esophagus Worldwide - Squamous cell carcinoma
- MC type of CA in western countries - Adenocarcinoma
- MC site of Squamous cell carcinoma - Middle 1/3rd
- MC site of Adenocarcinoma - Lower 1/3rd
- MC site of CA Esophagus overall - Middle 1/3rd
- SCC - more common in low socio-economic status
- Adenocarcinoma - more common in high socio-economic status

Risk Factors for SCC And Adenocarcinoma

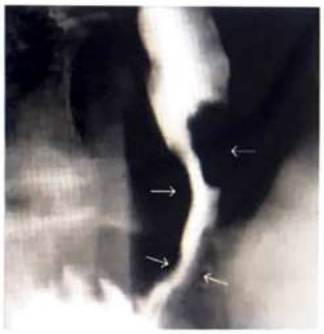
Refer Table 13.10

- Seen in 6th Decade
- Mc site of metastasis – Liver
- Chemotherapy regimen (Same for CA Esophagus and CA stomach)
  - E - Epirubicin
  - C - Cisplatin
  - F - 5-Fluorouracil



Esophageal stent

Clinical Features



- MC symptom – Dysphagia > weight loss
- Progressive dysphagia (Initially Solid >semisolid > liquid)
- In pts. with Malignant Tracheo esophageal fistula
  - Choking
  - Coughing
  - Cyanosis
  - Dyspnea
- Invasion of RLN - Hoarseness of voice

Investigations
- First Ix done in a suspected case of CA esophagus - Barium Swallow
- On Barium swallow - Apple core appearance
- IOC for diagnosis of CA Esophagus - Endoscopy + Biopsy
- IOC for staging of CA Esophagus & CA stomach - Endoscopic ultrasound
- In case of Advanced malignancy or luminal obstruction - CECT
- IOC for distant metastasis - PET Scan

8th AJCC TNM classification for carcinoma esophagus

01:31:45

Refer Table 13.11

Treatment
- Esophagectomy - 10cm margin
- Definitive Chemoradiation:
  - SCC of cervical Esophagus
  - CA esophagus not amenable to resection

Margin taken during surgery
- In GI malignancies, for Resection & Anastomosis - 5 cm margin is taken
- Exceptions
  - Esophagus - 10 cm margin
  - Distal rectum - 2cm margin
- During wide local excision of
  - Squamous cell Ca
  - Barret cell Ca
  - Malignant melanoma
  - Soft tissue sarcoma

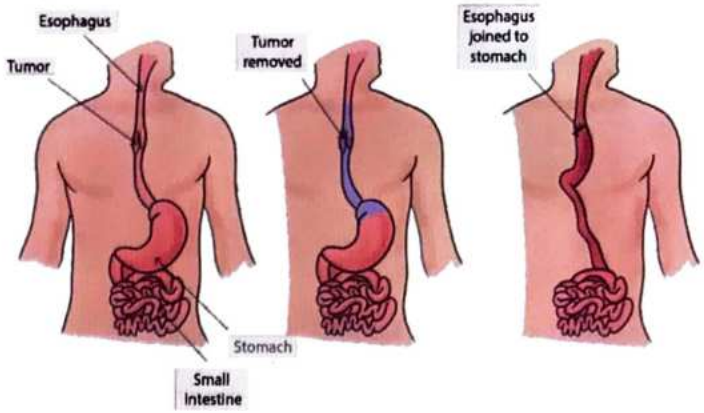
  } 2 cm margin is taken
- During wide local excision in breast conservation surgery – 1 cm margin is taken

TYPES OF ESOPHAGECTOMY

01:37:46

1. Ivor-Lewis operation
2. Orringer trans hiatal esophagectomy: M/c performed
3. McKeon En-bloc esophagectomy: Least recurrence rate

1. Ivor- Lewis Operation
- Step 1 – Laparotomy followed by Thoracotomy is performed
- Step 2 - Intrathoracic esophago- gastric anastomosis is performed



- Low risk of anastomotic leak – Due to increased Vascularity at anastomosis site
- If anastomotic leak occurs - Severe mediastinitis (has high Morbidity and mortality associated)
- MC cause of death - anastomotic leak

2. Orringer Trans-Hiatal Esophagectomy
- Laparotomy F/b Dissection around hiatus
  ↓ enter thorax
- Dissection around Esophagus & Thorax (blindly)
  ↓
- Incision in Neck – Dissection around cervical part of Esophagus
  ↓
- Ryle's tube inserted & Esophagus excised
  ↓
- Pull the stomach & the Esophagus delivered to abdomen is excised
  ↓
- Stomach is pulled up to cervical region
  ↓
- Cervical esophago- gastric anastomosis
- Has high risk of anastomotic leak, but morbidity and mortality associated with leak is low
- It is the most popular/ most performed procedure

3. Mc- Keon Enbloc esophagectomy Thoracotomy
↓
Direct dissection of Esophagus (max. no. of LN removed)
↓
Laparotomy
↓
Incision in cervical region
(Followed by similar steps as Orringer esophagectomy)
- Advantage - Associated with low recurrence rate
- Disadvantage
  - Increased risk of pulmonary complication due to thoracotomy
  - MC cause of death - Pneumonia

Replacement Conduits after esophagectomy

- Best conduit - Stomach > left colon > jejunum
  - Stomach is based on Right gastric + Right gastroepiploic artery
  - Left Colon is based on Left colic artery (branch of IMA)
  - Jejunum is based on Jejunal Arteries (branch of SMA)

- Conduit of choice after esophagectomy for benign disorders like
  - Corrosive Injury: Colon (left)
  - Acid-Peptic Disease: Colon (left)

- Route of replacement for Esophagus - Posterior Mediastinal Route
  - Shortest route
  - Most preferred route

- Preferred treatment for Malignant Tracheo-esophageal fistula - Self expanding metallic stent (SEMS)

Prognostic Factors for Ca Esophagus

- Depth of invasion (Most Important)
- No. of involved LN
- Location of Tumor
  - Cervical has Better Prognosis
  - GE Junction

LEIOMYOMA

01:51:11

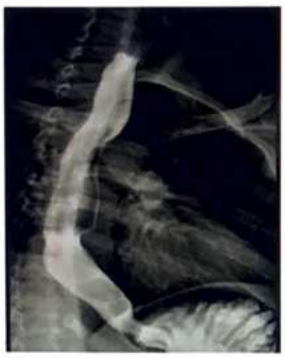
- Mc Benign tumor of esophagus
- Location - > 90% in lower 2/3rd of esophagus
- MC in males
- MC in 4-5th decade

Clinical features

- Most pts - Asymptomatic
- MC Symptom – Dysphagia & Chest pain

Investigation

- IOC for Dx - Barium swallow
- On Barium swallow - Smooth punched out filling defect



Treatment

- TOC - Enucleation

PLUMMER-VINSON SYNDROME

01:53:31

- Aka Paterson Brown Kelly Syndrome / Sideropenic Dysphagia
- It is a Premalignant Condition - ↑ses risk of SCC of Oral Cavity / Hypopharynx / Esophagus
- Characterized by:
  - **S** – **S**plenomegaly
  - **A** - **A**chlorhydria
  - **D** - **D**ysphagia - Upper Esophageal web
  - **C** - **C**hronic Iron deficiency Anemia
  - **A** - **A**trophic Oral mucosa/Glossitis
  - **Koil** - **Koil**onychia

DYSPHAGIA LUSORIA

01:55:35

Refer Image 13.1

- Characterized by disorder of swallowing - Congenital Vascular anomalies
- MC Anomaly – Aberrant Right Subclavian Artery (Arises from descending aorta)

↓

- Travels behind esophagus to supply right upper extremity

↓

- Posterior compression of esophagus

Other Anomalies

- Anomalous Right aortic arch with left Ligamentum Arteriosum
- Pulmonary artery sling

Clinical Features:

- Pulmonary A. slings } Dysphagia
- Vascular rings }
- Compression of trachea - recurrent respiratory infections & Dyspnea

Diagnosis

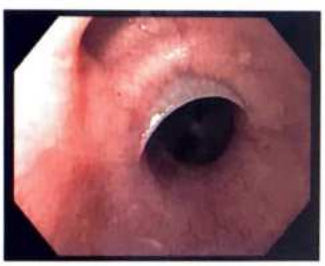
- Barium Swallow – Evaluate compression of esophagus
- Angiography - Diagnosis of vascular anomaly

Treatment

- Both vascular rings } Repaired
- Pulmonary artery slings }

SCHATZKI'S RING

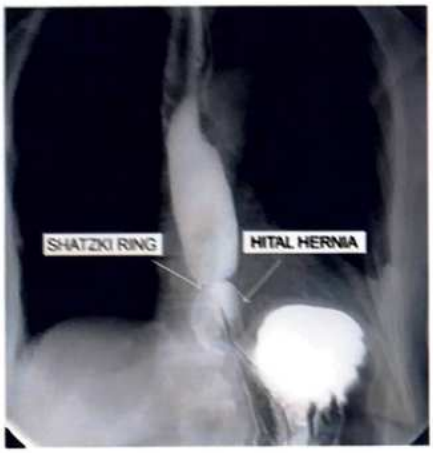
01:59:48



- Characterized by Concentric symmetric narrowing
  ↓
- Restricted distensibility of lower esophagus
- It is composed of mucosa and submucosa
- Located at Squamo-columnar mucosal GE junction

Clinical Features
- MC symptom - Dysphagia (for solid food only)
- Episodic aphagia (because of intermittent obstruction by large piece of Food)

Investigation
- IOC for Dx - Barium swallow
- On Barium Swallow – 3 types of rings seen
  - Type A: Located few cm above GE junction
  - Type B
    - → Known as Schatzki's ring
    - → Located at GE junction
  - Type C: Located Distal to GE junction



Treatment
- Incidentally detected Asymptomatic patients - No treatment
- For Symptomatic pts. - Esophageal dilatation
- Surgical excisions – Not Recommended (lead to stricture formation)

ESOPHAGEAL PERFORATION

02:03:49

- MC cause - Iatrogenic (during endoscopy)
- MC site of perforation - Posterior wall of Crico pharynx

Previous Year's Questions

- Longitudinal tear in stomach – Mallory Weiss syndrome
- Longitudinal tear in Esophagus – Boerhaave syndrome

BOERHAAVE SYNDROME

02:05:28

- Aka Spontaneous esophageal perforation
- Caused by
  - Forceful vomiting
  - Repeated vomiting
- MC site of perforation - Lower 1/3rd of esophagus along Left posterolateral direction
- More common in males

Clinical features
- Characterized by Mackler's triad
  - Thoracic Pain
  - Vomiting
  - Cervical subcutaneous emphysema
- In case of massive contamination / inflammation
  - Fever
  - Sepsis

Investigation
- On CXR – Hydropneumothorax
- IOC for Dx - Water soluble contrast esophagogram (Gastrografin > Hypaque)

Management
- Depends on Time of Presentation

Within 24 hours	After 24 hours
• Golden period of repair • Repair of Perforation + ICD insertion + Feeding jejunostomy	• Esophagostomy + ICD insertion + feeding jejunostomy
• Mortality rate up to 20%	• Mortality rate > 50%

Table 13.1

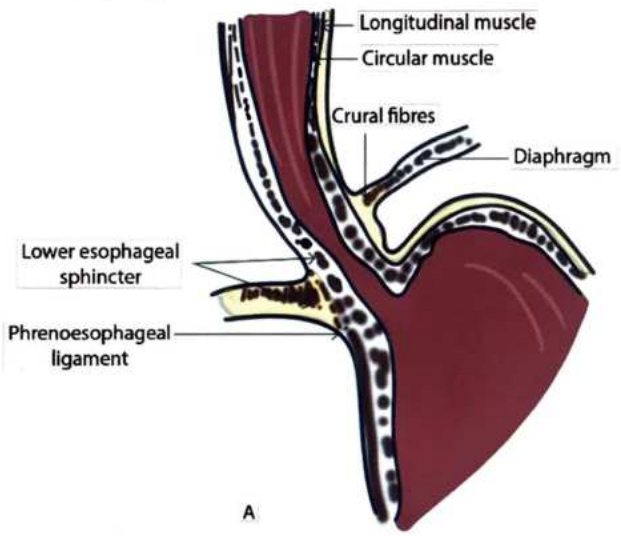
1.	At beginning/ crico pharynx	• 15 cm from upper incisors
2.	At Arch of aorta, At Left Bronchus	• 25 cm from upper incisors
3.	At Diaphragm	• 40 cm from upper incision

Table 13.2

	Foreign body in esophagus	Foreign body in trachea
• Symptoms	• Dysphagia	• Dyspnoea
• Chest X-ray	• On Ap view: Frontal surface of coin • On Lateral view: Edge	• On Ap view: Edge • On lateral view: Frontal surface

Table 13.3

Type I	• Aka Sliding Hernia (most common type) • Herniation of GE junction
Type II	• Aka True Paraesophageal hernia (Rolling Hernia) • Herniation of fundus of stomach • GE junction located below diaphragm
Type III	• Aka Mixed Paraesophageal hernia (sliding + rolling hernia) • Herniation of both GE junction of fundus of stomach
Type IV	• Paraesophageal hernia with herniation of content other than stomach



A

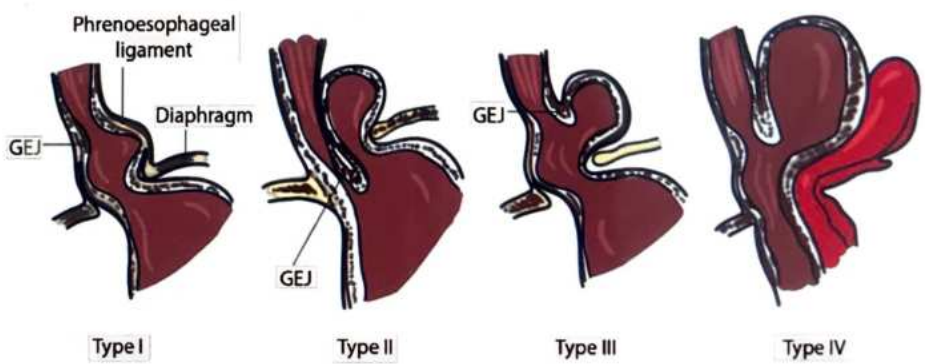


Table 13.4

	Upper esophageal Sphincter	Lower esophageal Sphincter
Normal Length	• 4 – 5 cm	• 5 cm • Intrabdominal length of LES – 2 cm
Normal pressure	• 60 mmHg	• 6-26 mmHg
Muscles	• Has 3 muscles ○ Distal portion of inferior constrictor ○ Cricopharyngeus ○ Circular muscles of Proximal esophagus	

Table 13.5

Factors that decreases LES pressure

Drugs	Foods
• P - Prostaglandin E1, E2, Progesterone • M - Morphine, Meperidine • T - Theophylline • B - Barbiturates • D - Diazepam, Dopamine • C - Calcium channel blockers • A – Atropine • N – Nitrates	• C- Chocolate, Coffee • A - Alcohol • P - Peppermint • S - Smoking • F – Fatty food

How to remember

- PMT BD CAN

How to remember

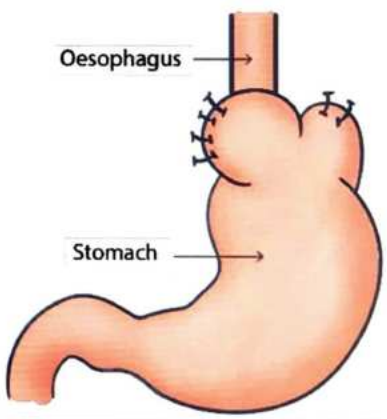
- CAPS Fat

Table 13.6

Types of fundoplication

a) Watson fundoplication

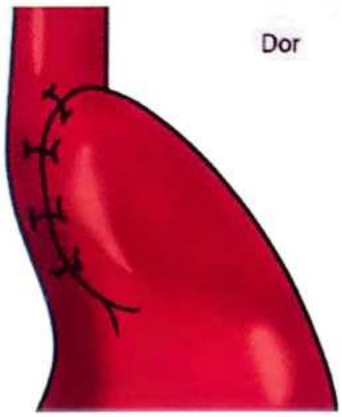
- Fundus of stomach is taken to cover only 90° /one fourth of esophagus anteriorly.



Anterior Watson 180° fundoplication

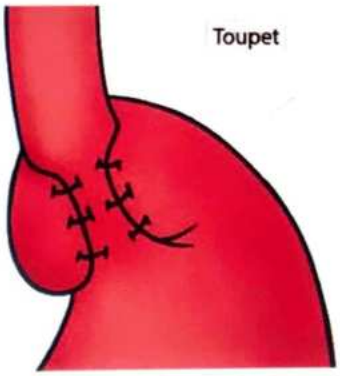
b) DOR fundoplication

- Fundus of stomach is taken to cover 180° of esophagus anteriorly



c) Toupet fundoplication

- Fundus of stomach is taken to 270° of esophagus posteriorly

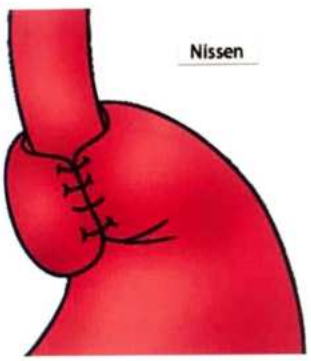


d) Belsey Mark IV

- Fundus of stomach is taken to cover 270° of esophagus anteriorly.

e) Nissen's fundoplication for 360°

- M/c performed
- One part of fundus is taken behind the esophagus of other part of fundus is taken in front of esophagus
- Both of them are plicated in front of esophagus.



- MC performed fundoplication – Nissen's fundoplication
- Rarely performed fundoplication
  - Watson fundoplication
  - Belsey Mark IV fundoplication
- MC performed Partial fundoplication
  - DOR fundoplication
  - Toupet fundoplication

Table 13.7

True diverticulum	False diverticulum
• Has herniation of all the layers of wall (Mucosa + Submucosa + Muscularis)	• Has herniation of only Mucosa & Submucosa
• Only one true diverticulum in esophagus: Mid esophageal / Traction diverticulum	• Zenker's diverticulum • Epiphrenic diverticulum

Table 13.8

LES Related	Esophageal body Related
• Absence of LES relaxation	• Absence of Peristalsis • Ineffective contraction
• Increased LES pressure	• Increased Esophageal pressure

Table 13.9

Primary	Secondary	Tertiary
• Progressive contraction • Triggered by voluntary swallowing	• Progressive contraction • Triggered by irritation or distention caused by food bolus	• Non-progressive • Non-peristaltic spasmodic contraction

Table 13.10

SCC	ADENOCARCINOMA

• Alcohol
• Smoking
• Zenker's diverticula
• Achalasia cardia
• Intake of
  ○ Nitrites
  ○ Nitrates
  ○ Nitrosamine
• Fungal toxins
• HPV infections (16, 18, 31, 33)
• Plummer- Vinson syndrome
• Hot liquid ingestion
• Tylosis Palmaris & Plantaris
• Deficiency of
  ○ MO -Molybdenum
  ○ Z -Zinc
  ○ A -VITAMINA
• Bulimia nervosa
	• GERD
	• High fat diet
	• Scleroderma - Esophageal dysmotility & smooth muscle atrophy → GERD
	• Barret's esophagus

Table 13.11

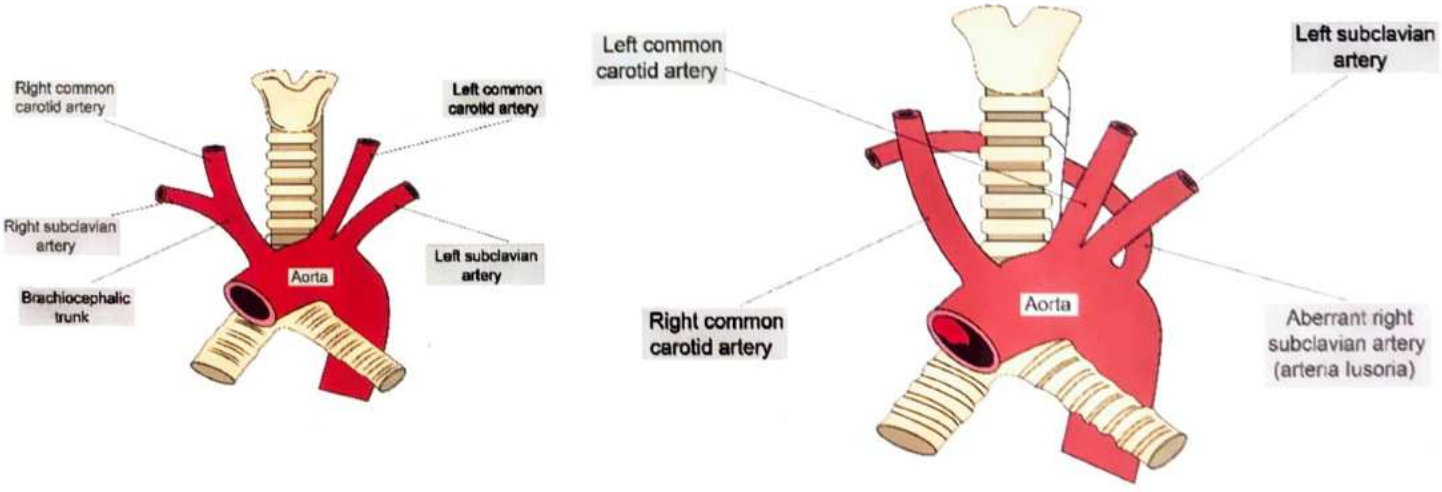
Tis	• Carcinoma insitu / High – grade dysplasia
T1a	• Tumor invades lamina propria or muscularis mucosa
T1b	• Tumor invades Submucosa
T2	• Tumor invades Muscularis propria
T3	• Tumor invades Adventitia

T4a	• Tumor invades
	  ○ P - Pleura, Pericardium, Peritoneum
	  ○ A - Azygous vein
	  ○ D - Diaphragm

T4b	• Tumor invades
	  ○ V - Vertebral body
	  ○ A - Aorta
	  ○ T - Trachea

N1	• Metastasis to 1-2 regional LN
N2	• Metastasis to 3-6 regional LN
N3	• Metastasis to 7 or more regional LN
M0	• No Metastasis
M1	• Distant Metastasis

Image 13.1



CLINICAL QUESTIONS

Q. A 40-year-old female presented to the OPD with complaints of heartburn, regurgitation, and mild dysphagia. The patient was diagnosed to have a hiatus hernia. Hiatus hernia is associated with all of the following complications except:

A. Esophagitis
B. Oesophageal varices
C. Volvulus
D. Esophageal stricture

Answer: B

Solution

Complications of hiatus hernia

- Oesophagitis

Mild redness to severe bleeding ulceration with stricture formation

- Barrett's oesophagus
- Anemia

Iron deficiency anemia occurs as a result of occult blood loss

Bleeding can occur due to oesophagitis or subtle erosions in the neck of the sac (Cameron lesions)

- Benign oesophageal stricture
- Gastric volvulus

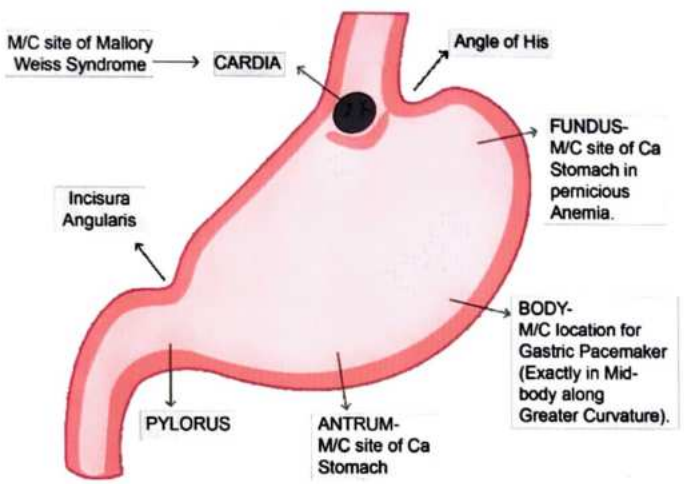
Massive intrathoracic hiatus hernia may twist on itself leading to a gastric volvulus

14 STOMACH AND DUODENUM PART-1

ANATOMY OF STOMACH

00:00:17

- Cardia - the MC site of Mallory-Weiss syndrome
- Fundus
  - MC site of stress ulcers/stress gastritis
  - MC site of Ca stomach in pernicious Anemia
- Body
  - MC site of Gastric pacemaker cells K/A INTERSTITIAL CELLS of CAJAL
  - Gastric pacemaker cells located in midbody along greater curvature
- Antrum
  - MC site of Ca stomach (overall)
- Incisura Angularis (notch near longer curvature)
  - MC Site of gastric ulcer



Nerve Relation

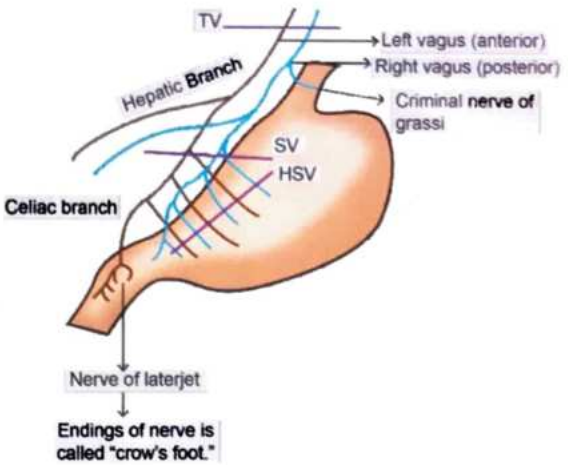
- Left vagus (anterior)
  - Hepatic branch - 1st branch
  - Terminal branches supplying pylorus known as Nerve of Latarjet

Anterior → Branch of Lt. Vagus

Posterior → Branch of Rt. Vagus

  - Nerve of Latarjet has nerve endings knows as crows' foot.
  - Seromuscular branches of left vagus
- Right vagus (posterior)
  - Criminal Nerve of Grassi (CNG) - 1st branch
  - Celiac branch: 2nd branch
  - Seromuscular branches of right vagus

VAGOTOMY



Types of vagotomy

1. Highly selective vagotomy (HSV)
- Division of seromuscular branches with preserved supply of pylorus
- Nerve of Latarjet is intact
- Associated with maximum risk of recurrence
- Minimum morbidity
- Done for intractable duodenal ulcer

2. Selective vagotomy
- Division of vagus after celiac and Hepatic branch

3. Truncal vagotomy
- Division of main trunk of vagus
- Minimum risk of recurrence
- Maximum morbidity
- Done for recurrent duodenal ulcer

PEPTIC ULCER

00:07:35

- Peptic ulcer is of 2 Types
  - Duodenal ulcer
  - Gastric ulcer
- H pylori is responsible for
  - 90% cases of duodenal ulcer
  - 75% of cases of gastric ulcer
- MC type of peptic ulcer – Duodenal ulcer
- MC Site of peptic ulcers – 1st part of duodenum
- Treatment for Gastric ulcer - depends on location/type
- Treatment for Duodenal ulcer - depends on complications

Classification of Gastric Ulcers 00:09:11

Refer Table 14.1

- Type I - associated with blood group 'A'
- Type II to Type IV - associated with blood group 'O'
- In Type I, IV, V
  - Acid production is either normal or low
  - So, Vagotomy not performed
- In Type II, III
  - Increased acid production
  - Truncal vagotomy routinely

Management of Gastric Ulcer 00:12:40

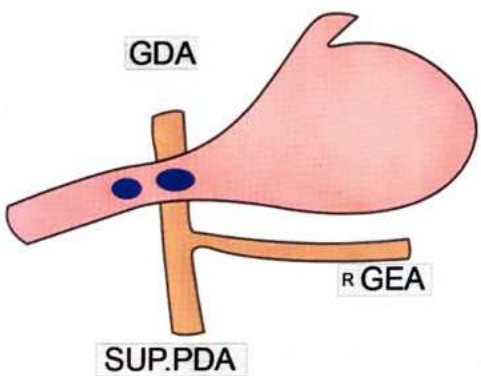
- Type I - Distal Gastrectomy
- Type II & III - Truncal vagotomy + antrectomy
- Type IV (special surgeries)
  - CSENDES
  - POUCHET
  - KELLING – MADLENER
  - SHOE – MAKER
- Type V - Stop NSAIDS

Complications of peptic ulcers 00:14:20

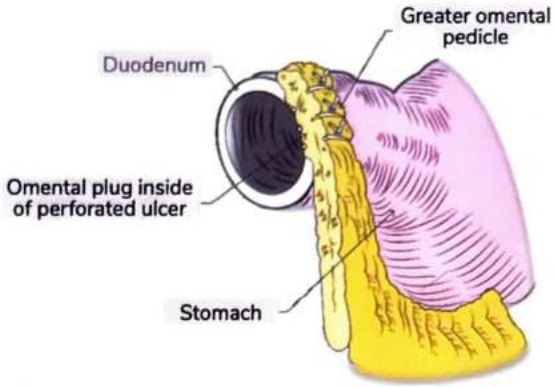
1. Intractability – not healing after medical management
2. Bleeding – MC complication of peptic ulcer
3. Perforation – MC complication of gastric ulcer
4. Gastric outlet obstruction

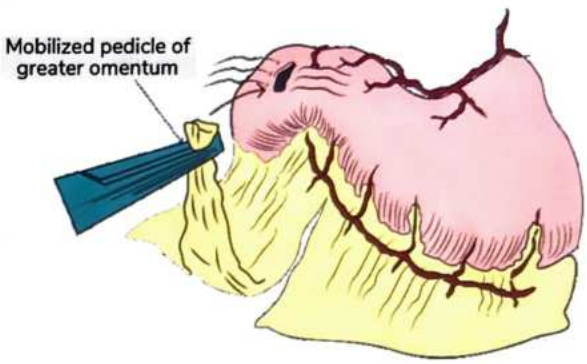
Treatment

- HSV (Highly Selective Vagotomy) – Performed for
  - Intractable Duodenal ulcer
  - Chronic duodenal ulcer
- Ulcers located on anterior wall of duodenum - Perforate
- Ulcers located on posterior wall of duodenum – Bleed
- MC involved artery in Bleeding duodenum ulcer - Gastro duodenal artery



- For Bleeding Duodenal ulcer
  - Duodenotomy + Ligation of bleeding vessel + Truncal vagotomy (to prevent re- bleeding & recurrence due to high acid production)+ Pyloroplasty (to prevent stricture formation)
- For duodenal ulcer perforation: Modified GRAHAM'S REPAIR
  - Aka OMENTAL PATCH REPAIR
  - Vascularized pedicle of Omentum is patched over the defect





- For Gastric Outlet Obstruction (GOO)
  - Rare complication of peptic ulcer
  - MC cause GOO worldwide - CA stomach
  - MC site of obstruction in GOO - 1st part of duodenum

Diagnosis

- Saline load test: Empty the stomach and Insert Ryle's tube

↓

Instill 750 ml of saline & place patient in sitting position

↓ after 30 min

Nasogastric aspiration

↓

If residual saline

< 400 ml	> 400 ml
↓	↓
Normal	Gastric outlet obstruction

Management

- Initial management
  - NPO for 48hrs
  - IV fluids (Fluid of choice - Normal Saline)

- Most patients improve

- For non-responding pts
  - TOC – Truncal vagotomy + antrectomy
- If antrectomy becomes difficult (due to extensive fibrosis and scarring)
  - Alternative Treatment: Truncal vagotomy + gastrojejunostomy

Previous Year's Questions

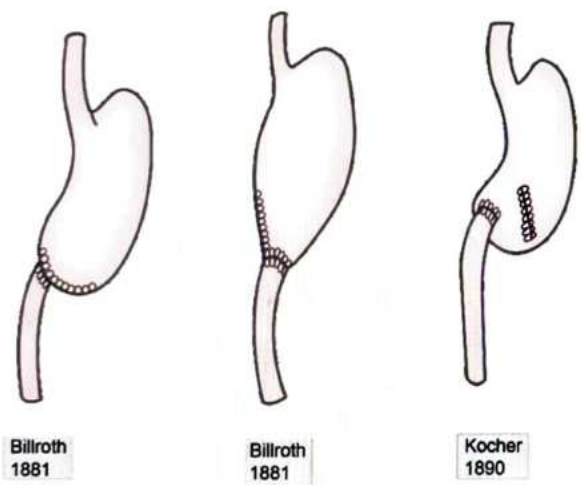
Q. What is modified radical gastrectomy?
(JIPMER - May - 2018)

A. Spleen and pancreas removed
B. Gastrectomy with N1 nodes removed
C. Gastrectomy with N2a nodes removed
D. N2a node except splenic hilum removed

GASTRECTOMY

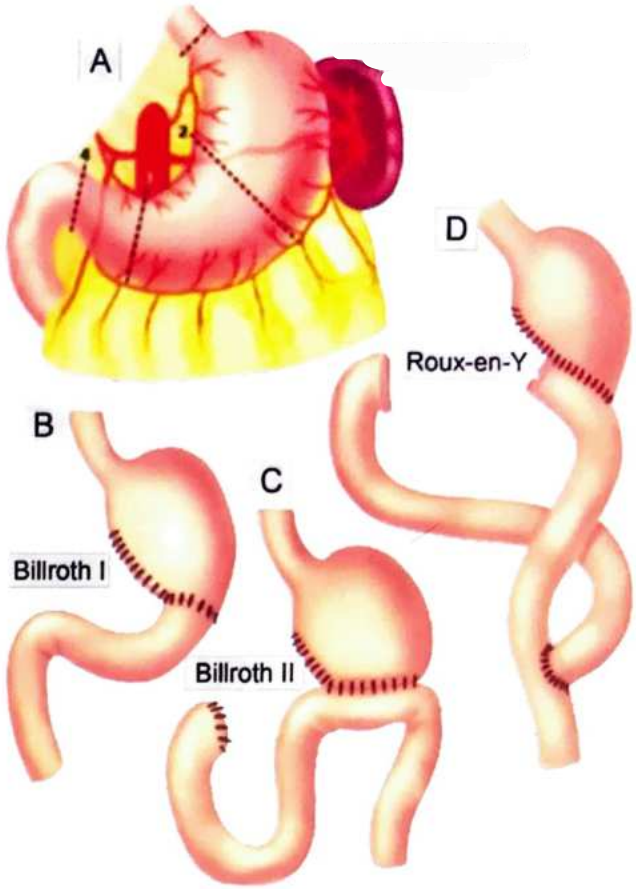
00:24:42

- 1st performed by THEODOR BILLROTH in 1881
- Types of Gastrectomy based on method of reconstruction
  a. Billroth- I
  b. Billroth- 2
  c. Roux-en-Y gastrojejunostomy



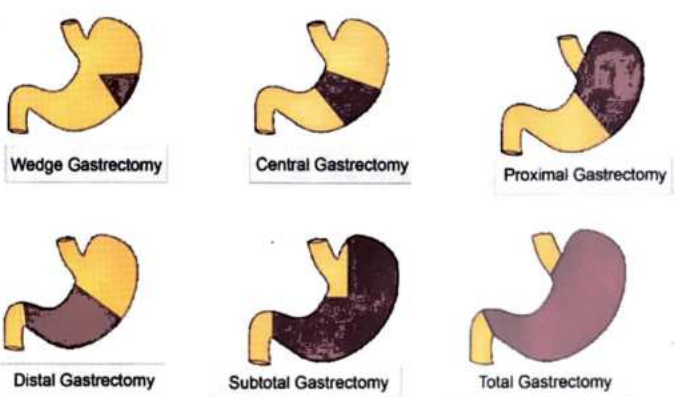
Billroth- I Gastrectomy
- Aka Gastro – duodenostomy
- Physiological (so, minimal risk of complications)

Billroth- II Gastrectomy
- Aka Loop gastrojejunostomy
- Maximum risk of complications



Types of Gastrectomy based on amount of Stomach removed

TYPE	Amount of Stomach removed
1. Total Gastrectomy	• Entire Stomach
2. Near Total Gastrectomy	• >90%
3. Sub-total gastrectomy	• 80-90%
4. Partial gastrectomy	• 65-75%
5. Hemi gastrectomy	• 50%
6. Antrectomy (distal gastrectomy)	• 35-50%



Complications of gastrectomy

1. Secondary to Gastric Resection
- Dumping Syndrome
- Metabolic disturbances

2. Secondary to Gastric Reconstruction
- Afferent Loop syndrome
- Efferent Loop obstruction
- Alkaline reflux gastritis
- Retained antrum syndrome

3. Post-Vagotomy Syndrome
- Post vagotomy diarrhea
- Post vagotomy gastric atony
- Incomplete vagal transection

DUMPING SYNDROME

00:30:41

- Constellation of symptoms due to accelerated emptying / dumping of hyperosmolar content into proximal part of small intestine.
- More common in - Billroth –II > Billroth-I

Prevention of dumping syndrome

- Dietary modification
  - Small frequent meals
  - Low carbohydrate, high fat, high protein diet
  - Avoid high calorie drink
  - Avoid liquids during meals
- If patient is not improving after dietary modification
  - Octreotide intake (Somatostatin analogue) - To decrease secretions of GIT and to decrease insulin release
- If patient not improving even after Octreotide intake: Surgery
  a. Convert BILLROTH II to BILLROTH I
  b. Interposition of anti-peristaltic segment of jejunum

Metabolic complications of Gastrectomy

- MC Metabolic complication – Iron Deficiency Anemia
  - Fe^{3+} (oral form of iron) gets converted to Fe^{2+} (Absorbable form) with the help of acid
  - Rx: ↑ oral supplementation
- Megaloblastic anemia
  - 50% of stomach removed (deficiency of intrinsic factor- ↓secretion of Vit B12)
  - Mx: Life-long parenteral supplementation of Vit B12

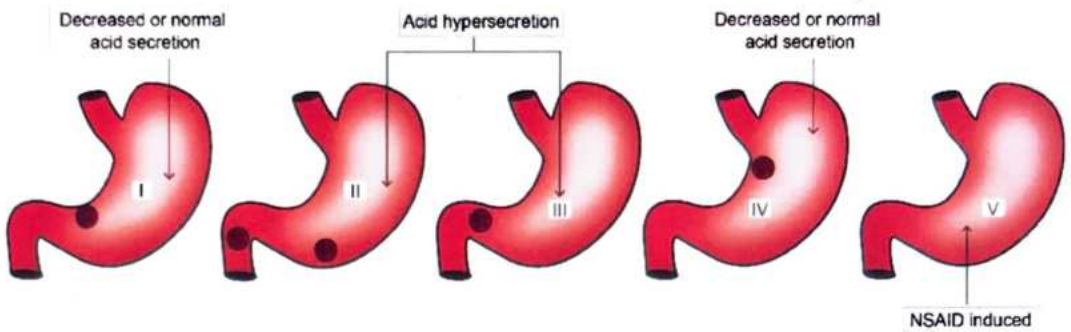
EARLY DUMPING	LATE DUMPING
• Seen within 15-30 min of meals • Hyperosmolar content in jejunum ↑se secretion in jejunum ↓ Third-space loss ↓ Hypovolemia • Treatment – IV fluids	• Seen after 2-3 hours of meals • Hyperosmotic/ Hyperglycemic content in jejunum ↓ Increased release of insulin ↓ Leading to Reactive Hypoglycemia ↓ Late dumping • Treatment – Oral glucose

Table 14.1

Type I	• Ulcer located at incisura Angularis • Most common

Type II	• Two ulcers:
	  ○ One in the body of stomach
	  ○ One at 1st part of duodenum.

Type III	• AKA Prepyloric ulcer • Ulcer located just before pylorus
Type IV	• Ulcer located higher on lesser curvature
Type V	• NSAIDS induced ulcers



15 STOMACH AND DUODENUM PART-2

UPPER GI BLEEDING

00:00:16

- MC cause of UGI bleeding – Peptic Ulcer
- 1st Investigation done in UGI bleeding – Endoscopy

Risk Stratification System

- Used to identify the patient at risk of
  - Major Bleeding
  - Death
- MC used scoring systems
  a) Rockall-Baylor Score: Most useful as it is based on Endoscopic findings
  b) Blatchford score: Used during Initial assessment, Endoscopic data is not included

Refer Table 15.1

BLEED risk Classification

- Used to predict the risk of rebleeding & Mortality in patients of UGI bleeding
- Based on the following criteria
  a. Ongoing Bleeding
  b. Low SBP
  c. Elevated PT (>1.2 times)
  d. Erratic mental status
  e. Unstable comorbid Disease

Forrest Classification

00:05:18

- For estimation of risk or re-bleeding based on endoscopic findings

1. IA: Active pulsatile bleeding
2. IB: Oozing
3. IIA: Non – bleeding visible vessel

} High risk of rebleeding

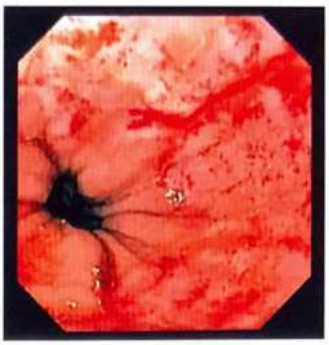
4. IIB: Adherent clot – Intermediate risk of rebleeding
5. IIC: Black Dot- Low risk of rebleeding
6. III: Clean base - Low risk of rebleeding

BLEEDING DISORDERS OF STOMATCH

00:07:10

Mallory – Weiss Syndrome

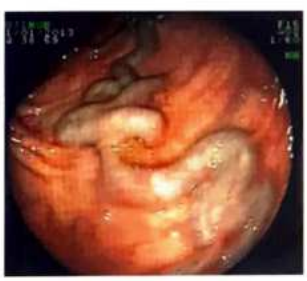
- Characterized by longitudinal partial tear (only mucosa + sub mucosa involved)
- MC site is cardia (just below GE junction.)
- MC in Alcoholic males
- Risk Factors
  - Repeated vomiting
  - Forceful vomiting
  - Retching

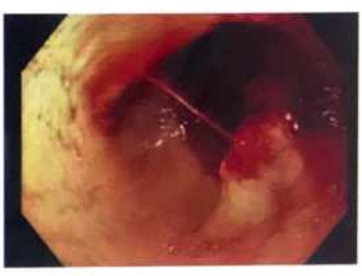


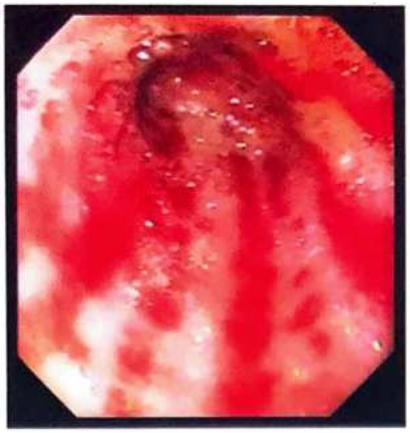
- Clinical features
  - Minor bleeding in Majority
  - Massive bleeding in only 10-20% cases.
  - Painless condition
  - MC vessel responsible for bleeding – Left gastric artery
  - Largest vessel supplying stomach – Left gastric artery
- Diagnosis
  - IOC for Dx – Endoscopy
- Management
  - Conservative management (because of minor bleeding)
  - If not controlled, then: Endoscopy + Electro coagulation
  - If not available / failed: Angiography + embolization
  - If not available/ failed: Open surgical ligation of bleeding vessel.
- Sengstaken-Blakemore tube
  - Use is indicated in variceal bleeding (bleeding in veins)
  - Use is contraindicated in Mallory Weiss syndrome (bleeding is from artery)

DIEULAFOY'S LESION

00:13:18







- Characterized by
  - Presence of large arteriole below mucosa with diameter of 1-3 mm within 6cm – 10cm of GE junction near lesser curvature
  - Placed just below mucosa
  - Necrosis of overlying mucosa
  - Arteriole is exposed to acidic environment of stomach Cause Injury to wall of arteriole leading to active pulsatile bleeding
- Clinical features
  - Massive bleeding leading to Hematemesis and Recurrent Hypotension
- Diagnosis
  - IOC- Endoscopy
- Management
  - Endoscopic electrocoagulation
  - If not available / failed: Angiography + embolization
  - If not available/failed: Surgical ligation of bleeding vessels or wedge resection of stomach containing the arteriole

WATERMELON STOMACH

00:16:45

- Aka GAVE (Gastric Antral Vascular Ectasia)
- MC site - Gastric antrum
- Pathology is vascular ectasia
- **Clinical features**
  - more common in elderly females
  - Chronic Occult bleeding leads to Anemia which in turn leads to Fatigue associated with Chronic liver disease in 25% of females
- **Diagnosis**
  - IOC - Endoscopy + Biopsy
  - On endoscopy - Parallel stripes of dilated blood vessels near antrum (like covering of watermelon)
- **Treatment**
  - Endoscopic electrocoagulation

CA Stomach

- MC histological type - Adenocarcinoma
- MC in Low Socio-economic status

Risk factors

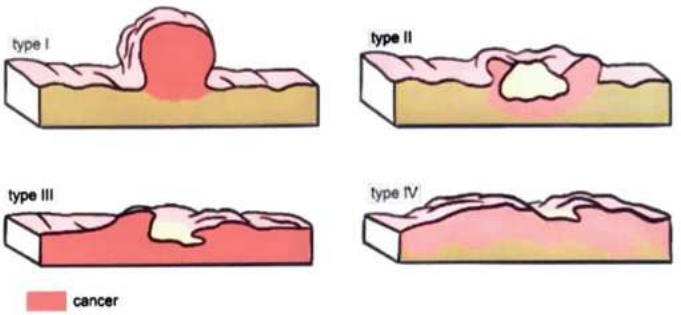
Refer Table 15.2

Protective Factors

- **S**- Selenium
- **I** – Iron
- **Z**- Zinc
- **A**- Aspirin, Vitamin A
- **C**- Calcium, Vitamin C

Classification 00:24:22

1. BORRMAN'S Classification



- A Pathologic classification based on macroscopic appearance
- Type I – Diffuse polypoidal growth
- Type II- Ulcerated Lesions with raised/ elevated borders
- Type III- Ulcerated Lesions infiltrating the gastric wall
- Type IV- Linitis Plastica
- Type V – Non – classifiable

2. LAUREN'S Classification 00:22:25

Refer Table 15.3

CA STOMACH

00:29:46

- Maximum incidence of CA stomach - JAPAN
- More common in males, 6th decade
- MC site of CA stomach – Antrum
- MC site of CA stomach in Pernicious Anemia – Fundus
- MC site of metastasis - Liver
- Chemotherapy regimen (same as Ca esophagus)
  - E – Epirubicin
  - C – Cisplatin
  - F – 5-FU

Clinical features

- MC symptom - Abdominal pain > weight loss
- For GE junction tumors - MC symptom – Dysphagia

Siewert Classification

- For GE junction tumors

Refer Table 15.4

LINITIS PLASTICA

00:34:40

- Aka Leather bottle stomach
- Characterized by Diffuse proliferation of fibrous tissue

- MC Symptom - Early satiety

Lymph Node involvement in Ca stomach

- Involvement of Axillary LN - Irish nodes
- Involvement of left supraclavicular LN - Virchow's Node (Aka Troisier's Sign)
- Cutaneous metastatic deposit around umbilicus called as Sister Mary Joseph nodes (Not Lymph node)
- Palpable intraperitoneal metastasis on digital rectal examination - Blummer's shelf
- Krukenberg tumor – it is the involvement of bilateral ovary in CA stomach via
  - Retrograde Lymphatic route (MC)
  - Hematogenous route
  - Trans – coelomic / Transperitoneal route

Previous Year's Questions

Q. What is false regarding wandering spleen?
(JIPMER - Nov - 2018)

A. Chronic torsion leads to splenomegaly
B. Treatment of choice is splenectomy only
C. Infarction & torsion are common
D. It is encapsulated with long vascular pedicle

Diagnosis

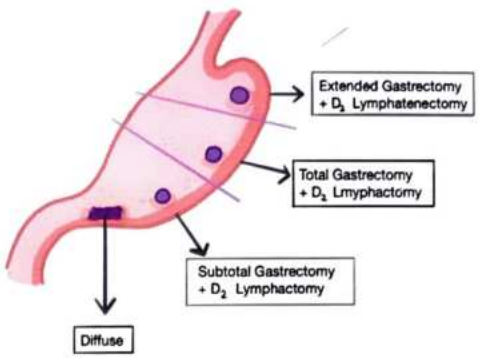
- IOC - Endoscopy + Biopsy
- IOC for staging – Endoscopic ultrasound
- Best investigation for pre-operative staging – CECT

8th AJCC TNM classification For CA Stomach

Refer Table 15.5

Treatment

- Depends on the location of malignancy
- Proximal 1/3rd: Extended gastrectomy + D2 Lymphadenectomy
- Middle 1/3rd: Total gastrectomy + D2 Lymphadenectomy
- Distal 1/3rd: Subtotal gastrectomy + D2 Lymphadenectomy



- This treatment is same for both Intestinal & Diffuse variety of CA Stomach
- Exception
  - Diffuse variety involving distal 1/3rd malignancy: Total gastrectomy + D2 Lymphadenectomy.
- Indication of distal Pancreatectomy: Involvement of body / tail of pancreas by the tumor
- Indications of Splenectomy
  - Direct involvement of spleen by CA Stomach
  - CA Stomach in the proximal part along posterior wall or greater curvature.

Prognostic factors

1. Depth of invasion
2. LN status – Single most important prognostic factor

GIST (GASTROINTESTINAL STROMAL TUMOR)

00:48:26

- MC site - Stomach > SI > colon-rectum > esophagus
- Arises from gastric pacemaker cells knows as Interstitial cells of CAJAL
- GIST expresses Tyrosine kinase receptor known as C-KIT
- C-KIT- express marker called CD – 117
- Other markers
  - BCL -2
  - CD-34
  - PDGFR – α (Platelet derived growth factor receptor – Alpha)

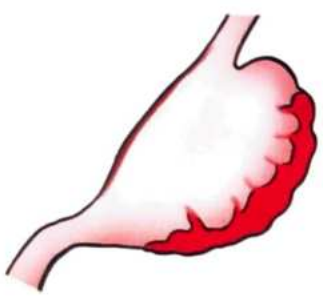
- New markers
  - DOG-1 - Detected on GIST-I
  - Protein kinase "C" theta

- Types
  - Spindle cell variety– 70% (MC type)
  - Epithelioid variety – 30%

Difference between Adenocarcinoma & GIST

Adenocarcinoma	GIST
• Intraluminal growth	• Extramural / extraluminal growth • Highly vascular tumor (Bleeding - MC presentation) • Abdominal pain (sometimes) • Patient symptomatic at advanced stage

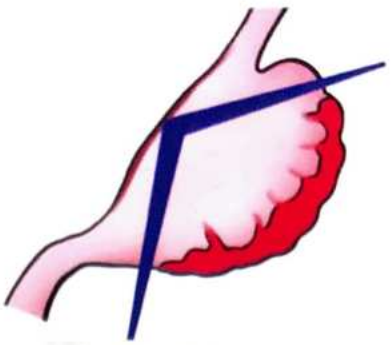
Clinical Features
- MC symptom – Bleeding and abdominal pain
- MC route of spread - Hematogenous spread
- Not associated with lymphatic spread
- MC site of metastasis – LIVER



Extra luminal/ Extra mural
↓
Not detected early

Diagnosis
- IOC for Dx – CECT
- Endoscopic Bx – Contraindicated (Risk of tumor rupture)

Treatment
- Resectable GIST - Segmental resection / wedge shaped excision with 2cm margin
- Drug of choice for unresectable GIST - Imatinib Mesylate
  - 2nd line agent– SUNITINIB
  - 3rd line agent - REGORAFINIB
- IOC for assessment of Response of Imatinib – PET scan
- Gold standard investigation for diagnosis of recurrent GIST – PET CT



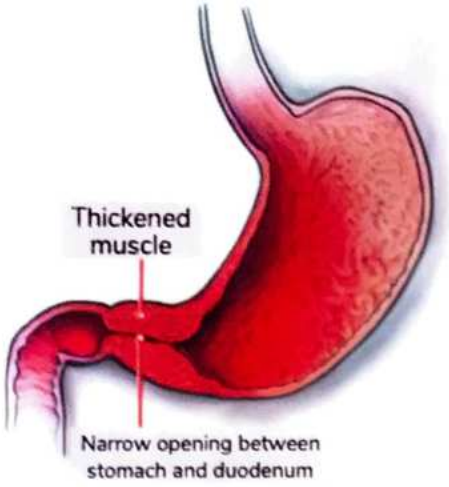
Segmental Resection
wedge shaped resection
with 2 cm

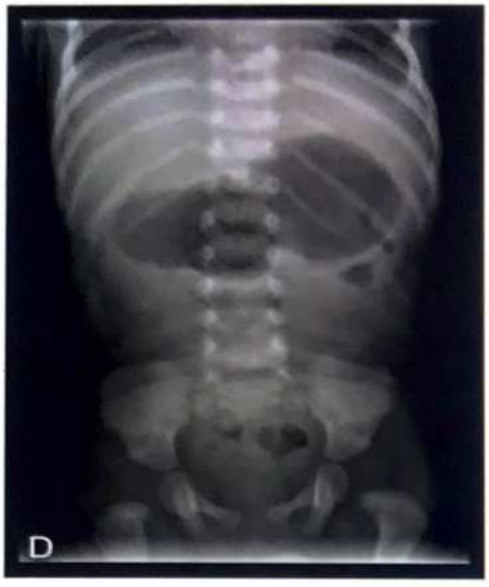
CARNEY's TRIAD 00:58:24
- Components
  - Multifocal GIST
  - Pulmonary chondroma
  - Extra- adrenal paraganglioma

CONGENITAL HYPERTROPHIC PYLORIC STENOSIS (CHPS) 00:58:46
- Now name has changed as Infantile hypertrophic pyloric stenosis (IHPS) because it is an acquired disease
- Characterized by hypertrophy of circular muscle fibers at pylorus
- Acquired condition
- Incidence – 1:3000-4000 live birth
- MC in first born male
- Child is normal at birth – Age of presentation is at 4-6th week after birth

Clinical features
- Multiple episodes of non-bilious vomiting which can be projectile/ non-projectile.
- On examination
  - Palpable mass or olive in the epigastrium > Right hypochondrium
  - Direction of peristalsis from left to right

Diagnosis
- IOC for diagnosis - Ultrasound
- Diagnostic criteria
  - Pyloric muscle thickness >4mm
  - Channel length >16mm
  - Transverse diameter >13mm
- On plain X-ray - Single bubble appearance
- On Barium meal
  - String sign
  - Shoulder sign
  - Double - track sign





Dyselectrolytemia in IHPS

- Hypokalemia (Loss of K+ due to repeated vomiting of mucous)
- Hypochloremia (loss of Cl- due to repeated vomiting)
- Metabolic alkalosis (due to loss of H+)
- Paradoxical Aciduria (only in severe cases)
- IHPS is medical emergency.

Management

- Resuscitation by IV fluids + correction of Dyselectrolytemia
- Fluid of choice - Normal Saline
- Treatment of choice: Ramstedt-Fredet Pyloromyotomy

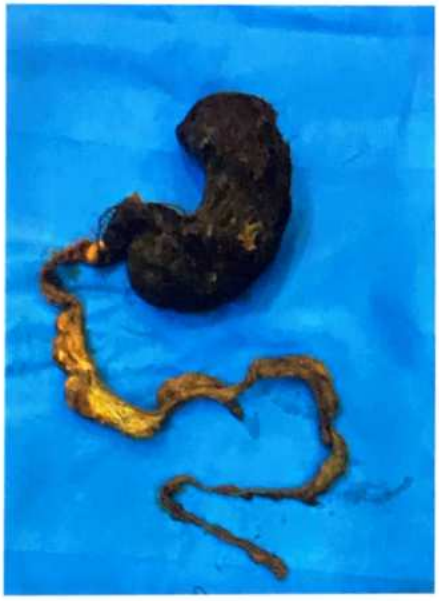
BEZOARS

01:09:23

- Collection of non-digestible material in stomach
- Types
  - Phytobezoar
    - → Collection of Vegetable
    - → MC type
  - Trichobezoar
    - → Collection of Hair
    - → MC in children
  - Pharmaco bezoar
    - → Collection of Drugs
  - Lactobezoar
    - → Collection of undigested Milk concretions

1. Trichobezoar

- Concretion of hair
- Common in Long haired girls or women
- Seen in Trichophagia (habit of eating their own hair)
- Formation of hair ball in stomach



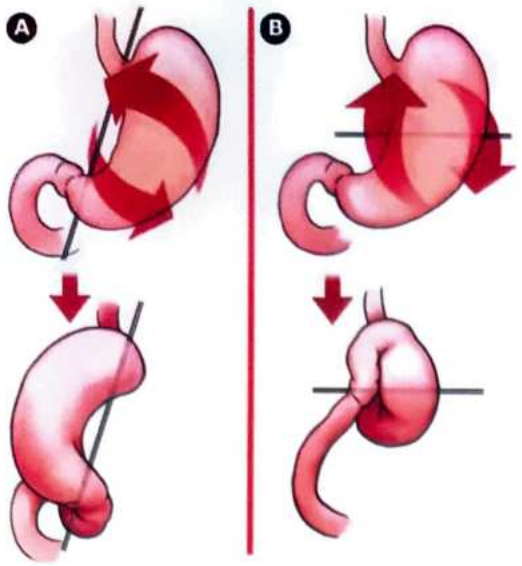
- Rapunzel Syndrome: Gastric trichobezoar with extension into duodenum
- Clinical features
  - Abdominal pain (Due to ulceration)
  - Gastric outlet obstruction
- Management
  - Surgical removal of hair ball after gastrectomy
  - After surgery - Psychiatric referral

GASTRIC VOLVULUS

01:13:40

- Torsion of stomach
- 2 types
  a. Organoaxial
  b. Mesentroaxial

Organoaxial	Mesentroaxial
• MC type • Responsible for 2/3rd of cases • Torsion along longitudinal axis of stomach	• Less common • Responsible for less than 1/3rd of cases • Torsion along vertical axis of stomach



Primary Gastric Volvulus	Secondary Gastric Volvulus
• Associated with a. Cong. Asplenia b. Wandering spleen • Mesentroaxial volvulus is seen ○ Partial (<1800) ○ Recurrent • Not a/w diaphragmatic defect	• 2° to anatomical defect - Diaphragmatic hernia • Organoaxial volvulus is seen • MC cause a. Children – CDH b. Adults – Paraesophageal hernia

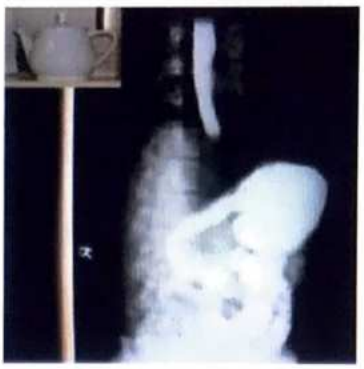
Clinical features
- Borchardt's triad
  - Epigastric pain
  - Inability to vomit
  - Inability to Ryle's tube/NG tube

Diagnosis
- Barium studies (or)
- Endoscopy

Treatment
- Acute volvulus – Stomach reduced & uncoiled followed by repair of diaphragmatic defect
- Spontaneous volvulus – Detorsion followed by fixation of stomach (gastropexy)

TEA-POT STOMACH

01:20:11



- AKA Hand-bag stomach
- Characterized by Longitudinal shortening of lesser curvature due to healing of gastric ulcer

HOUR-GLASS STOMACH

01:21:11

- D/t cicatricial contraction of a saddle shaped ulcer at lesser curvature

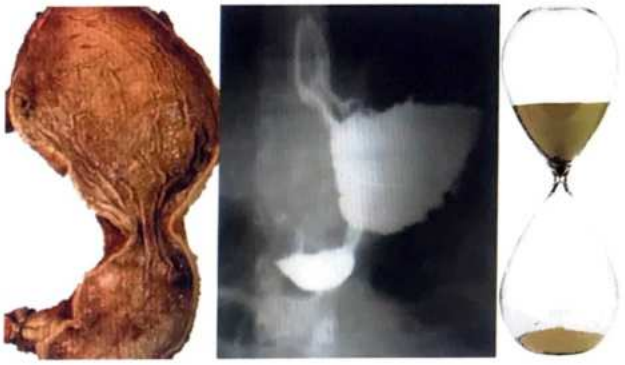


Table 15.1

Commonly Used Risk Stratification Systems for Upper GI Bleeds

Blatchford Score

- P - Pulse
- U - Blood Urea nitrogen
- S - Systolic BP
- H - Hemoglobin
- Presence of
  - Melena
  - Syncope
  - Hepatic or Cardiac dysfunction

Rockall & Baylor Score

- Comorbid disease (cardia, hepatic, renal, or disseminated)
- Age (<60 years, 60-79 years >80 years)
- Shock
  - Systolic BP <100 mm Hg
  - Pulse rate >100 beats/min
- Diagnosis at the time of endoscopy (Mallory- Weiss non-malignant lesions, or malignant lesions)
- Endoscopic Stigmata of recent bleed

Table 15.2

1. Nutritional
   - Low fat/ Low protein intake
   - High complex carbohydrate Intake
   - ↑sed nitrate intake
   - Consumption of salted meat
2. Social
   - Low socio- economic status
3. Environmental
   - Smoking
   - Lack of refrigeration
   - Use of well water
   - Poor food preservation technique
4. Medical
   - H/O partial Gastrectomy
   - H. pylori infection
   - EBV infection
   - Adenomatous polyp
   - Chronic atrophic gastritis
   - Menetrier's disease
5. Occupational
   - Rubber and coal workers
6. Genetic factors
   - Male gender
   - Blood group 'A'
   - HNPCC
   - Li- Fraumeni syndrome
   - Pernicious Anemia

- Alcohol is not a risk factor for carcinoma stomach

Table 15.3

Intestinal variety (Classical)	Diffuse variety (Atypical)
MC in males, elderly (5th – 6th decade)	MC in females, young age
MC site is distal part	MC site is fundus / proximal part
Environmental risk factors	Familial risk factors
Well defined gland formation	Poor gland formation - Signet ring variety
Hematogenous spread	Lymphatic or transmural spread
Associated with APC Gene mutation	Decreased E- CADHERIN
Epidemic	Endemic

- Both are associated with P16 & P53 inactivation

Table 15.4

Type	Adenocarcinoma of	Location
Type I	Distal esophagus	1-5 cm above cardia
Type II	Real Cardia	1 cm above and 2 cm below cardia
Type III	Sub-Cardial Stomach	2-5 cm below cardia

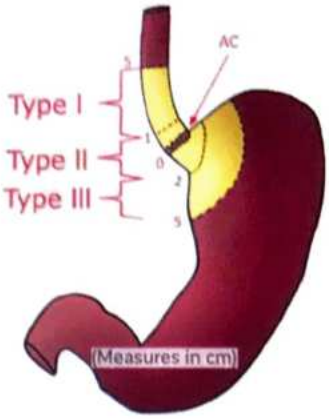


Table 15.5

Tis	Carcinoma in-situ / High grade dysplasia (HGS)
T1a	Tumor invades lamina propria or muscularis mucosa
T1b	Tumor invades Submucosa
T2	Tumor invades Muscularis propria
T3	Tumor Penetrates sub serosal connective tissue without invasion of visceral peritoneum or adjacent structures.
T4a	Involvement of visceral peritoneum/serosa
T4b	Involvement of adjacent structures

N1	Metastasis to 1-2 regional LN
N2	Metastasis to 3-6 regional LN
N3a	Metastasis to 7-15 regional LN
N3b	Metastasis to 16 or more regional LN

M0	No Metastasis
M1	Distant Metastasis

CLINICAL QUESTIONS

Q. A 55-year-old male presented to the OPD with complaints of melena and significant loss of weight. On endoscopic evaluation, the patient was found to have a gastric ulcer in the lesser curvature. Multiple biopsies were taken and the histopathology report came out to be gastric adenocarcinoma. All of the following conditions are associated with increased risk of gastric cancer except:

A. Pernicious anemia
B. Multiple endocrine neoplasia type I (MEN 1)
C. Adenomatous polyps
D. Chronic atrophic gastritis

Answer: B

Solution

Factors increasing or decreasing the risk of gastric cancer

Increase risk

- Family history
- Pernicious anemia
- Blood group A
- Diet(high in nitrates, salt and fat, smoked/cured foods, low vitamin A and C, well water) Gastric bacteria convert nitrate to nitrite ,a known carcinogen
- Familial polyposis
- Gastric adenomas
- Hereditary non polyposis colorectal cancer
- Helicobacter pylori infection
  Atrophic gastritis, intestinal metaplasia ,dysplasia
- Previous gastrectomy or gastrojejunostomy (>10 years ago)
- Radiation exposure
- Coal workers, rubber workers
- Tobacco use
  Tobacco use probably increases the risk of stomach cancer and alcohol use probably has no effect
- Epstein Barr virus
  About 10% gastric adenocarcinoma carry the EBV virus
- Genetic factors
  The most common genetic abnormalities in sporadic gastric cancer affect the p53 and COX 2 gene. A germ line mutation in the CDH1 gene encoding E-cadherin was shown to be associated with hereditary diffuse gastric cancer. Prophylactic total gastrectomy should be considered in patients with these mutations
- Menetrier's disease

Decrease risk

- Aspirin
- Diet (high fresh fruit and vegetable intake)
- Vitamin C

Premalignant conditions of the stomach

- Atrophic gastritis
  By far ,the most common precancerous lesion. Helicobacter pylori is critical in the pathogenesis. Correa described three distinct patterns of chronic atrophic gastritis - autoimmune, hypersecretory and environmental
- Hyperplastic polyp (>2cm)
- Intestinal metaplasia
- Adenoma
  Patient with familial adenomatous polyp have a high prevalence of gastric adenomatous polyps
- Benign gastric ulcer
  All gastric ulcer should be viewed as malignant until proven otherwise with adequate biopsy and follow up
- Stomach remnant
  Gastric cancer can develop in the gastric remnant following subtotal gastrectomy. They most common develop near the site of anastomoses. Bile or alkali reflux gastritis following Billroth II gastroenterostomy has been implicated as a precursor

Neither MEN 1 nor MEN 2 is associated with gastric cancer

MEN 1 - Multiglandular parathyroid disease, Neuroendocrine tumour of pancreas, Adenomas of anterior pituitary

MEN 2A - Medullary thyroid carcinoma, pheochromocytoma, parathyroid adenoma

MEN 2B - Medullary thyroid carcinoma, pheochromocytoma, mucosal neuroma, marfanoid habitus

16 PERITONEUM

PERITONITIS

Types of peritonitis

1. Spontaneous bacterial peritonitis (SBP)
2. Secondary bacterial peritonitis
3. Peritonitis in chronic ambulatory peritoneal dialysis (CAPD)

1. Spontaneous bacterial peritonitis 00:01:20

- Spontaneous infection of ascitic fluid
- Pre-requisite – Ascites
- MC cause of ascites in adults – Cirrhosis or chronic liver disease
- MC cause of ascites in children – Nephrotic syndrome

Pathophysiology

- Bacterial translocation from GUT to mesenteric LN and then to Ascitic fluid
- MC organism responsible for SBP
  - In adults: E coli > Klebsiella
  - In children: Group A streptococci

Clinical Features

- Abdominal pain and tenderness
- Fever
- Tachycardia

Investigations

- Lab findings
  - ↑sed ESR
  - ↑TLC count
- IOC - Paracentesis (aspiration of ascitic fluid)
- Diagnostic criteria for SBP
  - Monomicrobial growth
  - Neutrophils > 250/mm3

Treatment

- IV Cefotaxime + Albumin

2. Secondary bacterial peritonitis 00:08:27

- Caused by visceral perforation
- Poly microbial
  - E. coli (aerobe)
  - Bacteroides fragilis (anaerobe)

Treatment

- Exploratory laparotomy + peritoneal lavage + repair of perforation / stoma formation

3. Peritonitis in CAPD 00:11:16

- For Chronic renal failure patients who cannot afford dialysis or renal transplantation

↓

Insert Peritoneal catheter & attach to dialyzing fluid

↓

Fluid will enter peritoneal cavity
(Peritoneum is a semi permeable via which toxins can be exchanged)

↓

After 4-6 hours collected peritoneal fluid goes out

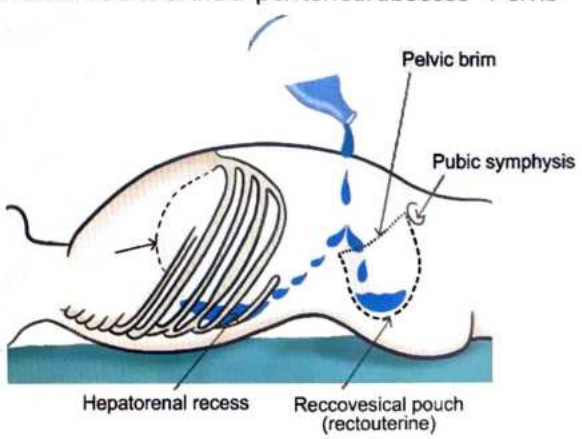
↓

Done in daily basis so it is called Chronic ambulatory peritoneal dialysis

- MC organism causing peritonitis in CAPD: Staph epidermidis (Slime producing organism that colonizes the catheter)

Treatment

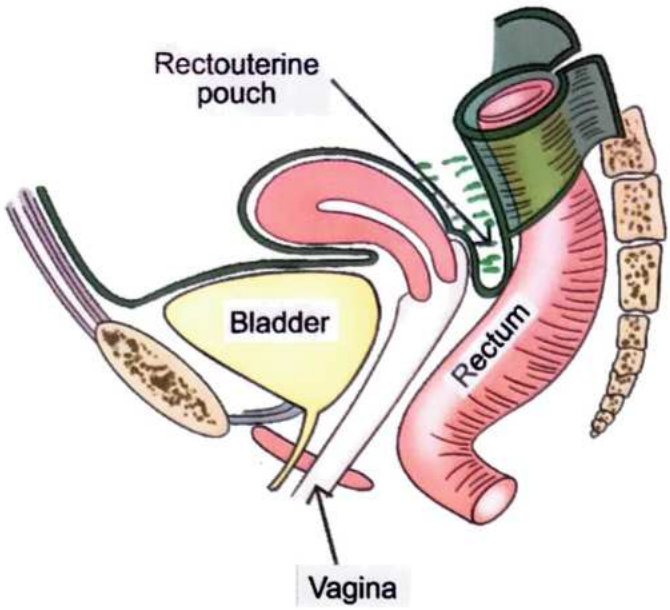
- Intra peritoneal instillation of 1st generation cephalosporin via catheter
- In cases of Recurrent attacks - Change catheter
- Most dependent cavity in peritoneum in recumbent position or lying down position - Hepato Morrison pouch or right subhepatic space
- Most dependent cavity in peritoneum in up right posture – Pelvis
- MC site of intra-peritoneal abscess in recumbent or lying down position: Hepato- Morison pouch or right sub hepatic space
- MC site of intra- peritoneal abscess in upright posture - Pelvis
- Overall MC site of intra-peritoneal abscess - Pelvis



PELVIC ABSCESS

00:18:58

- MC site of intra peritoneal abscess



Clinical features

- Pain in lower abdomen
- Chills and rigor, fever
- Irritates the rectum - Multiple episodes of loose stool with mucous
- On digital Rectal exam - Bulge on anterior wall of rectum

Investigation

- 1st investigation done – Ultrasound
- IOC – CECT

Management

- Ultrasound /CT guided per cutaneous aspiration
- If bowel adhered over abscess cavity, percutaneous drainage not possible.
  - In females: posterior colpotomy (via posterior wall of vagina)
  - In males: anterior rectal drainage

MESENTERIC CYST

00:23:53

- MC in females
- Usually seen in 2nd decade.

Types

1. Chylolymphatic: MC type
2. Enterogenous: 2nd MC)
3. Simple/ mesothelial
4. Uro-genital remnant
5. Dermoid

Refer Table 16.1

Extent of mesentery

- Starts from L2 on left to right Sacro Iliac joint
- Mesentery is a fan shaped structure via which the bowel is hanged from posterior abdominal wall.
- Patient has a large swelling moving perpendicular to the attachment of mesentery K/a Tillaux sign

Tillaux triad

- Soft fluctuant swelling in periumbilical region
- Zone of hyper resonance around the swelling
- Swelling moving perpendicular to the attachment of mesentery

Presentation

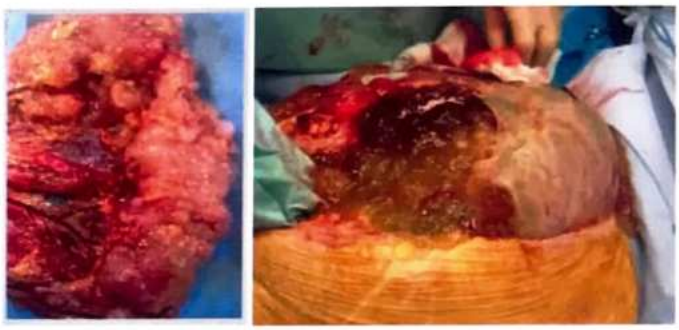
- Asymptomatic
- Abdominal distension
- 20 years old female

Diagnosis

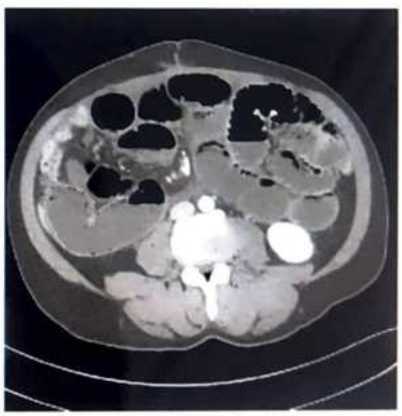
- 1st investigation: USG
- IOC- CECT

PSEUDOMYXOMA PERITONEI

00:36:10



- Mucinous ascites
- Caused by rupture of Mucinous Adenocarcinoma
- MC primary: Appendix > ovary
- Incidence: male = female
- Usually seen in 4th – 5th decade
- Peritoneal cavity is filled with mucinous substances (JELLY like) creates pressure in abdomen compressing the bowel & simultaneously in Upright posture - Abdominal distension



Clinical Features

- Most patients are asymptomatic initially
- Later generalized/ global deterioration of health (amino acid is used up in the production of jelly like substance).
- Progressive abdominal distension
- On examination
  - Multiple hernias (due to increased intrabdominal pressure)
  - Ascites without shifting dullness (due to semisolid substance)

Diagnosis

- IOC – CECT

Treatment

- Cytoreduction (to remove maximum amount of tumor) + hyper thermic intra- peritoneal chemotherapy
- Components of Cytoreduction
  - Omentectomy + stripping of peritoneum (peritonectomy) + Right hemicolectomy
  - In females - Omentectomy + stripping of peritoneum (peritonectomy) + right hemicolectomy + Bilateral Salpingo–oophorectomy

RETROPERITONEAL FIBROSIS

00:44:51

- Characterized by fibrotic proliferation in retroperitoneum
- Boundaries of retro peritoneum
  - Superiorly – dome of diaphragm
  - Inferiorly – Levator ani
  - Posteriorly – psoas muscle
  - Anteriorly – peritoneum
- Organs involved - Kidney, ureter, adrenal, inferior vena cava, aorta.
- Fibrotic proliferation that starts from aortic bifurcation and moves cranially upwards
- MC involved: Ureter > IVC > aorta

Types of Retroperitoneal Fibrosis

1. Primary / idiopathic RPF
- Aka Ormond's disease responsible for 70% of cases

2. Secondary RPF
- Secondary to causes
- Chronic inflammation
  - **C** - **C**hronic pancreatitis
  - **A** - **A**ctinomycosis
  - **T** - **T**B
  - **H** - **H**istoplasmosis

How to remember

- CATH

- Drugs
  - **M** - **M**ethysergide
  - **A** - **A**mphetamines
  - **H** - **H**ydralazine
  - **E** - **E**ntacapone
  - **B** - ß- blockers, **B**romocriptine
  - **P** – **P**henacetin

How to remember

- MAHE BP

- Malignancies
  - Non-Hodgkin lymphoma
  - Ca stomach
  - Carcinoid tumor

Clinical features

- Initially dull aching, non- specific pain: M/c symptom
- MC specific earliest symptoms: signs and symptoms of obstructive uropathy
- Increased frequency
- Dysuria
- Fever (due to infected hydronephrosis)

Diagnosis

- IOC - CECT (for most of retroperitoneal pathologies)
- On IVP - due to fibrosis & inflammation, there is medialization/ medial pulling of ureter known as Pipestem Ureter.
- In retroperitoneal sarcoma - lateralization of ureter/lateral pulling of ureter

Treatment

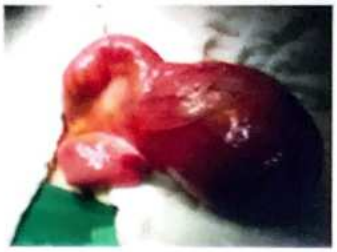
1. In primary RPF / Idiopathic RPF
   - Ureteric stenting (to relieve extrinsic compression) + immune suppression
   - Drugs for immunosuppression
     - **T**- **T**amoxifen
     - **A**- **A**zathioprine
     - **P**- **P**enicillamine
     - **S**- **S**teroids

How to remember

- TAPS

2. In secondary RPF
   - Transperitoneal ureterolysis with omental wrapping

Table 16.1

Chylolymphatic mesenteric cyst	Enterogenous mesenteric cyst
	
• Congenitally misplaced lymphatics in ileum with Afferent lymphatics only. • Absence of efferent lymphatics ↓ Collection of Chyle ↓ Progressive increase in size of cyst • Cyst has independent vascular supply • Treatment - Enucleation	• Duplication cysts (walled off diverticula) • Origin is from diverticula / duplication cyst • SI lined by columnar epithelium (has goblet cells that produce mucin) • Mucin collection leads to cyst ↓ Enterogenous cysts • Content is mucinous (has shared wall & shared vascular supply) • Treatment: Resection + anastomosis

17 INTESTINAL OBSTRUCTION

- Most common cause of large bowel obstruction – Malignancy
- Most common cause of small bowel obstruction – Adhesions

SMALL BOWEL OBSTRUCTION

00:00:48

Causes

- Adhesions (MC)
- Malignancy – metastasis or peritoneal carcinomatosis
- Hernia
- Crohn's disease
- M > H > C

Risk of Adhesive intestinal obstruction

- Pelvic surgeries > lower abdominal > upper abdominal surgeries

Clinical features

- Intestinal obstruction cause Hyperperistalsis causing Colicky abdominal pain (1st symptom of small bowel obstruction)
- Bilious vomiting (multiple episodes)
- Obstipation (absolute constipation)
- Symptoms of Proximal obstruction
  - Vomiting
  - Dyselectrolytemia
- Symptoms of Distal obstruction
  - Distension
- Jejunal secretion leading to Hypovolemia as a result there is Hypotension and tachycardia
- Swallowed air responsible for Air-fluid level
- Major component of air: Nitrogen
- Fever suggest possibility of strangulation

Diagnosis

- On examination: Hypotension and tachycardia
- On Auscultation there is presence of Hyperactive Bowell sound

Management

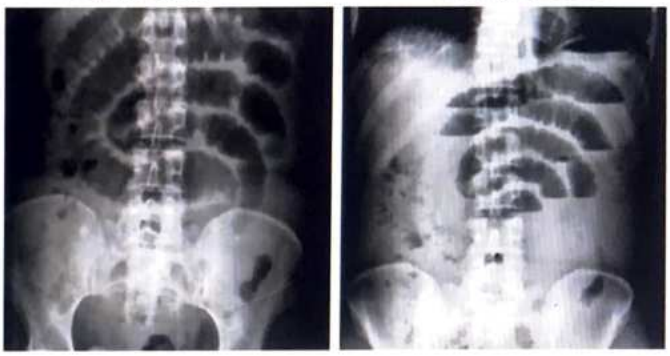
- Put 2 large bore IV cannula
- Start IV fluids
- Fluids of choice is Ringer's Lactate
- Ryle's tube insertion for proximal decompression
- Foley's catheterization for monitoring of urine output
- Best clinical indicator of tissue perfusion is urine output
- After adequate tissue perfusion, urine output should be
  - In adults - 1 ml/min
  - In children – 0.5-1 ml/min

Investigations

- IOC for diagnosis of small bowl obstruction: Abdominal X-ray (Supine > Erect)
  - Erect view is better for Air fluid levels
  - Supine view is better for site of obstruction

SMALL BOWEL OBSTRUCTION

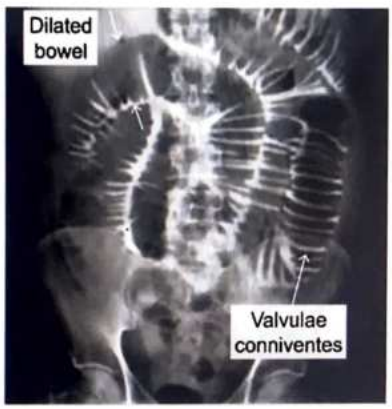
Supine view **Upright view**



- CECT – Used for
  - High grade obstruction
  - Extraluminal Causes
  - Strangulation
- IOC for Low Grade Intermittent SBO: Enteroclysis
- Features of bowel loops in X-ray

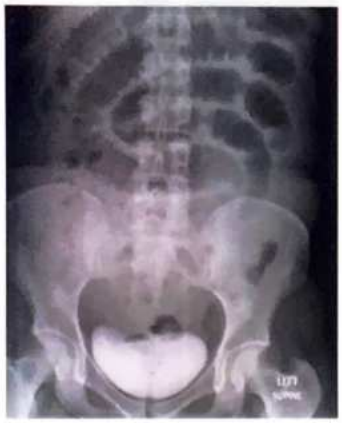
Jejunum

- Dilated bowel loops placed centrally
- Valvulae Conniventes / Plica Circulares - circumferential ring like pattern



Ileum

- Dilated bowel loops placed centrally
- Featureless / characteristically characterless

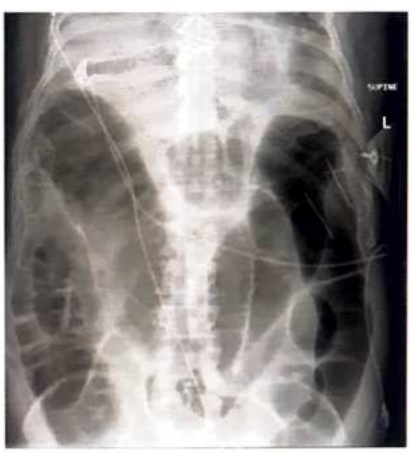


Previous Year's Questions

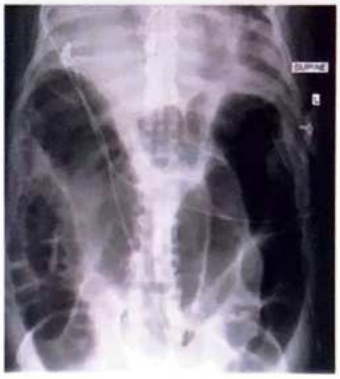
Q. A 6-year-old boy experienced life-threatening shock. his CT scan showed large amount of ascites. bowel wall thickening and poor or absent enhancement of the strangulated bowel segment. showing gangrenous bowel on surgical exploration. True about anastomosis is? (NEET Jan 2018)

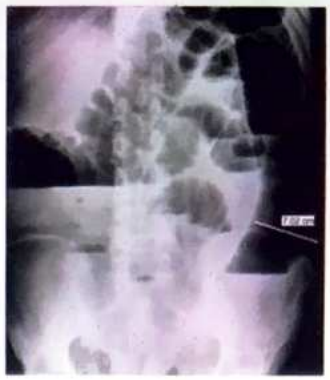
A. Should be done by continuous layers as it takes less time
B. Should be done with catgut
C. Should be done by single layer seromuscular Lambert sutures
D. Should be done by single layer taking submucosa

LARGE BOWEL



- Wider in caliber
- Bowel loops are placed peripherally
- Presence of haustrations
- Few bowel loops





Treatment

- Depends on cause
  - For Adhesion: Adhesiolysis
  - For Malignancy: Resection + anastomosis (Peritoneal carcinomatosis)
  - For Hernia: Reduction
  - For Crohn's disease – Resection + anastomosis

Simple obstruction	Strangulating obstruction

• Mechanical obstruction in the lumen with preserved blood supply.
• Has Colicky pain
• Diagnosed by Abdominal X-ray
	• Closed loop of obstruction + compromised vascular supply
	• Signs and symptoms of strangulation
	  ○ Fever,
	  ○ Tachycardia
	  ○ Leucocytosis
	• Steady non-crampy abdominal pain
	• Diagnosed by CECT

Previous Year's Questions

Q. While doing emergency laparotomy for an intestinal obstruction, which organ should you first visualize to say whether it is small bowel or large bowed obstruction? (AIIMS Nov 2018)

A. Ileum
B. Cecum
C. Sigmoid colon
D. Rectum

PARALYTIC ILEUS

00:22:57

- Characterized by Impaired intestinal motility due to failure of transmission of peristaltic waves leads to collection of food and fluid in bowel causing abdominal distension
- Caused by failure of neuromuscular transmission

- It is a type of adynamic obstruction

Etiology
- Abdominal surgery
- Uremia
- Mesenteric ischemia
- Retro peritoneal hematoma
- Intra-abdominal sepsis
- Dyselectrolytemia
- Drugs
  - Opiates
  - Antipsychotics

Clinical features
- Abdominal distension (due to collection of blood & fluid in small bowel)
- Steady abdominal discomfort / pain (non-colicky)
- Vomiting
- Absent Bowel sounds
- Non passage or feces and flatus

Investigations
- IOC for Dx - Abdominal X-ray
- Findings
  - Dilated bowel loops
  - Presence of multiple air fluid levels
  - Gas in rectum and colon

Management
- Nasogastric aspiration
- Restriction of oral fluid intake
  - Until return of bowel sounds
  - Until pt. starts passing flatus
- Treatment of Underlying cause

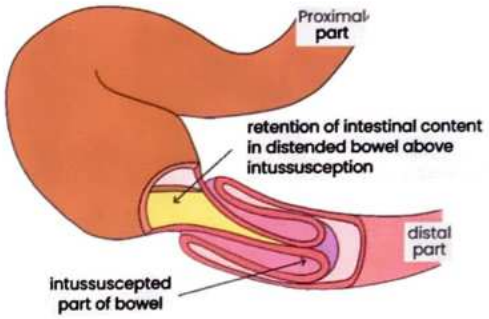
Postoperative ileus 00:29:25
- It is a kind of paralytic ileus in which because of surgery there is failure of neuromuscular transmission
- Earliest activity after surgery is seen
  - In small intestine - within 24 hours (In jejunum within 8 hours)
  - In Stomach - within 48 hours
  - In colon - 3 to 5 days
- Colon is mainly responsible for post- operative ileus
- Earliest activity is seen in Jejunum – Within 8 hours

Paralytic ileus	Mechanical obstruction

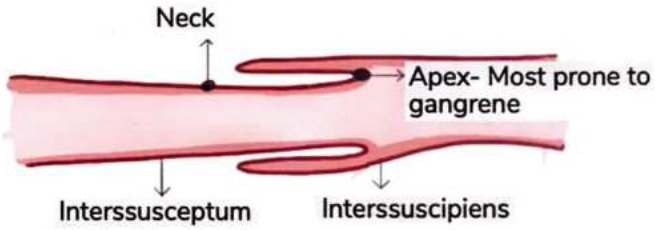
• Absence of Peristalsis
  ○ No colicky pain
  ○ Absent bowel sounds
	• Associated with Hyperperistalsis
	  ○ Colicky pain
	  ○ Hyperactive bowel sounds
	• Complete obstruction - Absence of air in rectum

- Presence of gas in Rectum

INTUSSUSCEPTION 00:33:08
- Telescoping of one segment of bowel into another
- More common in children of age 4-10 months
- Predisposing factors
  - Weaning child (4-10 months) prone to Infections (Rota Virus Diarrhea)
  - ↓
  - Peyer's patches hypertrophy
  - ↓
  - Increased risk of Intussusception
- Rota virus vaccine increases the risk of intussusception
- MC type in children is Ileocolic > Ileo-Ileocolic > Ileo Ileal > Colo-Colic
- MC type in adults – Colocolic



Parts of intussusception
- Intussusceptum- incoming segment
- Intussuscipiens- receiving segment
- Neck- narrowest part of intussusception
- Apex - most prone to gangrene
- Middle layer is most prone to gangrene because it is sandwiched between outer and inner layer and has two acute bends



- Lead point: point which initiate or lead the intussusception
- MC lead point is Meckel's diverticulum > Polyps
- MC tumor responsible for intussusception in children - Lymphoma
- MC tumor responsible for intussusception in adults - Villous Adenoma

Clinical features
- At time of attack

- Child cries a lot, pulls legs towards abdomen
- Colicky pain
- Bilious vomiting (Multiple episodes)

- In between attacks, child is asymptomatic
- After many attacks passage of small amount of stools mixed with blood (Red currant jelly appearance)

On examination

- Sausage shaped mass in right lumbar region
- Empty right iliac fossa known as Sign of dance

Investigation

- Diagnostic + therapeutic - Enema (air > barium)

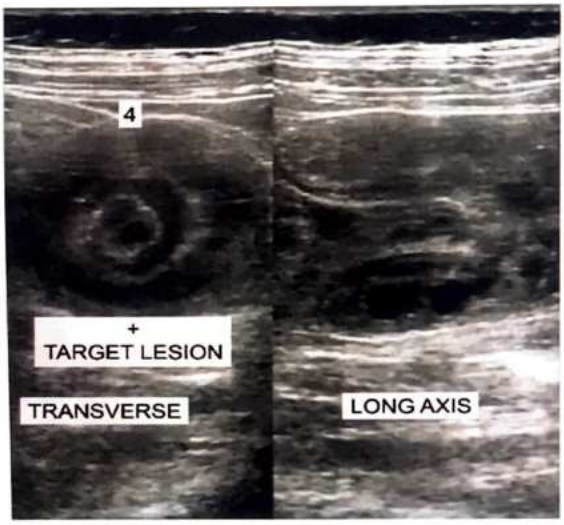
Treatment

- Air enema (Enema creates pressure by which there will be reduction of bowel back to normal)
- For Recurrence - Air enema is repeated.
- If recurrence occurs for the third time: indication for surgery i.e. Ileocolectomy + Ileo- transverse anastomosis

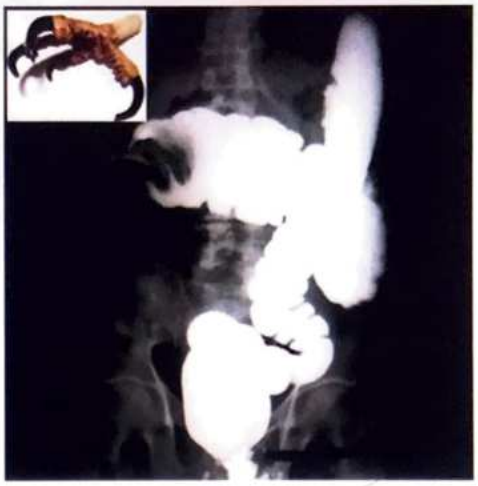
Radiological signs

Refer Table 17.1

INTUSSUSUSEPTION
Coiled spring sing



INTUSSUSUSEPTION
Claw Sing



COLONIC PSEUDO OBSTRUCTION 00:47:18

- Characterized by signs & symptoms of colonic obstruction in absence of mechanical cause of obstruction

Types

1. Idiopathic colonic pseudo-obstruction - known as Ogilvie's syndrome
2. Secondary pseudo-obstruction – Factors responsible are
   - Retroperitoneal hematoma
   - Uremia
   - Hypothyroidism
   - Dyselectrolytemia
   - Drugs
     - Opiates
     - Anti- psychotics
   - Parkinson's disease
   - Chronic visceral myopathy

Etiopathogenesis

- Sympathetic overactivity impaired peristalsis (Bowel sounds are present but sluggish) causing Colonic distension (with air)

Clinical features

- Abdominal distension + abdominal discomfort
- Sluggish bowel sounds are present

Investigations

- Diagnosed by giving Enema shows massive distention of colon

Treatment

- Drug of choice – Neostigmine (IV)
  - It is Parasympathomimetic
  - Most of the patients are relieved within 3-10 mins after passing massive amount of flatus.

- Precautions
  - → R/O Cardiovascular contraindications
  - → R/O Acute obstruction
  - → If contraindications cannot be ruled out for neostigmine → Flatus tube insertion (air is taken out of colon)

LARGE BOWEL OBSTRUCTION

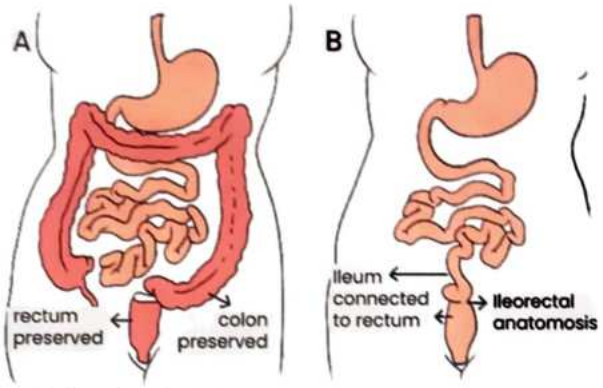
00:52:42

- MC cause of LBO – Malignancy
- MC site of LBO – Rectum > Sigmoid
- Adhesions are rarely responsible for LBO

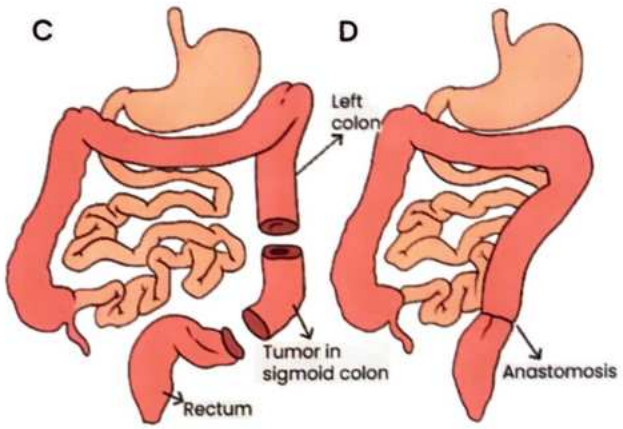
Clinical Features

- Colicky pain in lower abdomen in hypogastric region
- Abdominal distension (not vomiting)
- Absolute constipation /obstipation
- LBO is a type of Closed loop obstruction (Real emergency - Surgery ASAP)

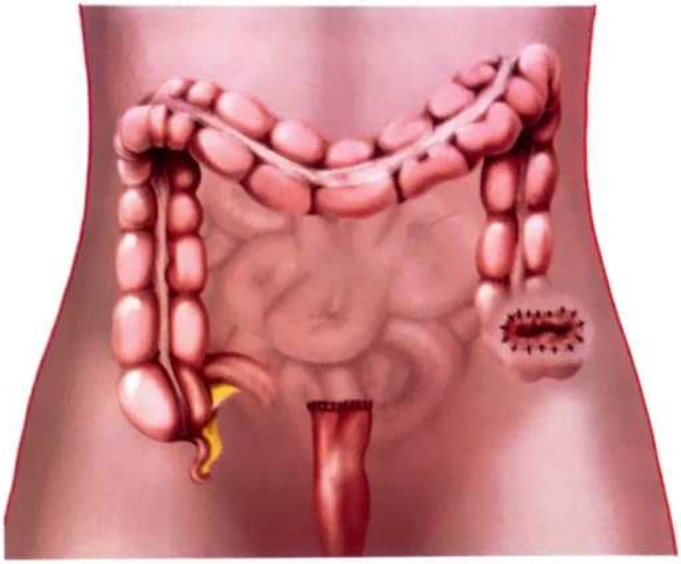
Treatment



Segmental colectomy



- For Right colonic malignancies: Resection + Ileo-Transverse Anastomosis
- For Sigmoid malignancy
  - Sigmoidectomy + Colorectal anastomosis
  - Total Colectomy + Ileorectal anastomosis
  - → Performed under delayed presentation if whole colon is ischemic
  - Hartman's procedure
    - → Components
      - Sigmoidectomy
      - Descending colostomy
      - Closure of rectal stump
    - → Performed for Sigmoid malignancy in elderly



- Malignancy in Mid / lower Rectum
  - Defunctioning colostomy followed by Chemoradiation f/b Tumor resection & Colostomy closure

SIGMOID VOLVULUS

01:03:44

- MC Site of volvulus
- Volvulus can be both
  - Anti- clockwise (MC)
  - Clockwise
- Mandatory factors for volvulus
  - Constipation
  - Long narrow mesentery

Predisposing factors

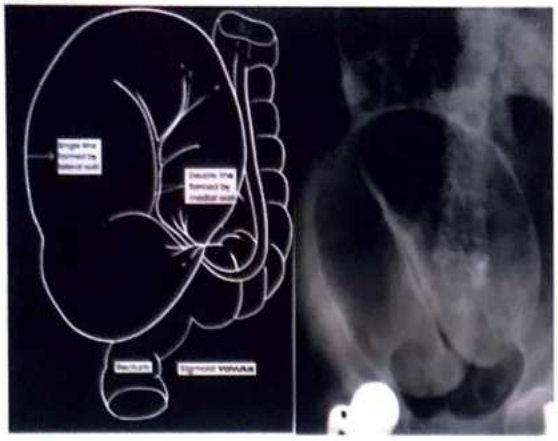
- Old Age
- Hospitalized patients
- Mentally impaired patients
- Intake of opioids/ antipsychotics

Clinical features

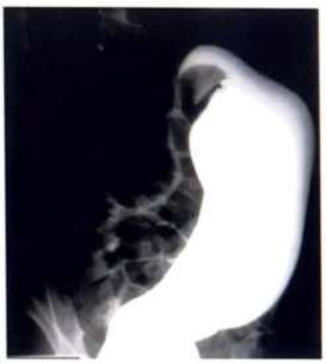
- It is a type of Closed loop obstruction - Has signs & symptoms of LBO
  - Colicky pain in lower abdomen
  - Abdominal Distention
  - Absolute constipation / obstipation

Investigations

- On X-ray
  - Coffee Bean sign
  - Bent Inner Tube sign
  - OMEGA sign



- On Barium enema
  - Bird beak sign
  - Ace of spade sign
  - Bird of prey sign



Treatment

- TOC- Colonoscopic Detorsion followed by Elective sigmoid colectomy (After 72 hrs)

CECAL VOLVULUS

01:09:37

- Misnomer - should have been Cecocolic volvulus
- Part of ileum, cecum & Ascending colon are involved
- Volvulus is Mainly clockwise
- Caecum is relatively fixed - If free or mobile there is Increased chances of torsion

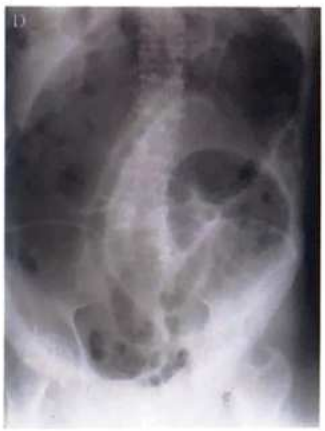
Predisposing factors

- Multipara patients (due to release of relaxin)
- H/O previous surgery (ligaments are divided)
- Malrotation (abnormal location of cecum which is free)
- Distal obstructing lesion (proximal part of colon distention loading to torsion)

Clinical features

- Has signs and symptoms of SBO (Because Twisting is at the level of ileum)
  - Colicky pain
  - Bilious vomiting
  - Absolute constipation

Investigations



- IOC – Abdominal X-ray
- Findings
  - Kidney bean sign
  - Comma shaped cecum

Treatment

- Ileocolectomy + Ileo-transverse anastomosis

CECAL BASCULE

01:14:00

- Cecum Folds in a cephalad direction anteriorly over fixed Ascending colon
- Clinical Features: Intermittent episodes of colicky pain because of Intermittent isolated cecal obstruction
- Resolves spontaneously

Table 17.1

Plain x- ray	Barium enema	Ultrasound
• Meniscus sign • Target sign	• Claw sign • Coiled spring sign	• Target sign on transverse scan • Pseudo kidney sign on longitudinal scan

18 SMALL INTESTINE

BOWEL DIVERTICULA

00:00:16

Pathophysiology of Bowel Diverticula

- Mesentery (Lymphovascular supply)
- Nutrient artery (penetrates the muscularis propria of bowel)
- Increased intraluminal pressure (due to constipation) causing herniation of Mucosa & Submucosa

Bowel Diverticula

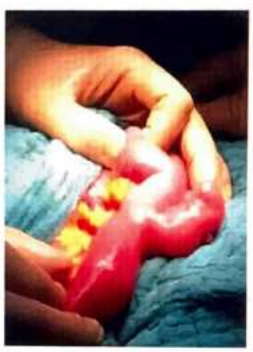
- Acquired
- Multiple
- False
- Located along mesenteric aspect

Meckel's Diverticulum 00:03:30

- Single / True / Congenital
- Located along Anti- mesenteric border
- MC congenital anomaly of midgut
- Caused by Persistent Omphalomesenteric duct/ vitello-intestinal duct
- Characterized by Rule of '2'
  1. Seen in 2% population
  2. 2 inches in length.
  3. 2 feet proximal to ileocecal junction
  4. Symptomatic patients are < 2 years of age

Refer Image 18.1

- MC ectopic mucosa - Gastric > pancreatic > colonic



Clinical Features

- If Ectopic mucosa contains gastric substance → produces acid → ulcer formed → bleeding
- Most common presentation - Bleeding
- MC presentation / symptom in adults - Abdominal pain (No symptoms during childhood – don't have ectopic mucosa in the diverticulum)

Causes of Abdominal pain in Meckel's diverticula

- Midgut volvulus (due to TORSION)
- Intussusceptions
- Diverticulitis
  - Meckel's Diverticulitis mimics acute appendicitis.
  - On exploration, if appendix was found to be normal, at least 2 feet of ileum should be screened for presence of Meckel's diverticulum

Investigation

- IOC for Dx – Tc-Pertechnate scan (to detect ectopic mucosa)
- In absence of ectopic gastric mucosa in Tc-Pertechnate scan, IOC is - Enteroclysis

Treatment

- MD with Healthy base - Diverticulectomy + Anastomosis
- MD with unhealthy base - Resection + Anastomosis
- Incidentally detected Meckel's diverticulum during elective surgery - should be removed in all the patients up to 80 years of age. (No added morbidity in performing diverticulectomy)
- If left untreated - Increased Risk of complication in 12% of patients.

Conditions in which there is increased risk complications in Meckel's diverticulum

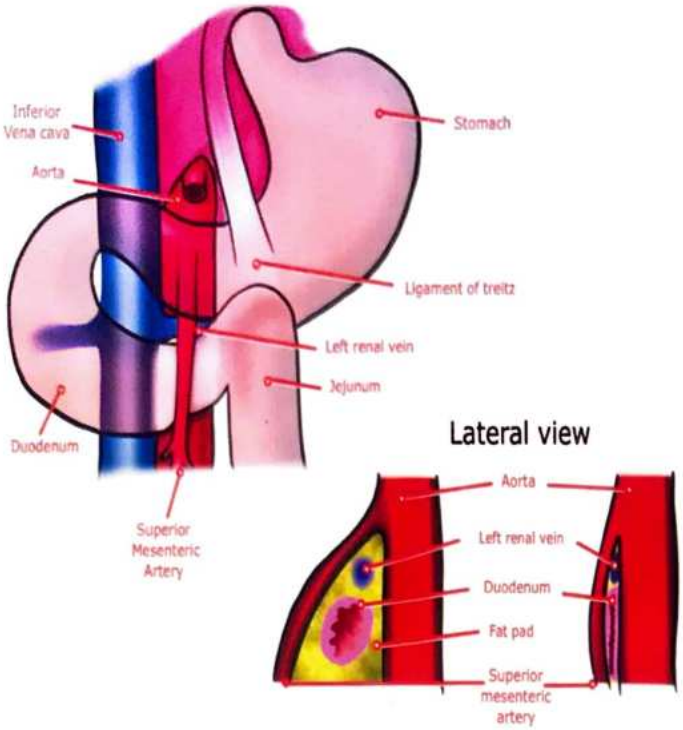
- Narrow mouthed
- Unhealthy base
- Presence of Ectopic gastric mucosa

SUPERIOR MESENTERIC ARTERY SYNDROME (SMA SYNDROME)

00:19:21

- Aka Wilkie's Syndrome / Cast Syndrome
- Characterized by Compression / obstruction of 3rd part of duodenum by SMA
- Caused by loss of Fat that acts as cushion for 3rd part of duodenum between aorta & SMA

- If Angle between aorta & SMA is < 20° – presents with symptoms (Normally angle 38-65°) [Aorto-Mesentric angle]



Predisposing factors
- Rapid weight loss
- Rapid gain of height
- Prolonged immobilization
- Body cast application

Clinical features
- Colicky pain after meals
- Feces & Flatus passed by patient (due to partial obstruction)

Investigation
- Diagnose is made by - Hypotonic duodenography or CECT

Management
- Conservative management
  - Remove the cast
  - Gain weight
  - Lie prone after meals

Surgery 00:26:14
- Strong's procedure
  - Division of ligament of Treitz
  - Mobilization of 4th part of Duodenum
- TOC for SMA syndrome – Duodenojejunostomy
- TOC for Annular Pancreas and Duodenal Atresia - Duodeno-duodenostomy f/b Duodenojejunostomy

Previous Year's Questions

Q. Which of the following is wrong regarding superior mesenteric artery syndrome? (AIIMS May 2018)

A. Superior mesenteric artery is compressed by third part of duodenum at the ligament of Treitz attachment

B. Superior mesenteric artery has a nomal angle between 38-65 degree is relation to duodenum

C. Strong procedure is corrective surgery in which ligament of Treitz is divided

D. Superior mesenteric artery syndrome is characterized by an angle less than 25 degree due to loss of intervening mescenteric pad of fat

SMALL BOWEL TUMOR 00:28:41

- MC SBT: Stromal tumor > Adenoma
- MC SBT in children: Lymphoma
- MC malignant SBT: Adenocarcinoma > Carcinoid

1. Carcinoid Tumor 00:30:37

- Neuroendocrine Tumors
- Arises from Neuroendocrine cells
  - ECL cells (enterochromaffin like cells)
  - Argentaffin cells
  - APUD cells
  - Kulchitsky cells
- MC site of carcinoid tumors - Bronchus > Ileum> Rectum > Appendix > colon> Stomach
- Combined Incidence of carcinoid tumor - Duodenum + Jejunum + Ileum > Bronchus
- Overall, most common site: small intestine > Bronchus > I > R> A> C> S

Types of carcinoids (based on location of tumor)

1. Localized carcinoid
   - Larynx > ovary, Appendix > Rectum
   - GI carcinoid with best prognosis – carcinoid of Appendix
   - Overall best prognosis – Laryngeal Carcinoid tumour

2. Non localized carcinoid
   - Pancreas > Colon > Small intestine
   - Carcinoid with worst prognosis - carcinoid of pancreas

Important Information

- MC site of carcinoid tumor in GIT: Ileum
- MC site of carcinoid tumor in Hindgut: Rectum
- MC site of carcinoid tumor in foregut in GIT: Stomach

Foregut carcinoids	• Argyrophilic	• Produces Low levels of 5-HT
Midgut carcinoids	• Argentaffinic	
Hindgut carcinoids	• Mixed (Mainly Argentaffinic & some Argyrophilic)	• Rarely produces 5-HT

- Foregut and Hindgut carcinoids are rarely associated with carcinoid syndrome.
- Midgut carcinoids are associated with
  - Carcinoid syndrome
  - MEN-I (10% of cases)

Pathophysiology
- Serotonin is metabolized in liver (M/C), lungs, brain
- MAO converts serotonin to 5 HIAA, which is excreted in urine
- 5 HIAA in urine – IOC for Carcinoid tumour
- Production capacity of Serotonin exceeds the metabolic capacity of MOA
- Raised level of serotonin → ↑chances of Carcinoid tumour

Previous Year's Questions

Q. Which of the following is the most common epithelial tumor of stomach? (NEET Jan 2018)

A. Carcinoid tumor
B. Sarcoma
C. GIST
D. Gastric adenocarcinoma

Previous Year's Questions

Q. Increased level of 5-HIAA is present in? (NEET Jan 2018)

A. Alkaptonuria
B. Albinism
C. Carcinoid tumor
D. Phenylketonuria

Manifestations of CARCINOID SYNDROME
- MC manifestation - Flushing
- Wheezing, Bronchospasm & Diarrhea

Clinical features
- MC symptom - Abdominal pain
- MC site of metastasis in GI carcinoid - Liver
- Peculiar symptom of Gastric carcinoid - Bright red patchy flushing

Carcinoid Heart Disease
- Catabolism of serotonin occurs in pulmonary capillaries
  ↓
  So, right side of heart is mainly affected
  ↓
  Tricuspid valve involved > pulmonary valve
- MC valvular abnormality - Tricuspid regurgitation > Pulmonary regurgitation > Tricuspid stenosis > Pulmonary Stenosis

Risk of malignancy
- **L** - Location
- **S** – Size
- **D** – Depth of invasion
- **Growth** – **Growth** pattern

Small Bowell carcinoid
- Arises from crypt of Lieberkuhn
- Intense desmoplastic reaction around the tumor – leads to excessive fibrosis causing compression of lumen causing Intestinal obstruction leading to Abdominal pain
- Clinical features
  - MC symptom - Abdominal pain
  - MC site of metastasis in GI carcinoid - Liver
  - Peculiar symptom of Gastric carcinoid - Bright red patchy flushing

Investigations
- IOC for Dx – 24 hr estimation of 5- HIAA in urine
- In neuroendocrinal tumors, initial investigation for localization & staging - SRS (Somatostatin receptor Scintigraphy)
- Best investigation for localization - DOPA - PET

Treatment
- Segmental resection + En-bloc lymphadenectomy
- In advanced cases - Chemotherapy regimen
  - **D** - Dacarbazine
  - **E** - Epirubicin
  - **F** - 5- Fluorouracil
- Most important prognostic marker in carcinoid syndrome - Chromogranin A
- Main treatment of small bowel carcinoid - Resection and anastomosis
- After so many resection anastomoses as treatment patient may develop short bowel syndrome.

Previous Year's Questions

Q. A 50 years old lady with history of carcinoid syndrome complains of flushing and diarrhea. Which of the following is not true regarding this syndrome? (JIPMER - May - 2019)

A. Occurs in <10% of carcinoid tumors
B. Octreotide injection reduces symptoms of flushing and diarrhea
C. Attacks precipitated by stress, alcohol and large meal
D. Bright-red patchy flushing is typically seen with ileal carcinoids

SHORT BOWEL SYNDROME

00:57:16

- Caused by Massive resection of small bowel
- Normal length of small bowel - 600 cm
- In Short bowel syndrome - Length of bowel <200 cm.
- Conditions that leads to short bowel syndrome due to massive resection
  - Mesenteric ischemia
  - Mesenteric trauma
  - Midgut volvulus
  - Crohn's disease
- Ileum has better adaptability, so jejunal resections are better tolerated
- Function of terminal ileum - B12 absorption and enterohepatic circulation of bile salts
- After effects
  - Megaloblastic anemia - impaired absorption of B12
  - Cholesterol gall stone - impaired enterohepatic circulation of bile salts
  - Choleretic diarrhea - watery diarrhea due to irritation of colon by bile salts
  - Malabsorption - Free fatty acids binds with calcium
  - Oxalate stone formation - free oxalates is absorbed from colon
  - If Ileocolic valve is removed - reflex of fecal matter leading to Bacterial overgrowth + Diarrhea
  - Hypergastrinemia - Catabolism of gastrin occurs in small bowel mucosa. So, In cases of short bowel syndrome – Hypergastrinemia

Treatment

- Immediate post-operative treatment is Conservative management (Total parenteral Nutrition) SCV > IJV > FV
- TOC for short bowel syndrome – Small bowel transplantation
- Intestinal lengthening procedures
  - BIANCHI procedure: Aka LILT (Longitudinal Intestinal Lengthening & Tailoring)
  - STEP (Serial Transverse Enteroplasty Procedure)

GI TUBERCULOSIS

01:10:28

- Caused by
  - M. Tuberculosis: M/c organism
  - M. Bovis (eliminated by public health measures)

Pathway of Spread of GI TB

- 1st organ involved - Lung
- GIT is involved by - Swallowing of infected sputum, which reaches terminal ileum, Recruitment of lymphocytes in submucosa causing Oxidative stress and loss of epithelium leading to Formation of Transverse ulcer
- Earliest activity of GI TB is seen in - Submucosal layer of GIT
- MC site of GI Tuberculosis - Ileocecal junction
- Longitudinal ulcers are seen in typhoid

Pathological types of TB

Refer Table 15.1

Clinical features

- Initially - Nonspecific signs and symptoms of TB
  - Evening rise of temperature
  - Low grade fever
  - Night sweats
  - Anorexia
  - weight loss
- Specific symptoms
- Formation of transverse ulcers → Ileum gets hyperirritable →Contents are going to colon at a faster rate → Diarrhea
- Later, at the site of transverse ulcer → Formation of stricture (Passable stricture) → Sub-Acute Intestinal obstruction (SAIO)
- MC presentation - Abdominal pain (due to SAIO)

Complications of TB

1. Acute obstruction
2. Perforation
3. Fistula formation
4. Abscess

Investigations

- MC Lab abnormality - ↑ ESR (> 90% of cases)
- On Ultrasound - Club Sandwich Appearance (due to formation of matted bowel loops with collection of fluid in between the bowel)
- Paracentesis
  - Lymphocytes > 500/mm3
  - Protein > 2.5 gm/dl (Exudate)
  - SAAG < 1.1
  - ADA ↑↑
- IOC for GI tuberculosis – CECT

- On Barium meal follow through
  - Pulled – up cecum (due to contraction of mesocolon): Obtuse I/C Angle (Goose Neck Deformity)
  - Narrowed appearance of ileum (Due to Hyperirritability): "STERLEIN SIGN"
  - Persistent narrowing due to established strictures - String of KANTOR sign
  - In chronic cases - Thickened IC value, rigid cecum, narrowed ileum: Umbrella Sign/ Fleischner's Sign

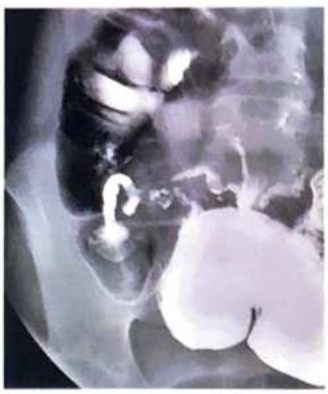


Image 18.1

Important Information

- **Sterling sign & String sign of Kantor – are seen in GI TB. as well as Crohn's disease.**

Treatment

- ATT with Management of complications
- Indications of Surgery
  - Acute obstruction
  - Perforation
  - Bleeding
  - Abscess
  - Fistula formation

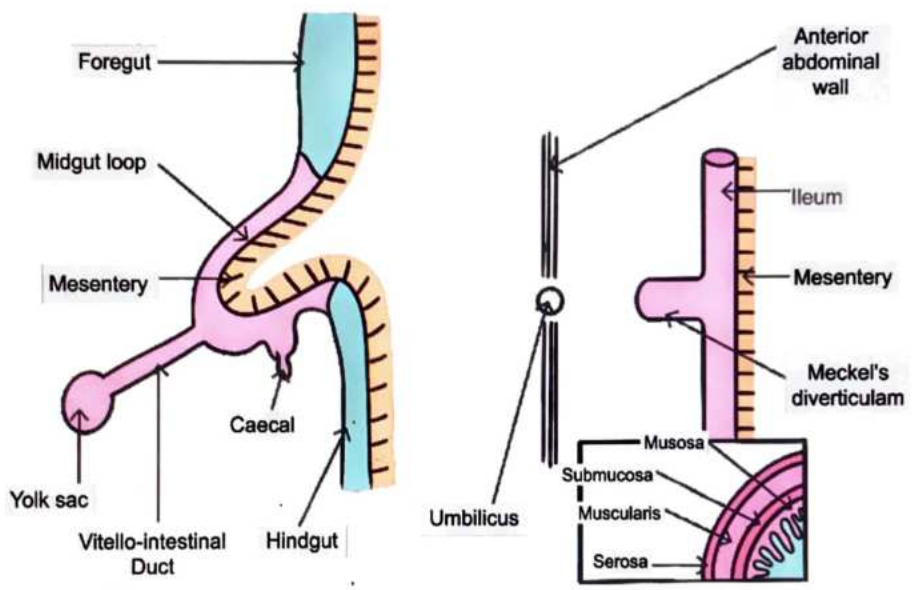


Table 18.1

Ulcerative (60% cases)	Hyperplastic (10% cases)	Sclerotic/ fibrotic (30% cases)
• ↓ Immunity & ↑Virulence of organism: Formation of Transverse ulcer in ileum	• ↑ Immunity & ↓ Virulence of organism ↓ Strong inflammatory response ↓ Mesenteric lymphadenopathy ↓ Caseous necrosis ↓ Formation of Matted bowel loops (Bowel wall – Thickened)	• Chronic cases • Formation of Strictures

CLINICAL QUESTIONS

Q. A 27 year old female was admitted to your hospital with a complaint of abdominal swelling associated with a history of fever for 2 weeks. She was anemic with a Hb of 10.0; liver functions were within limit; ESR = 70 (Normal = <20). Based on her CT findings, she was diagnosed as a case of GI tuberculosis. You can treat the patient with medical therapy but if you have to operate on this patient then the most common indication is :

A. Acute Obstruction
B. Mucosal ulcerations
C. Mass abdomen
D. GI symptoms

Answer: A

Solution

Indications of Surgery in GI Tuberculosis

- Intestinal obstruction secondary to stricture (MC)
- Free perforation
- Severe GI hemorrhage
- Intra-abdominal abscess
- Internal or external fistula

19 LARGE INTESTINE

ANATOMY & PHYSIOLOGY OF LARGE INTESTINE

- Normal length: 150 cm
- Extends from Caecum to Rectum
- Widest part-caecum
- Narrowest part - sigmoid
- M/C site of rupture in distal obstruction: Caecum
- M/C site of Ischaemic colitis: splenic flexure
- Superior mesenteric artery supplies
  - Caecum
  - 2/3rd of transverse colon
- Inferior mesenteric artery supplies
  - Distal 1/3rd of transverse colon
  - Descending colon
  - Rectum
- Arc of Riolan / marginal artery of Drummond
  - Collateral branch
  - Connect proximal part of middle colic artery to left colic artery
- Water-shed areas
  - Griffith's point: in splenic flexure
  - Sudeck's point: in sigmoid colon
- Lymphatic drainage & venous drainage follows arterial supply
- Lymph nodes
  - Epicolic: along the bowel wall
  - Paracolic: located adjacent to marginal artery
  - Intermediate: located along the main branches of major vessels
  - Primary / Terminal: located on SMA & IMA

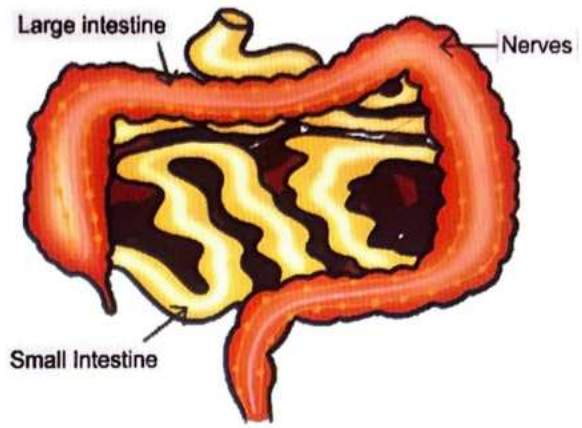
Physiological functions of colon

- Absorbs water, Na^+ Cl^-
- Secretes K+, HCO_3^-, mucus
- Fermentation of dietary fibres to produce short chain FAs
- SCFA(s) are metabolic fuel for colon
- Right colon act as fermentation chamber
- Left colon is site of storage & dehydration of stool

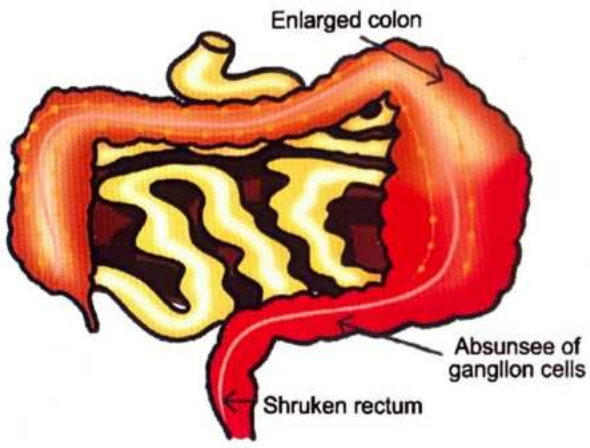
HIRSCHSPRUNG'S DISEASE

00:11:58

- Incidence = 1:5000 live birth
- Characterized by Absence of ganglion cells in both Auerbach plexus & Meissner's plexus
- MC site - Rectum > sigmoid
- It is a type of Neurocristopathy - characterized by failure of migration of neural crest cells to colonic mucosa
- Severity of symptoms and age of presentation - depends upon length of segment involved and severity of obstruction.



NORMAL COLON and RECTUM



HIRCHSPRUNG'S DISEASE

Clinical presentation

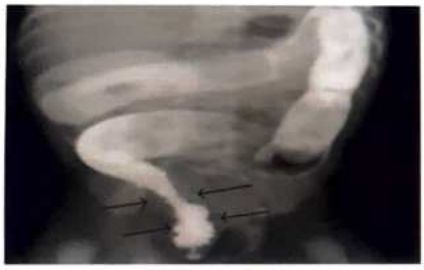
Just after birth	After first few weeks of life	Older children & adults
• Delay of passage of Meconium (longer the involved	• Chronic constipation • Abdominal distention • Failure to thrive	• Chronic constipation

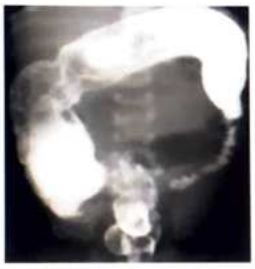
segment severe the obstruction)
- MC symptom - Abdominal distention

- Fecal soling is not a feature of Hirschsprung's disease

Investigations
- IOC for Dx: Rectal Biopsy (Suction Biopsy> full Thickness Biopsy)
- Biopsy findings
  - Aganglionosis (Absence of ganglion cells)
  - Hypertrophied nerve trunks
  - (+) Acetylcholine esterase staining

Management
- For Short segment disease - Extended myectomy
- For Long segment disease - Temporary colostomy followed by definitive operation
- Definitive procedures are
  - Swenson
  - Duhamel
  - Soave

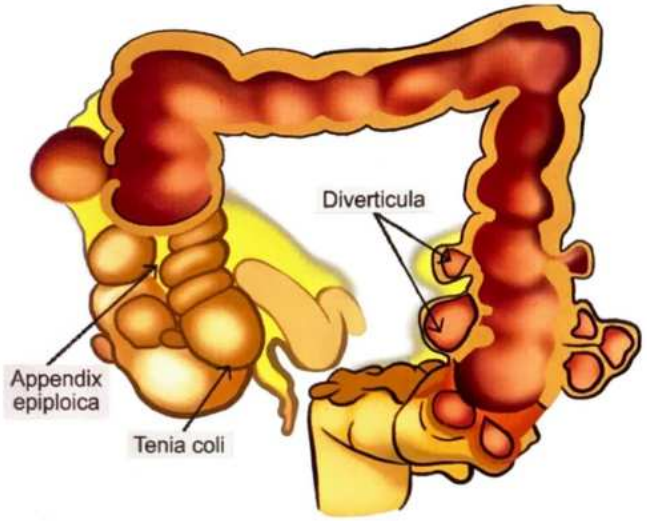




Refer Image 19.1

COLONIC DIVERTICULOSIS

00:24:50



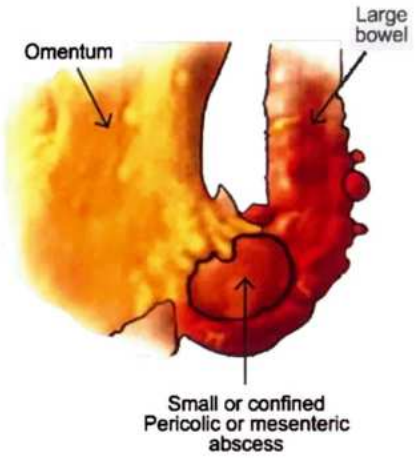
- M/C site: sigmoid colon
- M/C cause of significant lower GI bleed

Etiology
- Low intake of dietary fibres
- Altered collagen structure
- Disordered motility
- Increased intraluminal pressure

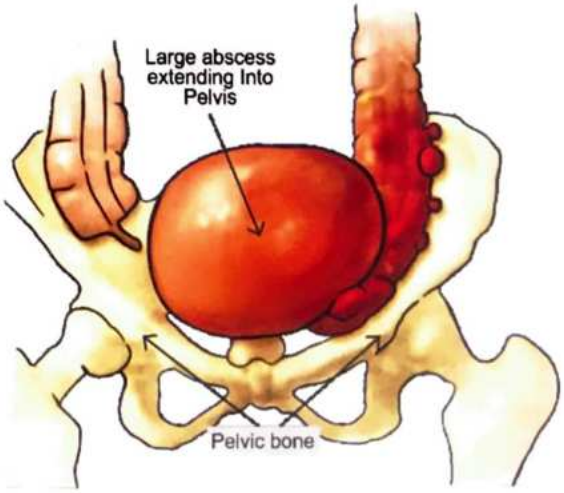
Clinical features
- Most patients: Asymptomatic
- 10-30% - symptomatic: d/t complications
- Diverticulitis
  - Pain & Tenderness at left iliac fossa

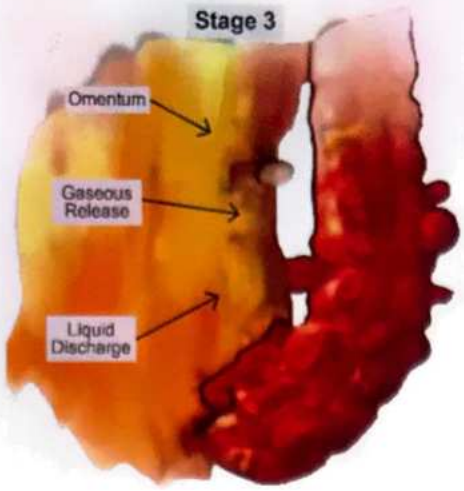
Hinchey classification for complicated Diverticulitis
- Stage I: Small or confined pericolic or mesenteric abscess
- Stage II: Large abscess extending into pelvis [walled off pelvic abscess]
- Stage III: Generalised Purulent Peritonitis
- Stage IV: Generalised Fecal Peritonitis

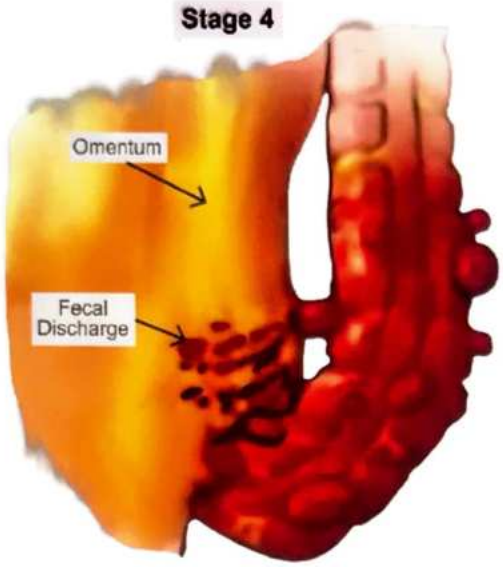
Stage 1



Stage 2





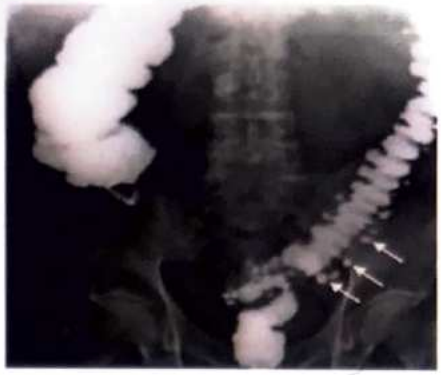


Complications

- Haemorrhage: Painless, Profuse
- Perforation: Pericolic Abscess
- Intestinal obstruction
- Fistula Formation
  - Colovesical (M/C)
  - Frequent UTI
  - Fecaluria (Passage of stool in urine)
  - Pneumaturia (Passage of flatus in urine)

Diagnosis

- IOC for diagnosis of colonic diverticulosis: Barium Enema
- IOC for Dx of colonic Diverticulitis: CECT
- On Barium Enema: Saw- Tooth appearance



Management

- Conservative management
  - High fibre diet
  - Laxatives
  - Anti- spasmodic
- Indications of Surgery
  - No improvement after Conservative Mx
  - 2 Documented attacks of Diverticulitis
  - Complicated diverticulitis
  - Recurrent or Persistent Haemorrhage

Surgery

- Elective surgery is done
- Sigmoid colectomy with 1° anastomosis

COLORECTAL POLYPS

00:40:48

Neoplastic (adenomatous) polyp	Non-neoplastic polyp
1. Tubular (most common benign)	1. MC Overall - Hyperplastic
2. Villous (most malignant)	2. Hamartomatous
3. Tubulovillous	• Juvenile polyps
	• Peutz Jeghers polyp
	3. Inflammatory polyp (Pseudopolyp)

Important Information

- Overall, most common type of colorectal polyps- Hyperplastic polyps
- Overall, most common Neoplastic polyp -Tubular polyps

- Overall, most malignant colorectal polyp – Villous polyps

Similarly

- Overall, most common type of gastric polyp- Hyperplastic polyps
- Most common neoplastic gastric polyp- Tubular polyps
- Most common malignant gastric polyp – Villous polyps

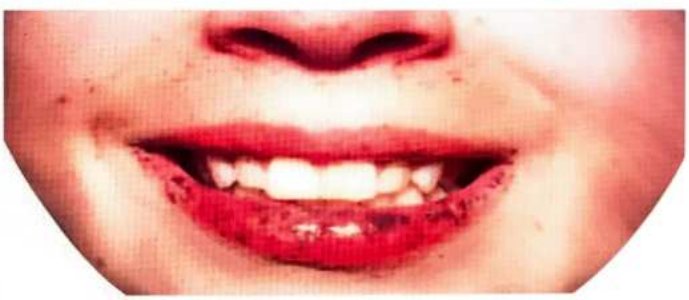
Juvenile polyp 00:46:04

- Type of hamartomatous polyp
- Usually Single, seen in children < 5 years of age
- MC site – Rectum
- Clinical presentation: Bleeding Per rectum and mucus discharge
- Management: Polypectomy

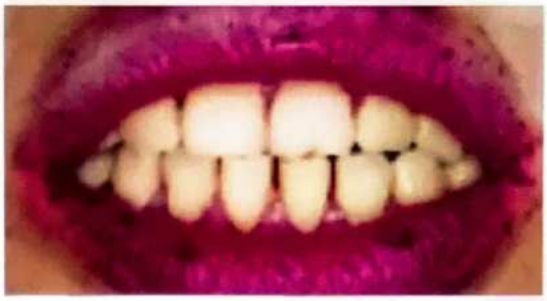
Important Information

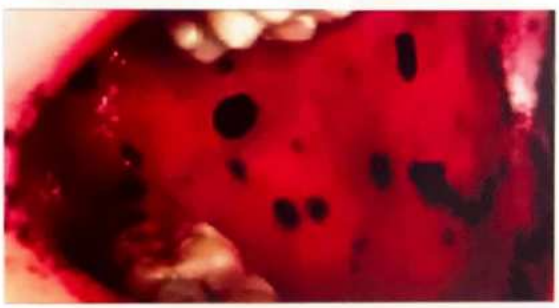
- Juvenile polyposis syndrome
  - Has multiple juvenile polyps
  - Both juvenile polyp and juvenile polyposis syndrome have lower risk of malignancy (But on comparison, Risk of malignancy- Juvenile polyposis syndrome > Juvenilepolyp

Peutz - Jegher's syndrome (P-JS) 00:48:33



- Has multiple hamartomatous polyps
- MC site - small intestine (jejunum) > Colon > Stomach
- Mutated Gene - LKB1 / STK11 (located on chromosome 19)
- Characterized by Hyper melanotic macules (No risk of malignancy) over lips & buccal mucosa
- Pathology – shows Arborization & Pseudo invasion
- Clinical Features





- Recurrent intussusception – leads to Recurrent abdominal pain (Polyps act as lead point)
- Doesn't increase the risk of colorectal cancer. But
  - → Increases the risk of SI malignancy
  - → Increases the risk of Pancreatic malignancy: maximum risk
  - → Increases the risk of Breast cancer
  - → Increases the risk of Thyroid cancer
  - → Increases the risk of Endometrial cancer
  - → Increases the risk of Sertoli cell tumor

Inflammatory polyps 00:53:51

- Aka Pseudo polyp
- Seen in Inflammatory bowel diseases (Ulcerative colitis >Crohn's disease)
- It is Non-malignant (But IBD like UC & CD are pre-malignant condition for CRC)

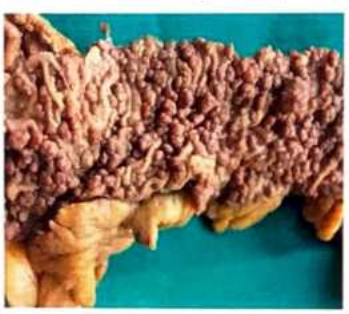
ADENOMATOUS POLYP 00:54:57

- Premalignant polyp
- Conditions that increases the risk of adenomatous polyp
  - **U - U**reterosigmoidostomy
  - **S - S**treptococcus bovis Bacteremia
  - **A - A**cromegaly
- Factors which increases risk of malignancy in adenomatous polyp
  - Villous polyp (Max. risk)
  - Sessile polyp
  - Size > 2cm
- Syndromes related to Adenomatous polyp
  - Familial Adenomatous Polyposis (FAP)
  - NPCC

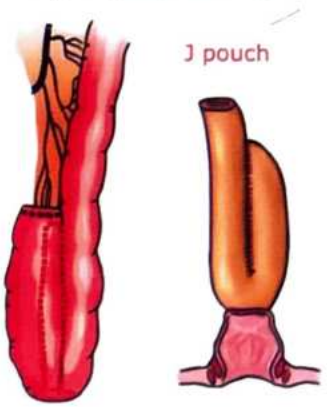
Important Information

- FAP: Responsible for 1% of CRC in population, having 100% risk of malignancy (Prophylactic Treatment Recommended)
- HNPCC: Responsible for 5% CRC in population, having upto 80% risk of malignancy (Prophylactic not Treatment Recommended)

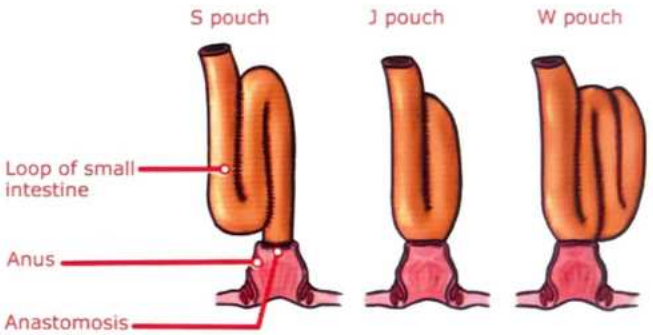
Familial Adenomatous Polyposis (FAP)



- Autosomal dominant
- Mutated gene - APC gene (Adenomatous Polyposis Coli)
- Gene is in - Chromosome 5q 21 (long-arm)
- It is Characterized by > 100 adenomatous polyps
- Associated with 100% risk of malignancy
- Polyp formation begins at the age of 15 years
- 100% patients – develop malignancy by 40 years
- Clinical presentation: Bleeding per rectum
- Investigations
  - On DRE/ proctoscopy - Polyps can be identified
  - IOC for FAP - Colonoscopy (> 100 polyps) + On histology (Adenomatous variety of polyp)
- Treatment
  - TOC - Total proctocolectomy + Ileal pouch anal anastomosis (j shaped pouch is preferred)



- Other ileal pouches
  - S shaped pouch
  - W shaped pouch



- MC cause of death after proctocolectomy in FAP patients - Periampullary Carcinoma
- Complication of surgery (TPC + IPAA)
  - MC complication - small bowel obstruction (25% of cases)
  - Pouchitis- not seen in FAP but is seen in IBD (UC - Pouchitis [33%] > SBO [25%])
- Screening
  - FAP is Autosomal dominant - 50% of patient's family members can have FAP. So, screening should be done
  - IOC for screening of family members of FAP - APC gene testing

- If mutation is positive - Surveillance is done by colonoscopy
- If Polyp is detected - Total proctocolectomy is recommended

Variants of FAP

1. Gardner's syndrome
- Autosomal dominant condition
- Associated with
  - Osteoma (MC bone involved - Mandible)
  - Congenital Hypertrophied Retinal Pigmented Epithelium (CHRPE)
  - Desmoid tumors
  - Sebaceous cyst
  - Benign lymphoid polyposis of ileum
  - Supernumerary teeth (extra teeth)

2. Turcot's syndrome
- Autosomal recessive
- Associated with - Brain tumors
- It is associated with both
  - FAP: MC brain tumor - Medulloblastoma
  - HNPCC; MC brain tumor - Glioblastoma multiforme

Previous Year's Questions

Q. Desmoid tumor is associated with? (JIPMER May 2019)
A. Colonic polyps
B. Pancreatic cancer
C. Ovarian cancer
D. Gastric cancer

HNPCC (HEREDITARY NON-POLYPOSIS COLORECTAL CANCER)

01:16:02

- Autosomal dominant
- Caused by Mismatch repair gene abnormality
  - 3 Chromosomes involved – Chromosome 2, 3, 7
  - 7 genes are involved – in > 90% of cases → h MLH 1, h MSH 2 is responsible
- Modified Amsterdam criteria - used to select at risk patients for HNPCC
- Revised Bethesda criteria - used for detecting micro satellite instability in HNPCC
- Responsible for 5% of Colorectal cancer in the population – up to 80% risk of malignancy. So, prophylactic treatment is not recommended.
- HNPCC is Aka Lynch syndrome

Types
- Lynch I: Colorectal cancer
- Lynch II: Colorectal cancer + Extraintestinal_malignancy (MC– Endometrium > Gastric >Ovarian)

Muir- Torre syndrome
- Variant of HNPCC – Characterized by Benign & Malignant tumor of sebaceous gland + keratoacanthoma

Management
- Surveillance colonoscopy should be started at 20 years
- If Patient develop CA Colon - Total colectomy + IRA (Ileorectal anastomosis)
- But Rectum also has high risk of malignancy - Annual proctoscopy must be done to detect malignancy
- For females who have completed their family, Prophylactic treatment - Trans- abdominal hysterectomy + Bilateral salpingo oophorectomy

Cowden's Disease
- Gene mutated PTEN (Present on Ch. 10)
- Multiple Hamartoma – present in skin, breast, mucous membrane
- M/C feature – Multiple Trichilemmoma
- Ectodermal Polyps + BUT Malignancies
  - **B - B**reast
  - **U - U**terine
  - **T – T**hyroid

1. Not a/w GI malignancies
   Cronkhite- Canada Syndrome
2. Acquired
3. Skin pigmentary changes
4. Hair loss
5. Onychodystrophy
6. Diarrhoea → Dehydration
7. M/C cause of Death – Massive fluid loss

Screening of Colorectal cancer

01:31:28

- Starts at 50 years of age
- Investigations used

1. FOBT	Should be performed annually after 40yrs of Age
2. Flexible	Should be performed every 5 years
3. Double contrast barium enema	Should be performed every 10 years
4. Colonoscopy	Should be performed every 10 years

- Colonoscopy is the most preferred investigation
- If colonoscopy is contraindicated - Double Contrast barium enema is preferred

Risk factor for colorectal cancers

- Smoking
- Alcohol
- High fat diet
- FAP
- HNPCC
- Adenomatous polyp
- Ureterosigmoidostomy
- Streptococcus bovis bacteremia
- Acromegaly
- IBD (UC & CD)
- Pelvic irradiation
- Risk factors for CA colon & CA rectum are similar

CA COLON

01:36:21

- Mc site of CA colon – Sigmoid (MC site of large bowel malignancy- Rectum > colon)
- Least common site of CA colon - Hepatic flexure
- Most common site of metastasis - Liver >lungs

Chemotherapy regimen for CA colon

- FOLFOX-IV
  - FOL – Folinic acid (Leucovorin)
  - F - 5 Fluorouracil
  - OX –Oxaliplatin
- FOLFIRI
  - FOL - Folinic acid (Leucovorin)
  - F - 5fluorouracil
  - IRI -Irinotecan
- FOLFIRI: Not preferred
- FOLFOX IV: preferred for CA colon & CA rectum

Clinical features

- MC symptom - Abdominal pain
- RIF mass & Alteration in bowel habit
- Hematochezia & Melena
- Anemia (which can lead to fatigue)
- In CRC, Symptoms differ depending on the location

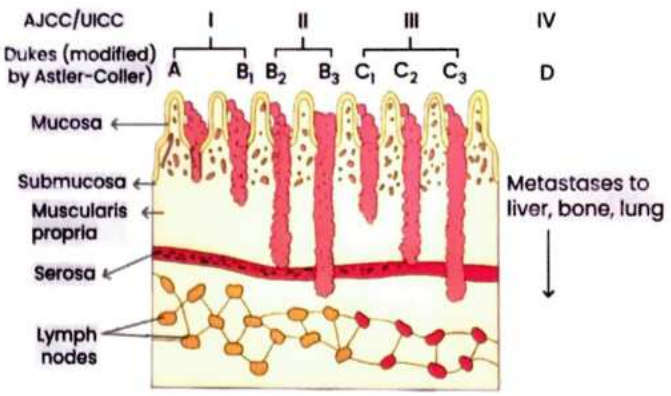
Refer Table 19.1

Investigations

- On barium Enema: Apple core appearance
- IOC for diagnosis of CA colon- Colonoscopy + Biopsy
- IOC for staging of CA colon – CECT
- Virtual Colonoscopy
  - CT/MRI images converted into 3D images
  - Advantage: Extraluminal pathologies can be diagnosed
  - Disadvantage: Biopsy cannot be taken

Modified Dukes/ Modified Astler Collar classification

01:47:53



- A - Tumor confined to mucosa
- B1 - Partial penetration of muscularis propria
- B2 - Full penetration of muscularis propria
- C1 - Partial penetration of muscularis propria + LN involvement
- C2 - Full penetration of muscularis propria + LN involvement
- D - Distant metastasis

8th AJCC TNM classification for CRC

01:51:39

Tumor

TIS	• Carcinoma insitu /Intraepithelial tumor/ invasion of Lamina propria
T1	• Tumor invades submucosa
T2	• Tumor invades muscularis propria
T3	• Tumor invades Subserosa or into Non- Peritonealized pericolic or perirectal • tissues
T4a	• Tumor penetrates surface of visceral peritoneum
T4b	• Tumor directly invades or is adherent to other organs or structures.

Lymph Node

N1a	• Metastasis to 1 regional LN
N1b	• Metastasis to 2-3 regional LN

N1C	• Tumor deposits in the Subserosa, Mesentery or Non- Peritonealized pericolic or perirectal tissues without regional lymph node metastasis
N2a	• Metastasis to 4-6 regional LN
N2b	• Metastasis to 7 or more regional LN

Metastasis

M1a	• Metastasis confined to one organ or site without peritoneal metastasis
M1b	• Metastasis to more than one organ
M1C	• Metastasis to peritoneum with or without other organ involvement

Management

TIS	• Polypectomy
Stage I &II	• Segmental resection
Stage III	• Segmental resection + adjuvant chemotherapy (FOLFOX IV)
Stage IV	• Metastasectomy + palliation by chemotherapy

- Most common site of metastasis Liver > Lung
- Isolated 3 metastasis to Liver, Lung & Brain are Resectable
- Chemotherapeutic agents used only in Metastasis
  - Irinotecan
  - Cetuximab - acts against EGFR
  - Bevacizumab - acts against VGEF

Prognosis

- Most important prognostic factor in CA colon - Staging (TNM)
- Single independent most important prognostic factor - Lymph node status

Types of Colectomy

1. Ileocolectomy
   - Structure Removed - terminal ileum & caecum
   - Vessels ligated - Ileocolic

2. Ascending colectomy
   - Structure Removed - Terminal ileum, colon, caecum
   - Vessels ligated - Ileocolic vessels & Right colic vessels

3. Right Hemi-colectomy
   - Structure Removed - Ileum (10 cm) + Caecum + Ascending colon + Hepatic flexure + Right half of transverse colon
   - Vessels ligated – IC vessels, RC vessels, ® branch of middle colon artery

4. Extended ® Hemi-colectomy
   - Structure Removed - Ileum, caecum, Hepatic Flexure, Proximal 2/3rd of transverse colon
   - Vessels ligated – IC vessels, RC vessels, middle colic vessel at its base

5. Transverse colectomy
   - Structures removed – Transverse colon
   - Vessels Ligated - Middle colic vessels

6. Left colectomy / Hemicolectomy
   - Structures removed - Distal 1/3rd of transverse colon, Splenic flexure, Descending colon
   - Vessels Ligated - Ⓛ branch of MC vessels, Ⓛ colic vessels

7. Extended Ⓛ Hemicolectomy
   - Structures Removed - Distal 2/3rd of TC, splenic flexure, Descending colon
   - Vessels ligated - ® & Ⓛ branch of middle colic vessels, Ⓛ colic vessels

8. Sigmoid colectomy
   - Structure Removed – sigmoid colon
   - Vessels ligated – sigmoid branches of inferior mesentric artery

9. Subtotal colectomy
   - Structures removed – Terminal ileum, caecum, ascending colon (A to I)

10. Total colectomy → [A to I] + Sigmoid colon [A to K]

11. Total Proctocolectomy: structures removed: [A to K] + Rectum i.e. [A to L]

Malignancy & Colectomy performed

- Malignancy in caecum - ® Hemicolectomy
- In Hepatic Flexure of colon – Extended ® Hemicolectomy
- In Transverse colon – Transverse colectomy
- In Splenic flexure of colon – Extended Ⓛ Hemicolectomy
- In descending colon - Ⓛ Hemicolectomy / Colectomy

- In sigmoid colon – Sigmoid colectomy

PSEUDOMEMBRANOUS COLITIS

- Caused by clostridium difficile – leading cause of nosocomial acquired diarrhoea

Pathogenesis

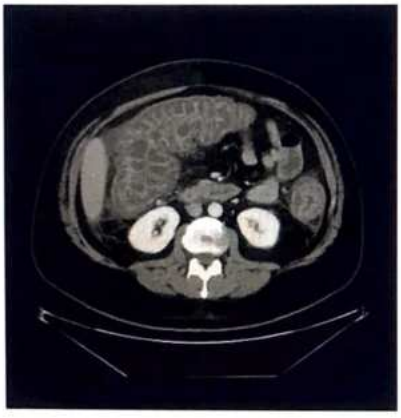
- Antibiotics → Depletion of Ⓝ commensal flora cause overgrowth of clostridium difficile which produce Toxins leading to watery diarrhea
  - Toxin A: enterotoxin
  - Toxin B: cytotoxin

Clinical Features

- Watery Diarrhea to life threatening fulminant colitis

Diagnosis

- Gold standard – stool cytotoxin assay
- ELISA
- On colonoscopy
  - Ulcers
  - Plaques
  - Pseudomembranes
- CECT: Accordion sign



Management

- Stop the antibiotic
- DOC

Mild disease	Severe Disease
• Oral Metronidazole • Oral Vancomycin [2nd line agent]	• Bowel Rest • I/V Hydration • I/V Metronidazole

- Fidaxomicin is new drug used to treat diarrhea caused by clostridium difficile

ISCHAEMIC COLITIS

02:25:04

- M/C site – Splenic flexure of colon
- Ischaemia occurs d/t
  - Low blood flow
  - Vascular occlusion d/t embolus Thrombosis

Clinical Features

Mild disease	Severe Disease
• Bloody Diarrhea	• Severe Abdominal Pain • Tenderness • Fever • Leucocytosis

Diagnosis

- On Barium enema or Plain x-ray: Thumb – print sign
- On colonoscopy: Dark Haemorrhagic mucosa

Management

- Bowel Rest
- Broad Spectrum Antibiotics

Complications

- Structure: M/C site is sigmoid colon

LOWER GI BLEED

- Bleeding distal to ligament of Treitz
- M/C site of LGIB – colon
- M/C cause of LGIB – Hemorrhoids
- M/C cause of significant LGIB – colonic diverticula
- M/C cause of significant small blood LGIB – Angiodysplasia aka Vascular ectasia
- M/C cause of occult LGIB – vascular ectasia

Refer Image 19.2

ANGIODYSPLASIA

- M/C vascular lesion in colon (® colon)
- Acquired
- D/t age related degeneration of Ⓝ colonic vessels: Dilated tortuous submucosal vein

Clinical Features

- Anaemia
- Bleeding [10-15%]
  - Melena
  - Rectal Bleeding

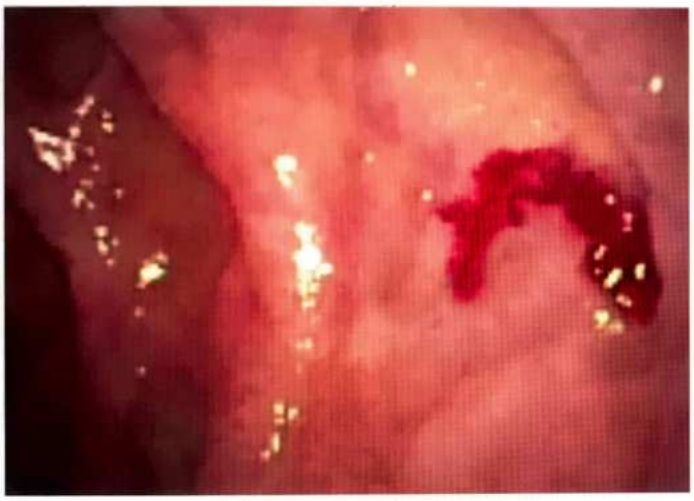
HEYDE'S SYNDROME

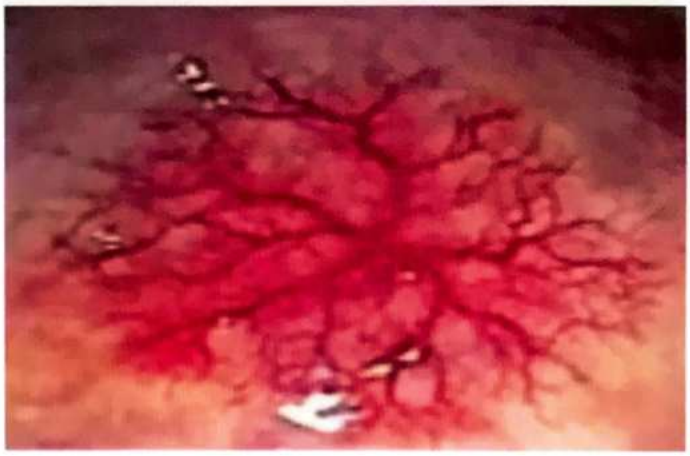
Components

- Aortic stenosis
- Acquired coagulopathy
- Angiodysplasia

Diagnosis

- Colonoscopy
- Angiography





Management

- After stabilisation
  - Colonoscopy with cauterization
  - Argon Plasma Coagulation
- **Surgical Rx – Subtotal colectomy [when lesion is not localised]**

Image 19.1

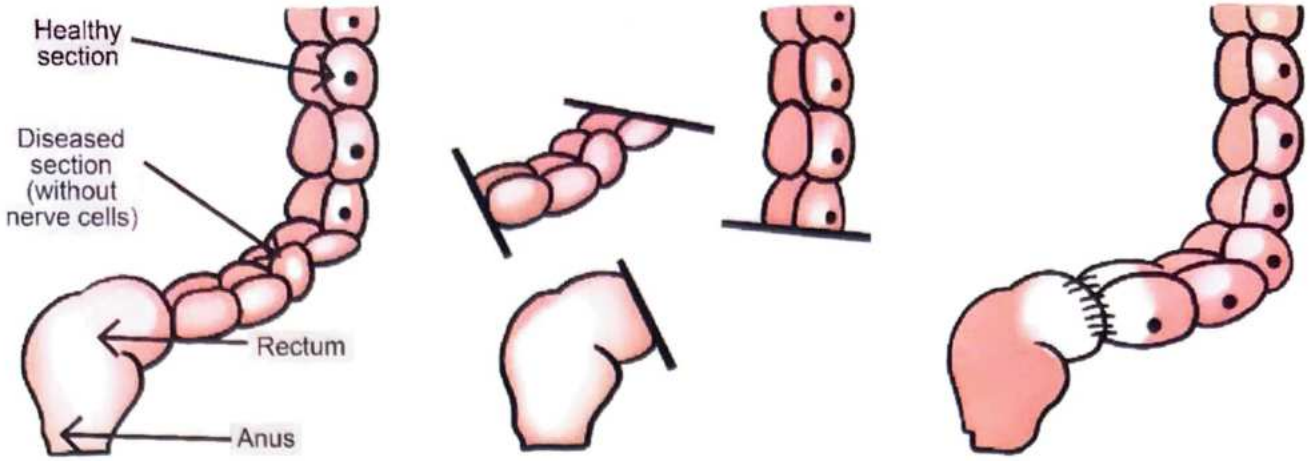


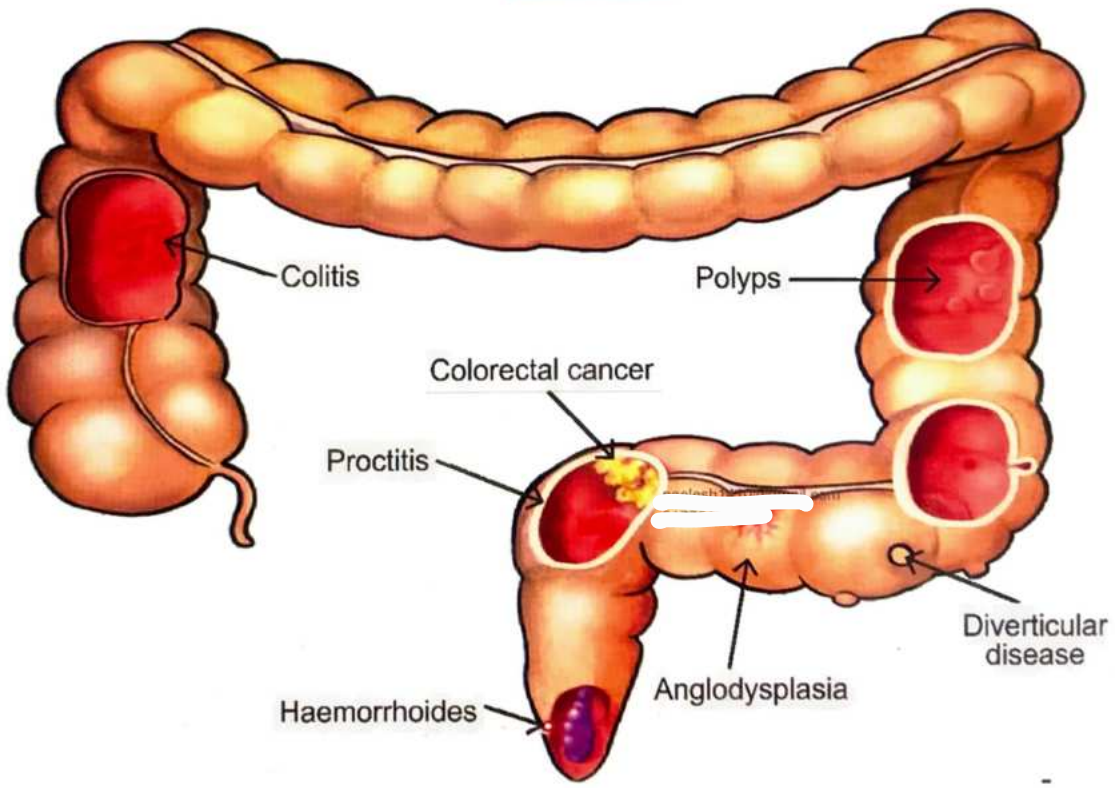
Table 19.1

Right colonic malignancy	Left colonic malignancy

• Fungating /cauliflower like growth
• Liquid fecal matter
• Mc symptom: Bleeding → Anemia (fatigue)
  ○ Melena
  ○ Occult bleeding
	• Annular/stenosing growth
	• Solid fecal matter
	• Narrow caliber
	• MC symptom-Abdominal pain (due to Obstruction)

- MC symptom of CA Transverse Colon → Bleeding + Obstruction

Image 19.2



CLINICAL QUESTIONS

Q. 34 year old male presents to the OPD with complaints of abdominal pain and bleeding per rectum. On further evaluation patient was found to have multiple polyps in the intestine. The patient gives a family history of Gardner's syndrome in his father. The most common facial abnormality in Gardner's syndrome is:

A. Ectodermal dysplasia
B. Odontome
C. Multiple osteomas
D. Dental cysts

Answer: C

Solution

Gardner's syndrome

- It is a variant of Familial adenomatous polyposis
- Autosomal dominant condition
- Associated with
  - Osteoma (MC bone involved→Mandible)

The osteomas are characterized by slow, continuous growth, and occur most frequently in the mandible, the outer cortex of the skull and the paranasal sinuses

- Congenital hypertrophied retinal pigmented epithelium
- Desmoid tumors
- Sebaceous cyst
- Benign lymphoid polyposis of ileum
- Supernumerary teeth (extra teeth)

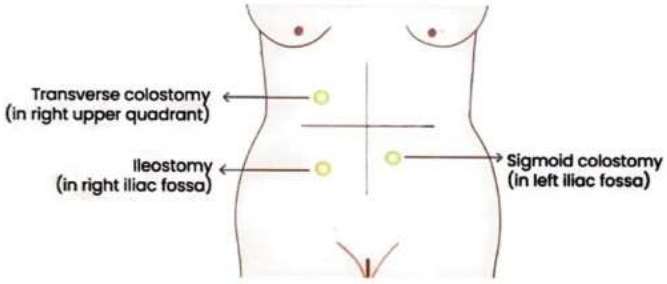
20 ILEOSTOMY & COLOSTOMY

- Colostomy: Exteriorization of colon to abdominal skin
- Ileostomy: Exteriorization of ileum to the abdominal skin

Most common Indications for Stoma Formation
- Colorectal cancer
- Chronic ulcerative colitis
- Crohn's disease

Types of stomas 00:01:48
- Stoma is of two types- Temporary stoma and Permanent stoma
- Temporary stoma
  - To divert fecal matter
  - Are usually Loop stoma
- Permanent stoma
  - Are usually End stomas

Location of ileostomy
- Right iliac fossa



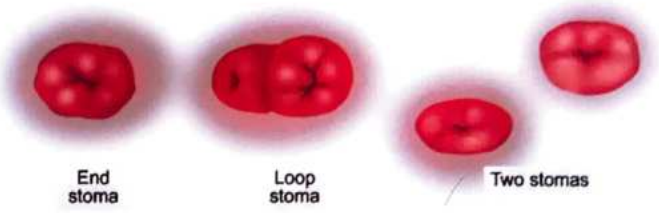
Sites of Stoma Formation

Location of transverse colostomy
- Temporary colostomy
- Right upper quadrant

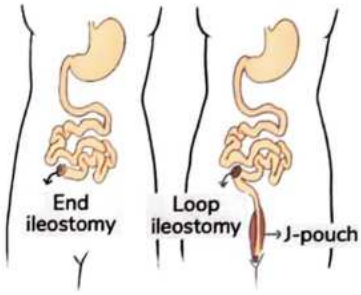
Location of Sigmoid colostomy
- Permanent colostomy
- Left iliac fossa

Ileostomy	Colostomy
• Spouted	• Flush
• Effluent is liquid and so it is made spouted.	• Effluent is Solid and so it is made flush
• Maximum risk of Dyselectrolytemia (because effluent is Liquid)	

Types of Ileostomies
1. End
2. Loop
3. Double Barrel



1. End ileostomy



- Proximal one end is taken out and the distal end is closed and placed inside the abdomen
- Usually, Permanent stomas

2. Loop Ileostomy
- Loop of small intestine is brought through the abdomen and cut before suturing.
- Has 2 external stomas joined together
- Usually Temporary stomas (for fecal diversion)

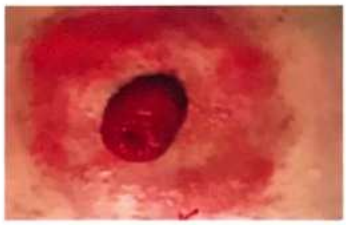
3. Double barrel ileostomy
- 2 separate openings with skin bridge in between

Stomal Complications 00:10:11

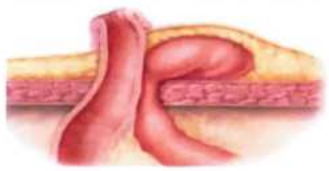
Early complications	Late complications
• Seen within 1 month	• **S** - Seen after 1 month
• **R** - Retraction	• **S** - Stenosis
• **A** - Abscess	• **P** - Prolapse
• **P** - Poor location	• **P** - Parastomal hernia
• **I** - Ischemia/ necrosis	• **G** - Gas

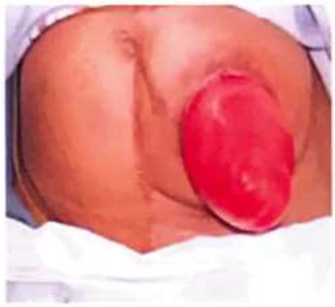
- **D - Detachment** dermatitis
- **O - Opening** wrong end, Output is high
- **O - Odor**
- **O - Obstruction**

- MC early complication of ileostomy – Ischemia / necrosis
- Overall M/c complication of ileostomy -Skin excoriation / dermatitis



- MC complication of both end colostomy and loop colostomy – Parastomal hernia
- Prolapse is more common in LOOP colostomy (due to larger opening)
- Parastomal hernia is more common in END colostomy (due to extensive dissection)





21 INFLAMMATORY BOWEL DISEASE – 1

Inflammatory Bowel disease (IBD)

00:00:13

- It's an Idiopathic chronic inflammatory disease
- Characterized by Chronic relapsing course
- MC in developed countries
- MC in Females (OCP use)
- Has Bimodal distribution
  - 2nd/3rd Decade
  - 6th/7th Decade
- Crohn's disease is more common in Smokers whereas Smoking is protective in Ulcerative colitis
- Etiology – Unknown

Risk factors

- Positive family history (Greatest Risk factor)
- Genetic susceptibility – 3 Genes implicated are
  - NOD – 2 (Nucleotide Oligomerization Domain – 2)
  - ATG -16 L-1 (Autophagy related 16 Like 1)
  - IRGM (Immunity related GTPase M)
- Other factors responsible are
  - Alteration in host interaction with intestinal micro-organisms
  - Altered Gut Micro-Biota
  - Intestinal epithelial dysfunction
  - Aberrant Mucosal immune response

CROHN'S DISEASE (CD)

00:06:22

- Chronic Transmural inflammatory disorder of GIT with unknown etiology
- Can involve any part – From mouth to anus
- MC sites involved
  - Ileum
  - Ileocecal valve
  - Cecum
- Upper GI Crohn's disease there is involvement of – Gastric antrum & Duodenum
- In patients of Colonic disease – Rectal sparing is characteristic in Crohn's
- In Crohn's disease, involvement of
  - Small intestine + Large intestine – seen in 55% cases
  - Only small intestine – 30% cases
  - Only Large intestine – 15% cases
- Attacks young adults – 2nd/3rd decade
- MC in Females (OCP use), Smokers & Urban dwellers

Etiology

- Unknown
- Infectious agents that are proposed to be causative agents are
  - Mycobacterium Paratuberculosis
  - Measles
- CARD-15/NOD-2 mutation (Located on chromosome 16q)
  - Aka IBD-1 Locus
  - Relatively specific for Crohn's disease

Important Information

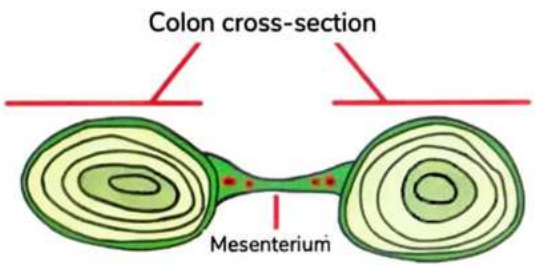
- **Organism responsible for Ulcerative colitis: Clostridium difficile and Campylobacter**
- **IBD-2 Locus (Located on chromosome 12q) – MC in Ulcerative colitis**

Pathology

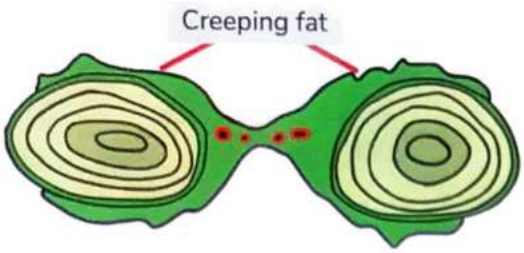
00:13:35

- Earliest Gross pathologic lesion – Superficial aphthous ulcer in Mucosa
- Diseased bowel is separated by areas of grossly normal bowel - known as Skip lesions
- Extensive fat wrapping caused by circumferential growth of mesenteric fat around the bowel wall – known as Creeping fat
- Has Thick, Firm, Rubbery & almost incompressible Bowel wall
- One part of bowel gets attached with the other part of bowel & form fistula
- In Crohn's disease there can be
  - Entero enteric
  - Entero cutaneous
  - Entero vesicle fistula
- Mesentery of involved bowel gets thickened
- Linear ulcers collides & forms Transverse ulcers with islands of normal mucosa in between

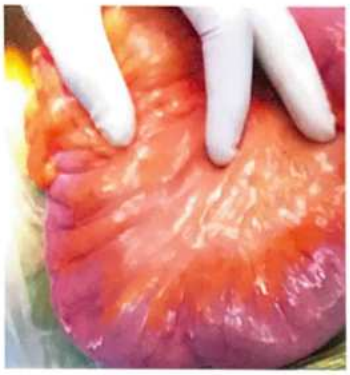
Cobblestone appearance

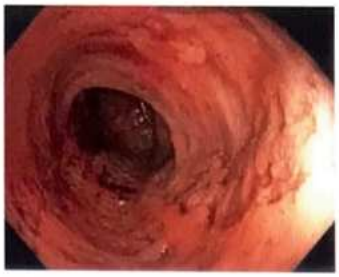


Normal colon



Crohn's disease colon





On Microscopic examination

- Inflammatory reactions
  - Extensive edema – widening of submucosa
  - Hyperemia
  - Lymphangiectasia
  - Distortion of mucosal architecture
  - Paneth cell hyperplasia
- Characteristic histologic lesion in Crohn's – Non Caseating granuloma with Langerhans giant cells
- These Non-Caseating granulomas are located - both in Bowel wall & Regional Lymph nodes

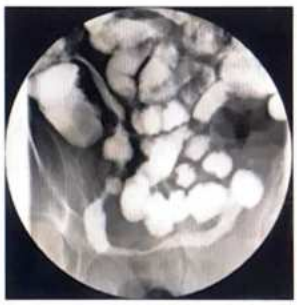
Clinical features 00:23:28

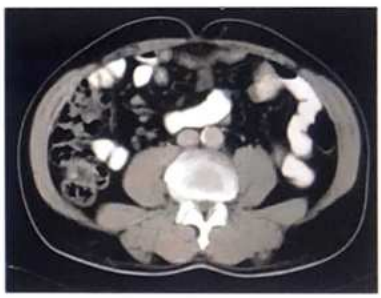
- MC symptom – Intermittent colicky lower abdominal pain > Diarrhea (Intermittent)
- In CD (As compared to UC)
  - Fewer bowel movements
  - Stool rarely contains mucus, pus, & Blood
- Main intestinal complication of Crohn's disease
  - Obstruction
  - Perforation – Leads to formation of Internal fistula
- Fistula occurs in
  - Sites of Perforation & Adjacent organs
  - Sites of Previous Laparotomy
- In Long standing CD
  - Increased risk of malignancy in - Small intestine & Large intestine (Colon)
- In Anus & Perianal involvement
  - Fissures
  - Fistula
  - Strictures
  - Perianal abscess
- In CD – MC site of
  - E/c fistula & E/v fistula
  - Ulcers / Strictures
  - Carcinoma

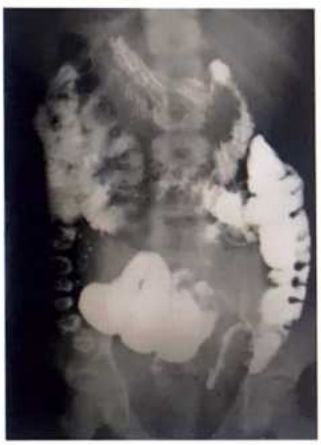
  } Ileum

Investigations

- IOC for Dx of CD – CT Enteroclysis
- Earliest Radiographic finding in CD – Aphthous ulceration
- Other Radiologic findings
  - Deep ulcers
  - Hose-pipe Appearance (Long stricture extending into I/C valve with Thickened wall) – Corresponds to String sign of Kantor
  - Fat Halo sign
  - Raspberry Thorn / Rose Thorn appearance – Linear Transmural fissure / ulcer
  - Creeping fat sign
  - Comb sign
  - Cobble stone appearance – Deep fissuring ulcers around inflamed mucosa







Serology

- ASCA (Anti-Saccharomyces Cerevisiae Antibody) – Relatively Specific for CD
- P-ANCA (Perinuclear Anti - Neutrophil Cytoplasmic Antibodies) - Relatively Specific for UC

Extra Intestinal manifestations of CD

⏱ 00:37:07

Refer Table 21.1

Previous Year's Questions

Q. Which statement is not true regarding Crohn's disease? (NEET Jan 2018)

A. Rectum is not involved

B. Continuous lesion visualized in endoscopy

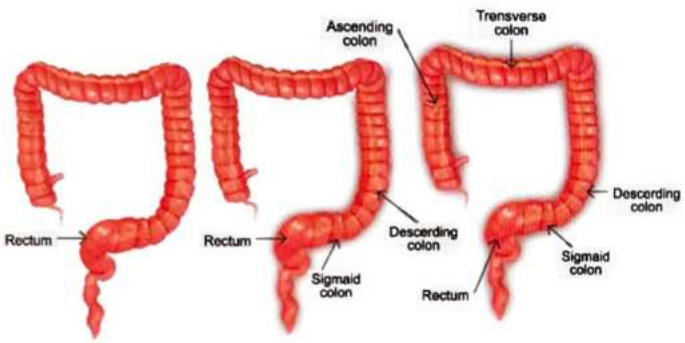
C. Noncaseating granulomas

D. Cobblestone appearance

ULCERATIVE COLITIS

⏱ 00:44:00

- There is proctocolitis
  - Only involvement of rectum: proctitis
  - In 10 to 20 % there is backwash ileitis
- Rectum is involved in 100% cases
- MC in developed countries
- Usually occur in Age < 30 years (Young adults)
- MC in Females (OCP's use)
- Smoking is protective
- Appendectomy decreases the risk of UC
- MC in Whites, Jews & Persons of Northern European Ancestry

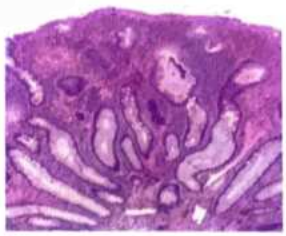


Etiology

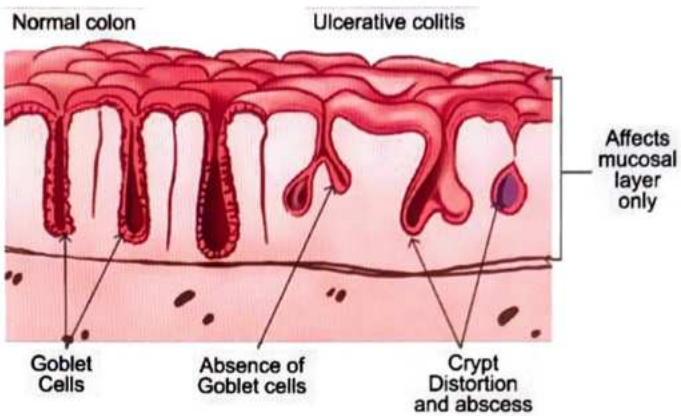
- Unknown
- Infectious agents Implicated are
  - Clostridium Difficile
  - Campylobacter Jejuni
- Risk factors
  - Family history: Significant risk
  - Smoking: Protective
  - Appendectomy: ↓ses risk of UC

Pathology

- In UC
  - Mucosa + Submucosa only involved
  - Muscularis Propria – spared
- Typical Gross appearance in UC – Hyperemic mucosa
  - Hyperemic mucosa is responsible for fine mucosal granularity (Earliest Radiographic finding)
- Rectal involvement / Proctitis – Hall mark of UC (+ in 100% pts.)
- Disease starts from Rectum – Extends Proximally (It is continuous)
- Pseudo polyps are MC in UC (UC > CD)



- Most characteristic lesion of UC – Crypt Abscess (Not specific for UC)
  - Also seen in CD & Infectious colitis



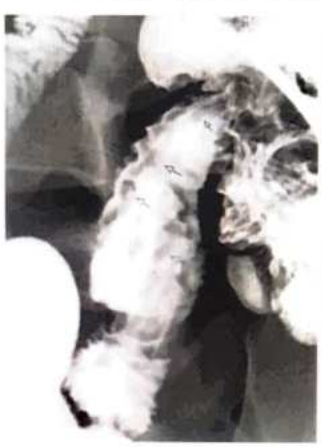
- Important Characteristic feature of Chronic UC – Crypt Branching
- Patients of UC has
  - ↓Sed No. of Goblet cells
  - ↓Sed Mucus production

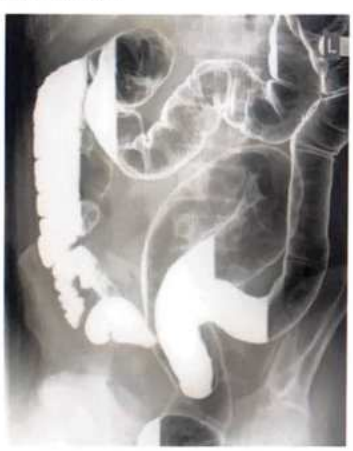
Clinical features

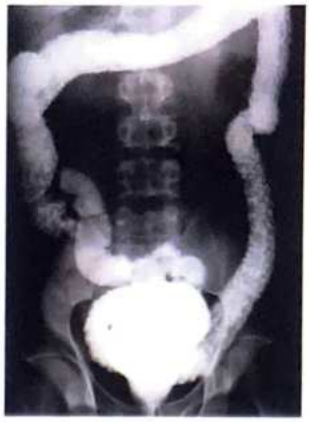
- Includes
  - Diarrhea
  - Rectal bleeding
  - Tenesmus
  - Passage of mucus
  - Crampy abdominal pain
- Diarrhea & Bleeding: intermittent
- Rectal involvement: 100% cases
- Anal involvement: Rare

Investigations

- Lab findings
  - ↑CRP, ↑ESR, ↑Platelet count
  - ↓Hb
- Local inflammatory markers
  - Fecal lactoferrin – highly Sensitive & Specific marker for Intestinal inflammation
  - Fecal calprotectin
    - → Levels correlate well with histologic inflammation
    - → Predict relapses (↑)
    - → Detect Pouchitis (↓)
  - Fecal lactoferrin & Fecal calprotectin – Helps to rule out Active inflammation Vs Irritable bowel or Bacterial overgrowth
- Serology
  - P–ANCA → Specific for UC
- Colonoscopy
  - Done to pts. Not having Acute flare
  - Used to assess the disease extent & activity
  - Earliest finding - ↓sed vascularity with Erythematous & Edematous mucosa
- Radiological findings
  - Earliest change – Fine mucosal granularity
  - Collar button ulcers – Deep ulcers (ulcer has penetrated the mucosa)
- Radiological findings in End stage / Burnt out UC
  - Shortening of colon
  - Loss of normal Redundancy - in Sigmoid region, Splenic & Hepatic flexure
  - Ahaustral colon – also known as
    - → Pipe stem colon
    - → Lead pipe sign
    - → Garden hose appearance
    - → Stove pipe sign
  - Featureless mucosa
  - Narrow caliber of bowel
- Backwash ileitis – seen in 15 – 20% cases of UC
  - On Barium enema
    - → Fixed Patulous I/C Valve
    - → Dilated granular Terminal ileum







Modified Truelove and Witts severity index 01:05:41

- Done for Disease severity grading of UC

Extra intestinal manifestations of UC 01:06:48

1. Arthritis
2. Ankylosing spondylitis
3. Erythema nodosum
4. Pyoderma gangrenosum
5. Primary sclerosing cholangitis

} More common in UC than Crohn's ds.

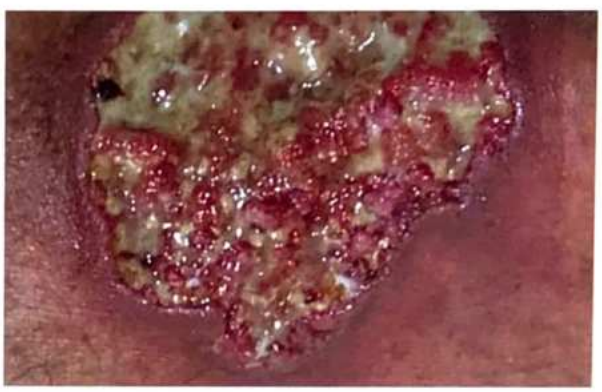


Table 21.1

1. Skin
   - Erythema nodosum
   - Erythema multiforme
   - Pyoderma gangrenosum

2. Eyes
   - Iritis
   - Uveitis
   - Conjunctivitis

3. Blood
   - Anemia
   - Thrombocytosis
   - Phlebothrombosis
   - Arterial thrombosis

4. Joints
   - Peripheral Arthritis
   - Ankylosing spondylitis

5. Liver
   - Non – specific Triaditis
   - Primary sclerosing cholangitis
   - Cholesterol gall stones

6. Kidney
   - Nephrotic syndrome

7. Urological
   - Stones (MC type – Oxalate stones)
   - Ureteral obstruction
   - Entero-vesical fistula

8. Pancreas
   - Pancreatitis

9. Amyloidosis

- MC cutaneous manifestations of IBD – Erythema Nodosum
- Erythema Nodosum
  - Most Responsive for Rx of Bowel disease
  - Persistence of Erythema Nodosum – Indicates inadequate control of IBD

- Manifestations MC in Crohn's disease
  - Erythema Nodosum
  - Peripheral arthritis
  - Ankylosing spondylitis
  - Stones (Cholesterol gall stones/Oxalate stones)
  - Ureteral obstruction

- Manifestations MC in Ulcerative Colitis
  - Primary sclerosing cholangitis
  - Pyoderma gangrenosum

22 INFLAMMATORY BOWEL DISEASE – 2

MANAGEMENT OF IBD

1. 5 – ASA Agents
- Mainstay of therapy in UC & CD
- MOA
  - Inhibition of NF-KB Activation
  - Inhibition of PG synthesis
  - Scavenging of Free radicals
- Up to 80% of unformulated acquired 5 - ASA is absorbed at Proximal SI (Does not reach distal SI & Colon)
- To overcome the Rapid absorption in SI, 5-ASA is attached with Carriers
  - Sulfasalazine: 5-ASA + Sulfapyridine

Important Information
- 5-ASA → Anti-inflammatory activity
- Sulfapyridine → Carrier
  - Linked by Azo bond
  - Responsible for most of the Side effects
  - Deliver 5-ASA moiety to the colon

  - Olsalazine: 5-ASA + 5-ASA
  - Balsalazide: 5-ASA + 4 – Amino benzoyl Beta-Alanine

2. Antibiotics
- Ciprofloxacin, Metronidazole
  - Mainly used in Crohn's disease
  - No role in Rx of Active or Quiescent Ulcerative Colitis
  - Used in pts. of Pouchitis (Total Proctocolectomy + Ileal Pouch-Anal Anastomosis)
- Glucocorticoids
  - Used in inducing remission of both UC & CD
  - No role in Maintenance therapy

3. Agents used for inducing Remission
- Prednisone
- Parenteral agents
  - Hydrocortisone
  - Methyl Prednisolone
- Budesonide
  - It is released entirely in Colon
  - Has minimal or no steroid related side effects

4. Azathioprine & 6-Mercaptopurine
- Used in management of Steroid dependent IBD
- Used as Maintenance therapy in both UC & CD
- Used in treating Active perianal disease & Fistula in CD

5. Methotrexate
- Effective in inducing Remission & reducing steroid doses
- Effective in maintaining remission in Active CD
- Promising role in Maintenance therapy

6. Cyclosporine
- Used in Severe UC, refractory to IV Glucocorticoids

7. Tacrolimus
- Good efficacy in
  - Children with IBD
  - Adults with extensive involvement of small intestine
- Effective in adults with
  - Steroid dependent or Refractory UC & CD
  - Refractory fistulizing Crohn's disease

8. Anti – TNF Therapies
- Infliximab
  - It is a chimeric IgG1 antibody against TNF-α
  - Used for
    - → Active CD refractory to Steroids & 6-MP OR ASA
    - → Crohn's disease with refractory perianal or E/C Fistula
    - → Approved for Rx of Moderate to Severely Active UC
- Adalimumab
  - It is a Humanized Recombinant IgG1 Monoclonal antibody against TNF-α
  - Approved for Rx of
    - → Moderate to Severe CD
    - → Moderate to Severely active UC
- Certolizumab Pegol
  - It is a Recombinant FAB antibody fragment against TNF-α
  - Effective for induction of clinical response in patients with Active inflammatory Crohn's disease
- Golimumab
  - It is a Human IgG1 antibody against TNF-α
  - Approved for Rx of - Moderate to Severely active UC

9. Anti-Integrins
- Natalizumab
  - It is a Recombinant Humanized IgG4 antibody against α4-Integrins

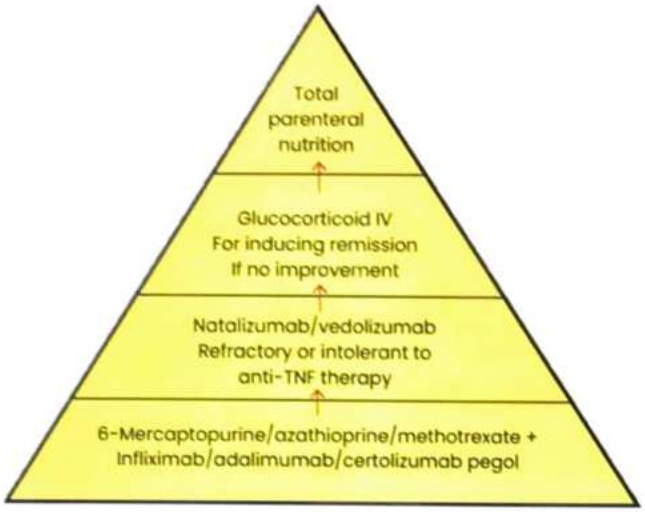
- Used for
  - → Induction & Maintenance of therapy in CD
  - → Rx of refractory or intolerant to Anti-TNF therapies
- Vedolizumab
  - It is a Monoclonal antibody against α4 β7 Integrins
  - Indicated for pts. with inadequate response to Glucocorticoids or Anti-TNF therapies or Immunomodulators

Management of Mild to Moderate Crohn's disease

00:20:23

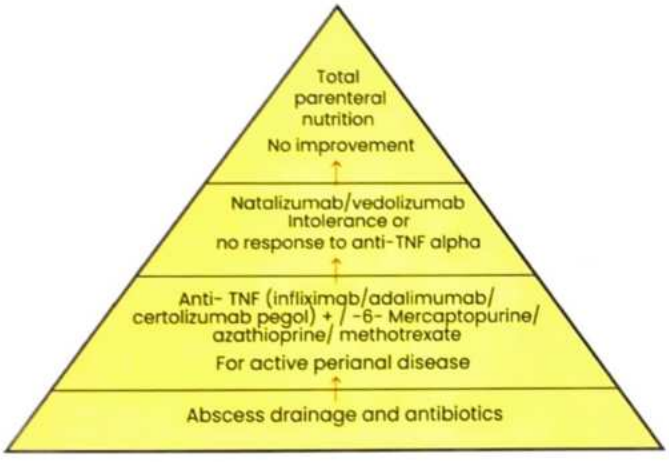
Refer Image 22.1

Management of moderate to severe Crohn's disease



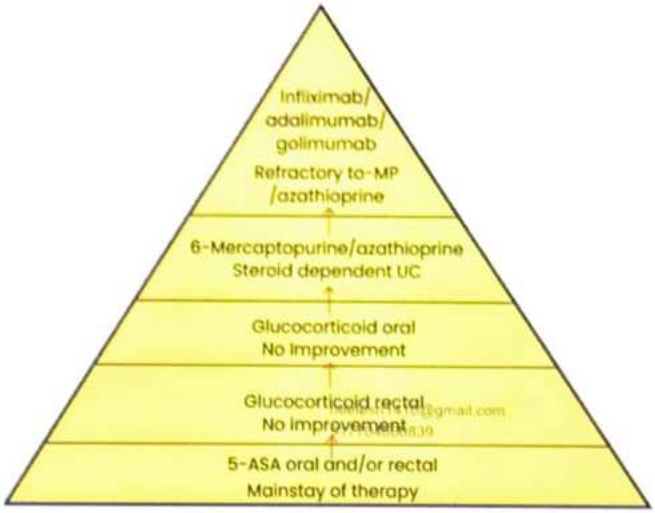
Moderate to severe Crohn's Disease

Management of Fistulizing Crohn's disease



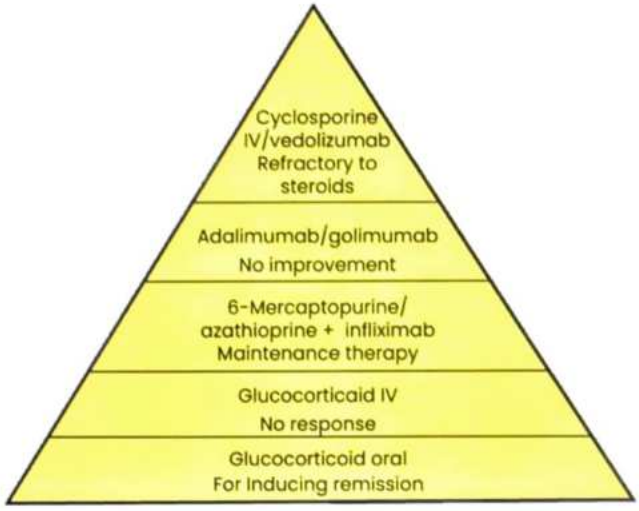
Fistulizing Crohn's Disease

Management of mild to moderate UC



Mild to moderate ulcerative colitis

Moderate to severe UC



Moderate to severe ulcerative colitis

Indication of surgery in IBD

- **O – Obstruction**
- **H – Hemorrhage**
- **F – Fistula**
- **A – Abscess**
- **C - Carcinoma**

1. Indications of Surgery in Crohn's disease

Refer Table 22.1

Indications of Surgery in Ulcerative Colitis

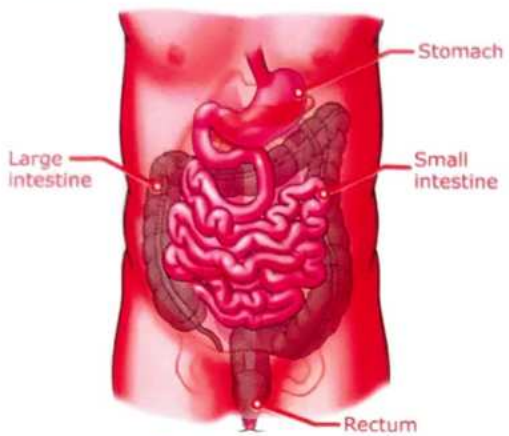
1. Intractability
2. Dysplasia or Carcinoma
3. Massive Colonic bleeding
4. Toxic Megacolon

Surgical options in Ulcerative colitis 00:34:28

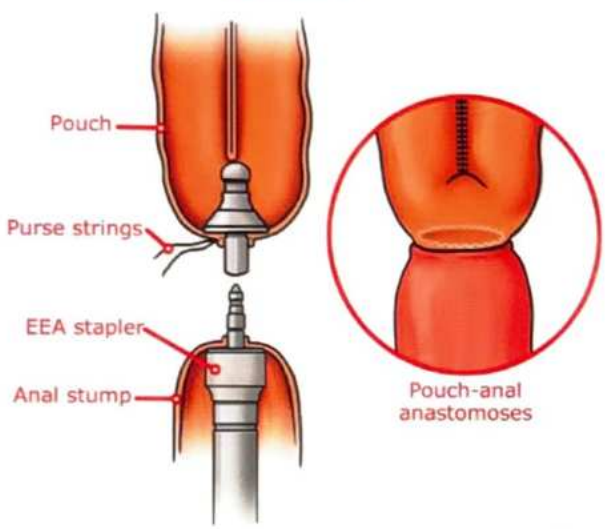
1. TPC + IPAA – Definitive Rx
2. TPC + Ileostomy
3. TPC + Continent ileal reservoir (Kock pouch)
4. TAC + End ileostomy

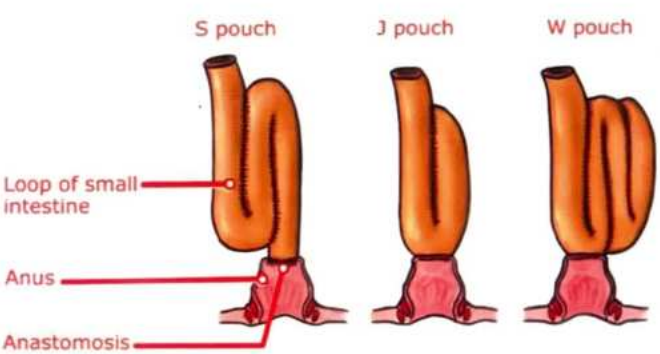
1. TPC + IPAA

- It is the Definitive treatment
- Preferred in younger patient with no Rectal dysplasia
- Procedure
  - Some part of Ileum, whole Colon & Rectum are removed
  - Ileal pouch created & Anastomosed with anus



Proctocolectomy
Large intestine and rectum removed





- Complications of TPC + IPAA in Ulcerative colitis
  - Pouchitis (7-33%) – MC
  - Small bowel obstruction (25%)
  - Pelvic sepsis
  - Anastomotic & Pouch suture line leak
  - Pouch vaginal fistula

Important Information

- MC complication after TPC + IPAA in UC patients – Small bowel obstruction

Surgical option for UC in patients with special situation

- Older patients: TPC + End ileostomy
- Pt. with Fecal incontinence: TPC + End ileostomy
- Pt. with confirmed Rectal dysplasia: TPC + Mucosectomy with hand sewn IPAA
- Pt. with Significant Debility (Poor operative candidate): TAC with very low Hartman closure with End ileostomy

CROHN'S DISEASE OF ANO-RECTUM

00:46:14

- Anal manifestations – Most Devastating
  - Painful in Nature
  - Threat to Patients continence
- Occurs in 20% of Pts. with CD
- Has 3 presentations
  - Ulceration (MC)
  - Fistula
    - → Cyanotic
    - → Chronic
    - → Indurated
    - → Painless
  - Stricture

Clinical features

- Stricture
- Fissure, Fistula & Abscess in Perianal region
- Pain, Swelling & Bleeding
- Soilage / Frank incontinence
- Fever
- Edematous & Purplish tags – Characteristic feature

Evaluation
- Inspection
- Digital Rectal Examination
- Proctoscopy / Proctosigmoidoscopy

Management
- Most pts. are managed Conservatively
- Surgery – performed for Pain resulting from Undrained or Poorly drained abscess
- Fissure in CD
  - Multiple
  - Located off the Midline
  - Avoid Fissurectomy or Lateral Sphincterotomy
- Infliximab
  - Very successful in the Rx of Fistulizing CD
  - Fistula closure rate is 25 – 67%

Staged approach for Perianal disease
- 1st Step: Control the Local sepsis
  - I/D of Abscess + Antibiotics
  - Fistula track require chronic drainage with Non-cutting Seton
- 2nd Step: Infliximab
  - Should be given only after control of Local sepsis
  - After 2-3 infusions of infliximab, Setons are removed for fistula closure
- 3rd Step – Surgery
  - Performed if Fistula doesn't heal & Local sepsis resolved

COLITIS ASSOCIATED COLON CANCER (CAC)

00:57:07

Refer Table 22.2

- Risk for Colonic carcinoma – CD = UC
- Risk for SI Malignancy – CD > UC
- Risk of Cholangiocarcinoma – UC > CD

Risk factors for cancer in UC
1. Duration of colitis
2. Extent of colonic involvement
3. Presence of PSC & family history of CRC
4. Pancolitis & Disease diagnosed at young age

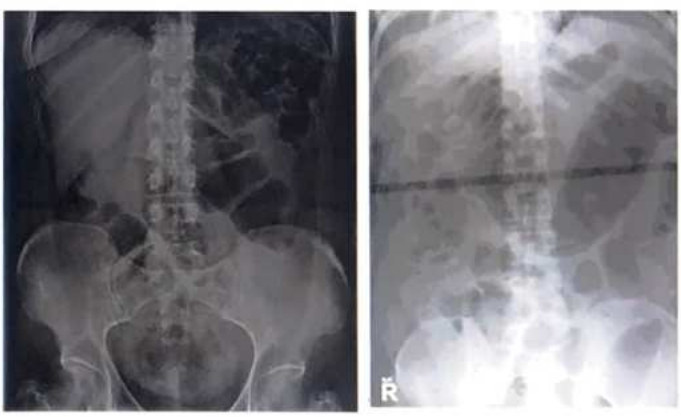
UC related CRC
- These cancers tend to be
  - Multicentric
  - Evenly distributed throughout the colon
  - Infiltrative
  - Highly aggressive
  - Poorly differentiated
- Has no significant difference between Sporadic & UC related CRC with respect to Prognosis
- Cumulative risk of cancer increases with duration of UC
  - 25% Risk – at 25 years
  - 35% Risk – at 30 years
  - 45% Risk – at 35 years
  - 65% Risk – at 40 years
- Risk of malignancy in Crohn's Pancolitis
  - 2% after 10 years
  - 8% after 20 years
  - 18% after 30 years
- MC cause of death in Crohn's disease – GI Malignancy
- Other causes include
  - Sepsis
  - Thromboembolic complications
  - Electrolyte disorders

TOXIC MEGACOLON

01:08:20

- It is a serious Life-threatening condition
- Risk factors
  - Ulcerative colitis (MC)
  - Crohn's disease
  - Infectious colitis (like Pseudomembranous colitis)
- Massive dilatation of colon leads to Necrotic thin-walled colon causing Perforation

Investigations
- On Radiography – Pneumatosis can be seen in the bowel
- Plain X-Ray Abdomen
  - Critical for diagnosis
  - To follow up the course
- Radiological findings
  - Transverse colon diameter > 6cm
  - Multiple air fluid levels
  - Normal Colonic Haustrations – Absent or severely disturbed
- Organs & their diameter in Megacolon
  - Cecum → > 12 cm
  - Ascending Colon → > 8 cm
  - Transverse colon → >6 cm
  - Rectosigmoid / Descending colon → > 6.5 cm



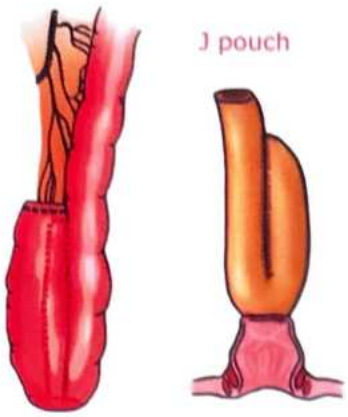
Management

- Medical management – Partial obstruction
  - Has high recurrence
  - Urgent Laparotomy required
- Pre-operatively, Stabilization should be done by giving Fluids + IV Antibiotics
- TOC – Total Abdominal Colectomy with Ileostomy (With preservation of Rectum)

POUCHITIS

01:17:28

- Inflammation of mucosa of Ileal pouch
- Incidence = 7-33% cases



J pouch

Etiology

- Unknown
- May be due to
  - Bacterial overgrowth
  - Mucosal ischemia
  - Local factors

J pouch

Clinical features

- ↑sed Stool frequency – leading to Dehydration
- Fever
- Bleeding
- Cramps

Treatment

- Rehydration + Oral Antibiotics (Metronidazole / Ciprofloxacin)
- Probiotics - Shows dramatic resolution in some cases

resistant to Antibiotic therapy

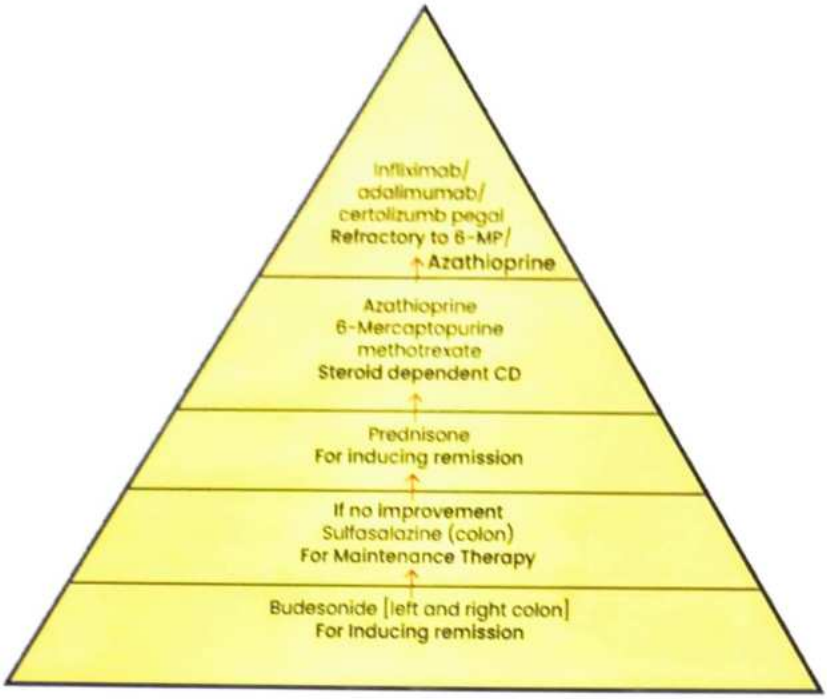
- For Significant Pouchitis not responding to Medical Rx – CD should be considered

DIFFERENCE BETWEEN CROHN'S DISEASE & ULCERATIVE COLITIS

01:22:37

Refer Table 22.3

Image 22.1



Mild to moderate Crohn's Disease

Table 22.1

Indications in Small intestine	Indications in Colon & Anorectum
1. Stricture & Obstruction unresponsive to medical therapy 2. Massive hemorrhage 3. Refractory fistula 4. Abscess	1. Intractable disease 2. Fulminant disease 3. Perianal disease unresponsive to medical management 4. Refractory fistula 5. Colonic obstruction 6. Cancer prophylaxis 7. Colonic Dysplasia or Cancer

Table 22.2

Colitis associated Colon cancer	Sporadic Colon cancer

• Arises from
  ○ Flat dysplasia
  ○ Dysplasia associated lesion or mass
	• Arises from: Adenomatous polyps

• Has Multiple synchronous colon cancer in 12% cases	• Has Multiple synchronous colon cancer in 3-5% cases
• Mean age – 30 years	• Mean age – 60 years
• Distributed uniformly throughout the colon	• Has left sided Predominance
• Mucinous or Anaplastic variety is more common	• Mucinous or Anaplastic variety is rare

Table 22.3

Crohn's disease	Ulcerative colitis
Macroscopic features	
• Distribution – Segmental with Skip areas	• Distribution – Continuous without Skip areas
• Location – Ileum (&/or) Cecum & Ascending colon	• Location – Rectum, Sigmoid & Extending upwards cranially
• Extent – Entire Thickness of Bowel wall	• Extent – Superficial, confined to mucosal layer
• Ulcers – Serpiginous ulcers that may develop into Deep ulcers	• Ulcers – Superficial mucosal ulcers
• Pseudo polyps – Rarely seen	• Pseudo polyps – Commonly seen
• Fibrosis - Common	• Fibrosis - Rare
• Shortening – Due to Fibrosis	• Shortening – Due to Contraction of Muscularis
Microscopic features	
• Depth of inflammation – Transmural (mucosa + submucosa + Muscularis propria)	• Depth of inflammation – Mucosal + Submucosal

• Type of inflammation
  ○ Non-Caseating granuloma
  ○ Infiltrate of Mononuclear cells
	• Type of inflammation
	  ○ Non-specific Acute & Chronic inflammatory cells

• Mucosal changes – Patchy Ulceration	• Mucosal changes - Hemorrhagic mucosa with ulceration
• Submucosa – Widened due to edema & lymphoid aggregates	• Submucosa – Normal or reduced in width
• Muscularis - Infiltrated by inflammatory cells	• Muscularis - Spared
• Fibrosis - Present	• Fibrosis - Absent
Complications	
• Fistula formation – Internal & External fistula in 10% cases	• Fistula formation - Rare

• Malignant changes
  ○ Colon cancer – UC = CD
  ○ SI Malignancy – CD > UC
  ○ Cholangiocarcinoma – UC > CD	

• Fibrotic strictures - Common	• Fibrotic strictures - Rare
• Toxic Megacolon - Rare	• Toxic Megacolon - ↑sed risk

Named features

1. String sign of Kantor
2. Hose pipe appearance
3. Creeping fat sign
4. Comb sign
5. Raspberry Thorn / Rose Thorn appearance
6. Fat Halo sign

1. Garden hose appearance
2. Pipe stem colon
3. Lead pipe sign
4. Stove pipe appearance
5. Collar button ulcers

23 VERMIFORM APPENDIX

NORMAL ANATOMY

Refer Image 23.1

- Normal length of appendix – 2 to 20 cm
- Intra luminal capacity of appendix: 0.1 mL
- Blood Supply: Appendicular artery (Branch of ileocolic artery)
  - Appendicular artery is an end artery.
- Most common location: Retrocecal
- Least common location: Post ileal
- Most dangerous location – Pelvic

ACUTE APPENDICITIS

00:02:41

- MC general surgical emergency worldwide
- Seen in Young patient usually of 2nd decade

Etiopathogenesis

- Luminal obstruction can be due to
  - Fecalith (MC cause)
  - Tumors (e.g., Carcinoid tumor)
  - Worm eggs (e.g., Ascaris eggs)
  - Fruit seeds
- Luminal obstruction: Increased Intraluminal pressure
  ↓
  Impaired Lymphatic drainage
  ↓
  Impaired Venous drainage & Arterial supply
  ↓
  Ischemia
  ↓
  Perforation
- Mc site of perforation: Just distal to obstruction on antimesenteric border
- Mc organism Isolated after perforated appendicitis: Bacteroides fragilis > E. coli

Clinical features

- Pain in peri- umbilical region - Shifting of Pain to right lilac fossa (Migratory Pain)
- Symptoms
  - Most characteristic symptom of Acute appendicitis - Migratory pain
  - Anorexia
  - Nausea, Vomiting
- Signs
  1. Tenderness in right iliac fossa
  2. Rebound tenderness
  3. Elevated temperature

Lab investigations

- Leucocytosis
- Shift to left

Alvarado Score aka MANTRELS Score

MANTREL	Score
Migratory pain	1
Anorexia	1
Nausea, Vomiting	1
Tenderness	2
Rebound tenderness	1
Elevated Temperature	1
Leucocytosis	1
Shift to Left	2

- Score of 9-10 - Diagnosis is certain
- Score of 7-8 - High likely hood of diagnosis
- Score of 5-6 - Equivocal (most dangerous)
  - CECT is indicated in cases of Equivocal MANTREL score findings to confirm diagnosis
- Score of 1-4 - Negative for acute appendicitis

Other named signs

- DUNPHYS SIGN- Pain on coughing
- ARON SIGN - Pain on pressure in epigastrium
- TEN-HORN SIGN - Pain on gentle traction of right testes
- ROVSINGS SIGN
  - Pain in right iliac fossa on pressing left iliac fossa
  - Most characteristic sign of acute appendicitis
- ROVSING'S SYNDROME - In horseshoe kidney, hyper extension of spine causes pain, nausea, Vomiting. [Most characteristic sign]
- OBTURATOR SIGN
  - Pain on internal rotation of right thigh over hip joint
  - Obturator sign is positive in Pelvic Appendicitis.
  - In Pelvic appendicitis, orientation of appendix is towards pelvis and in close relationship to rectum. So, abdominal signs are not marked in Pelvic appendicitis.

→ Irritation of rectum - Diarrhea
→ Irritation of ureter - microscopic hematuria (> 3RBCs/ HPF)
→ Delay in Dx - pt. presents with perforation

- PSOAS SIGN
  - Hyper extension at right hip joint causes pain in right iliac fossa
  - Psoas sign is Positive in Retrocecal appendicitis
- ROVSING'S OPERATION - Deroofing of cyst in autosomal dominant poly cystic kidney disease (ADPKD)

Diagnosis

- Purely clinical (in adults)
- Supplemented by lab investigation and ultrasound
- Leucocytosis is seen on laboratory investigation
- IOC
  - In children- ultrasound
  - In Adults – Clinical diagnosis
- Gold standard for diagnosis of Acute appendicitis- CECT (ever in equivocal cases, CECT can confirm the diagnosis)

Treatment

- Emergency appendectomy
- In patients of acute appendicitis, during emergency appendectomies → abdomen is palpated after spinal anesthesia to diagnose appendicular lump.
- Appendicular lump is a contraindication for surgery. So, patients are managed conservatively by Ochsner sherren regimen

Ochsner Sherren Regimen

- Conservative management of appendicular lump
- Components of appendicular lump
  - Appendix
  - Ileum
  - Cecum
  - Omentum
- Surgery done during appendicular lump formation can lead to increased risk of injury of cecum.
- To know whether the lump is appendicular lump: CECT has to be done.
- Start IV antibiotics in all the patients
- If abscess present: drain the abscess.
- Monitor pulse rate and temperature every 4 hourly
- Within 24-28 hours – most patients improve
- Continue the conservative management
- Perform Interval appendectomy (Not recommended in all patients)
  - Only for patients experiencing Recurrent appendicitis

Indications for Exp. Laprotomy

- **P** – Pulse rate rising
- **S** - Spreading abdominal pain
- **M** - Mass size increasing

Risk factors for Appendicular perforation

- Fecalith obstruction
- Diabetes mellitus
- Immunocompromised state
- Extreme of ages (<5 years, > 65 years)
- Pelvic appendicitis
- History of Previous surgeries

CARCINOID TUMOR OF APPENDIX 00:30:59

- MC tumor of appendix: Carcinoid tumor
- Aka Argentaffinoma
- Small, localized, not associated with metastasis
- Not associated with carcinoid syndrome
- Mc site of appendix - tip of appendix
- Treatment
  - Up to 1cm :Appendectomy
  - 2 cm :Right Hemicolectomy
  - 1cm to 2cm :Appendectomy
- Indications of right Hemicolectomy
  - Involvement of mesoappendix
  - Involvement of cecal base
  - Involvement of LN

Mc Burney's point 00:35:28

- Junction of lateral 1/3rd from umbilicus & medial 2/3rd from ASIS.
- Mc Burney's Point corresponds to base of appendix

Incisions

- Mc Burney's incision
  - Incision centered on Mc Burney's point & perpendicular to umbilical ASIS line.
  - Aka Grid iron incision
  - Aka Mc Arthur incision
  - This is a muscle splitting incision
- Rutherford- Morrison incision
  - In retrocecal appendicitis (appendix difficult to be visualized) extend the MC Burney incision, upward & laterally by cutting conjoint tendon.
  - This incision is Muscle Cutting incision
  - Preferred for retrocecal appendix.
- Lanz incision
  - This incision is a muscle splitting incision placed transversely 2cm below umbilicus on the line joining midpoint of clavicle to midpoint of inguinal ligament
  - Aka modified Mc Burney's incision
  - Aka Rocky Davis incision
  - Aka Bikini incision
  - Transverse skin crease incision
  - Preferred nowadays
    → Better exposure

→ Easier extension

Steps of Appendectomy

Symptoms	Score
Migratory right iliac fossa pain	1
Nausea / Vomiting	1
Anorexia	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory findings	
Leucocytosis	2
Shift to the left of neutrophils	1
Total	10

1. Skin incision – deepened to external oblique aponeurosis [EOA]
2. EOA – split along the direction of fibres
3. After EOA retraction
4. Internal oblique & transverse abdominalis split along the direction of fibres
5. Fascia transversalis divided
6. Peritoneum is picked and incision
7. Entery to peritoneal cavity & caecum is identified
   - With help of Taenia coli
   - With I/C junction
8. Appendix is indentified – present at base of calcum
9. Hold appendix with babcock's forceps
10. Ligate mesoappendix & appendicular artery is ligated
11. Pulse string suture around base of appendix
12. Base is crushed with artery forceps & transfixed with vicryl suture
13. Appendix is cut distal to suture ligature & removed
14. Purse string suture is tightened to bury the stump

Some special situations in which special methods are adopted are as follows

1. Edematous & inflamed cecal wall
   - Purse string suture is not applied
   - Stump is not invaginated

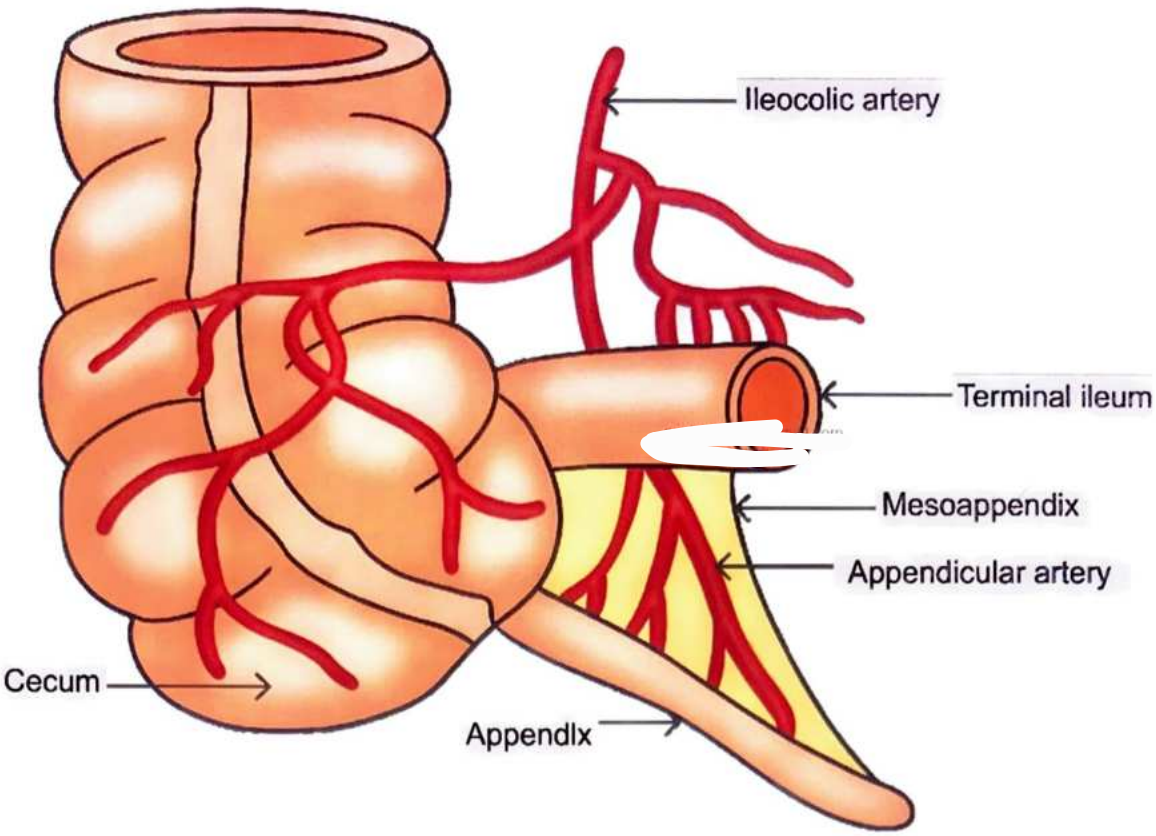
2. Inflamed bone in appendix
   - Base is not crushed – fear of spread of infection via lymphatics
   - Ligated closed to caecal wall

3. Gangrenous base
   - Neither crushing nor ligation is done
   - Two stitches are applied through caecal wall
   - Appendix is amputated flush with caecal wall
   - Tie the stitches

Complication of Appendectomy

- Wound infection (M/C)
- Intraabdominal abscess
- Ileus
- Venous Thrombosis → Embolism
- Portal Pyaemia
- Adhesive intestinal obstruction [M/C late complication]
- Fecal fistula in case of appendicular lump

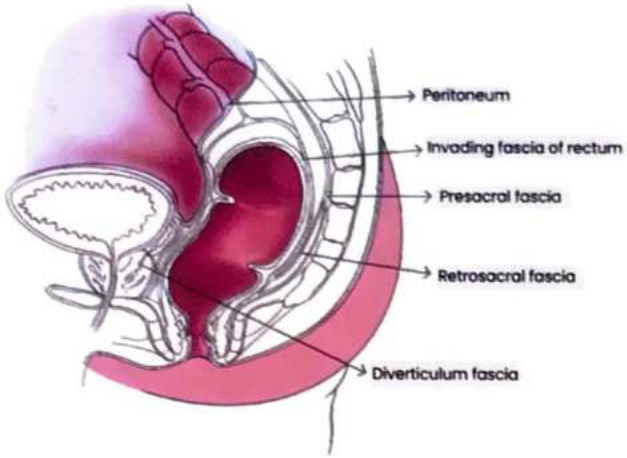
Image 23.1


Ileocolic artery
Terminal ileum
Mesoappendix
Appendicular artery
Cecum
Appendix

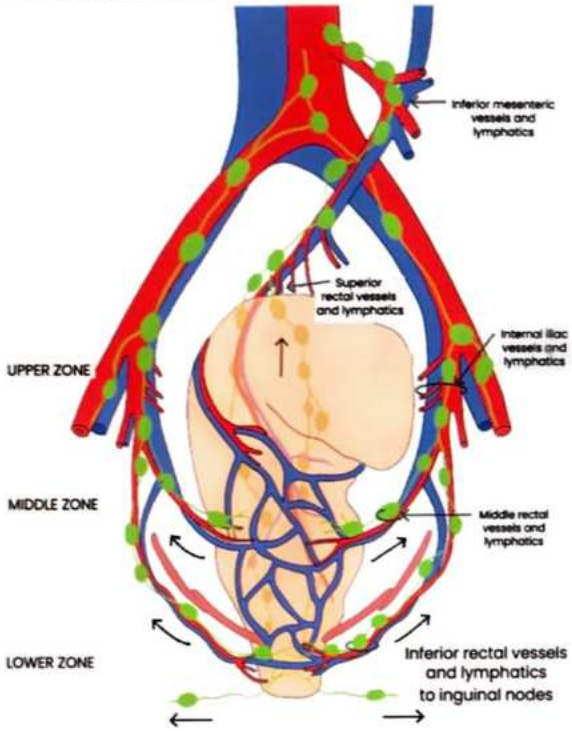
24 RECTUM AND ANAL CANAL

ANATOMY

00:00:20



- Ⓝ length if rectum – 14 cm
- Ⓝ Ano-rectal angle - 120°
- Houstan valves – semi-circular folds present on luminal surface
- Denonvilliers Fascia / Recto-genital fascia separates prostate & vagina from rectum
- Recto-sacral fascia / Waldeyer's fascia: Both fascia act as barrier for rectal metastasis
- Blood supply of Rectum

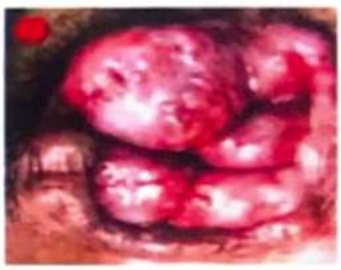


  - Superior rectal vessels – branch of inferior mesenteric artery [main vessel]
  - Middle rectal vessels
  - Inferior rectal vessels
- Lymphatic drainage follows vascular supply mainly towards superior rectal vessels – drain into Para-aortic nodes.

HEMORRHOIDS

00:05:27

- Are Normal anatomical cushions
- Made of
  - Venules
  - Arterioles
  - Smooth muscle fibers
  - Elastic tissues
- Location of hemorrhoids
  - 3' o clock
  - 7'O clock
  - 11'0 clock



Pathophysiology

- On constipation due to Excessive straining
- ↓
- Abnormal descent of anatomical cushions
- ↓
- Injury by hard fecal matter
- ↓
- Painless Bleeding PR
- Mc cause of bleeding PR → Hemorrhoids
- Mc cause of significant lower GI bleed → Colonic diverticula
- Mc cause of occult lower GI bleed → Angiodysplasia/ Vascular ectasia

Clinical Presentation

- Painless bleeding
- Mucus discharge, prolapse
- Amount of bleeding - 3 to 5 ml to a max of 10 ml

Diagnosis

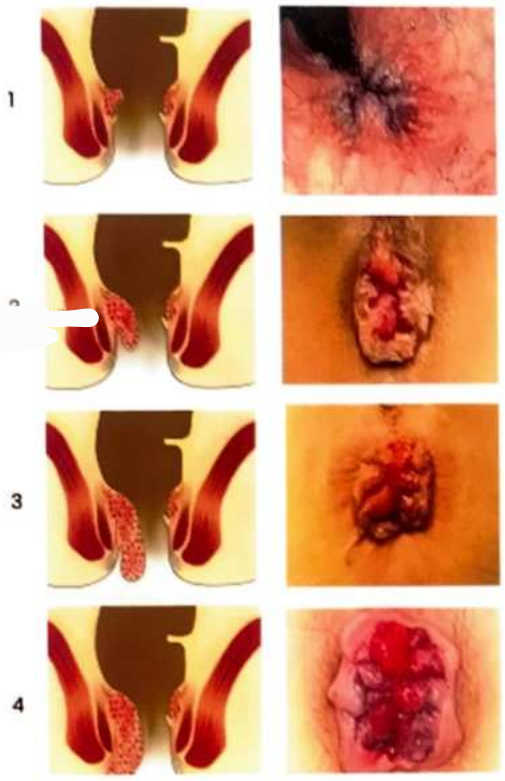
- They Cannot be palpated, therefore hemorrhoids cannot be diagnosed by DRE
- Diagnosis of hemorrhoids - by proctoscopy

Types of Hemorrhoids

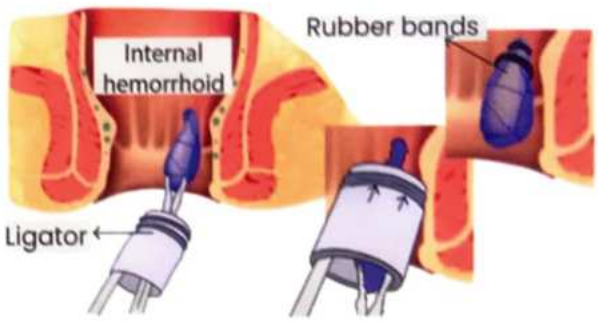
Internal hemorrhoids	External hemorrhoids
• Location - above dentate line (Pain insensitive region) • Painless bleeding • Treatment - depends on the degree	• Location – below dentate line (pain sensitive region) • Painful bleeding • Aka 5- days painful self-curing lesion • Recurrent thrombosis in external hemorrhoids leads to semi- ripe black currant • Treatment - Excision

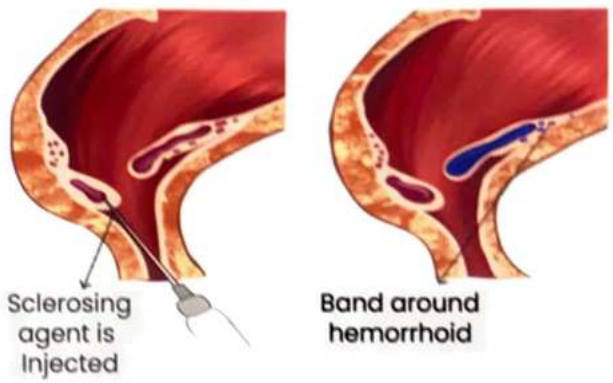
Internal Hemorrhoids classification

00:17:20



- First degree: Bleeding only
- Second degree: Bleeding + Prolapse during defecation (Spontaneous resolution)
- Third degree: Bleeding + Prolapse with manual reposition
- Fourth degree: Bleeding + Permanent prolapse
- Treatment
  - First degree hemorrhoids
    - → Sitz batch
    - → High fibre diet
    - → Stool softener
  - First degree, second degree and selected patients of third degree
    - → Banding: In banding - Rubber band is applied other the hemorrhoid. After 48 hours, hemorrhoids are sloughed off because of ischemia and the lesion heals with fibrosis.
    - → Sclerotherapy: 5% phenol in almond oil
    - → Both banding and sclerotherapy are very cheap and effective





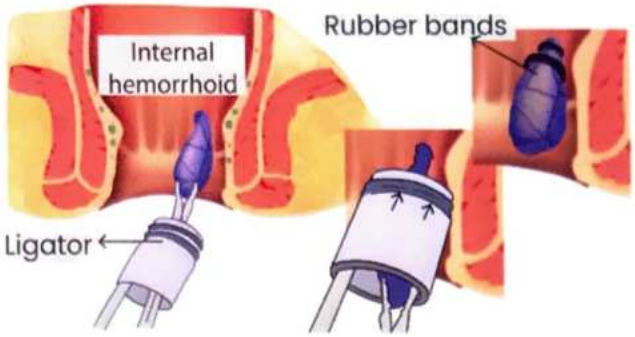
  - Rest of third-degree patients and fourth degree patients: Hemorrhoidectomy
    - → Milligan-Morgan open Hemorrhoidectomy
    - → Ferguson closed hemorrhoidectomy: Not done nowadays
    - → Whitefield submucosal hemorrhoidectomy: Not done nowadays

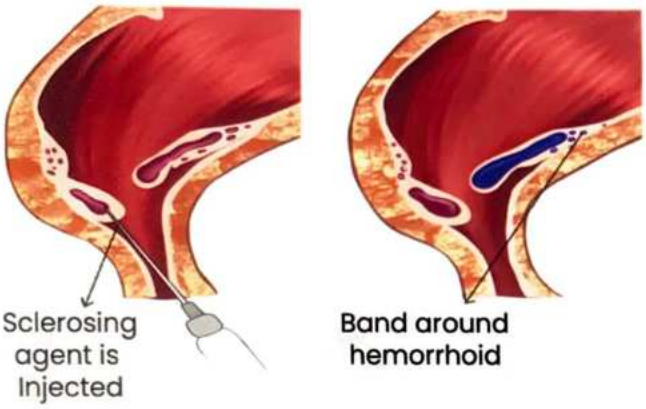
→ Longo's Stapler hemorrhoidectomy

→ Most preferred method- Longo's Stapler hemorrhoidectomy (Associated with Lesser post-operative pain)

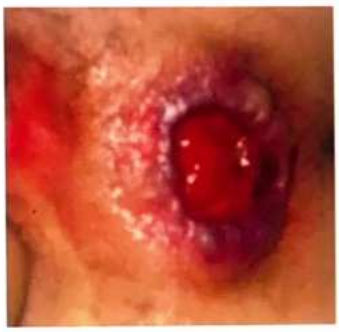
Complication

- MC complication - Pain > urinary retention

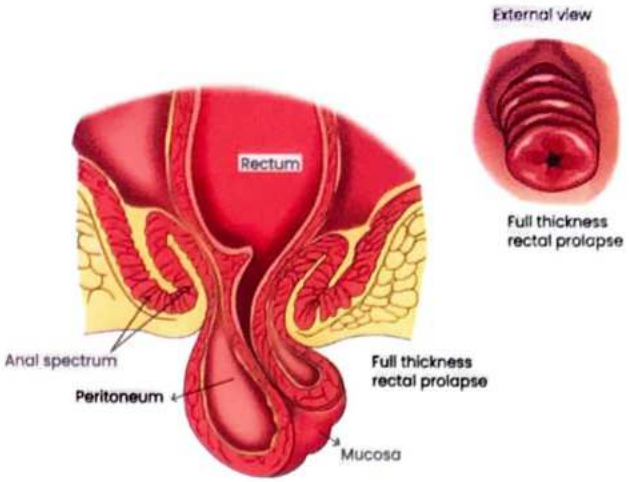




Rectal prolapsed



- Rectal Prolapse is of two types
  - Mucosal prolapse mainly in children
  - Full thickness prolapse mainly in adults



Causes of Rectal prolapse in children

- Common causes: Treat the underline cause
  - Protein Energy Malnutrition
  - Worm infestation
  - Diarrhea
- Rare causes
  - Sacral agenesis
  - Meningomyelocele

Management

- Depends on cause
- Conservative Management for common causes
- If patient is not responding: Lokhart Mummary Rectopexy
- For rare causes: Thiersch Anal Wiring
- For Adults: Rectopexy via Abdominal approach & Rectopexy via Perineal approach

Rectopexy via Abdominal Approach	Rectopexy via Perineal Approach
• Decreased recurrence rate	• Increased recurrence rate
• Associated with high morbidity	• Associated with low morbidity
• Preferred in young patients	• For old & frail patients
• Types of rectopexy	• Types of rectopexy
○ **W** – **W**ell's	○ **P** - **P**erineal
○ **A** - **A**bdominal	○ **A** - **A**ltmaier
○ **R** - **R**ipstein	○ **D** - **D**elorme
• Resection Rectopexy	• Thiersch Anal Wiring
○ Goldman: Fryberg	

ANORECTAL ABSCESS

⏱ 00:36:27

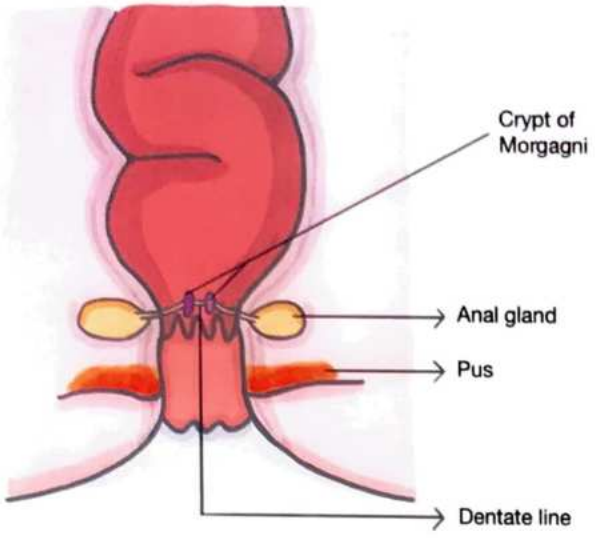
- M/C organism: E coli > Bacteroides
- Types

a. Perianal (MC)

b. Ischiorectal (2nd MC)

c. Submucous

d. Pelvi-rectal

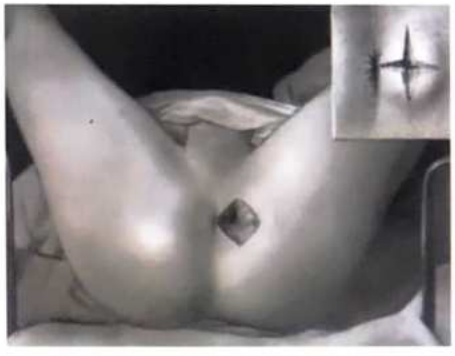


Formation of anorectal abscess

- Opening of anal glands at dentate line - crypt of Morgagni
- Via the crypts, infection reaches the anal gland
- There is pus formation & it follows the path of least resistance
- Pus is collected in the perianal area causing perianal abscess.
- It is tract behind, U- shaped tract in the ischiorectal fossa forming ischiorectal abscess.
- Theory responsible for formation of Anorectal Abscess - Cryptoglandular Theory

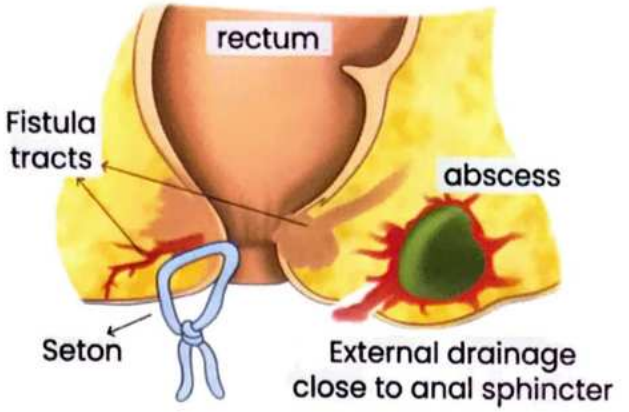
Clinical features

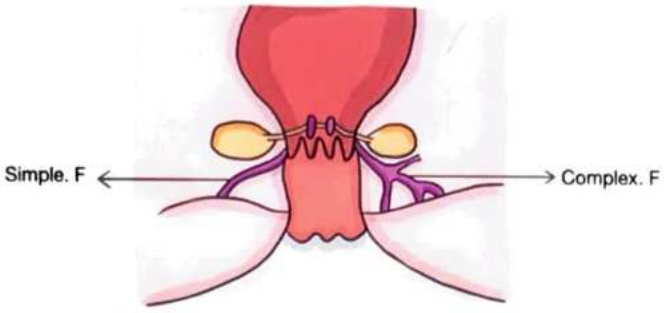
- Severe pain
- Throbbing swelling
- Swinging pyrexia



Treatment

- Incision (Cruciate shaped incision) and Drainage + Antibiotics





FISTULA-IN-ANO

- Chronic abnormal communication between anorectum & perineal skin
- History of Anorectal Abscess/ Anorectal sepsis
- Forms a tract outside known as Fistula in Ano
- Theory responsible for Fistula in Ano - Cryptoglandular Theory
- Simple fistula: Has ingle straight track
- Complex fistula: Has multiple branched tracts

Components of ANORECTAL RING

- Puborectalis (like sling around rectum junction)
- Internal Anal Sphincter (Formed by inner circular layer)
- External Anal Sphincter (Formed by outer longitudinal layer)

Types

- Low lying: If internal opening of fistula is below anorectal ring
- High lying: If internal opening of fistula is above anorectal ring

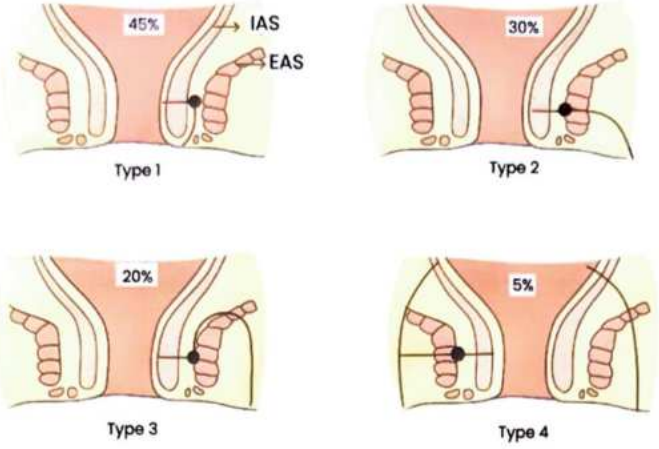
Causes

- Anorectal Abscess (MC)
- Crohn's disease
- Lymphogranuloma venereum

- Actinomycosis
- Foreign body in rectum
- Malignancy
- HIV

PARK'S CLASSIFICATION

Type 1	•	Inter- sphincteric (MC)
Type 2	•	Trans- sphincteric
Type 3	•	Supra- sphincteric
Type 4	•	Extra- sphincteric



Clinical Features

- More common in Males
- Usually seen in 3rd – 5th decade
- Intermittent purulent discharge + Pain
- If patient passes Feces & flatus from external opening - likely position of internal opening is in Rectum

Key points to be assessed in fistula

- Location of Internal opening
- Location of External opening
- Course of tract
- Secondary extensions- present/not
- Complicating disease/ condition that can affect healing of fistula

Investigations

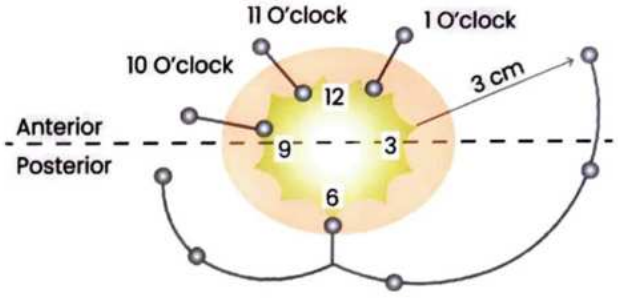
- ON DRE, induration around internal opening can be localized.
- On proctoscopy also, internal opening can be localized if the internal opening is within 10cm of anal verge.
- First investigation: Fistulogram
- IOC: MRI

GOOD SALL'S RULE

- To indicate the likely position of internal opening on the basis of external opening
- Anteriorly located external openings are joined by short straight track. (Example - 11'o clock position of external opening is same as 11'o clock portion of internal opening)
- Posteriorly located external openings are joined by Long curved track & opens in posterior midline (in posteriorly located external openings, whatever position of external opening, internal opening is at 6'oclock position)

Exception of Goodsall's rule

- External opening > 3cm from anal verge
- Multiple external openings



Treatment

- Fistulotomy - Incision over fistula tract } High morbidity
- Fistulectomy - Excision of fistula tract
- SETON
- VAAFT (Video Assisted Anal Fistula Treatment)
- Glue

SETON

- Thread made of silk, linen, nylon, silastic
- Types of seton

a. Cutting seton

b. Non-Cutting seton (aka Draining seton)

c. Marking seton

d. Staging seton

- Cutting seton
  - Cutting Seton is inserted over the fistula and tied and knot is applied.
  - Every week, knot is made tight and hence it starts cutting the tissues.

- Uses - Cutting seton converts High lying fistula to Low lying fistula
- (Treatment of high lying fistula is associated with high risk of fecal incontinence)

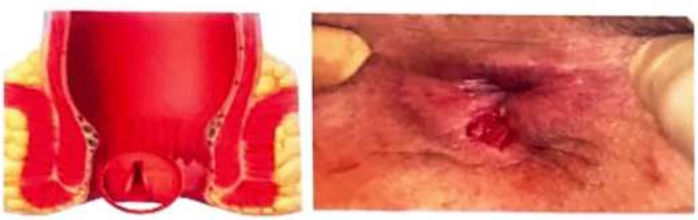
- Draining seton
  - Crohn's disease and HIV +ve patients

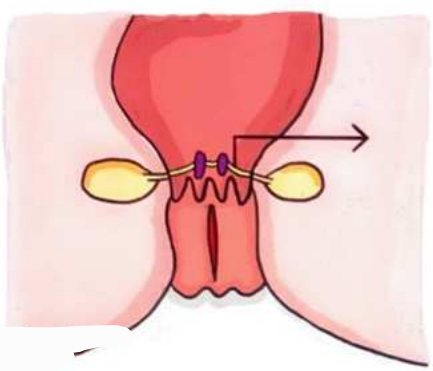
Indications of Seton

- Treatment of Complex Anorectal fistula
- Treatment of fistula in Crohn's disease &HIV patients: Draining seton is used to control infections as they have multiple, infectious fistula
- Anterior fistulas: More common in females
- Fistulas associated with Chronic diarrheal state.

FISSURE-IN-ANO

01:06:35





- Location of dentate line - usually 2cm below the anal verge.
- Longitudinal split in the anoderm from anal verge to the dentate line
- Location – In posterior midline at 6'o clock position
- Fissure is of two types
  - Acute fissures
  - Chronic fissures
- Chronic fissures - Characterized by Triad
  - Canoe- Shaped Ulcer
  - Sentinel Pile (aka skin tag)
  - Hypertrophied papilla

Pathophysiology

- Spasm of Internal Anal sphincter
- Patients have constipation
- During excessive straining at the time of defecation, the fecal matter passing through internal anal sphincter injures the pain sensitive mucosa of anal canal.

Tear/ split in the anoderm
↓
Decreased vascularity
↓
Healing of Tear decreases (due to ischemia)

- Principle of treatment is based on relaxing the spasm
- Fissure in Ano is similar to Achalasia cardia

Clinical features

- Serve pain during defecation
- Streaking of blood over stool
- In fissure in Ano - Digital rectal examination is contraindicated.
- Examine the gluteal region, find the longitudinal spilt in posterior midline

Management

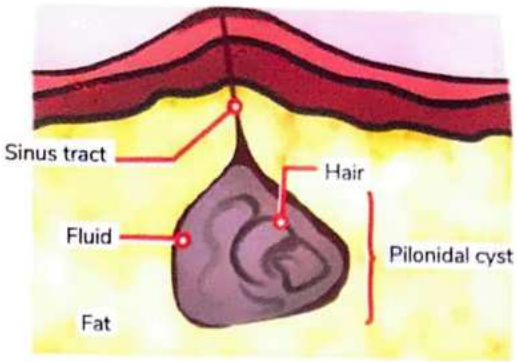
- Initially conservative management
  - Sitz bath
  - High fibre diet
  - Stool softener

- Medical Treatment
  - CCB – 2% Diltiazem Gel – (Local application)
  - Nitrates - 0.2% nitroglycerine
  - Botox injection into sphincters
  - Lord's procedure – manual dilatation of sphincter (not performed usually).
  - TOC - NOTARA'S lateral sphincterotomy (divide internal anal sphincter laterally)
  - Anal advancement flap

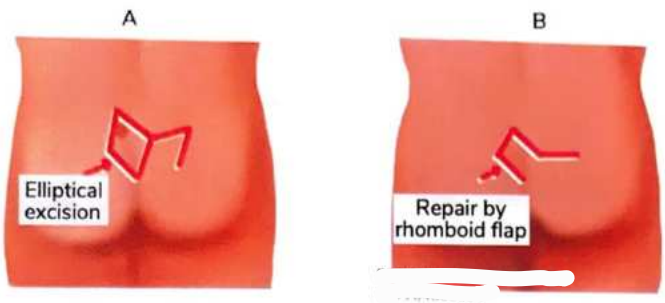
PILONIDAL SINUS

01:16:56

- Acquired condition
- Seen in hairy males
- Usually among 20-29 years
- Common in military personnel
- Aka JEEP'S DISEASE (common in Jeep drivers of Army)
- Collection of dead hair in the natal cleft overlying the coccyx.



Pilonidal sinus



Pilonidal sinus excision and repair by rhomboid flap

Clinical features

- Discomfort in post-natal cleft region with intermittent serous discharge
- Infection - Abscess formation
- Location
  - Interdigital pilonidal sinus (common in barbers)
  - Umbilicus
  - Axilla

Management

- For Abscess: Incision & Drainage + Antibiotics
- If no abscess: Excision of sinus tract + Closure of defect using flap
- Flaps Used for closure
  - Limberg's Flap / Rhomboid Flap
  - Karydakis flap
- Procedure performed for the treatment of Pilonidal sinus: BASCOM procedure

CA RECTUM

01:22:59

- MC site of large bowel malignancy
- Usually seen in 5th – 6 decades
- MC site of metastasis – Liver
- Chemotherapy regimen- FOL FOX-IV
  - **FOL** – Folinic acid/ leucovorin
  - **F** - 5-FV (5-Flurouracil)
  - **Ox**- Oxaliplatin

Clinical features

- MC symptom – Bleeding PR
- Early morning bloody diarrhea
- Passage of bloody slime (no fecal matter)
- Spurious diarrhea (every 2 to 3 hours, rectum is full with discharge from tumor, so patient passes like stool every 3 hours)
- Tenesmus - Painful defecation with sensation of incomplete evacuation seen in lower part of CA rectum
- Back ache/ sciatica (sacral plexus involvement posteriorly)
- Weight loss & Anorexia

Investigations

- Length of proctoscope – 10 cm
- Rigid sigmoidoscope -25 cm
- Flexible sigmoidoscope- 60cm
- Colonoscope – 160 cm
- Investigation of choice - Rigid sigmoidoscopy + biopsy
- Colonoscopy is mandatory for adequate evaluation of whole colon and to rule out any synchronous polyp or synchronous malignancy
  - Synchronous- simultaneously
  - Metachronous- later after surgery
- Virtual colonoscopy (3D reconstruction colonoscopy using CT)
  - Advantage: can visualize outside of lumen also
  - Disadvantage: Biopsy of colon cannot be done
- In head & neck malignancies & pelvic malignancies, overcrowding of nerves, blood vessels & soft tissues. So, IOC for staging of most of head and neck malignancy – MRI
- For T- staging, investigation of choice- TRUS (Transrectal ultrasound)
- Distantly lying nerve, lymph node, vessel cannot be differentiated as Sensitivity of ultrasound decrease if distance between probe & organ increase.
- For lymph node staging, investigation of choice is – Endorectal MRI
- Overall Best investigation for staging- MRI

Treatment

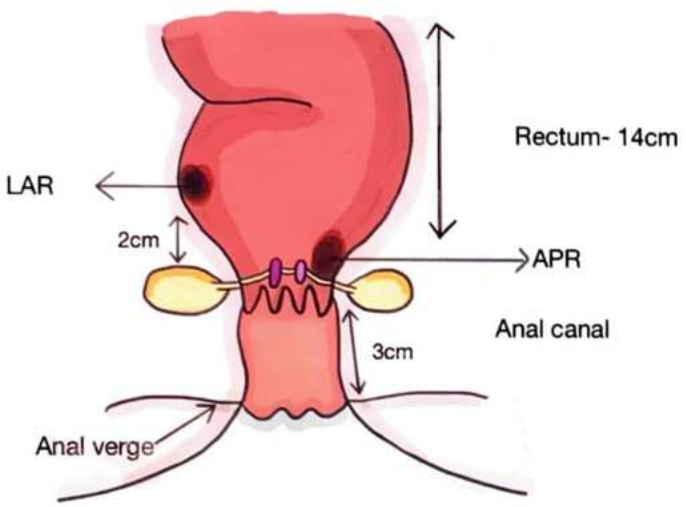
- Principle of treatment in CA Rectum
  - Stage I: Surgical resection

- State II & III: Neoadjuvant chemoradiation followed by surgical resection (down stage the tumor & then surgery)
- Stage IV: Neoadjuvant chemoradiation followed by palliation ± surgical excision

- TOC- TOTAL MESORECTAL EXCISION
  - Given by Bill Heald
  - Significant length of bowel removal around the tumor
  - Removal of Surrounding tissues up to the plane between Mesorectum & Presacral Fascia known as HEALD'S HOLYPLANE
- If CA rectum is located > 5 cm above Anal verge – Low Anterior Resection (LAR)
- If CA rectum is located at or below 5 cm from anal verge - APR (Adomino Perineal resection) aka Mile's Procedure

Important Information

- LAR- if Tumour> 5cm from Anal Verge
- APR- if Tumour at or below 5cm from Anal Verge
- Total Mesorectum excision is done in Ca Rectum.



CARCINOMA ANAL CANAL

01:42:42

- MC histological type - SCC > BCC > MM
- MC site of metastasis – lungs
- In perineal malignancies like CA Penis, CA Scrotum, CA Anus - Inguinal lymph nodes are involved

Risk Factors

- Smoking
- HPV infection (16, 18, 31,33)
- HIV +ve /Immunocompromised state
- Anal receptive intercourse
- Multiple partners
- History of CA Cervix / Vulval cancer
- Initially, growth in anus is inside lumen.
- Later, growth is seen outside lumen.
- In advanced malignancies in anus, they can infiltrate into bladder/ vagina leading to fistula and if sphincters are involved, incontinence can happen.

Clinical features

- MC symptom- Bleeding PR
- Foul smelling discharge
- Involvement of
  - Bladder
  - Vagina
  - Sphincters: Incontinence
- Alteration of bowel habit
- MC site of metastasis is Lungs

} Ominous symptoms of advanced cases

- MC involved group of lymph nodes: Inguinal Lymph nodes

Investigations

- IOC: Proctoscopy with biopsy

8th AJCC TNM CLASSIFICATION

Refer Table 24.1

Treatment

- NIGRO regimen - Chemotherapy followed by radiation
  - 5- fluorouracil + Mitomycin-C followed by radiation
- No response then Abdomino-perineal resection

Previous Year's Questions

Q. Treatment of stage II carcinoma anal canal?
(JIPMER Nov 2018)

A. APR
B. APR followed by chemoradiation
C. Concurrent chemoradiation
D. Neoadjuvant chemotherapy followed by Surgery

Table 24.1

Tis	• Carcinoma-in-situ • Aka BOWEN'S DISEASE • Anal intraepithelial neoplasia type I – III
T1	• Size of tumor up to 2 cm
T2	• Size of tumor > 2-5 cm
T3	• Size of tumor > 5 cm
T4	• Involvement of adjacent structures i.e. Vagina, Urethra, Bladder
N1a	• Metastasis to inguinal, meso rectal and/or internal iliac lymph node
N1b	• Metastasis to external iliac lymph nodes
N1c	• Metastasis to external iliac lymph nodes + inguinal lymph nodes + mesorectal and/or internal iliac lymph nodes
M0	• No Metastasis
M1	• Distant Metastasis

25 HERNIA AND ABDOMINAL WALL - 1

HERNIA

- Protrusion of viscus or part of viscus through the wall of its containing cavity

NYHUS classification

00:01:06

Type 1	• Indirect hernia (normal internal ring)
Type 2	• Indirect hernia (enlarged internal ring)
Type 3A	• Direct hernia
Type 3B	• Indirect hernial enlarge enough to encroach upon posterior inguinal wall • Indirect sliding / Scrotal hernial • Pantaloon hernia
Type 3C	• Femoral hernia
Type 4	• Recurrent hernia ○ 4A – direct hernia ○ 4B – indirect hernia ○ 4C – femoral hernia ○ 4D – combine hernia

GILBERT classification

00:05:36

- Type 1 – indirect, small
- Type 2 – indirect, medium
- Type 3 – indirect, large
- Type 4 – direct, involves entire floor
- Type 5 – direct, diverticular
- Type 6 – combined (pantaloon/saddle back/ dual hernia/ ROMBERG'S hernia)
- Type 7 – femoral hernia

Risk factors

00:08:18

- Factors that can cause weakness of abdominal wall muscles
  - Patent Processus vaginalis
  - Patent canal of nuck
  - Connective tissues disorders (Ehler's Danlos syndrome)
  - Prune – Belly syndrome
  - Ectopia vesicae
  - Lower abdominal incision
  - Defective collagen synthesis
  - Smoking
  - Steroid intake
- Factors that can cause increased intrabdominal pressure
  - Chronic cough
  - COPD/ Bronchitis
  - Chronic constipation
  - Obstructive uropathy (BPH, stricture urethra)
  - Heavy weightlifting
  - Ascites
  - Pseudomyxoma peritonei
  - Pregnancy
  - Chronic ambulatory peritoneal dialysis (CAPD)

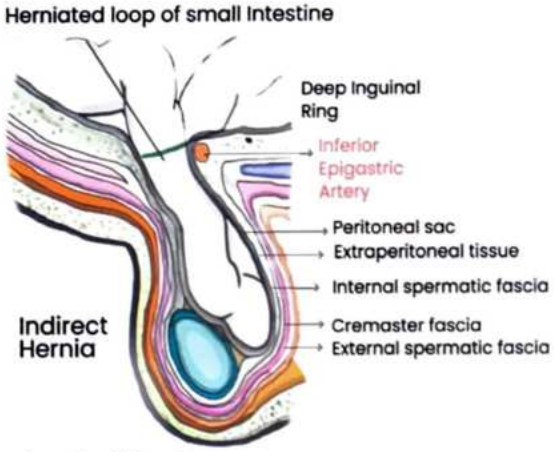
Types of hernia

00:15:12

- MC type of hernia in both male & females - Indirect inguinal hernia
- Femoral hernia - more common in females.
- Deep ring - defect in Fascia transversalis
- Superficial ring - defect in External oblique aponeurosis.

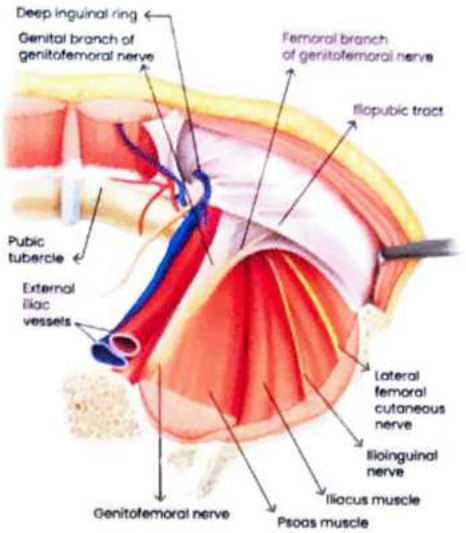
1. Indirect Inguinal Hernia

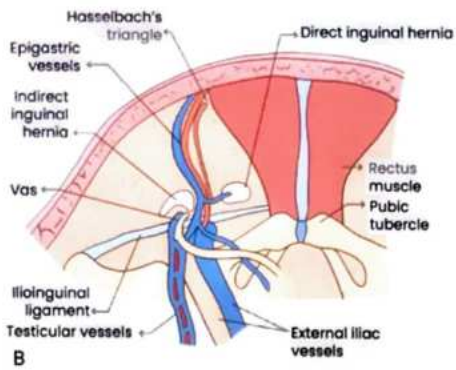
Sac enters via deep ring
↓
Traverse inguinal canal
↓
Goes out via superficial ring

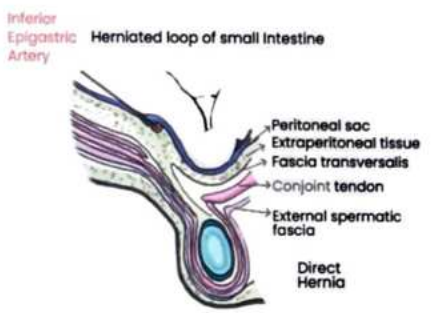


2. Direct Inguinal Hernia

- Sac protruding directly from posterior abdominal wall via triangle of Hesselbach and enters the inguinal canal
- Triangle of HESSELBACH
- Boundaries
  - Laterally - Inferior epigastric artery
  - Medially - Lateral border of Rectus abdominus
  - Inferiorly- Inguinal ligament

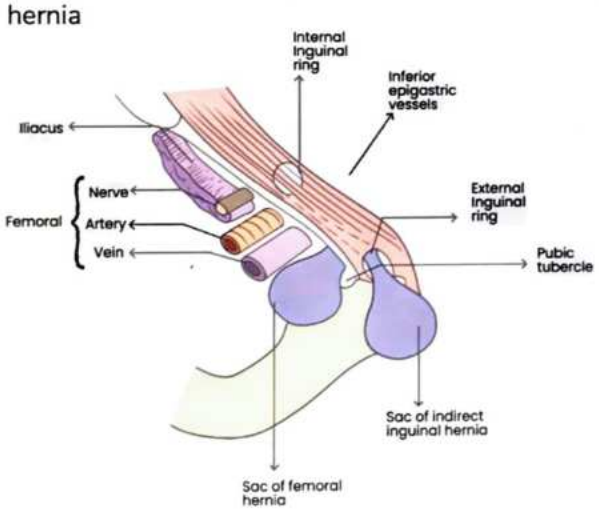






Relation of sac with the spermatic cord

- Sac is posterior to spermatic cord in Direct inguinal hernia
- Sac is anterolateral to spermatic cord in Indirect inguinal hernia

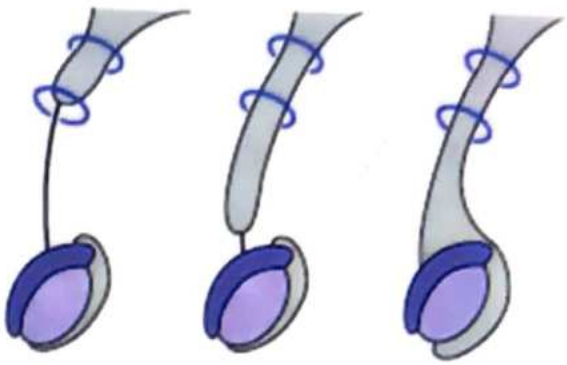


Relation of neck of sac

- In Inguinal hernia - above and medial of pubic tubercle
- In femoral hernia - below and lateral to pubic tubercle

Types of Indirect Inguinal hernia 00:22:33

- BUBONOCELE: Hernia content is limited to inguinal canal
- FUNICULAR
  - Processus vaginalis is closed above epididymis
  - Content of hernia is felt separately from the testis.
- COMPLETE/ SCROTAL: Testes appears to lie in the lower part of hernia



Bubonocele Funicular complete

Clinical features

- Swelling in Inguino scrotal region (more prominent on coughing/ straining)
- Reduce spontaneously on lying position
- Progressive increase in the size of swelling over a period.

Definitions

Refer Table 25.1

Previous Year's Questions

Q. While doing emergency laparotomy for an intestinal obstruction, which organ should you first visualize to say whether it is small bowel or large bowed obstruction? (AIIMS Nov 2018)

A. Ileum
B. Cecum
C. Sigmoid colon
D. Rectum

Diagnosis

- Made by clinical examination.
- Exception - Spigelian hernia/Internal hernia
  - They are not palpable

- Diagnosed with help of CT/ ultrasound

Treatment

1. Treatment of Sac
- Herniotomy: steps of herniotomy

a. Inguinal skin crease incision
b. Division of Subcutaneous fat
c. Division of Camper's fascia, Scarpa's fascia
d. Incision along direction of fibres n external oblique aponeurosis
e. Isolate the Sac from cord
f. Open the Sac at fundus
g. Invert the contents back
h. Apply PURSE- STRING suture over the sac
i. Excise the Redundant Sac

- Herniorrhaphy: Herniotomy + Inguinal floor Reconstruction with sutures
- Hernioplasty: Herniotomy + Inguinal floor Reconstruction with MESH

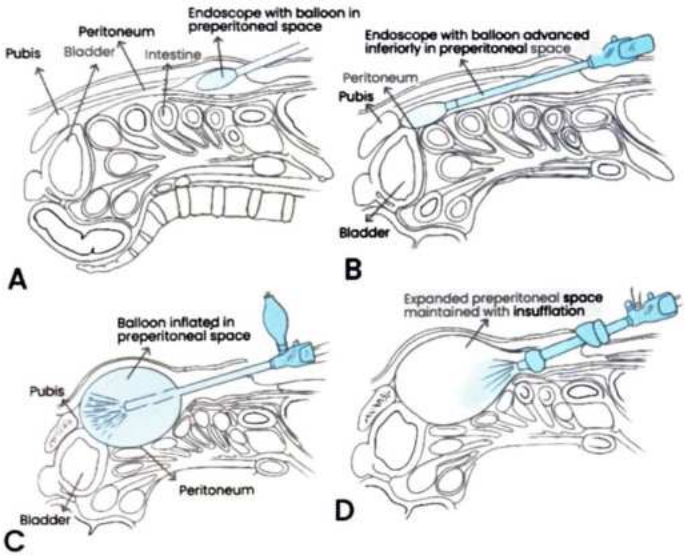
2. Inguinal floor Reconstruction

Primary tissue repair	Anterior tension free repair	Laparoscopic / Preperitoneal repair
• BASSINI'S • SHOULDICE	• LICHENSTEIN	•TEP (Totally extra peritoneal) •TEP (Trans abdominal

Refer Table 25.2

c. Laparoscopic preperitoneal repair 00:49:55

- TEP - Totally extra peritoneal
- TAPP - Transabdominal pre peritoneal



1) TEP

- Preferred by experienced surgeon
- Advantage – decreased risk of bowel injury & adhesions
- Disadvantage - small working space (surgery is difficult)

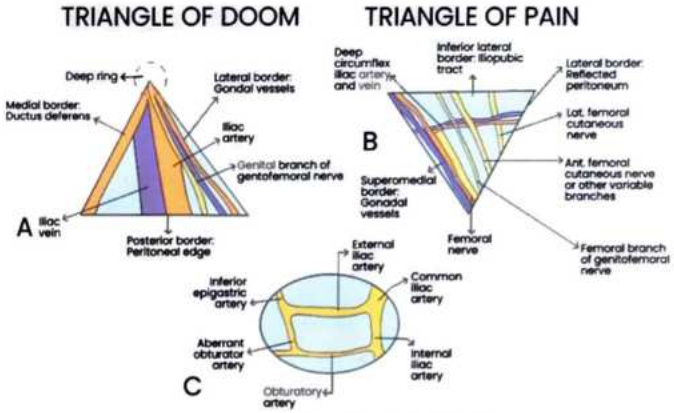
2) TAPP

- Preferred by beginners
- Advantage-huge working space (surgery is easy)
- Disadvantage- increased risk of bowel injury & adhesion formation
- Government setup - LIECHTENSTEIN REPAIR
- Private setup - LAPROSCOPIC REPAIR
- Early repair
- No Scar visible

LANDMARKS IN LAPAROSCOPIC REPAIR

a. TRIANGLE of DOOM

- Boundaries
  - Medially – Vas Deferens
  - Laterally – Gonadal vessels
  - Base - fold of peritoneum
  - Apex - deep ring
- Content - Iliac vessels
- Sharp dissection in this area can lead to injury of ILIAC vessels



b. Triangle of Pain

- Boundaries
  - Medially- gonadal vessels
  - Laterally - Fold of peritoneum
  - Superiorly - Iliopubic tract
- Contents
  - Femoral nerve
  - Femoral branch of Genito- Femoral nerve
  - Anterior cutaneous nerve of thigh
  - Lateral cutaneous nerve of thigh
- Electro cautery should not be used in this are as it is Electric Hazard Zone & nerves can be injured
- MC Nerve injured – lateral cutaneous Nerve of thigh

Previous Year's Questions

Q. Which of the following is correct regarding the boundaries of triangle of Doom? (AIIMS May 2018)

A. Medially vas deferens, laterally gonadal vessel, inferiorly peritoneum
B. Laterally vas deferens, medially gonadal vessel, inferiorly peritoneum
C. Laterally medial umbilical ligament, medially gonadal vessel, lateral inferiorly peritoneum
D. Laterally gonadal vessels and medially lateral umbilical ligament, inferiorly peritoneum

Nerves injured

- Laparoscopic Hernia Repair - Lateral Cutaneous N. of thigh > Genito-femoral N.
- Open Hernia Repair - Ilio inguinal > Iliohypogastric, Genital branch of Genitofemoral N.

c. Crown Of Death/ Corona Mortis 01:02:30

- Inferior epigastric artery – Branch of external iliac artery
- Obturator artery – Branch of internal iliac artery
- Usually no communication between IEA and obturator artery.
  - Aberrant obturator artery arises from - IEA

↓

Attaches to obturator artery

↓

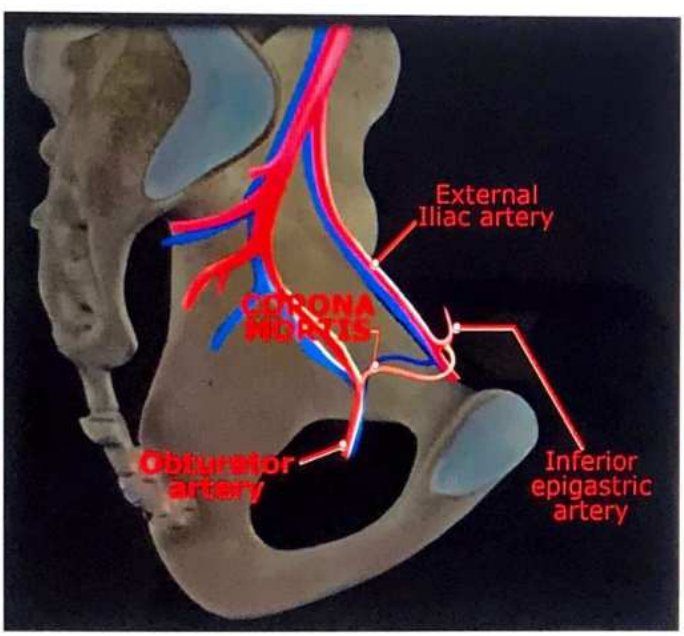
Forms a vascular loop

↓

Injured during dissection / mesh fixation

↓

Bleeding & death



SPACE OF RETZIUS	SPACE OF BOGROS
• Aka Retropubic space • Extraperitoneal space located between pubis & urinary bladder	• Aka Retro inguinal space • Extra-peritoneal space located deep to inguinal ligament. • Situated laterally & cranially to the space of Retzius.

Complications of Groin hernia repair

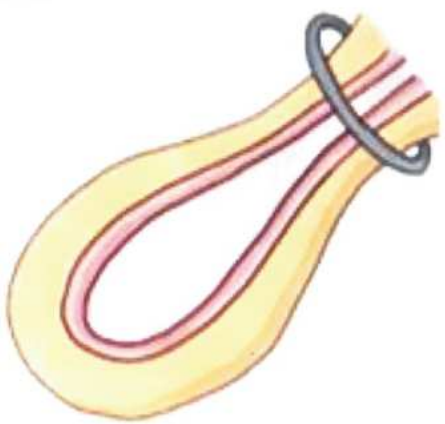
1. Recurrence
2. Hematoma formation
3. Seroma formation
4. Ischemic orchitis
5. Testicular atrophy (if testicular artery is injured)
6. Osteitis pubis (due to damage to periosteum of pubic tubercle)
7. Bladder injury
8. Wound infection
9. Mesh related complications like Contraction of mesh, Erosion due to mesh and Infection

STRANGULATED HERNIA 01:08:34

- Characterized by Intestinal obstruction + impaired vascular supply of the bowl
- MC Constricting agent - Neck of sac

Clinical features

- Irreducible hernia
- Intestinal obstruction signs and Symptoms like colicky pain, bilious vomiting, non-passage of feces and flatus.
- History of sudden pain over hernia followed by Generalized pain
- On examination
  - Tense and extremely tender hernia
  - Discoloration of skin (Reddish/ Bluish tinge) of skin overlying hernia.
  - No cough impulse
- Diagnosis of Strangulation - Based on clinical examination



Treatment

- Resuscitation
  - IV fluids
  - IV antibiotics
- Nasogastric aspiration
- Foley's Catheterization

- Incision given on most prominent part of hernia

↓

Dissection till reaching the Sac and open the sac fundus

↓

Collected fluids is aspirated

↓

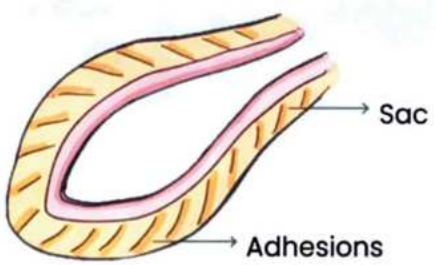
Examine bowl

Bowel viable	Gangrenous bowel
↓	↓
Reduce bowel to Peritoneal cavity	Excise gangrenous Bowel
	↓
	If omentum also non-viable
	↓
	Secure Ligature and excise the non-viable part of omentum

- Use of synthetic mesh is contraindicated in strangulated hernia (because there is increased risk of infection)
- If mesh needed → Use bioprosthetic / absorbable mesh.

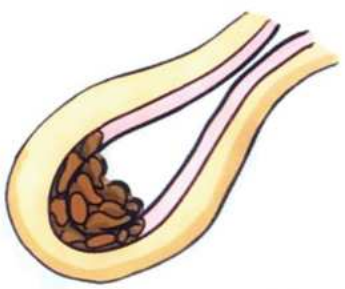
Table 25.1

1. Irreducible Hernia
   - Cannot be reduced due to formation of adhesions between sac & content



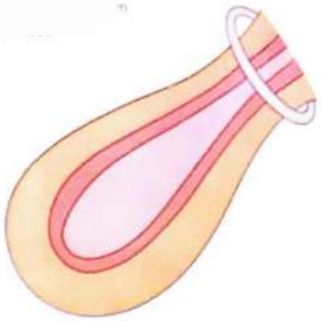
Irreducible hernia

2. Incarcerated Hernia
   - Contents cannot be reduced due to presence of fecal matter in the content



Incarcerated hernia

3. Obstructed Hernia
   - Intestinal obstruction with preserved blood supply



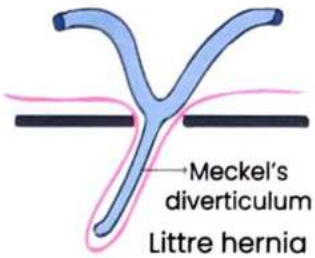
Obstructed hernia

4. Strangulated Hernia
   - Intestinal obstruction with impaired blood supply

5. Enterocele
   - Content- Small intestine
   - First part is difficult to reduce
   - Last part is easy to reduce (reduces with Gurgling sound)

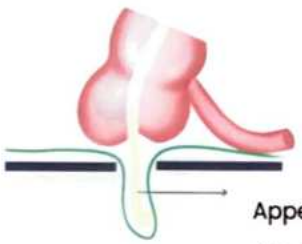
6. Omentocele
   - First part is easy to reduce
   - Last part is difficult to reduce
   - Content- Doughy (omentum)

7. Littre's Hernia
   - Content is Meckel's diverticulum



Littre hernia

8. Amyand's Hernia
   - Content is Appendix



Amyand's Hernia

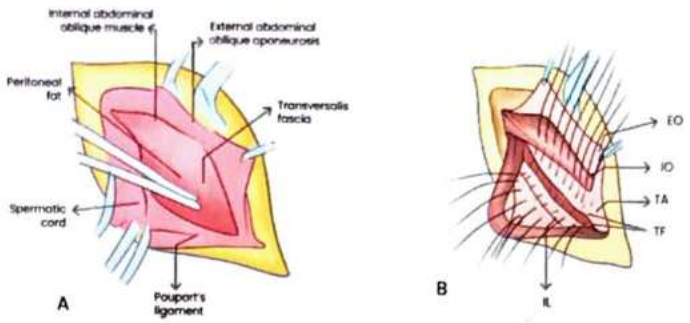
Table 25.2

a. Primary tension free repair

1) BASSINI'S

- Internal oblique + transverses abdominus + fascia transversalis
- These are suture to inferior edge / shelving edge of inguinal ligament
- Aka TRIPPLE LAYER REPAIR
- Increased tension in tissues -increased recurrence rate

BASSINI REPAIR

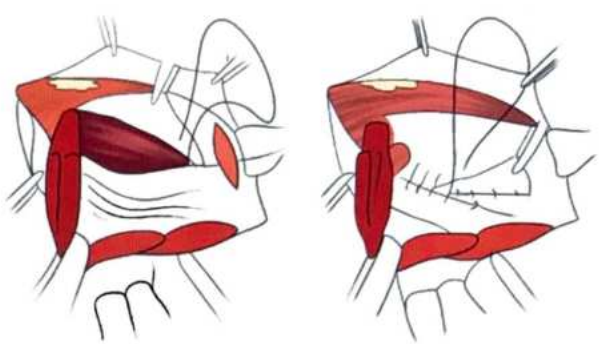


2) Shouldice

- Double breasting of Fascia transversalis
- Aka FOUR LAYERED REPAIR
- Relatively low tension in tissues - low recurrence rate

Shouldice Repair

- Multilayer repair of the posterior wall of the inguinal canal
- Double bresting of transversalis fascia
- Transverse abdominis aponeurotic arch to the iliopubic tract and conjoined tendon to the inguinal ligament



3) Modified Shouldice

- Double breasting of Internal oblique, Transverses Abdominis, Fascia transversalis
- Gold standard for Inguinal hernia repair - Lichtenstein repair

1) Lichtenstein Repair

- Fix the mesh to the anterior rectus sheath just above pubic tubercle

↓

Fix mesh (inferior aspect) to inguinal ligament

↓

Create artificial deep ring (by overlapping the cut edges of mesh)

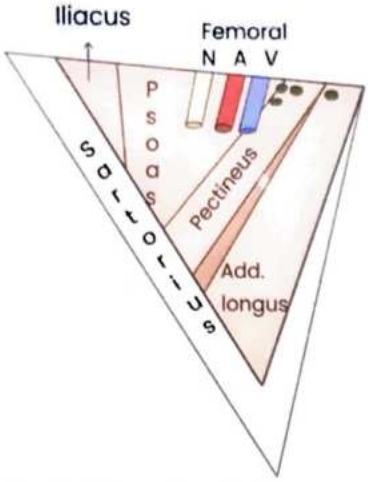
↓

Superior aspect of mesh can be fixed to conjoint tendon

26 HERNIA AND ABDOMINAL WALL - 2

FEMORAL HERNIA

00:00:25



- MC type of Hernia in Females - Indirect inguinal hernia
- Femoral hernia is more common in females
- MC in Right side
- Bilateral in 20% cases
- MC in Multipara females
- TRUSS - Not to be used in femoral hernia

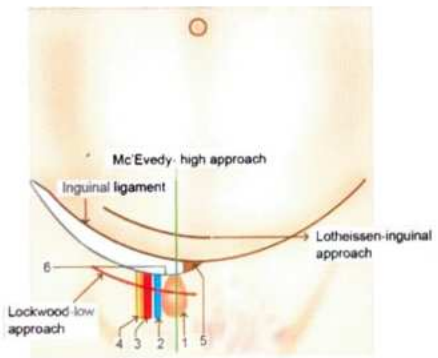
Femoral Canal and Femoral Ring

- Femoral canal is rigid & narrow: Increased risk of strangulation
- Surgery should be performed as early as possible to prevent strangulation
- Diameter of femoral ring - 1.25 cm
- Length of femoral canal - 1.25 cm
- Cloquet group of nodes present in femoral canal

Clinical presentation

- Swelling located below and lateral to pubic tubercle

Approaches of repair depends on incision

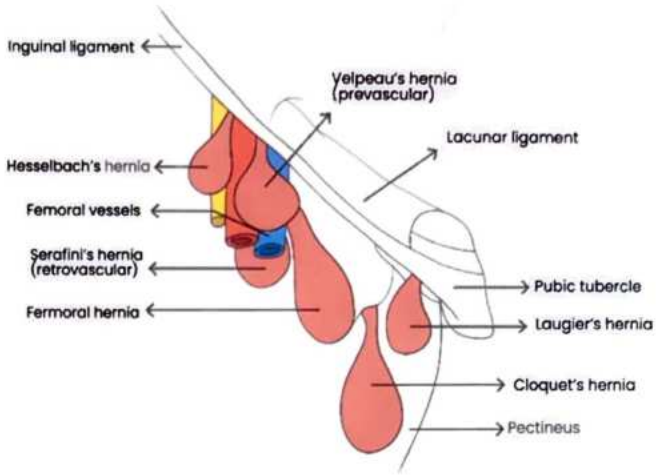


- Sub inguinal incision - LOCKWOOD
- Inguinal incision - LOTHIESSEN
- Supra inguinal incision - Mc EVEDY

TOC

- HENRY'S procedure
- Midline abdominal extraperitoneal femoral hernioplasty

Variants of femoral hernia

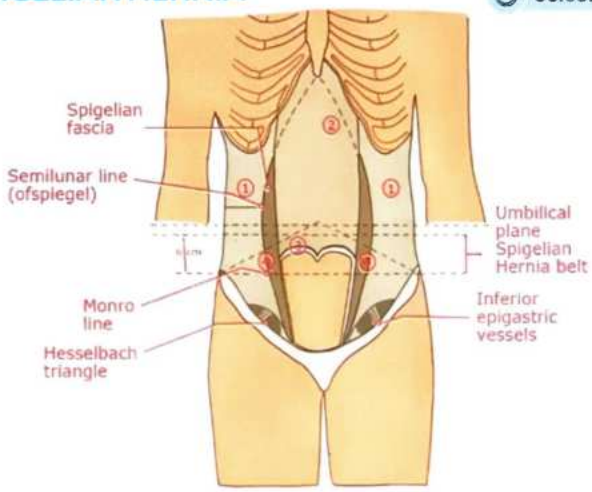


1. LAUGIER'S: Hernia through gap in Lacunar ligament
2. CLOQUET: Hernia located behind pectineus fascia
3. NARATH HERNIA

- Seen in congenital dislocation of Hip
- Lateral displacement of Sac
- Sac is located behind femoral vessels

SPIGELIAN HERNIA

00:09:36



- Hernia through Spigelian fascia
- Located at Infra umbilical region (below arcuate line)
- Most of hernias are usually seen in infra-umbilical region due to absence of posterior rectus sheath
- Spigelian fascia - thin aponeurosis located between Rectus abdominus muscle medially and semilunar line laterally.
- Aka Inter parietal hernia (located between internal oblique and external oblique & penetrates spigelian fascia and internal oblique)
- Located behind external oblique - hence not palpable/ not visible

Clinical presentation
- Swelling is neither visible nor palpable leading to delayed presentation
- Abdominal pain
- Delay in presentation → Delay in diagnosis → Increased risk of strangulation

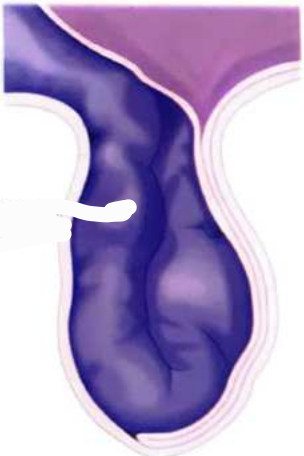
Investigations
- USG/ CT

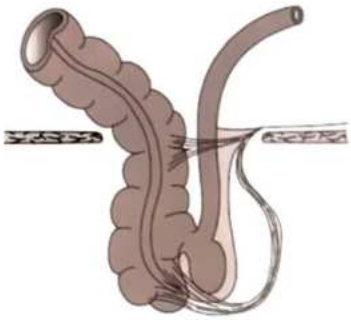
Management
- Reduce the herniated content back & close the defect

SLIDING HERNIA (HERNIA -EN-GLISSADE)

00:16:14

- Posterior wall of sac is formed by viscera.
- Increased risk of bowel surgery during ligation of Sac.
- More common in Left side. MC content- sigmoid colon
- More common in males
- On Right side MC content - Cecum

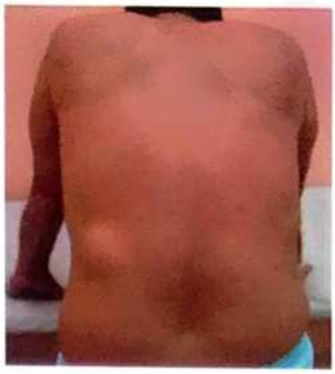




Management
- Sac along with content is reduced back
- Close/repair the defect

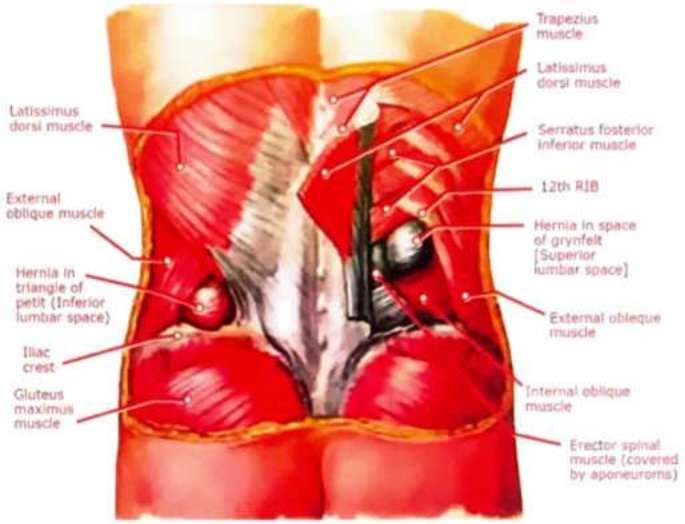
LUMBAR HERNIA

00:20:09



- Herniation in the lumbar region of posterior abdominal wall
- MC - left side
- Can be Congenital / acquired
- Congenital in 20 % cases
- Acquired in 80 % of cases
- Most of lumbar hernias are occurring through Superior triangle of Grynfelt
- Some of lumbar hernias are occurring through Inferior triangle of Petit.

Boundaries of Superior triangle of Grynfelt
- Posteriorly - Para spinal muscle
- Superiorly - 12th Rib
- Anteriorly - Internal oblique muscle



Boundaries of Inferior triangle of Petit
- Posteriorly - Latissimus Dorsi
- Anteriorly - External oblique muscle
- Inferiorly - Iliac crest

Clinical Features
- Defect is very large. so, patient is not aware mostly.
- Presence of unilateral bulge in the lumbar region
- Strangulation is very rare (large defect)

Management
- Dowd's Operation

OBTURATOR HERNIA

00:25:55

- Aka Skinny old lady hernia
- Aka French hernia
- Due to loss of fatty tissue in obturator canal

Risk factors

- Lean thin patients (chronic malnutrition)
- Elderly females
- Multipara patients
- Chronic constipation
- Other factors which increases intra-abdominal pressure

Clinical Presentations

- Howship – Romberg Sign: Compression of obturator nerve → Pain along medial aspect of thigh radiating to ipsilateral knee joint
- Hannington – Kiff- Sign: Absence of obturator reflex

Treatment

- Repair by posterior approach

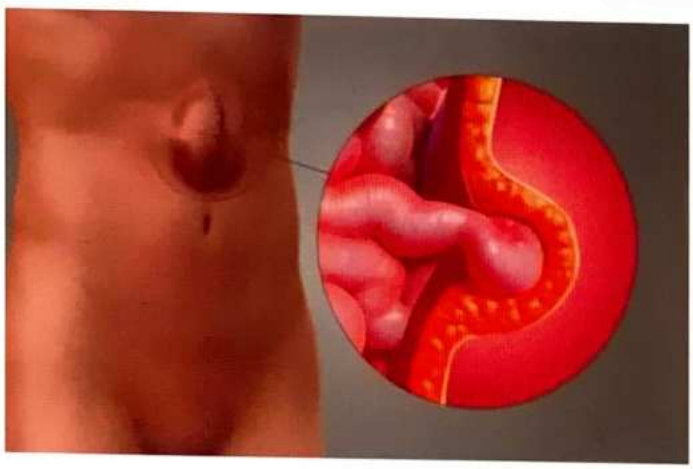
EPIGASTRIC HERNIA

00:32:21

- Any hernia from xiphoid process till 2 cm of umbilicus
- Aka Epigastric Lipoma
- Aka Fatty hernia of Linea Alba
- Just off the midline in 80% cases
- Multiple in 20% cases

Clinical feature

- Pain referred to epigastric region - It mimics peptic ulcer



Treatment

- Excision of pre- peritoneal fat + Repair
- If size of defect > 4cm- MESH is to be used

UMBILICAL HERNIA

00:36:30

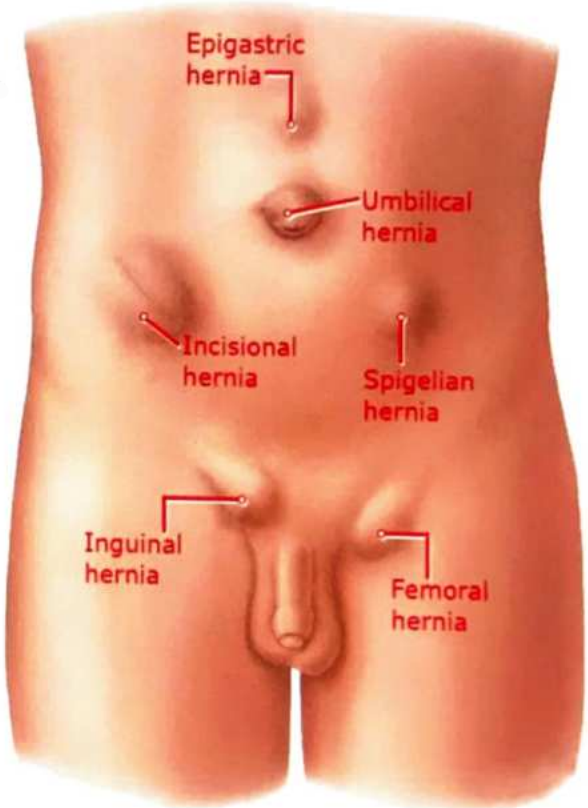
- Hernia occurring directly through umbilicus
- Paraumbilical hernia- Hernia within 2cm of umbilicus but not through umbilicus.
- In infants
  - Congenital
  - More common in Africans
  - Closes spontaneously in majority of cases by 2 years
- In adults
  - Acquired
  - M/c in females
  - ↑IAP
  - Seen in pregnancy
  - Ascites, cirrhosis, obesity
- Complications- rare

Indications of surgery

- If it persists beyond 5yrs age
- Symptomatic patients
- Strangulation
- Size > 2 cm
- Progressive enlargement of hernia after 1-2 years
- Maximum time to wait- 5 years

Treatment

- Small defects – Closed primarily
- Size of defect >3cm – Prosthetic mesh
- Mayo's Repair
  - Aka vests – over- pants repair
  - Not usually performed because of increased tension associated with increased Recurrence



ABDOMINAL WALL DEFECTS

00:43:20

1. Omphalocele

- Intestine fails return to the intra-abdominal cavity
- Covered by 2 layers
  - Amnion: Outer layer
  - Peritoneum: inner layer
- For Small defect - Protrusion of small amounts of bowel
- For Large defect - Protrusion of small bowel along with liver
- Associated with Trisomy 13, 18, 21
- Associated with congenital malformations - CVS > Musculoskeletal system > Gastrointestinal system > Genito urinary system
- MC cause of death - congenital malformations
- Associated with Beckwith – Weidman Syndrome (variant of Wilms tumour)
  - Hemi hypertrophy
  - Macroglossia
  - Visceromegaly
  - Omphalocele
  - Hepatoblastoma
- Poor prognosis (associated with congenital malformations)

2. Gastroschisis

00:49:32

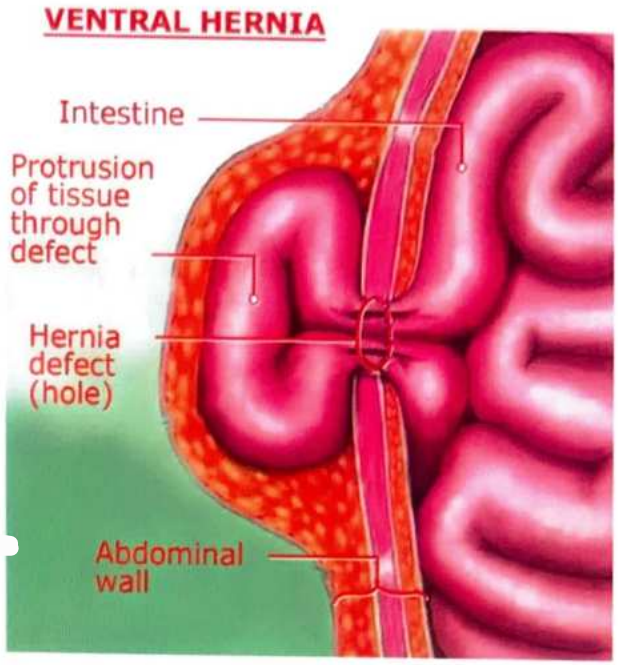
- Splitting of abdominal wall from right side with herniation of bowel.
- Bowel is exposed, becomes thickened, matted and edematous
- Associated with Intestinal atresia

Risk factors

- If mother has history of intake of
  - Alcohol
  - Smoking
  - Aspirin during first trimester
  - Ibuprofen
  - Pseudoephedrine
- Age of mother - < 20 years age
- Not associated with congenital anomalies – so good prognosis

INCISIONAL HERNIA

00:52:50



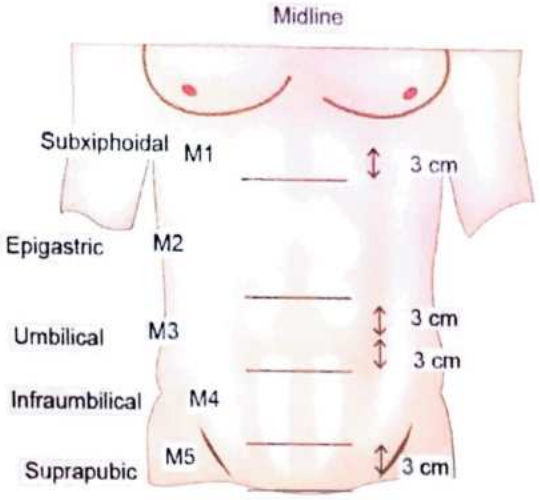
- Aka Post-operative ventral wall hernia
- Caused by failure of fusion of fascial tissues
- During laparotomy
  - With the help of Prolene suture (non- absorbable)
  - Subcutaneous fat is usually closed with Vicryl/ catgut
  - Skin is closed with silk (non- absorbable)
  - After laparotomy, rectus sheath is closed
- If failure of fusion of fascial tissues - Herniation of bowel
- Increased risk of incisional hernia
  - In Long, vertical, midline, lower abdominal incision

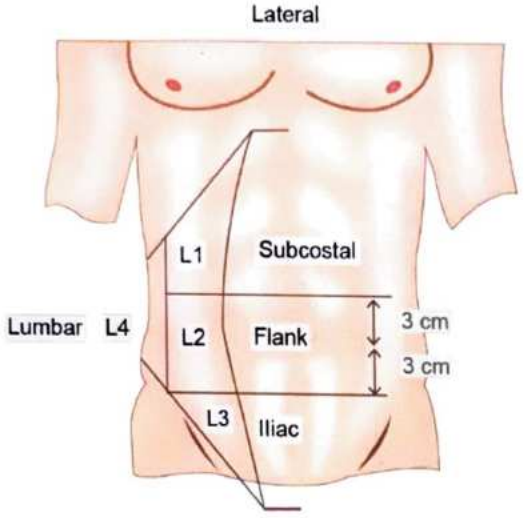
Risk factors

Refer Table 26.1

EHS classification

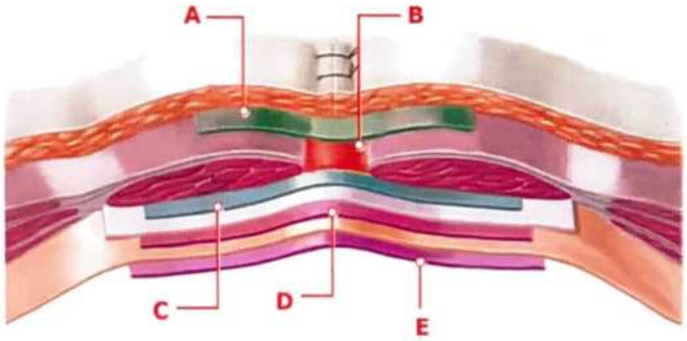
Refer Table 26.2





Treatment

- Gold standard Treatment- IPOM
  - A - Onlay /overlay: placing mesh above the facial sheath
  - B - Inlay / Interlay: suturing the edges of mesh through the sheath without closure & is the least commonly performed.
  - C/D - Sublay / underlay: placing mesh below the sheath & then closure
  - E- IPOM: Intra peritoneal Onlay mesh repair
    → Decrease Recurrence rate by > 50%



DESMOID TUMOR

01:07:09

Distribution

- In 60% cases: Extra abdominal
- In 25% cases: arises from abdominal wall
- In 50% cases: Intra-abdominal

Location

- Abdominal wall desmoid
  - Arises from Musculoaponeurotic structures in the infra-umbilical region
  - Unencapsulated- cracks whenever it is being cut.

Risk factors

- History of surgical incision / Trauma
- Estrogen stimulates growth (Mc in female)
- Variant of FAP - Gardner's syndrome (↑risk of desmoid tumor)
- No sarcomatous changes
- No distant metastasis
- Increased risk of recurrence despite of excision

Clinical features

- M/c presentation: Lumps/ mass

Investigations

- Investigation of choice
  - For diagnosis – Biopsy
  - For extent - MRI

Treatment

- Wide local excision with 2cm margin
- For recurrent desmoids: Surgery + Radiotherapy

Previous Year's Questions

Q. Most common presentation of abdominal desmoids tumor is? (AIIMS Nov 2017)

A. Abdominal pain
B. Abdominal mass
C. Fever
D. Urinary retention

Previous Year's Questions

Q. Desmoid tumor is associated with? (JIPMER May 2019)

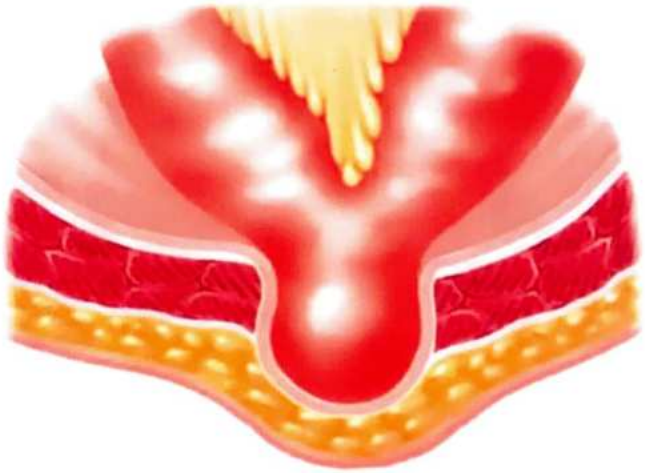
A. Colonic polyps
B. Pancreatic cancer
C. Ovarian cancer
D. Gastric cancer

Other Named Hernias

1. GIBBONS HERNIA - Hernia + Hydrocele
2. BERGER'S HERNIA - Hernia into pouch of Douglas
3. BECLAR'S HERNIA – Hernia through saphenous opening
4. OGILVIE'S HERNIA – Hernia through defect in conjoint tendon
5. STAMMER'S HERNIA – Hernia through transverse mesocolon after retrocolic Gastro-jejunostomy
6. PETERSON HERNIA – Hernia behind Roux limb after Roux-en-Y Gastric bypass (MC Bariatric surgery performed worldwide)
7. VELPAEU'S HERNIA
   - Aka pre vascular hernia
   - Sac is in front of femoral vessels
8. SERAFINI'S HERNIA
   - Aka Retro vascular hernia
   - Sac is located behind femoral vessels
9. HOLTHOSUE HERNIA
   - Type of inguinal hernia
   - Extension of bowel along inguinal ligament

RICHTER'S HERNIA

01:21:12

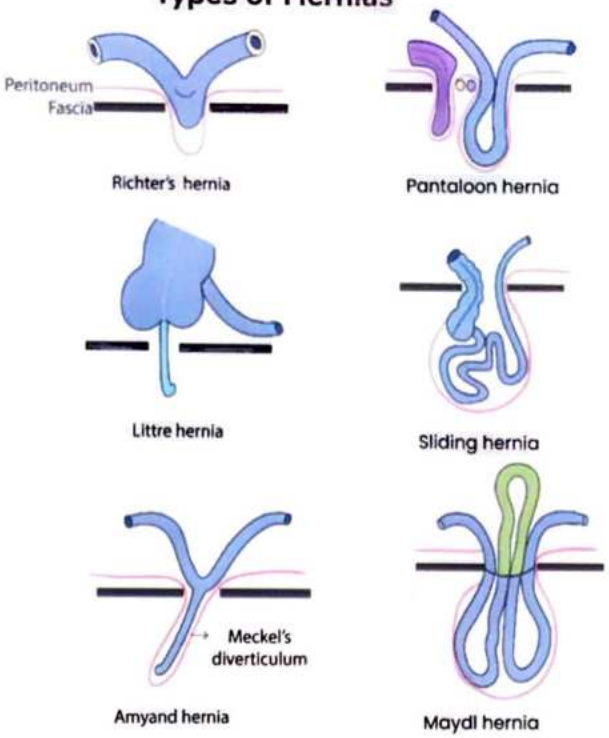


- Herniation of part of circumference of bowel

Clinical Features

- Colicky pain
- Diarrhoea
- Mimics acute Gastroenteritis → Delay in Diagnosis → ↑Risk of strangulation

Types of Hernias



Previous Year's Questions

Q. Hernia not related to abdominal wall? (JIPMER May 2019)

A. Amyand's hernia
B. Richter's hernia
C. Littre's hernia
D. Peterson hernia

Table 26.1

Surgery related	Surgeon related	Patient related

• Emergency Surgeries
• Post Op. Complications
  ○ Wound Infections
  ○ Burst Abdomen
	• Poor technique
	• Closure under tension
	• Use of absorbable sutures
		• Factors that contribute to Impaired wound healing
		  ○ Diabetes mellitus
		  ○ Steroid intake
		  ○ HIV positive / immunocompromised
		  ○ Jaundice & Cirrhosis

Table 26.2

Midline (M1 - M5)	**M1**: Sub xiphoidal (3cm from xiphoid process) **M2**: Epigastric (3 cm below xiphoid to 3cm above umbilicus) **M3**: Umbilical (3cm above and below umbilicus) **M4**: Infra umbilical (3cm below umbilicus and till 3cm above pubis) **M5**: Suprapubic (3cm cranial to the pubis)
Lateral (L1- L4)	**L1**: Subcoastal **L2**: Flank **L3**: Iliac **L4**: Lumbar

CLINICAL QUESTIONS

Q. 45 year old male came to the OPD with complaints of swelling in the abdominal wall which reduces on lying down. Examination revealed a positive cough impulse. CT scan findings were consistent with Spigelian hernia. True statement regarding Spigelian hernia:

A. It occurs exclusively in males
B. It involves part of the circumference of the bowel wall
C. It is best repaired by the classical Bassini technique of inguinal ligament repair
D. It occurs at the lateral edge of the linea semilunaris

Answer: D

Solution

Spigelian hernia occurs at the **linea semilunaris**, which extends along the lateral border of each rectus abdominis muscle. The posterior rectus sheath is deficient at the level of the arcuate line (semicircular line) about one-third of the distance between the umbilicus and the pubic symphysis; this is the most common site for spigelian hernia to occur through the linea semilunaris

They affect men and women equally and can occur at any age, but most common in elderly people

Patient often presents with localised pain in the area without a bulge because the hernia lies beneath the intact external oblique aponeurosis

Ultrasound or CT of the abdomen can be useful to establish the diagnosis

Spigelian hernias are repaired because of the risk for incarceration associated with its relatively narrow neck

The **Bassini technique is used for the repair of inguinal hernias only**

In **Richter hernia, a small portion or circumference of the anti mesenteric wall** of the intestine is trapped within the hernia and strangulation can occur without the presence of intestinal obstruction

27 SPLEEN

- Largest lymphatic organ
- Blood bank of body
- Stores 2% of blood
- Average weight 75-100 grams.
- Usually, spleen is not palpable
- If enlarged >2.5 times, it becomes palpable
- Relations of spleen
  - Spleen is in relation to 9th, 10th, 11th, ribs.
  - Long axis of spleen is along the 10th rib
- Develops from Cephalic part of Dorsal mesogastrium

SPLENECTOMY

00:02:54

- MC Indication - Trauma
- MC indication of Elective splenectomy – ITP
- Splenectomy always indicated in
  - Primary splenic tumor
  - Hereditary spherocytosis
- Splenectomy usually indicated in
  - Primary hypersplenism
  - Chronic ITP
  - Splenic vein thrombosis leading to gastric varices
  - Splenic Abscess

ITP (IDIOPATHIC THROMBOCYTOPENIC PURPURA)

00:05:56

- Aka Immune Thrombocytopenic purpura.
- Formation of Auto antibodies against platelets
- Autoantibody coated platelets are selectively destroyed in spleen, Platelet Destruction in spleen decreased Platelet count causing ITP leading to Petechiae & purpura
- Size of spleen is typically normal
- MC in children
- Seen in both boys & girls
- Resolve spontaneously in boys
- Chronic ITP usually seen in girls
- ITP persists in girls

- Clinical features
  - Petechiae
  - Purpura
  - Epistaxis
  - Gum bleeding
  - Size of spleen is characteristically normal (not enlarged)

Management

- Steroids - When used in long duration causes steroid related complications(Like Hypertrichosis and Hyper pigmentation which makes patient to discontinue treatment)
- Azathioprine
- Cyclophosphamide
- Gold standard treatment for ITP – Laparoscopic Splenectomy (open splenectomy not preferred because of normal size of spleen)
- In normal patient, for elective surgery minimum platelet count – $100000/mm^3$
- In ITP patient, for elective surgery minimum platelet count - $50,000/mm^3$
- Best time for platelet transfusion in ITP - after ligation of splenic artery (So, that platelets will not reach spleen & does not gest destroyed)

Complications

- Lung related complications
  - MC complication responsible for fever after surgery up to 48 hours is Atelectasis
  - (Noninfectious fever and is not associated with chills and rigors)
  - Consolidation – (fever + chills and rigors)
  - Pleural effusion

- Diaphragm related complications
  - Sub diaphragmatic hematoma
  - Sub diaphragmatic abscess

- Pancreas related complications
  - Acute pancreatitis
  - Injury to tail of pancreas
  - Pancreatic fistula

- Thromboembolic complications
  - Thrombocytosis
  - Immobilization

  } Increased risk of DVT → Increased risk of Pulmonary Embolism

OPSI (Overwhelming post splenectomy infection)

- MC late fatal complication of splenectomy
- Usually seen after 2-5 years of splenectomy
- Increased risk of OPSI in malignancy and hematological disorders
- Least risk in Trauma
- 40-50% mortality rate
- Normal function of Spleen - Phagocytosis of capsulated organisms
- In absence of spleen due to splenectomy – increased risk of capsulated organism infections
- Organisms responsible for OPSI
  - MC - Strep pneumoniae (Pneumococcus)
  - Neisseria meningitidis (Meningococcus)
  - H. influenza type B
- Healthy person → strep. Pneumoniae → usually cleared by 5 to 7 days.
- Prevention: By vaccination.
- Best time for vaccination
  - 2 weeks before elective splenectomy
  - As early as possible after emergency splenectomy

SPLENIC CYST

- MC true cyst of spleen – Hydatid cyst
- MC non-parasitic cyst - Pseudocyst (cyst lines by granulation tissue) (70-80%)
- MC congenital splenic cyst - Epidermoid cyst
- Overall, most common splenic cyst - Pseudocyst
- Incidence of hydatid cyst - 10%
- Incidence of pseudocyst - 70 to 80 %

SPLENIC TUMORS

00:25:18

- MC neoplasm of spleen – NHL
- MC primary benign tumor of spleen – Hemangioma
- MC primary malignant tumor of spleen - Angiosarcoma
- MC primary for splenic metastasis - Malignant melanoma
- MC primary for isolated secondaries to spleen – CA ovary

SPLENIC ABSCESS

00:27:10

- Rare condition
- Healthy patient having unilocular abscess – mortality rate is 15 -20%
- Immunocompromised, multilocular – mortality rate is 80%
- Predisposing factors
  - Malignancy
  - Polycythemia vera
  - IV drug abuse
  - HIV positive
  - Hemoglobinopathy
  - UTI
- MC organism responsible – staph aureus
- Fungal abscess is typically seen in HIV positive and immunocompromised caused by candida
- Other organisms responsible
  - Streptococcus
  - Salmonella
  - Gram negative enteric bacilli

- **Clinical features**
  - Abdominal pain
  - Tenderness
  - Peritonitis
  - Pruritic chest pain

- **Investigation**
  - Investigation of choice – CECT

- **Treatment**
  - Unilocular abscess: drainage + antibiotics
  - Multilocular abscess: splenectomy + drainage of left upper quadrant + antibiotics

LEARNING OBJECTIVES

UNIT 4: UROLOGY

- **Kidney and Ureter Part-1**
  - Introduction of Renal Stones and its Types, Calcium Oxalate Renal Stone, Uric Acid Stone, Struvite Stone, Cystine Stone, Xanthine Stone, Triamterene Stone, Silicate Stone
  - Investigation for Renal Stone
  - Indications for Conservative Management and Surgical Interventions
  - ESWL (Extracorporeal Shock Wave Lithotripsy)
  - PCNL (Percutaneous Nephrolithotomy, Ureteroscopy, Intracorporeal Lithotripsy
  - Management of Renal Stones and ureteric stones
  - Infectious Disorders of Kidney, EmphysematousPyelonephritis(EPN),Xanthogranulomatous Pyelonephritis(XGP), Difference between Pyonephrosis and Perinephric Abscess
  - Hydronephrosis (HDN), Unilateral and bilateral HDN
  - Genitourinary Tuberculosis
  - Changes seen in Kidney , Ureter,Bladder and Prostate.
- **Kidney and Ureter Part-2**
  - Renal Tumors, Angiomyolipoma, Renal Oncocytoma,
  - Renal Cell Carcinoma: Pathological and surgical aspect,classification and treatment
  - Pediatric Tumors,wilms tumour, CA Renal Pelvis
- **Kidney and Ureter Part-3**
  - Polycystic Kidney Disease, autosomal dominant and infantile PKD
  - Renal Agenesis, Renal Vascular Abnormality, Medullary Sponge Kidney
  - Pelviureteric Junction Obstruction, Retrocaval Ureter, Horse-Shoe Kidney
  - Ureterocele, Duplication of Ureter, Vesicoureteric Reflex
- **Urinary Bladder**
  - Ectopia Vesicae
  - Bladder stone,primary and secondary
  - Schistosomiasis, Similarity b/w Schistosomiasis and Genito Urinary TB
  - Malakoplakia
  - Interstitial Cystitis
  - Bladder Rupture
  - Carcinoma Bladder, Malignant Cystitis /Carcinoma -In-Situ, classification and management
- **Prostate and Seminal Vesicles**
  - McNeal Zone and basic principles
  - BPH, IPS scoring system, investigation and treatment
  - Indications of Surgical Intervention , Transurethral Incision of the Prostate, Open Prostatectomy
  - Acute Bacterial Prostatitis, Prostatic Calculi,
  - Carcinoma Prostate, tumor marker, PSA density, classification, gleason grade
- **Urethra and Penis**
  - Anatomy of urethra,penis
  - Hypospadia and epispadias
  - Posterior urethral valve
  - Phimosis and paraphimosis
  - Priapism, Urethral Injuries, Urethral Stricture,

- Peyronie's Disease,
- Carcinoma Penis and urethra

Testis Scrotum Part-1

- Normal Descent of Testis
- Position of Testis in Intrauterine Life
- Undescended Testis
- Ectopic and Retractile Testis
- Acute Epididymo-orchitis
- Testicular torsion
- hydrocele

Testis Scrotum Part-2

- Varicocele,spermatocele
- Fournier's Gangrene
- Testicular Tumors: Risk Factors & WHO Classification
- One line Questions regarding Testicular Tumors
- Seminoma- MC Testicular Tumor
- Tumor Markers in TT
- ITGCN
- Carcinoma Scrotum
- Perinephric Abscess
- Bilateral HDN

28 KIDNEY AND URETER PART-1

RENAL STONES

00:00:21

- **Mandatory factors for stone formation**
  - Super saturation
  - Crystallization
- **Randall Plaques**
  - Soft tissue calcification found in deep renal medulla
  - Act as nucleating agent for renal stones

TYPES OF RENAL STONES

00:02:00

Ca OXALATE STONES.

- Most common type of renal stones
- Radiopaque
- Risk factors
  - Hypercalcemia
  - Hypercalciuria
  - Hyperoxaluria

URIC ACID STONES

00:03:55

- Most common type of radiolucent renal stone

Risk factors

- Gout
- Lesch- Nyhan syndrome
- Myeloproliferative disorders (due to increased breakdown of cells)
- (Hypoxanthine→ Xanthine →Uric Acid)

Management Principles

- If acidic stone - do alkalinisation of urine
- If basic stone - do acidification of urine.
- Acid combines with base & forms salt which is soluble & is excreted in urine.
- Plenty of fluids
- Low purine diet
- Acetazolamideis used for Alkalinisation of urine
- Allopurinol-To block conversion of Hypoxanthine to xanthine & hence block formation of uric acid.

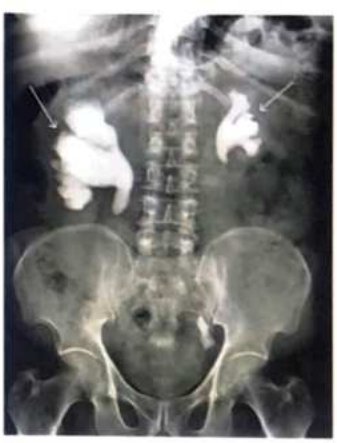
STRUVITE STONES

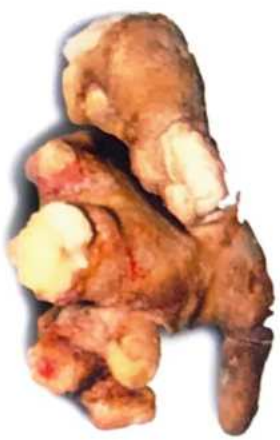
00:08:18

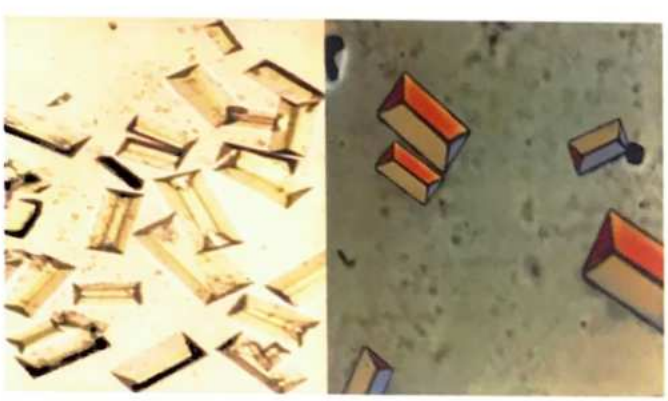
- Aka staghorn calculi / Triple phosphate stone (Ca, Mg, NH4+, Phosphate)
- MC in females because of short urethra (~4cm)
- Short urethra-Increased risk of UTI→Proteus→ produces urease.
- Urease converts urea into ammonia - Ammonia gets precipitated
- 3-5 minor calyces join major calyx and later forms pelvis, pelvic ureteric junction and then ureter.
- Struvite stone is very large & fills pelvic calyceal system and looks like staghorn (due to branching in stone) → very large silent destruction of kidney

Management

- Sandwich Technique-PCNL (percutaneous nephrolithotomy)+ ESWL (Extra corporeal shock wave lithotripsy)
- To prevent recurrence of stone formation- Irreversible inhibitor of urease (Acetoxy Hydroxamic acid)







Previous Year's Questions

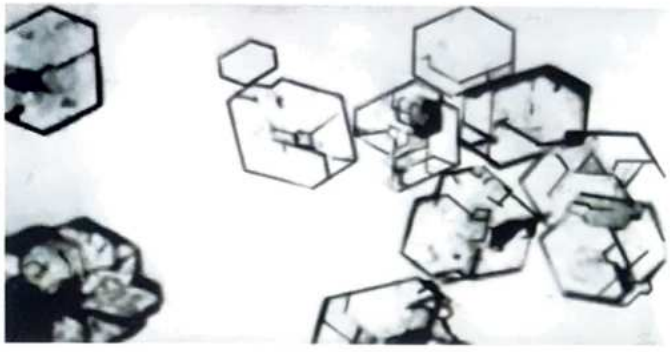
Q. Struvite stone is caused by which metal?
(NEET Jan 2018)

A. Magnesium
B. Calcium
C. Sodium and potassium
D. Both A and B

CYSTINE STONES

00:12:50

- Seen in cystinuria
- Radio Opaque (double sulphide bond)
- Very Hard (not easily broken by ESWL)
- Crystal– Benzene shaped Crystal (Hexagonal Crystal
- D- Penicillamine
- α-MPG (Alpha- mercaptopropionyl glycine)
  - (Alpha MPG> D- penicillamine)
  - Alpha – MPG – Better tolerated



XANTHINE STONES

00:15:47

- Seen in xanthinuria
- Hypoxanthine-xanthine (Allopurinol can be used to block conversion of Hypoxanthine to xanthine)
- Radiolucent
- Brick- red in color
- Lamination on cross section

DRUG INDUCED STONES

00:17:34

- **Triamterene**
  - excessive use of K+ sparing diuretic leads to formation of radiolucent stone
- **Indinavir**
  - Protease inhibitor used in HIV leads to formation of radiolucent stone
- **Silicate stone**
  - Excessive consumption of antacids containing silica
- **Radiolucent stones**
  - T - Triamterene
  - I - Indinavir
  - X - Xanthine
  - U - Uric acid
- **Acidic stone**
  - Calcium oxalate
  - Cysteine
  - Uric acid

How to remember

- CCU
  - Renal Stones-more common in males
  - Infectious renal stones-more common in females

CLINICAL FEATURES

00:22:41

- Abdominal pain - MC presentation
- **Causes of pain in the renal stone**
  - Obstruction is going to cause stretching in the renal capsule which can lead to non-colicky abdominal pain.
  - Stone fragment reaches ureter, ureter starts hyperperistalsis which can lead to colicky pain.
  - Radiation of pain depends on the location of stone
- **If stone in Upper 1/3rd of ureter, pain radiates to**
  - Testes (Males)
  - Labia majora (Females)
- **If stone in Middle 1/3rd of ureter, pain radiates to (via iliohypogastric nerve)**
  - Iliac fossa
  - Hypogastrium
  - Groin
- On right side-it mimics Acute Appendicitis
- On left side - it mimics Diverticulitis
- **If stone in Lower 1/3rd of ureter, pain radiates to (Via ilioinguinal nerve)**
  - Scrotum

- Perineum.
- Inner aspect of thigh

- If stone in intramural ureter-strangury (PAINFUL FREQUENT URINATION OF SMALL QUANTITY).

Previous Year's Questions

Q. Referred pain from ureteric colic is felt in the groin due to the involvement of the following nerve: (NEET PG 2019)

A. subcostal
B. iliohypogastric
C. ilioinguinal
D. genitofemoral

- Investigation of choice - Non contrast spiral CT

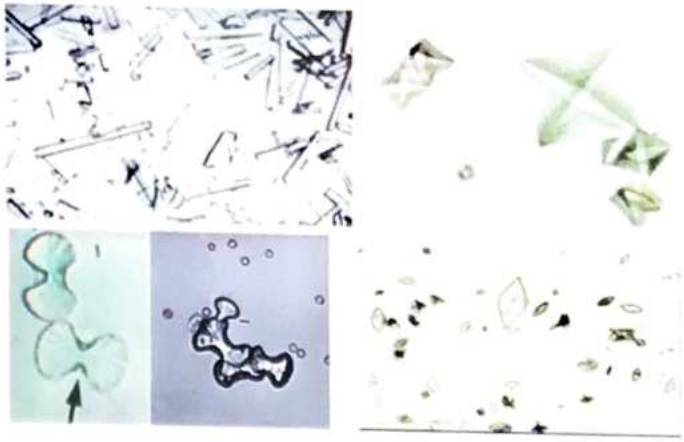
Management

- Analgesics [DOC- Diclofenac (Voveran)]

INVESTIGATIONS PERFORMED 00:28:22

- **Urine Routine & Microscopy**
  - Color
  - pH
  - Specific Gravity
  - Presence of Sugar / Albumin
  - RBCs / WBCs / Pus cells
  - Cast / crystals
- **Urine Culture & Sensitivity**
  - Confirmation of infection is done
  - To diagnose UTI +/-
  - To identify organism
  - To identify antibiotic sensitivity

- Calcium oxalate monohydrate stone- Dumbbell shaped
- Calcium oxalate dihydrate stone
- Envelope shaped
- Aka Bipyramidal shaped
- Uric Acid Crystals
  - Rosette shaped
  - Multi-faceted
- Calcium Phosphate-Amorphous crystals
- Struvite stone - coffin lid crystals
- Brushite stone- Needle shaped
- Cystine-Hexagonal or benzene shaped



X- RAY KUB 00:33:30

- 90% of Renal Stone- Radio opaque
- 90% of gall stones- Radiolucent
- 80% salivary gland stone – Radiopaque
- **Ultrasound**-Screening investigation for Hydronephrosis

IVP 00:35:24

- (access site of obstruction)- Intravenous dye injected usually antecubital fossa
- Used to access
  - Proximal part of obstruction
  - Hydronephrosis
  - Renal function

RGP 00:37:52

- Retrograde pyelogram
- Used to assess the distal part of obstruction

Radionucleotide scans 00:38:56

DMSA

- Dimercaprol succinic acid scan
- Used to assess M- Morphology
- S- Scar
- SA- Surface Anatomy
- Can evaluate presence of scar in kidney
  - Eg: Chronic pyelonephritis

DTPA

- Diethylene triaminePenta acetic acid scan
- Perfusion and Function
- IOC- for renal perfusion and function –DTPA

MAG-3

- Mercapto Acetyl glycine
- Gold standard for Renal perfusion

INDICATIONS OF CONSERVATIVE MANAGEMENT

00:42:13

- Stone size up to 5mm
- Non dilated ureter
- Stone located in lower third of ureter
- Progressive downward moment on repeated scan.

Principle

- Prevent super saturation & crystallization by dilution of urine.

Management

- →Plenty amount of fluids (4-6 liters/ day)
- →For 4mm stone -> Take 4 liters of water- > stone is excreted within 4 weeks
- →Alkalinisation /Acidification of urine for 4 weeks

Interventions

00:45:11

- ESWL (Extra corporeal shockwave lithotripsy): 85% of cases
- PCNL (Percutaneous nephrolithotomy)
- URS (Ureteroscopy): 15% of cases
- LSS (Laparoscopic stone surgery): Not commonly preferred
- OSS (Open stone surgery)

OSS indications

- Stone with non- function kidney = Nephrectomy has to be performed → open approach
- Stone with anatomical disorder of kidney e.g. (PUJ Obstruction) pyelolithotomy&pyeloplasty has to be performed → so, open approach

Previous Year's Questions

Q. Management of 4 cm size renal stag horn calculus? (AIIMS Nov 2017)

A. ESWL
B. PCNL
C. Intra renal repair surgery
D. Open pyelolithotomy

ESWL

00:47:52

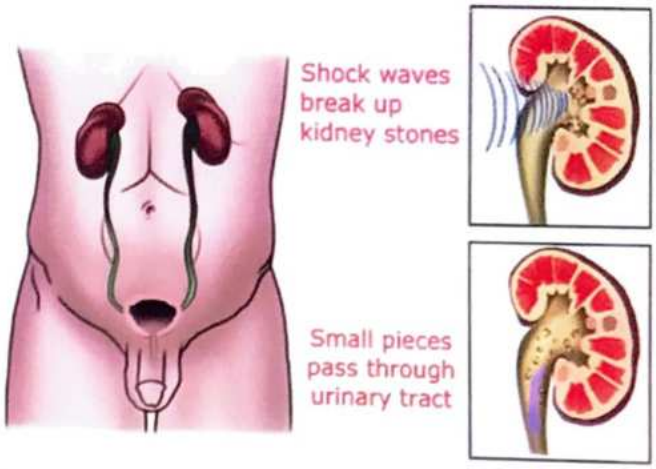
- Gold standard lithotripter used in ESWL-Dornier unmodified HM-3
- Shock wave induced tensile cracking

↓

Erosion & shattering

↓

Stone fragment excreted in urine via ureter



Complications

- If there is distal obstruction of ureter, all the stone fragments are collected in the Proximal part of ureter

Aka Steinstrasse / Street Of Stone / Columnation Of Gravel

- Hematoma in kidney (Bleeding due to shock waves)
- Increase risk of UTI
- Increased risk of Extra systoles
- For stones of size up to 2cm - ESWL is used

Hard stones that cannot be broken down by ESWL

- B - Bru
- shite
- H - Hydroxyapatite
- C - Cystine
- C - Calcium oxalate Monohydrate

How to remember

- BHC2

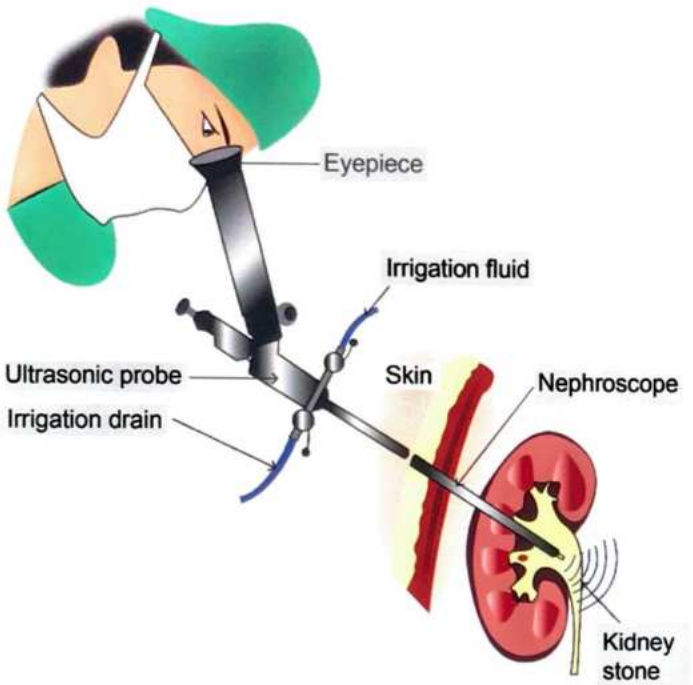
CONTRAINDICATIONS OF ESWL

Absolute Contraindications	Relative Contraindications
• Pregnancy (shock waves damage fetus) • Bleeding disorders. • (Increased risk of hematoma & bleeding so not be given in patients diagnosed with bleeding disorders)	• Pacemaker • UTI • Uncontrolled HTN • Obesity • Orthopedic abnormalities (Scoliosis/ kyphoscoliosis) • Distal Obstruction • Renal failure • Aneurysm

PCNL (PERCUTANEOUS NEPHROLITHOTOMY)

00:56:08

- A tract is created in kidney via abdominal skin & then nephrolithotomy is performed.
- Renal artery has two branches
  - Anterior branch of renal artery
  - Posterior branch of renal artery
- For PCLN-posterior approach is used. There are two posterior approaches followed.
  - Posterior pelvic approach
  - Posterior calyceal approach
- In posterior pelvic approach, the posterior branch of renal artery is injured. So, posterior calyceal approach is preferred in percutaneous nephrolithotomy to prevent injury of posterior branch of renal artery



Indications

- Size of stone> 2cm
- Distal obstruction
- UTI
- Hard Stone (BHC-2)
- Lower calyceal stone
  - Staghorn calculi (PCNL + ESWL) - Sandwich technique
  - Most common complications of PCNL -Bleeding
  - Most commonly injured organ - Pleura > colon > Spleen

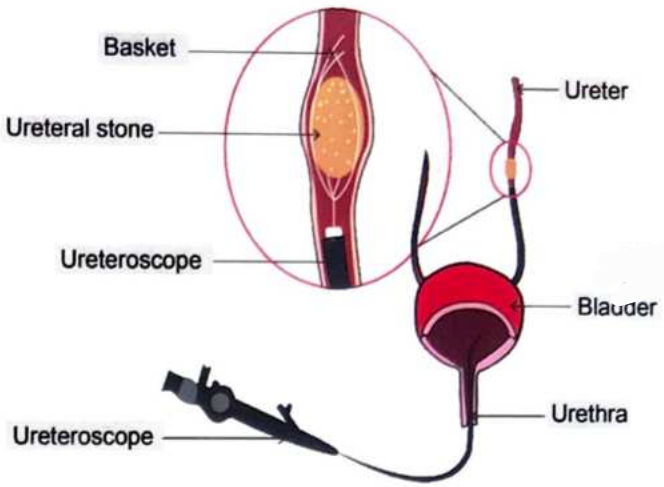
URS(URETEROSCOPY)

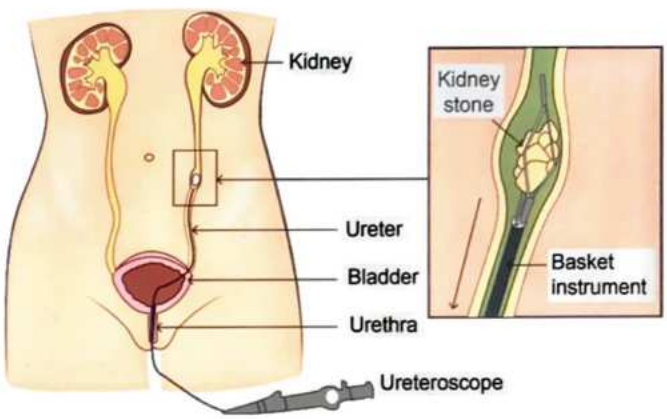
1:02:13

- Performed under spinal anesthesia
- MC Complication of URS-Ureteric perforation of URS (Internal diameter of ureter - 4mm)

Indications

- For insertion of DJ stent
- For removal of stone
- For removal of foreign body
- Taking biopsy from urothelial tumor





INTRACORPOREAL LITHOTRIPSY

1:06:04

4 lithotripters are used

a. Electro – hydraulic lithotripter (mainly used)

b. Ultrasonic Lithotripter

c. Ballistic Lithotripter
d. Laser Lithotripter

EHL

- Cheap
- Very effective
- Narrow safety margin
- Mainly used for bladder stone

Laser lithotripter

- Uses "Holmium – YAG" laser
  - Best source of laser for intracorporeal lithotripsy.
  - MC used laser for renal stones and Benign prostatic hyperplasia.
  - Causes stone vaporization by photothermal mechanism
    - → If laser lithotripter used for Uric acid stones - causes production of Cyanide
    - → No Significant Toxicity from the cyanide produced.
    - → Hight cost, but very effective

MANAGENMENT OF RENAL STONE 01:09:47

- For Stone size up to 2cm - ESWL
- For Stone size > 2cm - PCNL
- For Hard stone (BHC-2) - PCNL
- For Staghorn calculi-Sandwich technique (PCNL + ESWL)

MANAGEMENT OF URETERIC STONE 01:11:41

Depends on location of stone

- Stone in upper and middle 1/3rd of ureter
- Size of stone up to 1cm - ESWL > URS
- Size of stone > 1cm - URS
- Stone in lower 1/3rd of ureter-URS(No use of shockwaves in this area)

Previous Year's Questions

A. calcium oxalate stone: M/C type of kidney stone
B. uric acid stones: M/C radiolucent renal stone
C: xanthine stones: Brick red coloured, round and show lamination on cross section
D: cystine: Extremely hard radiolucent stones
Ans: D

INFECTIOUS DISORDERS OF KIDNEY 1:13:22

Important points:

Emphysematous Cholecystitis

- MC organism involved - Cl. Perfringens (Cl. Welchii)
- MC aerobic organism responsible - E. coli

Emphysematous pyelonephritis

- MC organism involved- E. coli

Xanthogranulomatous Pyelonephritis

- MC organism involved - Proteus (Staghorn calculi)

Xanthogranulomatouscholecystitis

- Non-infectious condition
- Caused by - Rupture of RokitanskyAschoff Sinuses

↓

Bile leak

↓

Xanthogranulomatouscholecystitis

EMPHYSEMATOUS PYELONEPHRITIS 01:17:30

- Characterised by: Presence of ring of air around kidney (perinephric region) or within the kidney
- MC organism responsible: E. coli >klebsiella
- MC in Diabetic (due to low immunity) & Females

Clinical features

- Flank pain, Fever & Vomiting
- Mortality rate is 19- 43%

Investigation

- **On X-ray** – Presence of air in relation to kidney
- IOC - **CT scan**

Treatment

- IV antibiotics
- Resuscitation
- Control blood glucose
- **If pus / evidence of infection is present**- Drainage should be done
- Nephrectomy to save the life of patient

XANTHOGRANULOMATOUS PYELONEPHRITIS 1:20:10

- Chronic bacterial infection
- MC organism - Proteus
- Associated with Struvite stone causing Obstructed and

hydro nephrotic kidney

Pathology

- Presence of Xanthoma cells in renal parenchyma (Foamy lipid laden histocytes)

↓

Mimics – Clear cell variant of RCC

Clinical features

- Flank pain
- Fever with chills and rigor
- Flank Mass
- Bacteriuria

Investigation

- IOC – **CECT**

Treatment

- Initially, Partial Nephrectomy – if not possible

↓

Total Nephrectomy

Pyonephrosis and pernephric abscess

Basic difference

Perinephric abscess	Pyonephrosis
• Collection of Pus around kidney	• Pus is collected inside the kidney (Bag of Pus)

PYONEPHROSIS

01:25:01

- Kidney is a bag of Pus
- Seen in chronic obstruction: Hydronephrosis

↓

Destruction of renal parenchyma

↓

Pus collection

- Most Common cause of obstruction – Renal stones

Clinical features

- Fever
- Anemia
- Mass in loin

Diagnosis

- **USG**

Management

- IV antibiotics + Drainage
- Percutaneous nephrostomy (Older, diabetic etc)
- For Non-Functioning Kidney - Nephrectomy

PERINEPHRIC ABSCESS

01:29:21

- Collection of Pus around kidney
- Spread by 2 routes
  - Cortical extension
  - Hematogenous spread
    - → Urine culture positive in 1/3rd cases
    - → Blood culture positive in 50% cases
    - → Most Common organism – E. coli > Proteus

Clinical features

- Pain
- Tenderness
- Fever

Diagnosis

- USG/CT

Management

- IV antibiotics + percutaneous drainage

↓not responding

Open drainage / Nephrectomy

HYDRONEPHROSIS

01:32:37

- Aseptic dilation of kidney
- Caused by Outflow obstruction of Urine
- Can be Unilateral / Bilateral

Causes of Unilateral Hydronephrosis

01:35:25

Extramural	Intramural	Intraluminal
• Advanced Malignancies ○ Colorectal cancer ○ Carcinoma cervix ○ Carcinoma ○ Prostate	• PUJ Obstruction	• Stone • DM
• Retro peritoneal fibrosis	• Ureterocele	• Papillary Slough • Due to ○ Analgesic nephropathy ○ Sickle cell anaemia

- Retrocaval Ureter
- Ureteric Stricture
- Ureteric stricture.
- Urothelial tumor

CAUSES OF BILATERAL HYDRONEPHROSIS 01:38:20

Congenital	Acquired
Posterior Urethral Valve	Bladder neck stenosis
Urethral atresia	BPH
	CA Prostate
	Urethral strictures

CLINICAL FEATURES 01:40:24

U/L Hydronephrosis

- Mild pain / Dull aching pain
- Acute Ureteric Colic
- Intermittent hydronephrosis (DIETL'S Crisis)

↓

Patient present with severe pain in flank and palpable swelling

↓

Disappears after passage of large volume of Urine

B/L Hydronephrosis

- Symptoms of Bladder Outlet Obstruction
- Signs and symptoms of renal failure.

Investigation

- Screening investigation - USG
- IOC for Dx - DTPA

Management

- < 10% kidney function – Indication for nephrectomy
- Treatment of underlying cause

GENITOURINARY TB 01:45:27

- MC organism involved - Mycobacterium tuberculosis
- MC in males, 20 to 40 years
- MC route of spread - Hematogenous
- Primary organ involved –Lungs

Primarily involved organs by Hematogenous spread

- Kidney
- Prostate

Secondarily involved organs by Hematogenous spread

- **By ascent of infection**: form Prostate to vas deferens (moving upwards)
- **By Descent of infection**: from kidney to ureter & bladder (moving down)
- Testes is spared

Pathophysiology

Bacteria (From hematogenous spread)

↓

Lodged into peri-glomerular capillaries

↓

If good immunity - Infection cleared

If bad immunity - Activation of bacteria

↓

Formation of cortical granuloma

↓

Formation of tubercular abscess

↓

Ruptures into pelvicalyceal system

↓

Sterile Pyuria

(On urine routine & microscopy - Pus cells)

(On culture & sensitivity - No growth within 48 hours)

- MC earliest symptom of GU TB - Increased frequency of urination

In Kidney and ureter

Calyceal Stenosis / stenosis at PUJ

↓

Hydronephrosis / Pyonephrosis

↓

Perinephric abscess

↓

Caseous necrosis

↓

Kidney filled with cheesy material (Aka Putty kidney)

↓

Calcification

(Calcified kidney Aka cement kidney)

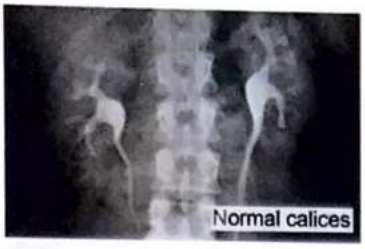
↓

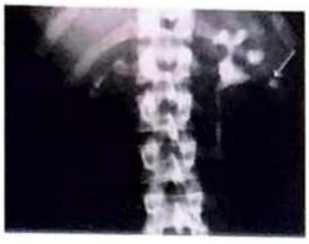
Becomes Non-functioning calcified kidney

(Auto nephrectomy)

Important Information

- Auto nephrectomy is seen in GUTB
- Auto splenectomy is seen in sickle cell disease





In bladder 01:53:50

- Infection moves from ureter into bladder - Pallor around ureteric orifice in the bladder
- Initial sign visualized during cystoscopy in TB - Pallor around ureteric orifice.
- hronic inflammation in bladder forms tubercles

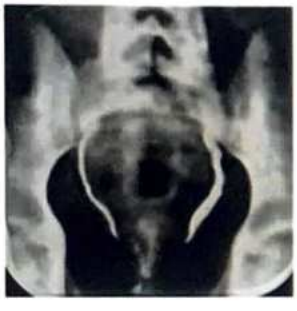
↓

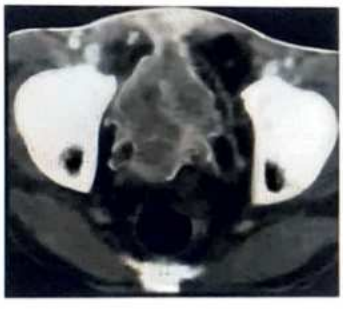
Fibrosis

↓

Bladder becomes small, contracted bladder with highly reduced capacity – Thimble bladder

- In advanced cases of TB, when there is contracted bladder – it gives Golf hole ureteric orifice.





In prostate 01:57:00

- Becomes Calcified - hard & nodular
- Testis is spared in genitourinary TB
- Characteristic feature of TB - Beaded appearance of vas deferens with multiple discharging sinuses via scrotum

Investigation

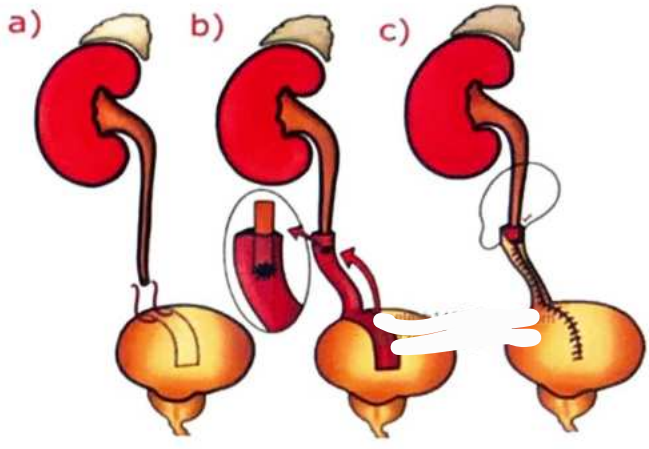
- Urine Routine and microscopy- Pus
- Urine culture & Sensitivity - no growth within 48 hours (sterile Pyuria)
- Earliest sign of renal TB on IVP - Moth Eaten calyx
- IOC for diagnosis of earliest changes of renal TB –IVP
- Other changes seen in IVP
  - Calectasis (calyx become swollen and dilated)
  - Space occupying lesion
  - Hydronephrosis
- IOC for diagnosis of Renal TB – CECT
  - On RGP-Pipe-Stem Ureter (Medial deviation of ureter)

Treatment

- ATT + Management of complications

Complications

1. For Ureteric stricture – Dilation
2. For Small contracted bladder-Augmentation Enterocystoplasty
3. For non-functioning kidney – Nephrectomy
4. For Non-dilatable stricture of lower 3rd of ureter - BOARI'S OPERATION (Excise the Non dilatable stricture and part of ureter & then rise a flap from bladder and suture the defect)



Boari's operation

Previous Year's Questions

Q. The most sensitive imaging modality to detect early renal tuberculosis is: (NEET PG 2015)

A: intravenous urography
B: computed tomography
C: ultrasound
D: Magnetic resonance imaging.

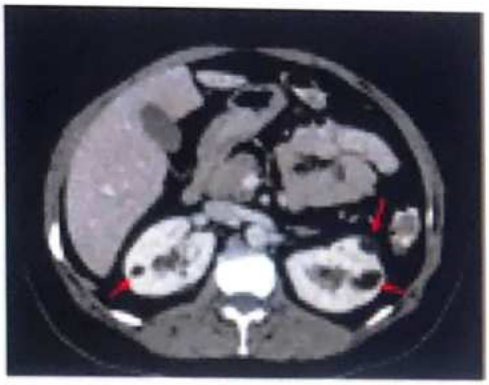
29 KIDNEY AND URETER PART-2

BENIGN RENAL TUMORS

ANGIOMYOLIPOMA

00:00:24

- Benign tumor
- Composition - Blood vessel + Muscle + fat
- MC in Females among 5-6th decade
- Associated with tuberous sclerosis (young patient with multiple & bilateral Angiolipoma)
- On Immunohistochemistry
  - Marker-HMB-45 is positive in both Angiomyolipoma& Malignant melanoma
- Presence of Macroaneurysm: Increased risk of Retroperitoneal Hemorrhage in 10% cases and is called as WUNDERLICH Syndrome



Clinical Features

- Asymptomatic – so diagnosed incidentally

Investigations

- IOC for most renal tumors: CECT (except Wilms tumor - MRI)
  - Presence of fat
  - Absence of calcification (These features differentiate RCC from angiomyolipoma)

Treatment

- For Asymptomatic, tumor up to 4cm: Observation
- For Symptomatic,> 4cm-Nephron sparing surgery partial nephrectomy.
- Bleeding: Angioembolization

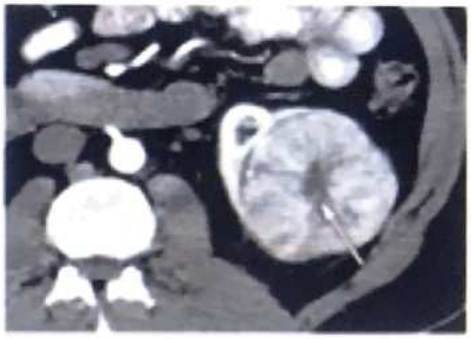
Previous Year's Questions

Q. All of the following statements are correct about angiomyolioma except: (JIPMER July 2018)
A. associated with tuberous sclerosis
B. positive immunoreactivity for HMB-45
C. presence of fat and calcification on CT
D. wunderlich's syndrome is seen in 10% of patients.

RENAL ONCOCYTOMA

00:09:04

- Responsible for 3-7% of solid renal tumor
- Arise from oncocytes, having rich mitochondria
- Renal oncocytoma looks like eosinophilic variant of chromophobe RCC



Investigation

- IOC for D_x - CECT (shows Central stellate scar)
- **On Angiography - spoke wheel pattern**

Treatment

- Nephron sparing surgery

Important Information

- Central stellate scar
- Also Seen in
- FNH (focal nodular hyperplasia)
- Fibrolamellar variant in HCC
- Serous cystadenoma pancreas
- Renal oncocytoma

RENAL CELL CARCINOMA

00:12:59

Pathological aspect

Clear cell variant of RCC

- MC variant of RCC
- Arise from PCT
- Cells contain glycogen & lipids →washed away during staining - Cell appears clear
- Mutation of VHL gene located on chromosome 3.
  - Deletion
  - Translocation t (3:6, 3:8, 3:11)

Papillary cell variant of RCC

- Papillary projection
- MC type of RCC Seen in patients of cystic disease requiring hemodialysis
- Mutation of MET gene located on Chromosome 7 (trisomy)
- In trisomy, chromosome 7, 16, 17 are also involved
- It arises from PCT
- This variant of RCC is Hemorrhagic + cystic Tumor
- Associated with Dystrophic Calcification-Psammoma Bodies
- Psammoma bodies are seen in
  - P - Papillary variant of RCC and PCT
  - S - serous cyst adenoma ovary
  - M - meningioma

Chromophobe variant of RCC

- Best prognosis
- Arise from - Intercalated cells of collecting duct
- Plant cell appearance
  - Relatively clear eosinophilic cytoplasm
  - Nucleus with fine chromatin
  - Thickened cell membrane
  - Perinuclear halo.
- Chromosomes lost are - 1, 2, 6, 10, 13, 17, 21, Y
- Multiple chromosome Loss - Extreme Hypodiploidy

BELLINI DUCT CARCINOMA VARIANT OF RCC

00:20:49

- Rare
- Arises from collecting duct
- Has HOBNAIL Pattern
- Associated with - Desmoplastic Reaction
- Poor prognosis

Medullary variant of RCC

- Exclusively seen in children having Sickle cell trait
- Rare

Previous Year's Questions

Q. Which of the following combination is incorrect? (NEET PG 2019)

A. M/C type of RCC: Clear cell carcinoma
B. M/C type seen with dialysis associated cystic disease: Papillary carcinoma
C. Exclusively associated with sickle cell trait: Medullary cell carcinoma
D. best prognosis: Clear cell carcinoma.

RENAL CELL CARCINOMA

00:23:04

Surgical aspect

- Aka Hyper Nephroma / Gravitz Tumor / Radiologist tumor / Internist tumor
- MC malignancy of kidney
- MC in Males among 6- 7th decade
- Sporadic [scattered in the population]

Risk factors

- Smoking / Tobacco
- Analgesic Nephropathy
- Cadmium + Asbestos exposure

UNIQUE FEATURES OF RCC

00:27:00

- Has pseudo capsule
- Refractory to cytotoxic agents
- Shows response to biological response modifiers (IL-2 & INF- α)
- Prolonged period of stable disease
- Spontaneous Regression is seen in 5 malignancies
  - **N** – Neuroblastoma
  - **C** – Choriocarcinoma
  - **R** – Renal Cell Carcinoma
  - **M** – Malignant Melanoma
  - **R** – Retinoblastoma

How to remember

- NCRMR

Clinical Features

00:30:00

- "TOO- LATE" TRIAD: Mass + Pain + Hematuria
- Triad is seen in 10% patients with advanced disease
- MC presentation: Hematuria

- In Advanced cases, Non-Reducing Varicocele: suspicious varicocele.

Due to thrombus from left RCC.

PARANEOPLASTIC MANIFESTATIONS OF RCC

00:34:17

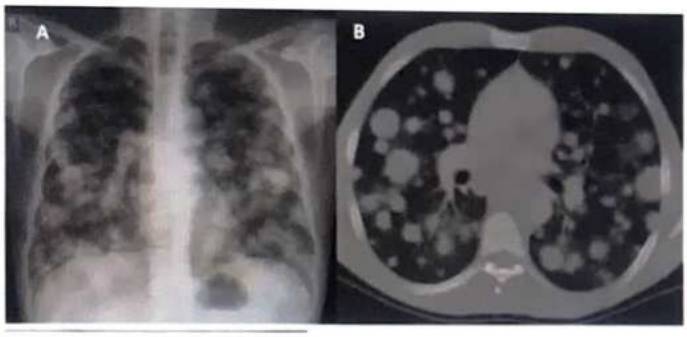
1. Raised ESR - MC (> 55% of patients)
2. Anemia-decreased erythropoietin due to nonfunctional mass replacing functional kidney
3. Polycythemia-due to functional mass which increase erythropoietin production
4. Hypertension-Increase Renin by production from mass / by compression of flood vessels by activation of RAAS system
5. Hypercalcemia - due to release of PTH- rp Medically managed with Bisphosphonates, (ZolendroNate). When consuming Bisphosphonates, plenty of water should be taken and standing erect for half an hour to prevent esophagitis
6. Stauffer's Syndrome (Non metastatic hepatic dysfunction) RCC patient with jaundice - Raised bilirubin, ALP

- On USG & CT abdomen – No evidence of metastasis.
- These changes are due to IL-6 and this is known as non-metastatic hepatic dysfunction and improves after tumor resection

Route of spread

00:39:05

- MC route of spread: Hematogenous
- MC site of metastasis: lungs
- Cannon Ball Secondaries are seen in RCC and Choriocarcinoma(variant of testicular tumor)



- MC malignancy responsible for Osteoblastic secondaries in Males - Carcinoma prostate
- MC malignancy responsible for Osteolyticsecondaries (Hyper vascular) in Males: RCC
- Pulsatile secondaries are seen in
  - RCC
  - Follicular Carcinoma Thyroid

Investigation

00:42:20

- IOC: CECT
- IOC for detecting tumor thrombus - MRI (to differentiate tumor thrombosis from bland thrombosis)
- GOLD STANDARD INVESTIGATION for ivc invasion- Inferior vena cava gram

8TH AJCC TNM CLASSIFICATION OF RCC

00:44:20

T_{1a}	Size up to 4cm confined to kidney
T_{1b}	Size > 4-7 cm confined to kidney
T_{2a}	Size > 7-10 cm confined to kidney
T_{2b}	Size > 10 cm confined to kidney
T_{3a}	• Tumor grossly extends into renal veins or its segmental branches. • Tumor invades perirenal and/or renal sinus fat without involvement of Gerota's fascia
T_{3b}	Tumor extends grossly into IVC below diaphragm
T_{3c}	Tumor extends into IVC above diaphragm or tumor invades the wall of IVC.
T_4	Tumor invades beyond Gerota's Fascia

N Classification

N_0	No metastasis to regional lymph nodes
N_1	Metastasis to regional LN

Stages

Stage I	T_1
Stage II	T_2
Stage III	T_{1-3} N_1 T_3
Stage IV	T_4 N_0 M_0 T any N any M_1

Treatment

00:50:06

Localized RCC	Locally advanced / Metastatic RCC
• Radical nephrectomy • Indications of Nephron sparing surgery:RCC size up to 4cm,	• Radical Nephrectomy • 1st line agent: SUNITINIB

- RCC in solitary kidney,
  - Bilateral RCC,
  - RCC with diseased contralateral kidney like Renal artery stenosis.
- 2nd line agent - IL-2 + IFN-α

Previous Year's Questions

Q. Management of RCC less than 4 cm in size?
(NEET Jan 2020)

A. Radical nephrectomy
B. Partial nephrectomy
C. Chemotherapy
D. Surgery followed by chemotherapy

NAMED STAGING & GRADING

00:53:26

• Robson staging • FuhrmanGrading	RCC
• Jackson staging	CA Penis
• Gleason Grading	CA Prostate

PEDIATRIC TUMORS

00:54:26

- MC malignancy of infancy, extra cranial malignancy: Neuroblastoma
- MC malignancy of childhood - Leukemia
- MC solid malignancy of childhood - Brain tumor
- MC intra-abdominal malignancy in children - Neuroblastoma
- MC extracranial solid malignancy-Neuroblastoma
- MC second Intra-abdominal Malignancy in children - Wilms' tumor
- MC primary Renal Malignancy-Wilm's Tumors
- MC Renal Tumor of infancy-Congenital Mesoblastic Nephroma
- MC Soft tissue tumor in children - Rhabdomyosarcoma
- MC malignancy of childhood - Leukemia (ALL)
- MC solid malignancy of childhood - Brain tumor

WILM'S TUMOR

00:58:11

- Aka Nephroblastoma
- MC primary renal Malignancy of childhood
- 2nd MC intraabdominal malignancy of childhood
- Usually seen among children of 2-5 years of age
- Usually Unilateral
- Genes involved - WT1 & WT2 located on chromosome II
- Components of Wilms tumor
  - **B** – **B**lastema
  - **E** – **E**pithelium
  - **ST** – **ST**roma

How to remember

- BEST

Variants of Wilm's tumor

- WAGR Syndrome
  - Wilms Tumor
  - Aniridia
  - Genital anomalies
  - Retardation (mental)
- DENYS DRASCH Syndrome
  - Gonadal Dysgenesis (associated with male pseudo hermaphroditism)
  - Renal failure
- BECKWITH WEIDMAN Syndrome
  - Hemihypertrophy
  - Visceromegaly
  - Macroglossia
  - Omphalocele
  - Hepatoblastoma

CLINICAL PRESENTATION

1:02:31

- TRIAD
  - Intra-abdominal mass (MC presentation)
  - Fever (disappears after tumor resection)
  - Microscopic Hematuria
- Pain (But pain is not part of Triad)

Route of spread

- Route of spread: Hematogenous
- MC site of metastasis: Lungs

Investigations

- Investigation of choice: MRI > CECT (better soft tissue details)
- In Wilm's tumor
  - CRESCENT shaped discrete and peripheralcalcification
  - Cannot cross midline
- In Neuroblastoma
  - Finely stippled calcification
  - Can cross midline

Treatment

- Radical Nephrectomy
- Most important Prognostic Factor - Histology > Stage
- If Adverse histological factors Start chemotherapy within 5 days & start Radiotherapy within 10 days
- Chemotherapy Regimen
  - V - Vincristine
  - C - Cyclophosphamide
  - D - Doxorubicin/ Dactinomycin

Staging

Pre chemotherapy staging	Post chemotherapy staging
• Preferred by NWTSG staging system • Staging & surgery is done before chemotherapy	• Preferred by international society of Pediatric Oncology (SIOP staging system) • Staging & Surgery is done after chemotherapy

CARCINOMA RENAL PELVIS

01:11:30

- MC histological type - Transitional Cell Carcinoma

Risk Factors

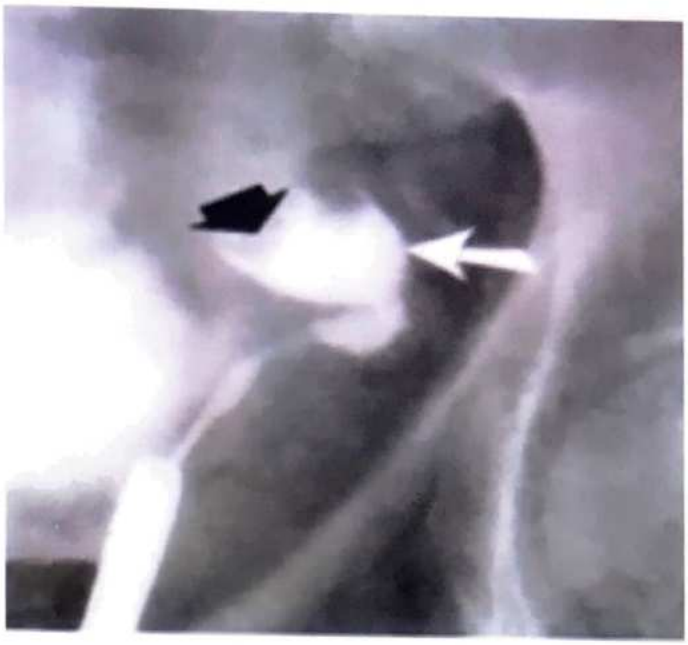
- Smoking
- Analgesics like phenacetin
- Industrial Dye/ Solvent
- Balkan's Nephropathy

Clinical Features

- MC symptom: Painless gross hematuria
- Flank pain
- Irritative voiding symptoms

Investigations

- Ureteroscopic brush cytology: can diagnose tumor at renal pelvis.
- On IVP- Filling defect can be seen.
- In CA of renal pelvis, due to poor cohesion between cells, these cells will pass via ureter and any obstruction in the ureter will cause dilatation of proximal as well as distal part from obstruction.
- GOBLET sign - dilation of parts of ureter distal to obstruction seen on Retrograde pyelography.
- Bergman sign - coiling of catheter distal to obstruction
- IOC for Diagnosis - CT Urography



Treatment

- Nephroureterectomy + Removal of cuff of bladder

Previous Year's Questions

Q. A 55 yr old male with 35 pack years presented with painless mass in left scrotal sac and microscopic haematuria. On lab investigations, alpa-fetoprotein and lactate dehydrogenase was negative. What is the diagnosis?

(AIIMS NOV 2018)

A. Epidydmitis
B. Seminoma
C. renal cell carcinoma
D. carcinoma lung.

30 KIDNEY AND URETER PART-3

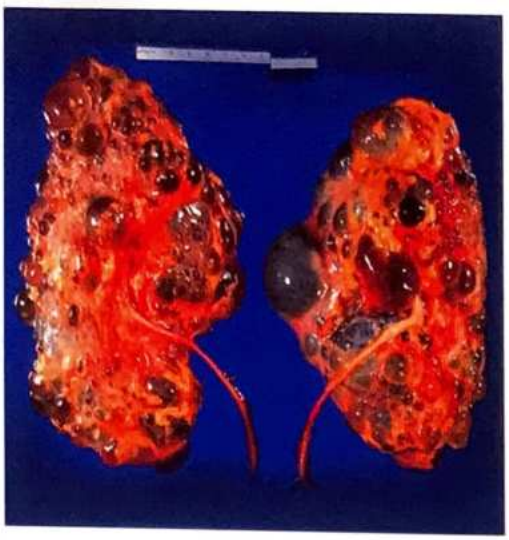
CONGENITAL ABNORMALITIES OF KIDNEY AND URETER

00:00:24

Polycystic kidney disease

2 Types

- ADPKD: Autosomal Dominant
- Infantile PKD: Autosomal Recessive



ADPKD [Autosomal Dominant Polycystic Kidney Disease]

- Involvement of chromosome 16, 4.
- Abnormal protein – Polycystin
- In ADPKD - both kidneys are replaced by multiple cysts

↓

Kidney loses its function of concentration of urine

↓

Pt. passes large amount of diluted urine (polyuria) Decreased specific gravity of urine.

- Due to cysts in kidney - Compression of blood vessels

↓

Activation of RAAS

↓

Hypertension

Any compression in pelvicalyceal system will lead to HIS (Hydronephrosis; Infection; Stone)→Haematuria

Clinical Features

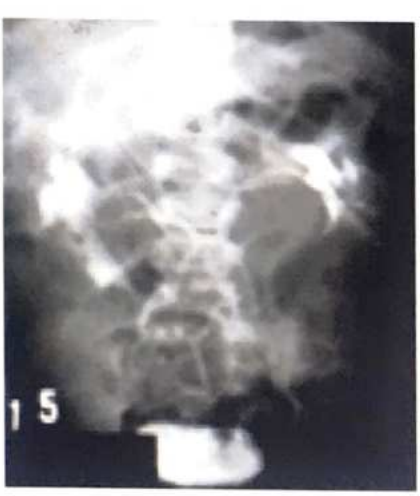
- Usually presented on 3rd to 4th decade
- MC - Hypertension (75% Adults & 25% Children)
- Other Presentations
- Polyuria
- Nocturia
- Hematuria
- Nephrolithiasis
- MC cause of death-Cardiovascular Disorders(like berry aneurysm
- CRF
- Usually in 5th to 6th decade
- Management - Hemodialysis/ Renal transplantation

Extra- renal manifestations of ADPKD 00:07:56

- Polycystic Liver Disease (MC)
  - Cyst in Ovary, Pancreas, Spleen
  - Mitral Valve prolapses
  - Berry Aneurysm
  - Colonic diverticulosis
  - Arachnoid cyst
  - Cyst in seminal vesicle
  - In ADPKD, Cyst is not seen in Lungs
  - In 8% of cases→ Arachnoid cyst is seen involving brain

Investigations

- IOC – CECT
- On IVP
  - Spider leg/ Bell- Shaped appearance
  - Bubble Appearance
  - Swiss- Cheese Appearance



Management

- TOC-Renal Transplantation
- ROVSING'S Operation–Deroofing of Cyst in ADPKD
- ROVSING'S Syndrome-Hyperextension of spine in treatment of horseshoe kidney produces abdominal Pain, Nausea, Vomiting.
- ROVSING Sign-pain in right iliac fossa on pressing left iliac fossa

Previous Year's Questions

Q. Which is the most common infection in a transplant patient after 3-4 months? In renal transplant recipients, which is the likely organism causing reactivation disease within 34 months after surgery? (NEET Jan 2020)

A. HSV
B. CMV
C. EBV
D VZV

INFANTILE POLYCYSTIC KIDNEY DISEASE (AR)

- Bilateral and most severe form of polycystic kidney disease
- Most patient die within 2 months of birth because of uremia and pulmonary hypoplasia
- Also associated with hepatic fibrosis and pulmonary fibrosis

Diagnosis

- IVP (sunburst pattern)

Treatment

- No cure
- Only palliative treatment is done

RENAL AGENESIS

00:18:16

- Unilateral renal agenesis 1:1000 live birth
- More common in males in left side
- Associated with:
  - Oligohydramnios
  - Pulmonary hypoplasia
  - Amnion nodosum
  - Potter facies (usually seen in bilateral agenesis)
- MC renal vascular abnormality-supernumerary renal artery (supernumerary renal vein is less common)

MEDULLARY SPONGE KIDNEY (AUTOSOMAL RECESSIVE)

00:21:27

- Collecting duct is dilated and associated with multiple cyst
- On cut section – sponge or honey comb appearance
- Usually bilateral
- Stones and infection are responsible for most of the symptoms
- Associated with:
  - Hypertrophy
  - Hypercalcemia
  - Nephrolithiasis (presence of stone)
  - Nephrocalcinosis (deposition of calcium in renal parenchyma)

Clinical features

- Renal colic > UTI > Gross hematuria

Investigation

- IOC – IVP
- Findings
  - Bristles of brush appearance
  - Bouquet of flowers appearance

Treatment

- No cure
- Palliative treatment depends on complication

PUJ OBSTRUCTION (PELVIC URETERIC JUNCTION OBSTRUCTION)

00:27:03

- Unilateral
- Left side (MC)
- MC in boys

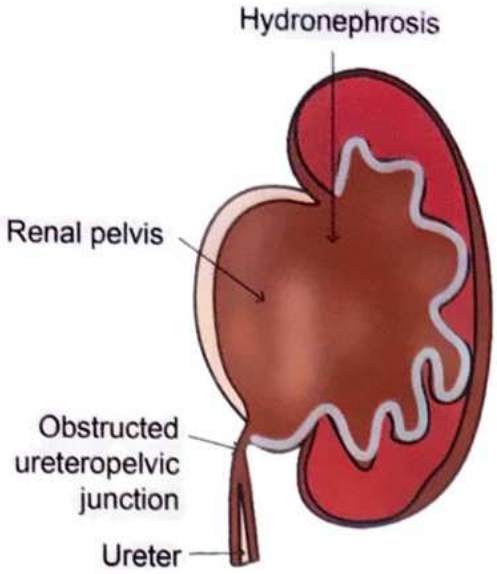
Cause

Congenital causes	Acquired Causes
• Atresia/ Stenosis of ureter at PUJ • Aberrant left renal artery	• MC Cause- Stone • Infection • Instrumentation can lead to Stricture and then leading to obstruction

In PUJ obstruction, patient will be having unilateral hydronephrosis. This condition can be diagnosed even before birth by the presentation of oligohydramnios by the mother.

Clinical features

- Asymptomatic
- Palpable intra- abdominal mass (unilateralhydronephrosis)



Investigations

- IOC - DTPA Scan

(To diagnose the obstruction & renal function of each Kidney can be identified)

↓

If equivocal

↓

Pressure – Flow study (Whittaker's test)

- Whittaker's test
  - Kidney is punctured percutaneously and contrast is injected into pelvis, simultaneously intrapelvic pressure is measured Abnormal Rise Intrapelvic Pressure

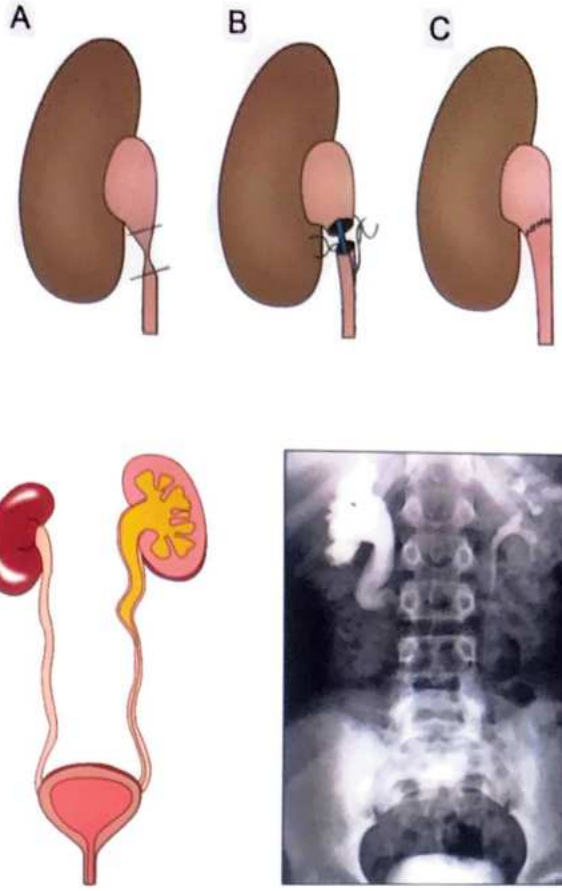
↓suggestive of

PUJ Obstruction

Treatment

Open Treatment	Endoscopic treatment
• Gold Standard - Anderson- Hynes Dismembered Pyeloplasty • Foley V-Y Pyeloplasty • Flap (Spiral/ Vertical)	• Done for small/ Intra- renal pelvis ○ Endopyelotomy ○ Balloon dilatation

- In Anderson Hynes Dismembered Pyeloplasty - Removal of obstruction site and end to end anastomosis is done.



Anderson Hynes Dismembered Pyeloplasty

RETROCAVAL URETER / CIRCUMCAVAL URETER

00:37:47

- Embryologically normal ureter is entrapped behind IVC
- Caused by Abnormal persistence of right posterior subcardinal vein

Clinical features

- Signs and symptoms of Ureteric obstruction

Investigation

- IOC for Dx - MRI
- On IVP-Reverse J /fish hook/ shepherd crook appearance

Management

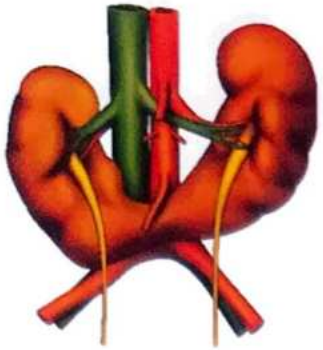
- Treatment of choice – Relocation Uretero-ureterostomy

HORSESHOE KIDNEY

00:42:57

- Fusion of kidneys at lower pole

- Incidence - 1: 400 live births (0.25%)
- MC in Males



Important Information

- Both Testis & kidney change their permanent position after development
- Testis
  - Develops from posterior abdominal wall
  - Descends to scrotum for effective spermatogenesis (has 2°C below the bodytemperature)
- Kidney
  - Develops in pelvis Ascends up and rotates from vertical axis to obliqueaxis

- If kidney fuses at lower pole - inferior Mesenteric artery prevents the ascend of isthmus of kidney
  - Level of isthmus of horseshoekidney - L3 to L4
  - Kidney axis remains vertical as kidney is not able to rotate.
  - Medial calyx is seen

Clinical features

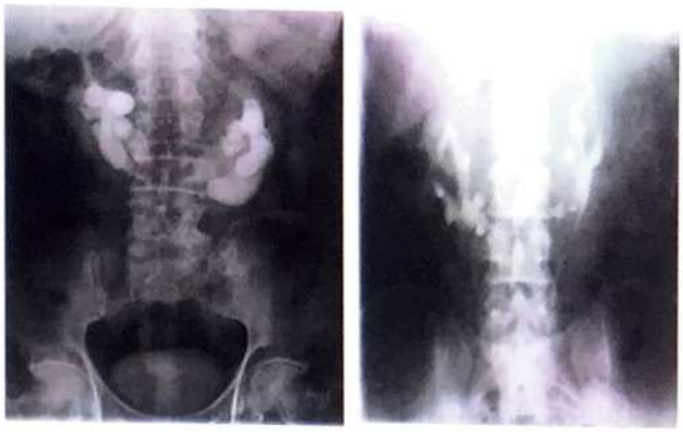
- Asymptomatic (Diagnosed incidentally on radiologic examination)
- MC symptom - Vague Dull Aching pain
- On hyperextension of spine
  - Abdominal Pain
  - Nausea
  - Vomiting

  } ROVSING'S syndrome

Investigations

- IOC for Dx–CT Angio [CECT] (to diagnose HSK & localize the position & abnormal vascularity)
- On IVP
  - Medial Orientation of Calyx- Hand Joining Sign
  - High Insertion of Ureter with Anterior Transposition -

Flower vase like curve of Ureter



Flower vase like curve of Ureter

Management

- Management of Complications Staghorn calculi →PCNL
- Isthmus should not be divided
- In pregnant patients, HSK Leads to Dystocia

Previous Year's Questions

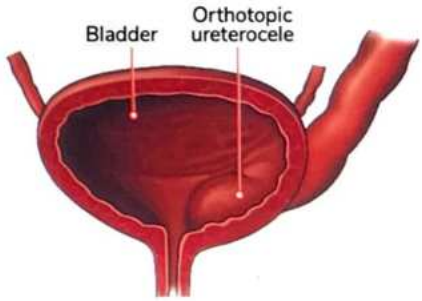
Q. Which of the following statement is correct about horseshoe kidney? (NEET PG 2016)

A. Incidence of 1:400 live births
B. IMA prevents full agent
C. hand joining sign& flower vase like curves of ureters is seen
D all of the above

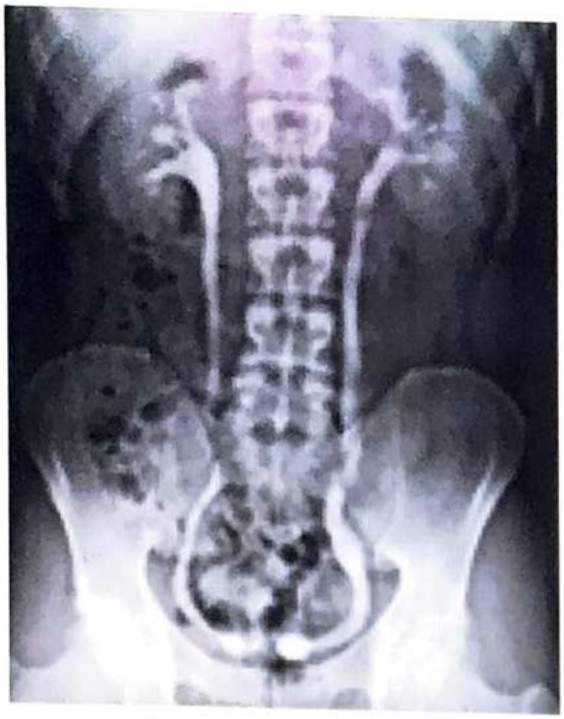
URETEROCELE

00:54:52

- Cystic dilatation of terminal ureter
- MC in Females
- Types
  - Intra- Vesical (20%)
  - Ectopic (80%) - A/W duplication of ureter
- In Intravesicalureterocele-Terminal part of ureter is cystic & dilated and is inside the bladder
- In ectopic ureterocele-Duplication of ureter and the upper pole of ureter is having ectopic ureteric orifice.



Ureterocele



Adder Head appearance

Clinical presentation

- Recurrent attacks of UTI/ Urosepsis
- Unilateral Hydro-ureteronephrosis
- Palpable mass

Investigations

- On USG-Hydroureteronephrosis with cyst in the bladder
- On IVP-Adder Head/ Cobra- head appearance
- IOC for diagnosis-IVP
- On MCU - Filling defect in bladder
- On Cystoscopy-Enlarging and collapsing cyst in the bladder

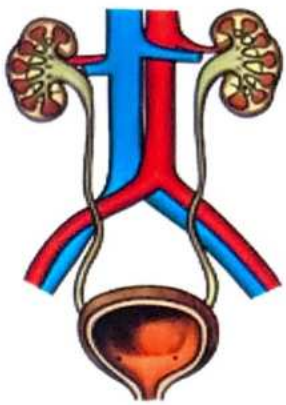
Treatment

- Depends on type of ureterocele
  - In intravesicalureterocele- Incision over the cyst wall (Free flow of urine into bladder)
  - In ectopic ureterocele– Excision and reimplantation into bladder
  - MC Congenital abnormality of upper urinary tract - Duplication of ureter (AD)
  - MC Congenital abnormality of urogenital tract-VUR (AD)

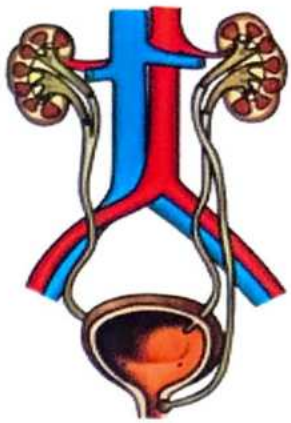
DUPLICATION OF URETER

01:03:48

- Autosomal dominant
- MC in females
- Usually bilateral
- It is of two types
  - Incomplete Duplication (bifid ureter)
  - Complete Duplication (Weigert Meyers Rule)
- Weigert Meyers Rule
  - Upper pole ureter is caudal and medial compared to lower pole ureter complete duplication
- Yo-Yo reflux
  - Reflux of contrast in both limbs of ureter on retrograde pyelogram in incomplete duplication



Duplication of ureter



Wiegert Meyers rule

COMPLETE DOU

- Upper pole ureter-Has Ureterocele
- Lower pole ureter-Has VUR (due to short intravesical length)
- MC location of Ectopic ureteric orifice
  - In males-orifice is in Prostatic urethra & is proximal to external urinary sphincter
  - In females-orifice of upper pole is in Anterior urethra & is distal to external urinary sphincter

Clinical features

- In Males
  - Continent
  - Increased risk of UTI
- In Females
  - Continuous incontinence with normal voiding pattern

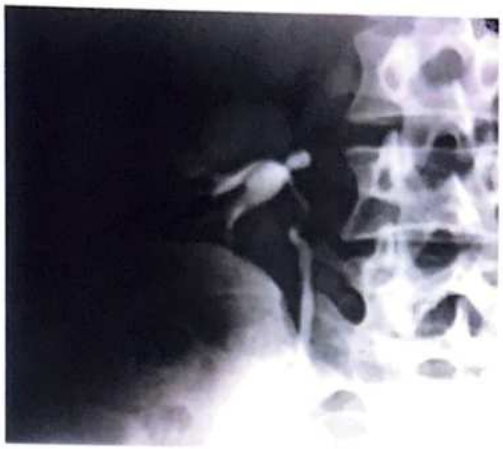
Investigations

- IOC for Dx is IVP-Adder head/ Cobra head appearance
- IOC for VUR – MCU (micturatingcysto urethrogram)

Treatment

- For upper pole ureter
  - Excision
    +
    Reimplantation into bladder

- For lower pole ureter
  - Ureterovesicoplasty (strengthening of uretero- vesical junction)
- If there is upper pole hydronephrosis with no function
  - Upper pole nephrectomy should be performed
  - On IVP – Shows Drooping Lilly sign



VESICOURETERIC REFLUX (VUR) 01:16:27

- Autosomal dominant
- MC congenital abnormality of urogenital tract
- MC in children
- Asymptomatic
- Mostly resolves Spontaneously – because
  - At the time of birth, Trigone & bladder system is not mature - High risk of VUR.
  - By 5-6 years of age, maturation occurs - low grade VUR disappears

Causes

Primary causes	Secondary causes
• Short in intravesical length of ureter • Deficiency of longitudinal muscle over the surface of ureter	• In children - Posterior urethral valves • In adults - Neurogenic bladder

Investigations

- IOC for Dx–MCU
- MCU is IOC for VUR, posterior urethral valve, posterior urethral stricture

INTERNATIONAL CLASSIFICATION OF VUR (BASED ON MCU)

Grade I Reflux into non- dilated ureter

Grade II Reflux into pelvicalyceal system

Grade III Mild to moderate dilatation of ureter with reflux into pelvicalyceal system

Grade IV Blunting of fornix with reflux into pelvicalyceal system

Grade V Dilated and tortuous ureter with reflux into pelvicalyceal system

- Chances of spontaneous resolution of VUR
  - Grade I & II: 80%
  - Grade III: 50%
  - Grade IV: 20%
  - Grade V: 0-5%

Management

- Prophylactic antibiotics to all patient irrespective of Grade of VUR-To prevent UTI
- For children upto 6 weeks
  - Ampicillin
  - Amoxicillin
- Children age > 6 weeks
  - TMP- SMX
- Medical Management Sufficient for
  - Grade I- Grade III VUR
  - Unilateral Grade IV – VUR
- Indications of surgical intervention
  - Bilateral Grade IV - VUR
  - Grade V - VUR
  - Recurrent UTI despite of antibiotics
  - Older Children
  - Presence of Permanent scar
  - Presence of Bladder Diverticula
- Various surgical interventions performed

1. Ureterovesicoplasty- Strengthening of ureterovesical junction
2. STING Operation

(Sub ureteric trans- urethral injection of Teflon paste)

3. Ureteric reimplantation
   - Lich- Gregoir technique (preferred for ureteric reimplantation)
   - LeadbetterPolitano technique

Previous Year's Questions

Q. All of the following statements are correct about VUR except? (AIIMS Nov 2019)

A. Autosomal dominant

B. Majority of cases are asymptomatic

C. MCU is IOC for diagnosis

D Preferred method of ureteric implantation is Lich Gregor technique.

31 URINARY BLADDER

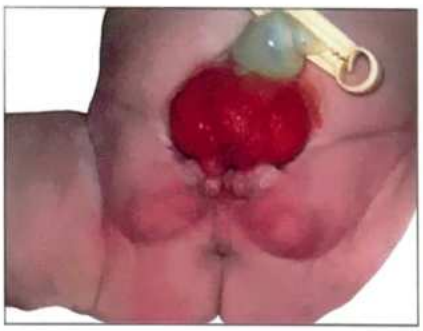
ECTOPIAVESICAE

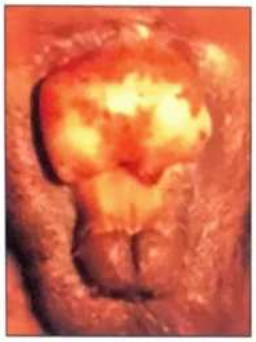
00:00:24

- Aka Exstrophy bladder
- Characterised by Complete ventral defect of urogenital sinus with overlying defect in muscular system.
- Abnormal over maturation of urogenital sinus

↓

Ventral defect (rupture of ventral wall)





- Associated with
  - Absent anterior wall of bladder
  - Absent infra-umbilical abdominal wall
  - Exposed posterior wall of bladder and urine dribbling from trigone
  - Widely separated public rami
  - Umbilical hernia
  - Rectal prolapse
- In Males
  - Epispadias
  - Undescended testis
  - Shallow scrotum
- In Females
  - Epispadias
  - Bifid clitoris
  - Widely separated labia
- Ectopiavesicae increase the risk of Adenocarcinoma.

Management– complex

- Augmentation Enterocystoplasty
- Abdominal wall closure after posterior iliac bone osteotomy+ Repair/ correction of associated abnormalities

BLADDER STONE

00:08:51

Primary bladder stone	Secondary bladder stone
Formed in bladder in absence of • Anatomical factors • Functional factors • Infections factors • Obstructive factors	Formed in bladder due to • Anatomical factors • Functional factors • Infections factors • Obstructive factors

Migrant bladder calculi

- Stones that are formed in the kidney & retained in the bladder due to distal obstruction

Primary bladder stone

00:12:24

- Aka Endemic bladder calculi
- Endemic in undeveloped countries (Burma, Indonesia, Thailand, Africa)
- Usually seen in children < 10 years and commonly seen in 2-4 years and MC in males
- In India-Andhra Pradesh, Rajasthan have been reported.
- MC type of primary bladder stone - Ammonium urate
  Other stones- Calcium oxalate

Predisposing factors

1. Chronic dehydration
2. Exclusive milk
3. High carbohydrate diet
4. Low phosphate intake

- In chronic laxative abuses most common type of stone is - Ammonium urate> CA oxalate
- Primary bladder stones-rarely associated with recurrence once after treatment.

Previous Year's Questions

Q. Chronic laxative abuse can result in the formation of which of the following renal stones?
(NEET Jan 2018)

A. Uric acid
B. Ammonium urate
C. Struvite
D. Calcium oxalate

Secondary bladder stone 00:17:58

- MC in elderly males due to BPH /Bladder outlet obstruction
- MC type of secondary bladder stone - Uric acid >Struvite
- Overall MC bladder stone-Secondary bladder stone (Uric acid)
- Hence, most of the bladder stone are Radiolucent (As uric acid stone is radiolucent)

Predisposing factors

- Bladder outlet obstruction/BPH
- Foreign body
- Bladder diverticula
- Prolonged catheterization

Clinical Features (1° & 2° bladder stones) 00:21:05

Jack stones

- Composition of Jack stone - Ca Oxalate dihydrate
- Having projections.
- Intermittent painful voiding with severe pain at the end of micturition with terminal hematuria

Investigation (1° & 2° bladder stones)

- IOC for Dx- Ultrasound
- On USG-Characteristic shadowing which changes the position with change of posture

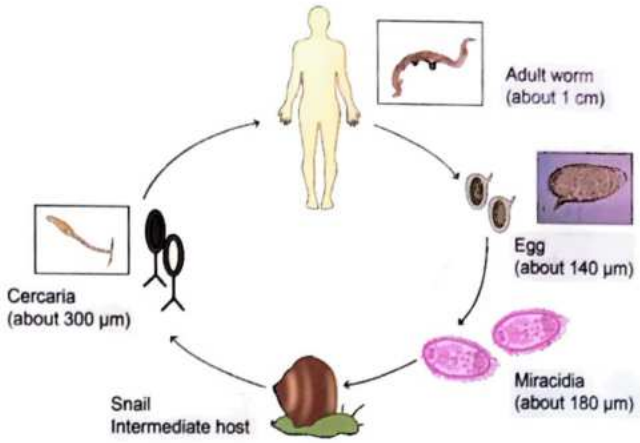
Treatment (1° & 2° bladder stones)

- **For small stones**
  - Cystolitholapexy
- **For Large stones**
  - Electrohydraulic lithotripsy
  - Suprapubic cystolithotomy

SCHISTOSOMIASIS 00:26:26

- Aka Bilharziasis
- Causative agent - S. haematobium
- Endemic in Middle east, Egypt, Africa
  - MC in Males
- Species of Schistosoma
  - S. Haematobium -Invades bladder
  - S. Japonicum -invades liver and small intestine
  - S. Mansoni -invades large intestine
- Definitive host- Man (Sexual phase occur)
- Intermediate host - Snail (Asexual phase occur)

Life cycle



1. Swimmer's itch-occurs at the site of penetration of cercaria within < 24 hours
2. Katayama fever-Within 3 weeks-4 months, larva converts to adult worm

↓

Egg laying occurs

(Submucosal venous plexus)

↓

Eggs are highly antigenic

↓

Forms a strong inflammatory response

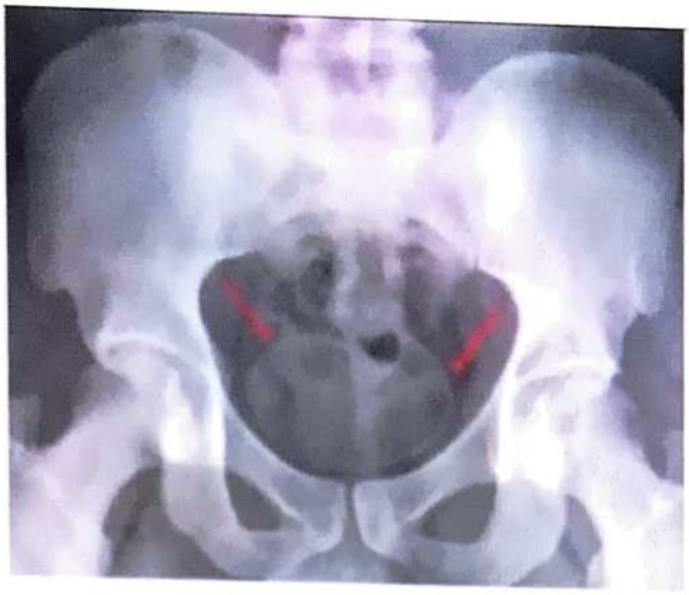
- Fever
- Chills & rigor
- Hepatosplenomegaly
- Lymphadenopathy

Clinical features

- Earliest MC symptom - Increased urine frequency
- Schistosomiasis-MC cause of bladder calcification worldwide
- Due to chronic inflammation-Increased risk of SCC & Transitional cell Carcinoma

Investigations

- On cystoscopy -Sandy patches
- On Urine examination - presence of eggs
- On X-ray - Fetal head-in-pelvis appearance.



Treatment

- Drug of choice – Praziquantel
  Alternative drugs
  - Metrifonate
  - Oxamniquine

MALAKOPLAKIA

00:36:05

- Inflammatory disorder of bladder
- Also involve ureter and kidney
- Formation of nodules/plaques, composed of large histiocytes (Von Hansemann cells)
- Associated with laminar inclusion bodies – Michaelis-Guttman bodies

Pathophysiology

- Defective phago-lysosomal activity - Inadequate killing of bacteria by monocytes/macrophage

Predisposing factors

- Immunosuppressed
- Diabetes mellitus
- Rheumatoid arthritis
- lymphoma

Clinical features

- MC in females having UTI – Causes Irritative symptoms

↓

Frequency
Urgency

Investigation

- On USG/CT- Mass in the bladder
- If there is involvement of ureter-Evidence of obstruction is seen
- On Urine culture sensitivity - E. coli

Treatment

- Antibiotics
  - Fluoroquinolones
  - TMP-SMX
- In case of Upper urinary tract involvement-Antibiotics + Surgery (max. cure rate)
- Involvement of bilateral kidney-Associated with poor prognosis

Interstitial cystitis (Hunner's ulcer) 00:43:53

- Characterized by Chronic Pancystitis
- Infiltration of lymphocytes and macrophages
- MC in females
- **Etiology is unknown**
- Presence of linear bleeding ulcer in the fundus (involving mucosa)

Clinical features

- Initial symptom - Increased frequency
- Pain increased by distention of bladder & relieved by micturition
- Bladder capacity is reduced to 30 – 50ml

Diagnosis

- On Cystoscopy-presence of linear bleeding ulcer in fundus
- To rule out malignancy:
  - Urinary cytology
  - Biopsy

Treatment

- Difficult and unsatisfactory
- Bladder distention under anesthesia
- Instillation of dimethyl-sulphoxide into the bladder

Bladder rupture 00:49:47

- 2 types
  - Extra- peritoneal (responsible for 80% cases)
  - Intra- peritoneal (responsible for 20% cases)

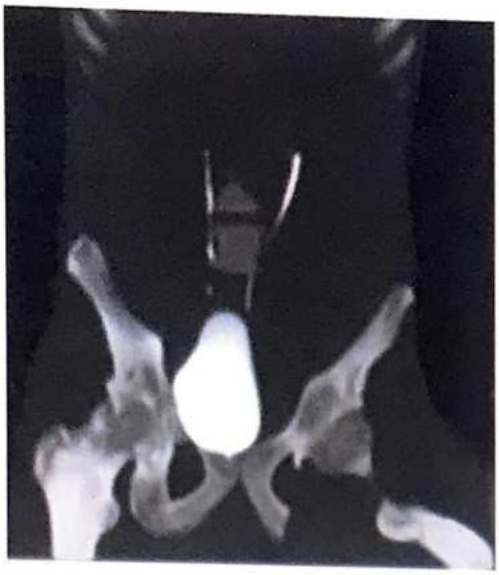
Extraperitoneal bladder rupture

- Caused by - Road traffic accident

RTA causes Pelvic fracture
↓ leads to
Extra-peritoneal rupture of bladder and
Posterior Urethral injury

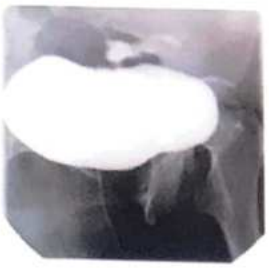
Clinical features

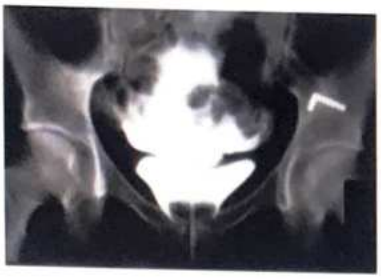
- Suprapubic pain
- Difficulty in passing urine
- Hematuria



Investigations

- IOC - CT cystography/ Cystogram
- Findings
  - Flame sign
  - Pear sign
  - Tear drop bladder





Management

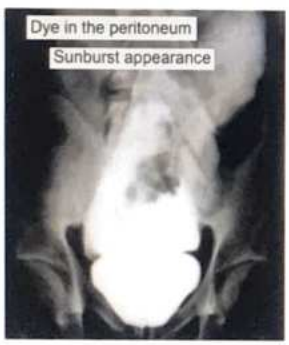
- Foley's catheterization
- Spontaneous healing within 7-10 days

Indications of surgical intervention

- Repeated occlusion on catheter due to ongoing hematuria
- Projecting bone fragment, impinging over the bladder wall.
- Tear near neck of bladder

Intra peritoneal bladder rupture 00:57:56

- External blow/ kick to full bladder may lead to intraperitoneal bladder rupture
- MC in Males



Clinical features

- Suprapubic pain
- Difficulty in passing urine
- Hematuria
- Peritonitis

Investigation

- IOC for Dx -Cystography
- On Cystography - Sunburst appearance
- On Ultrasound - Bladder in bladder appearance

Management

- Exploratory Laparotomy + Peritoneal lavage + Repair of defect + Suprapubic catheter / Foley's catheterization

CA Bladder 01:01:06

- TCC > SCC > Adenocarcinoma

Risk factors

Transitional cell carcinoma	Squamous cell carcinoma
1. Smoking 2. Drugs • Phenacetin • Chlornaphazine • Cyclophosphamide 3. Exposure of • Benzidine • Hydrocarbon • Aniline • Acrolein • Beta-naphthylamine 4. Printing, Dyeing, Rubber, Leather, Automobile & Petroleum industries 5. Schistosomiasis (SSC > TCC) 6. Pelvic irradiation	1. Schistosomiasis 2. Chronic Inflammation • Bladder stone • Bladder diverticulum • Prolonged catheterization

Squamous cell carcinoma	Adenocarcinoma
• Nodular & invasive • **Treatment**: Radical cystectomy	**Risk factors** • Ectopic vesicae • Patent urachus • Intestinal pouch/ conduit • Augmentation Enterocystoplasty **Treatment**: Radical cystectomy + Pelvic lymphadenectomy (due to involvement of pelvic group of lymph nodes)

- MC benign mesenchymal tumor of bladder - Leiomyoma
- MC malignant mesenchymal tumor of bladder - Leiomyosarcoma
- MC malignant mesenchymal tumor of bladder in children - Embryonal Rhabdomyosarcoma

Previous Year's Questions

Q. A 67 years old chronic heavy smoker presents with 2 weeks history of frank haematuria. Ultrasound pelvis shows a filling defect. Most probable diagnosis? of which of the following renal stones?
(NEET May 2018)

A. Bladder diverticula
B. Adenocarcinoma of bladder
C. Squamous cell carcinoma of bladder
D. Transitional cell carcinoma of bladder

CA BLADDER

01:11:12

- MC in high socio-economic status
- MC among whites, males and smokers
- MC in 6th / 7th decade
- MC type histological type - Transitional cell carcinoma
- MC site of CA bladder - Posterolateral wall of Trigone
- Precursor lesions of CA bladder
  - Papillary tumor
  - Malignant cystitis

Papillary tumor (Benign)

- Aka kiss ulcer
- Exophytic tumor when touches(kisses) surrounding bladder mucosa, implantation of daughter tumor arises
- Characterized by Painless, profuse paroxysmal hematuria

Carcinoma in Situ

- Aka Malignant cystitis
- High grade tumor
- Present with Irritative symptoms
  - **F** – **F**requency
  - **U** – **U**rgency
  - **D** - **D**ysuria

Investigations

- Diagnosis is made by - Urinary cytology (Transitional epithelium has multiple layers and poor cohesion between cells - causes shedding of these cells in urine)

Treatment

- Intravesical BCG

Clinical Features

- MC symptom – Hematuria
  - Painless
  - Gross
  - Intermittent hematuria
- Irritative symptoms
  - Frequency
  - Urgency
  - Dysuria

Route of spread

- MC route of spread - Hematogenous
- MC site of metastasis - Liver
- Non-GI malignancies with liver as MC site of metastasis
  - CA bladder
  - Malignant melanoma
  - Medullary carcinoma thyroid
- MC group pf LN involved - Pelvic LN (obturator nodes)

Investigations

- IOC for Dx- Cystoscopy + Biopsy
- Urinary cytology
  - To confirm the diagnosis
  - But location of tumor cannot be identified.
- IOC for staging- MRI
- Urinary tumor markers
  - BTA (Bladder tumor antigen)
  - NMP -22 (Nuclear Matrix Protein)
  - Lewis- X- antigen
  - Hyaluronidase
  - Helpful in diagnosis and for follow up to assist the response of therapy and to detect recurrence

8th AJCC TNM Classification

01:21:40

Ta	Noninvasive papillary carcinoma
Tis	Carcinoma insitu
T1	Tumor invades subepithelial connective tissue
T2a	Superficial muscularispropria invasion of inner half
T2b	Deep muscularispropria invasion of outer half
T3a	Microscopic extension into perivesical fat
T3b	Macroscopic extension into perivesical fat
T4a	Cancer invading pelvic viscera • Prostatic stroma • Vaginal wall • Rectum • Uterus
T4b	Extension to pelvic side walls, abdominal walls or bony pelvis

N1 Single regional LN in true pelvis

N2 Multiple regional LN in true pelvis
- Hypogastric
- Obturator
- External iliac
- Presacral

N3 LN metastasis to common iliac lymph nodes

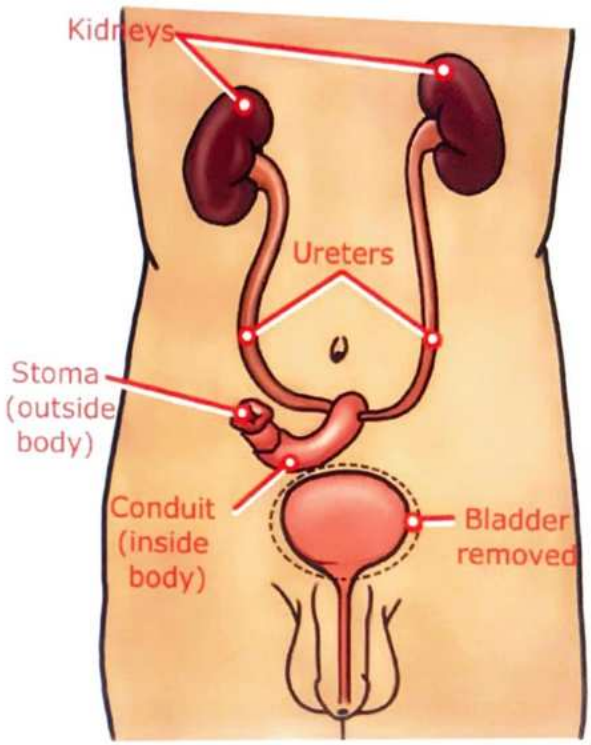
M0 No metastasis

M1 Metastasis

Treatment 1:28:28

- For Tis (malignant cystitis) - Intravesical BCG
- For Ta (single, low to moderate grade, non-recurrent) - Complete TUR
- For Ta (multiple, high grade, recurrent) - Complete TUR + Intravesical chemotherapy
- For T1 - Complete TUR + Intravesical chemotherapy
- For T2-T4
  - Radical cystectomy
  - Neo Adjuvant chemotherapy followed by radical cystectomy
  - Radical cystectomy followed by adjuvant chemotherapy ± Radiotherapy
- Systemic Chemotherapy agents
- MVAC
  - Methotrexate
  - Vincristine
  - Adriamycin
  - Cisplatin
- Intravesical chemotherapy agents
  - Mitomycin-C
  - Epirubicin
  - Thiotepa
  - BCG (most effective)
- Any T, N+, M+→Neoadjuvant chemotherapy followed by Surgery/Palliation
- **BCG**
  - Attenuated strain, of M. bovis
  - Most effective
  - MOA- immunologically mediated (exact mechanism not known)
  - MC side effects -Frequency, urgency, dysuria
  - Immunocompromised patients may develop Severe BCG sepsis – treated by ATT
- Absolute Contraindications for intravesical BCG
  - Immunocompromised patients
  - Gross hematuria
  - Immediately after Trans urethral resection of bladder tumor (TURBT)
  - Traumatic catheterization
  - Total urinary incontinenc
  - Order
  - History of BCG sepsis
- Urinary diversion 1:38:00
  - Stricture at the site of anastomosis
  - Reflux of urine
  - High risk of Dyselectrolytemia
  - Best or gold standard conduit for urinary diversion is ileum
    → Easy to perform
    → Minimal intraoperative and
    → Immediate postoperative complication
- Dyselectrolytemia in ileal/colonic conduit
  - Hyperchloremic
  - Hypokalemic
  - Metabolic acidosis

- Dyselectrolytemia in Jejunal conduit
  - Hypochloremic
  - Hyponatremic
  - Hyperkalemic
  - Metabolic acidosis



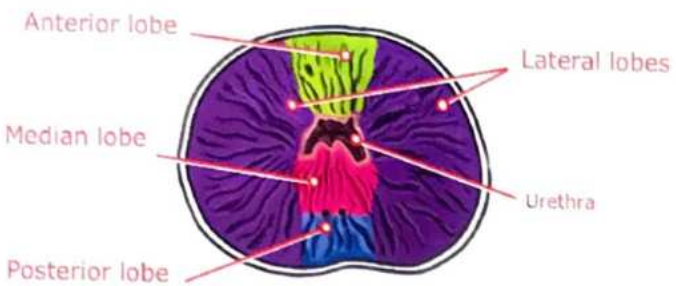
- Dyselectrolytemia in Stomach conduit (same like IHPS)
  - Hypochloremic
  - Hypokalemic
  - Metabolic alkalosis

32 PROSTATE AND SEMINAL VESICLE

ANATOMY OF PROSTATE

00:00:13

- MC site of BPH - Median lobe / Transitional zone
- MC site of CA Prostate - Posterior lobe / Peripheral zone
- On DRE-Posterior lobe is felt and medial lobe is felt when enlarged.



Mc Neal zones classification

- Prostate has been divided into three zones:
- Transitional zone
- Central zone
- Peripheral zone

Important principles

- Severity of symptoms depends on Nodules and its relation of being close to urethra
  - Nodule close to urethra even small will be symptomatic
- Nodule far from urethra even large will be asymptomatic
  - No correlation between size of prostate & severity of symptoms
  - Most patients of CA prostate - Asymptomatic (initially)
  - Screening of CA prostate-Digital rectal examination + Prostate specific antigen
  - In patients of BPH-TURP is done but it is not protective for CA prostate. So, DRE+ PSA is to be continued for screening of CA prostate.

BENIGN PROSTATIC HYPERPLASIA

00:08:26

- Age related
- Endocrine controlled
- Multifactorial process
- MC site - Transition zone
- Age related
  - Incidence of age 41-50 years - 20%
  - Incidence of age 51-60 years - 50%
  - Incidence of age >80 y - 90%
- Endocrine controlled - Under control of testosterone
- In cut section of BPH
  - Epithelium
  - Stroma-composed of collagen and smooth muscles and has rich adrenergic nerve endings.
  - Testosterone converted into

$$\frac{5\text{-}\alpha reductase \quad 5\ DHT\ (\text{acts on epithelium})}{(inhibited by\ 5\text{-}\alpha reductase inhibitor)}$$

- If stromal component is predominant-α blockers are given for relaxation of smooth muscles.
- If epithelial component is predominant-5α Reductase inhibitors are given
- α blockers are instantaneously active.
- Minimum time required for 5α Reductase inhibitors to act - 1 month
- Maximum effect of 5α Reductase inhibitors is seen after 6 months

Secondary changes in bladder

- Due to increased force of contraction
  - Collagen deposition
  - Detrusor muscle hyperplasia
  - Detrusor muscle hypertrophy

Clinical features

- Obstructive Symptoms
  - Poor flow/stream
  - Hesitancy
  - Intermittency
  - Incomplete evacuation of bladder
  - Dribbling of urine
  - Post residual volume
- Irritative symptoms
  - **F** - Frequency
  - **U** - Urgency
  - **N** - Nocturia

How to remember

- FUN

IPSS Score-International Prostatic Symptom Score

00:19:08

- Score varies from 0 to 35
  - Mild - 0 to 7
  - Moderate – 8 to 19
  - Severe - 20 to 35
- On DRE

BPH	CA Prostate
• Smooth elastic enlargement of prostate	• Enlarged & hard prostate with obliteration of median sulcus

Investigations

00:22:23

- **Uroflowmetry**- to document the obstruction
  - Normal- if Qmax> 15 ml/s
  - Equivocal- if Qmax 10-15 ml/s
  - Suggestive of obstruction but not confirmatory-if Qmax<10ml/s
- **Cystometry**- to confirm the diagnosis
  - Voiding pressure > 80 cm of H2O
  - Diagnostic criteria for BPH-Qmax< 10 ml/s & Bladder pressure > 80 cm of H20

Management

00:25:16

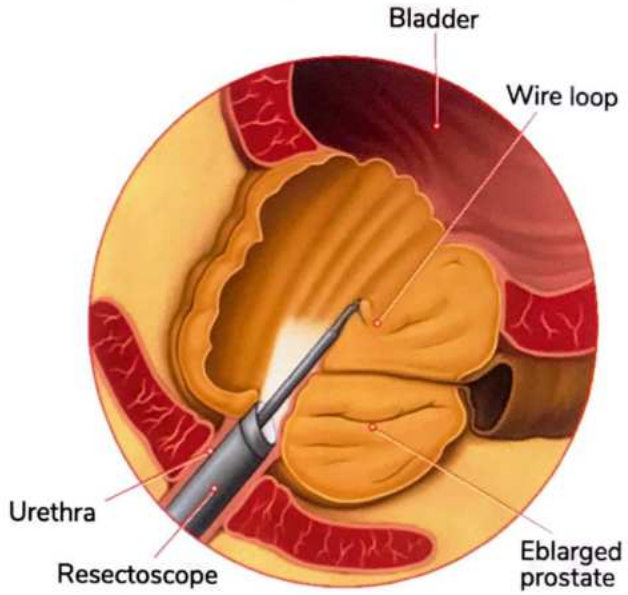
Medical management:

- α blockers (preferred)
  - Prazosin
  - Terazosin
  - Doxazosin
  - Alfuzosin
  - Silodosin
- MC used-Tamsulosin (α1A selective blocker)
- 2nd line agents-5-α Reductase inhibitors
  - Finasteride
  - Dutasteride
  - Triptorelinpamoate
- Combination treatment (α blockers + 5α RI) preferred in patients with
  - Large prostate
  - High PSA level
- Indications of Surgical intervention
  - No improvement after medical management
  - Recurrent UTI
  - HDN/ Renal failure
  - Bladder stone
  - Gross hematuria
  - Refractory urinary retention
- Surgical treatment
  - Gold standard-TURP (Trans Urethral Resection of Prostate)

TURP

00:30:1

- Techniques used for TURP
  - Nesbit technique (preferred)
  - Mauer- Meyer technique
- For irrigation - 1.5% Glycine is used



- In Monopolar cautery
- Electrolyte like Normal saline should not be used (Ion dissipates current locally)
- In BipolarCautery
- Normal saline can be used.
  - This is aka TURIS (TURP in Saline)
- Most important distal landmark in TURP-Verumontanum (Located proximal to external urinary sphincter)
- No landmark proximally - High risk of injury to internal urinary sphincter by TURP

Complications of TURP

00:36:44

- MC - Retrograde ejaculation (75% of cases)
- Impotence (10% of cases)

- Incontinence (<1% of cases)
- Retrograde ejaculation
  - Erection is due to parasympathetic system and Ejaculation is due to sympathetic system.
  - Internal urinary sphincter is under the control of L1 sympathetic ganglion
  - Normally, at the time of ejaculation, Internal urinary sphincter is closed.
- Retrograde ejaculation is seen after
  - TURP (Injury of Internal urinary sphincter)
  - Bilateral Lumbar sympathectomy
  - α Blockers (Relaxation of Smooth muscles of internal urinary sphincter)
- Late complications
  - MC-Bladder neck stenosis (4%) > Urethral Stricture (3.6%)

TUR syndrome

00:42:22

- Aka Water intoxication / Dilutional hyponatremia
- Predisposing factors
  - Size of prostate > 75 g
  - Duration of Surgery > 90 min

Clinical features

- Dizziness
- Confusion
- Fluid overload
- Visual abnormalities
- Bradycardia
- Hypertension

Treatment

- Drug of choice-Furosemide
- If no response to Furosemide-3% saline (hypertonic saline)

Trans Urethral Incision of prostate (TUIP)

00:45:39

Procedure

- Collin's Knife is used
- Two incisions at 5'o clock & 7'o clock

Advantage

- Prostate up to 20g can be operated without any complications as of TURP like retrograde ejaculation and Impotence.

Open prostatectomy

00:47:32

Indications

- Size of prostate > 75g
- Bladder stone
- Bladder diverticula

Named Prostatectomy

1. Frayer's suprapubic prostectomy-Preferred for patients having bladder stone, bladder diverticulum
2. Millin'sretropubicprostectomy
3. Young's Perineal Prostectomy – obsolete

- Ho -YAG laser is used for BPH, Renal Stones

ACUTE BACTERIAL PROSTATITIS

00:54:01

- Acute inflammation of prostate associated with UTI
- MC organism responsible - E. coli

Clinical Features

- Fever
- Chills and rigor
- Irritative symptoms
- On DRE- Prostate is enlarged, tender boggy
- Catheterization & massage of prostate is contraindicated

Treatment

- Antibiotics
  - TMP-SMX
  - Ciprofloxacin

} Treatment should be done 4-6 weeks to prevent Chronic bacterial Prostatitis

Chronic bacterial prostatitis

00:56:24

- Persistent infection of prostate
- Recurrent attacks of UTI

Investigations

- Microscopic examination
- Culture

} prostatic expresate& urine taken before& afterprostatic massage

Treatment

- Antibiotics for 3-4 months

Prostatic abscess

00:59:16

- Most cases - Complication of Acute bacterial prostatitis
- Fluctuation - late sign in cases of prostatic abscess

Predisposing Factors

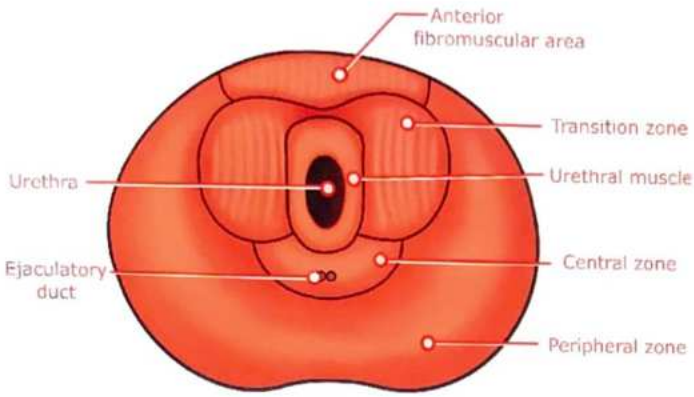
- DM

- Renal insufficiency
- Immunocompromised state
- Chronic catheterization

Diagnosis
- TRUS (Transrectal Ultrasound) / Pelvic CT

Treatment
- Trans urethral drainage with antibiotics

Prostatic calculi 01:01:39
- Calcified corpora amylacea
- Composed of Calcium phosphate
- Location - Peripheral region of transition zone
- Occurs in clusters
- Asymptomatic (peripheral location)
- Doesn't predispose to infection



CA PROSTATE 01:03:01
- MC histological type-Adenocarcinoma > TCC
- Seen in high socio-economic status
- MC among Afro- Americans
- Usually seen in 7th to 8th decade
- Other malignancies seen during 7th to 8th decade
  - CA Prostate
  - Anaplastic Carcinoma of thyroid

Risk factors
- Advancing age
- High fat diet

Protective factors
- **L** - **L**ycopene
- **E** - Vitamin **E**
- **S** - **S**elenium
- **A** - Vitamin **A**

Pathology
- MC site of CA prostate-Peripheral zone (75%) > Transitional zone (15%) > Central zone (10 %)
- MC genetic alteration seen in CA prostate- Hypermethylation of GSTP 1 (Glutathione Transferase promotor region 1) located on chromosome 11
- Histological appearance of Malignant Glands
  - Small
  - Crowded
  - Absence of basal layer (unlike benign)
  - Lack Branching

Clinical features
- Asymptomatic in initial stages
- Symptoms in advanced state/ metastasis
  - Backache (MC site of metastasis is lumbar vertebrae)
- Lymphnode Metastasis – pelvic LN – obturator Ln

Route of spread
- MC route of spread- hematogenous
- MC site of metastasis – lumbar vertebrae
  - Osteoblastic secondaries
  - Via batson plexus
- MC malignancy responsible for osteoblastic secondaries in males – CA prostate
- MC malignancy responsible for osteolytic secondaries in males – RCC
- MC malignancy responsible for osteoblastic & osteolyticsecondaries in females- CA Breast
- MC site of visceral metastasis – Lungs

Investigations
- On DRE - prostate is hard and nodular with obliteration of median sulcus
- IOC for Dx-TRUS guided Biopsy
- IOC for staging- Endo rectal MRI (TRUS can be used)
- Prostascint
  - Antibody imaging for CA prostate
  - Radiolabeled monoclonal antibody against prostate specific membrane antigen
  - Advantage-In Biopsy proven CA prostate→Soft tissue and lymph node metastasis can be detected
- Tumor markers
  - PSA
  - Prostatic acid phosphatase
  - ALP
  - Alpha Methyl CoA racemase
  - Hepsin
  - DD3

PSA (Prostate Specific Antigen)
- Can be raised in benign conditions of prostate also

- Not cancer specific
- Normal level - < 4ng/ml
- diagnostic of Ca prostate: > 20ng/dl

PSA density
- PSA / Prostate volume
- PSA density ≥ 0.15 – Biopsy is recommended

PSA velocity
- Rate of change of PSA
- PSA velocity≥0.75ng/ml/year is diagnostic of CA prostate

Free PSA (%)
- If 4-10 ng/ml

Conditions that leads to increased PSA	Conditions that leads to decreased PSA
• CA prostate • BPH • ABP, CBP, prostatic Abscess • DRE, prostatic massage • Catheterization • Sexual intercourse • Prostatic Biopsy	• Castration • Radical prostatectomy • Chemotherapy/ radiotherapy

8th AJCC TNM Classification for Ca Prostate 01:20:31

Tis	Carcinoma in Situ
T1a	up to 5% of tissue in resection for benign disease has cancer, DRE normal
T1b	>5% of tissue in resection for benign disease has cancer, DRE normal
T1c	Tumor is identified by needle biopsy
T2a	Tumor involves one half of lobe
T2b	Tumor involves more than one half of lobe
T2c	Tumor involves both lobes
T3a	Extra capsular extension on one or both sides including bladder Neck
T3b	Seminal vesicle involvement
T4	Tumor is fixed/ invades adjacent structures other than seminal vesicle like • External sphincter • Rectum • Levator muscles and or pelvic wall

N0	No regional Lymph node metastasis
N1	Metastasis to regional LN (obturator, internal iliac, External iliac, presacral)

M0	No metastasis
M1a	Distant metastasis in non-regional LN
M1b	Distant metastasis to bone
M1c	Distant metastasis to other sites

Management of CA prostate 01:27:45
- T1a – observation + Follow up (DRE + PSA)
- T1b, T1c & T2
  - > 70 years – Observation + follow up
  - < 70 years – Radical prostatectomy Or Radiotherapy
- T3 & T4
  - Androgen ablation> Palliative radiotherapy
  - Bilateral Orchidectomy + Flutamide
  - LHRH Agonist (Goserelin, Leuprolide) + Flutamide
- Goserelin-Recently FDA approved for advanced and metastatic CA prostate
- New drugs for castration resistant metastatic CA Prostate
  - Cabazitaxel
  - Sipuleucel. T : it is a vaccine

Gleason Grade:

Gleason Grade

1st MChistological type (1 °) grade	2nd Mc occurring histological type (2°) grade

Gleason Score
- 1° + 2° grade
- 1-5 + 1-5
- Minimum score is 2
- Maximum score is 10
- Grade 1 – well differentiated
- Grade 5- Poorly differentiated

Important Information
- Gleason score 7 (3+4) has better prognosis than (4+3)

Important Information
- Robson Staging: RCC
- Jackson Staging: CA Penis
- Gleason Grading: CA Prostate

33 URETHRA AND PENIS

BASIC ANATOMY

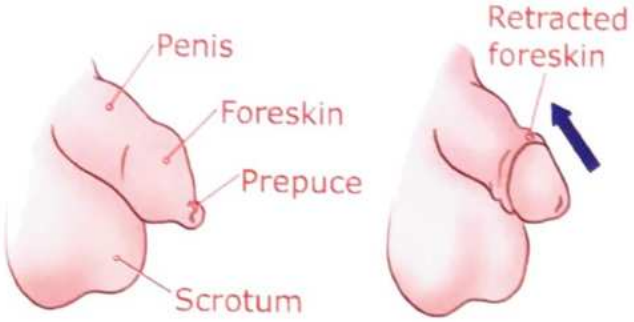
00:00:25

Anatomy of penis

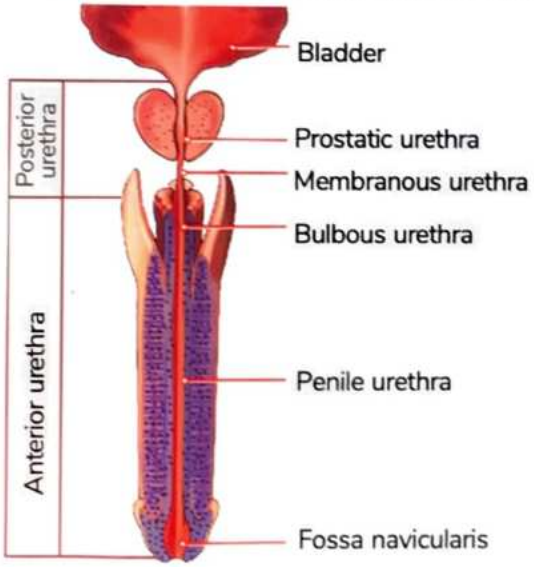
- Length of male urethra – 20 cm
- Length of female urethra – 4 cm

Parts of urethra

- **Posterior urethra**
  - prostatic urethra
  - Membranous urethra
- **Anterior urethra**
  - Bulbar urethra
  - Penile urethra
  - urethra meatus



- **Prostatic urethra**-widest & most dilatable part of urethra
- **Membranous urethra**–shortest, narrowest & least dilatable part of urethra
- **Penile urethra** – longest urethra
- **Meatus>membranous urethra**-Narrowest part of urethra

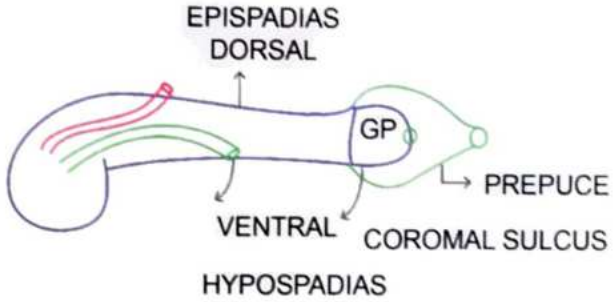


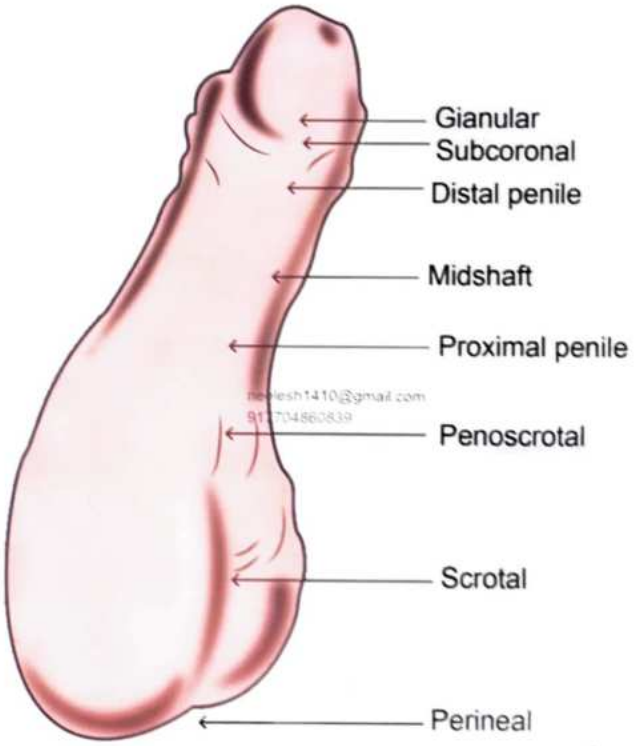
CONGENITAL ABNORMALITY OF URETHRA

00:04:45

Hypospadias

- MC congenital abnormality of urethra
- Incidence
  - Hypospadias 1:250 live births.
  - Horseshoe kidney 1:400 live births.
  - Unilateral renal agenesis 1:1000 live births.
- Caused by failure of fusion of urethral folds - Meatus is presents over ventral aspect.
- Urethral fold usually closes in posterior to anterior direction.



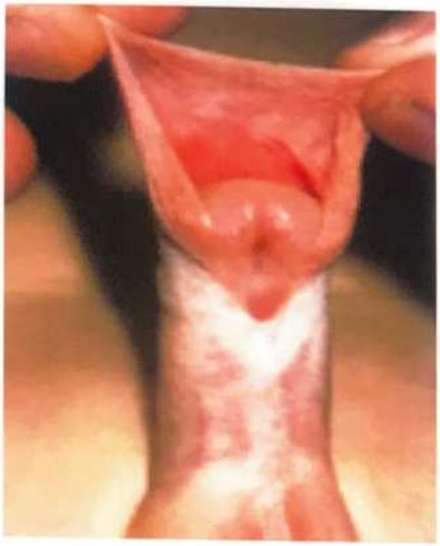


Types of Hypospadias 00:07:01

- Glandular Hypospadias
- Coronal Hypospadias
- Distal penile hypospadias
- Mid shaft hypospadias
- Proximal penile hypospadias
- Penoscrotal hypospadias
- scrotal hypospadias
- Perineal Hypospadias
- MC are Anterior types (glandular, coronal and distal penile)
- Galandular,Coronal hypospadias and distal penile hypospadias contribute to 70% of cases of hypospadias.

Associations

- Hooded prepuce over dorsal aspect
- Ventral Chordee.
- Flattened Glans penis.
- Microphallus [short length of penis]
- Ectopic Meatus
- Meatal Stenosis



- Anterior type of hypospadias-Circumcision is contraindicated because prepuce is used for urethral reconstruction

Clinical features

Depends on type

Especially glandular hypospadias

- Anterior type especially glandular hypospadias – Abnormal stream of urine
- Posterior Type (e.g. Midshaft / proximal penile) at the time of erection, there is downward curvature of penis causing chordee and painful erection.
- In proximal penile hypospadias, at the time of intercourse, semen is deposited outside vagina, making than infertile.
- Abnormal Stream
- Painful erection.
- Infertility

Treatment

- Best age for repair is 6 – 12 Months
- Principle
  - 1st Principle – Meatal advancement
  - 2nd Principle – reconstruction of Glans Penis
- Both Surgeries are performed together known as MAGPI

Various Treatment procedures

- MAGPI (Meatal advancement & glanuloplasty integrated)
- DENNIS BROWN
- THIERSCH– DUPLAY
- BRACKA'S
- MATHIEW'S
- ASOPA & DUCKET

Complications

- After reconstruction of urethra, infant feeding tube has to be inserted. If not inserted, patient may experience complication like Urethral Fistula in 10% of cases (most common complication of hypospadias repair)

Epispadias 00:17:50

Uncommon

- Characterized by urethral opening over dorsal aspect of penis
- In females-fissure or cleft in anterior wall of urethra which opens above the clitoris.
- Associated with
  - EctopiaVesicae
  - Dorsal chordee
  - VUR (40% of cases)

Clinical features

- In Females
  - Maldevelopment of urinary sphincters
  - Bifid clitoris
  - Widely separated labia with incontinence
- In Males
  - Undescended testis and shallow scrotum

Treatment

- 1st – correction of incontinence
- 2nd – Removal of Chordee
- 3rd – Extension of urethral opening till glans

Posterior Urethral Valve 00:21:58

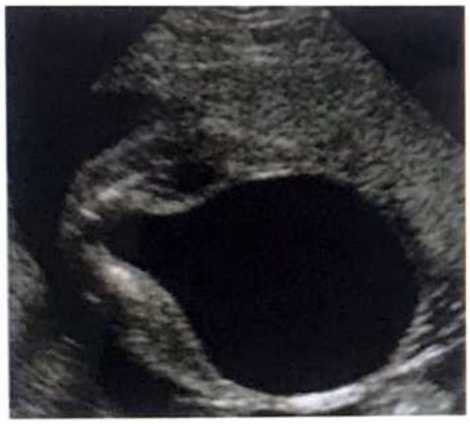
- Symmetric folds of Urothelium that starts from prostatic urethra & extends to external urinary sphincter
- Male urethra is affected exclusively
- MC type – Type 1
  - Located just distal /at verumontanum
- Posterior urethral value – secondary cause of VUR

Clinical features

- Associated with Vesicoureteric reflex - 50% cases.
- Other associations
  - Oligohydramnios
  - Pulmonary hypoplasia (most common cause of death in PUV and also in CDH ie congenital diaphragmatic hernia).
  - Renal parenchymal dysplasia
  - Bladder dysfunction.
- Most patients present with
  - Symptomatic after birth
  - Bilateral hydro-ureteronephrosis
  - Bilateral palpable abdominal mass
  - Distended bladder.
  - Ascites (urinary ascites)
  - infants increased UTI/ Sepsis

Investigation

- IOC – MCU (Micturating cysto urethrogram) { PUV, Posterior Urethral Stricture, Vesicourethral Reflex }
- On Prenatal Ultrasound – At 28 weeks, keyhole sign



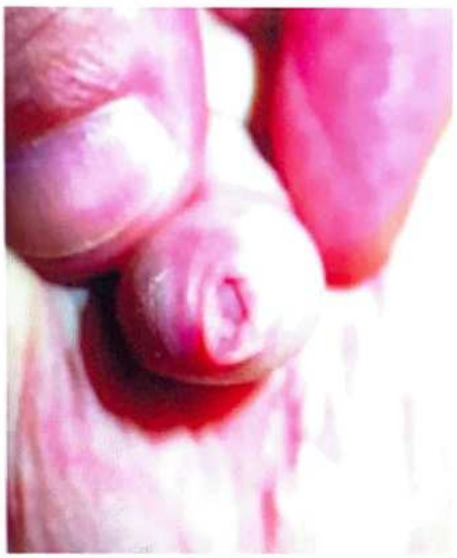
Management

- 1st step – Infant feeding tube insertion
- 2nd step -After tube insertion

If Creatinine is normal	If Creatinine is raised
↓	(means there is no effective drainage ↓
Endoscopic Fulguration Of valve	Suprapubic cystostomy by Blockson Technique.

Phimosis 00:33:59

- Contracted foreskin or prepuce cannot be retracted over glans penis.
- MC cause of phimosis chronic infection is because of poor hygiene
- Others causes:
  - Congenital
  - Acquired
    - → Trauma
    - → CA Penis
    - → BXO (Balanitis Xerotica Obliterans)



Clinical features 00:34:05

- MC symptom – Difficulty in micturition
- In children – Ballooning of Prepuce
- In adults – Difficulty in intercourse

Complications

- Infection of glans/ prepuce-Increased risk of Balanoposthitis
- Secretion become solidified - Preputial calculi
- Chronic inflammation – CA penis

Treatment

- In Children-Conservative management (Steroidal cream application for 4-6 Weeks)
- Circumcision
  - Not preferred for young patents because they are not co-operative for local anesthesia.
  - Performed for younger age only when there is an indication for circumcision

Indications of Circumcision

- No improvement after steroidal cream application
- Recurrent infection
- Age 16 – 18 years

Paraphimosis

⏱ 00:40:24

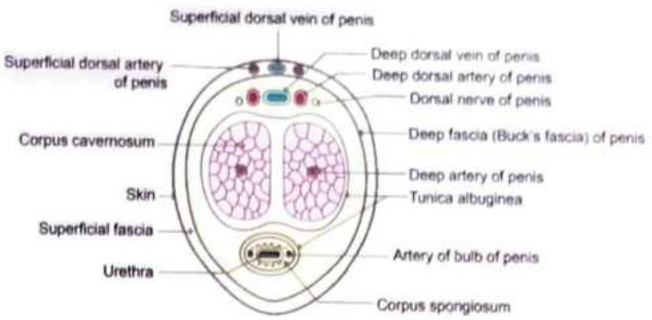
- Acquired condition
- Caused by formation of ring of Prepuce around glans because once prepuce is retracted it cannot be brought to its Normal position.

Formation of ring around Glans penis
↓
Impaired Lymphatic Drainage
↓
Edema of Glans
↓
Impaired venous Drainage
↓
Further edema
↓
Impaired Arterial Supply
↓
Gangrene formation [in severe cases]

- Urine flow not obstructed

Treatment

- Ice bag application
- Manual compression
- Hyaluronidase injection
- For non- responding patients - Circumcision



Priapism

⏱ 00:47:55

- Persistent painful erection in absence of sexual excitement / desire or it persist after sexual excitement / desire
- Min duration of painful erection – 24 hours
- It is an emergency & delay in treatment leads to Cavernosal fibrosis & impotence
- It should be treated within 6 hours to prevent other complications

Priapism is of 2 types

High Flow	Low Flow (MC)
• Non- Ischemic	• Ischemic
Causes	**Causes**
• Penile Trauma	• Sickle cell anemia
• Perineal trauma	• Leukemia
• Leading to formation of arterial sinusoidal shunts.	• Fat emboli
	• Spinal cord lesion
	• Malignant Penile inflammation
	• Trazadone Injection

Clinical Presentation

- In children (4– 10 yeɾ s) with sickle cell disease - Painful erection during nights
- In Adults – iatrogenic

Diagnosis

- Mainly clinical
- Doppler is helpful in diagnosis

Treatment

- If patient comes within 4-6 hrs.
- ketamine injection given (> 50% cases improve)

  ↓ No improvement

  Aspiration & saline irrigation

  ↓ No improvement

  Hyaluronidase injection
- For High flow priapism-Selective internal Pudendal Angiography f/b embolization of feeding vessel.
- **Another surgical option** - Shunts [Blood is shunted from corpora cavernosa]
  - Corporo-glanular shunt – winter shunt
  - Corporo-spongiosal Shunt-QUACKEL or SACHER shunt
  - Corporo–saphenous shunt -GRAYHACK shunt
  - Corporo-dorsal vein shunt- BARRY shunt

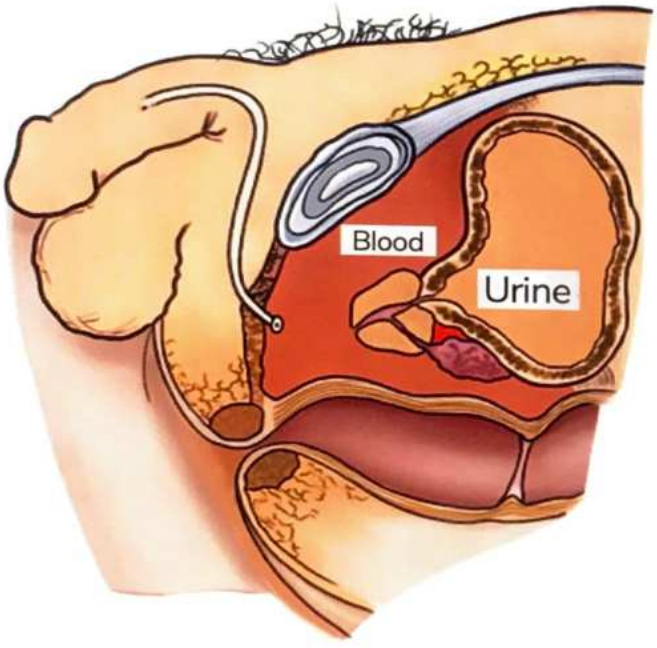
URETHRAL INJURIES

01:01:29

- 2 types
  - Posterior Urethral Injuries
  - Anterior Urethral injuries

Posterior Urethral injuries

- MC type
- Caused by road traffic accident
- Leading to pelvic fracture which further leads to
  - Extra peritoneal bladder rupture
  - Posterior Urethral injuries (20%)
- MC site of injury-Membranous Urethra (Bulbomembranous junction>Prostatomembranous junction)



Clinical features

- Urinary retention + Blood at meatus + pelvic hematoma
- If injury at Prostatomembranous junction - High lying prostate

↓

On IVP - Pie in sky appearance

Instrumentation

- Catheterization Shouldn't be done [if blood is found at meatus] - Partial tear may get converted to complete tear
- Retrograde urethrogram (RGU) only can be performed to rule out Urethral injuries

Management

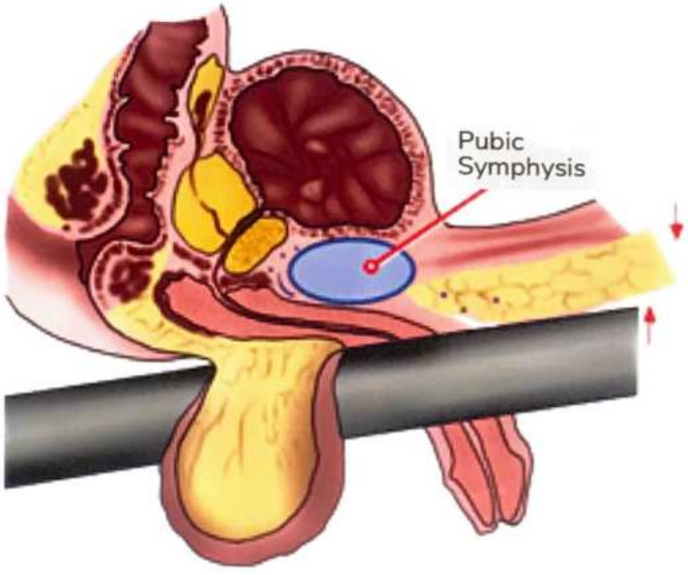
- Gold standard Treatment - SPC (Suprapubic cystostomy)
- Emergency repair should not be attempted - Can lead to increased risk of
  - Impotence
  - in Continence
  - Stricture formation
- Delayed repair within 3 months is preformed

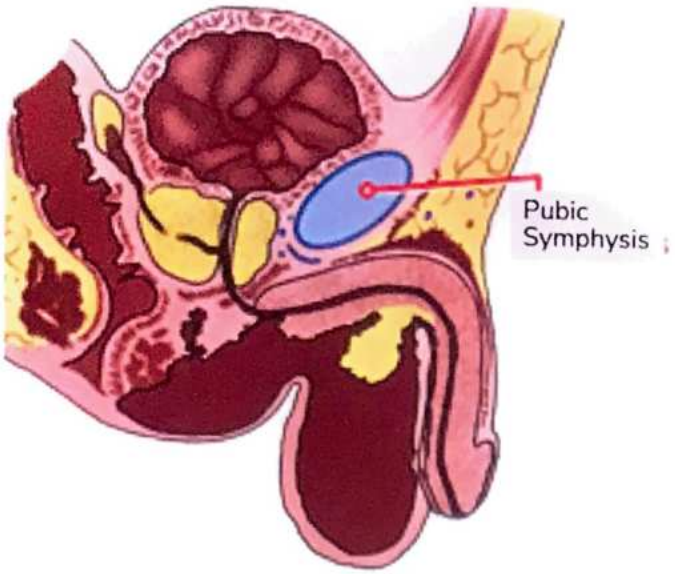
Anterior Urethral Injuries

- MC injured anterior urethral part - bulbar part of urethra

Causes

- External blow / kick
- Straddle / manhole injury

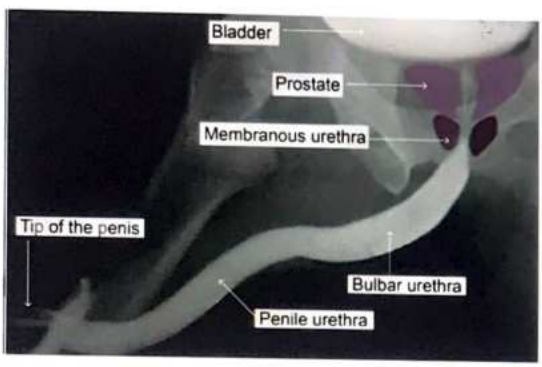




- Urinary retention
- Blood at meatus
- Perineal Hematoma - involves shaft & Bilateral scrotum (butterfly shaped)

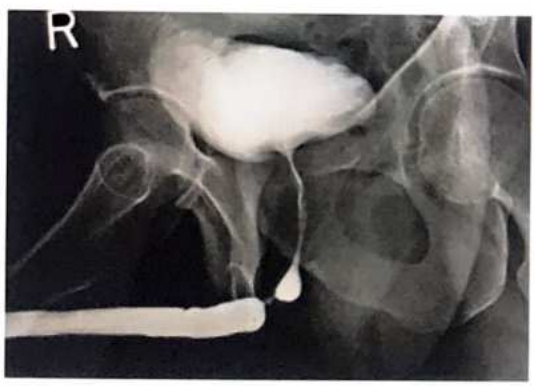
Treatment

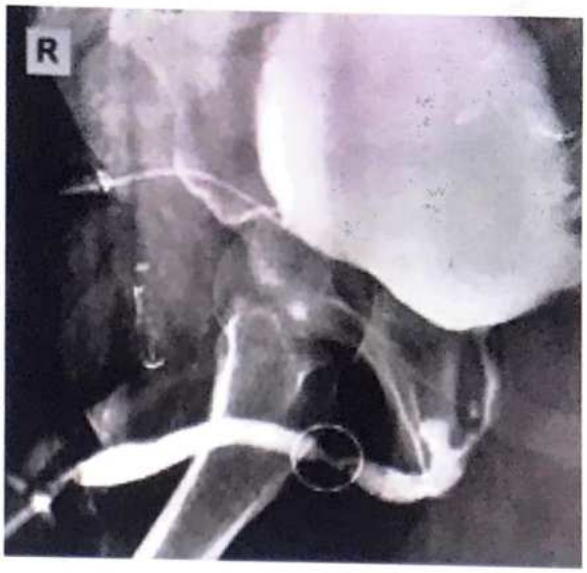
- Suprapubic cystotomy performed followed by delayed repair
- Usually Asymptomatic even after development of strictures
- Antibiotics



Urinary stricture 1:14:29

Most common cause is trauma





Investigation

- IOC for diagnosis of post Urethral Stricture - MCU
- IOC for diagnosis of ant Urethral Stricture - RGU
- Perform both RGU + MCU in an emergency patient for adequate evaluation of stricture

Management of patients of stricture

1. Dilatation
2. Optical internal urethrotomy at 12"0 clock Position - only performed for short bulbar stricture
3. If length of stricture up to 2cm - Excisions with end to end Anastomoses
4. If length of stricture > 2cm – Excision with tissue transfer for reconstruction

↓

Tissues used are

- Buccal mucosa (MC used)
- Bladder mucosa
- Penile skin

Previous Year's Questions

Q. A man is brought to the emergency after he fell into a man hole and injured his perineum. He feels the urge to micturate but is unable to pass urine and there is blood at the tip of the meatus with extensive swelling of the penis and scrotum. What is the location of the injury?

(NEET Jan 2020)

A. Bulbar urethra
B. Prostatic urethra
C. Bladder
D. Membranous urethra

PEYRONIE'S DISEASE

01:23:24

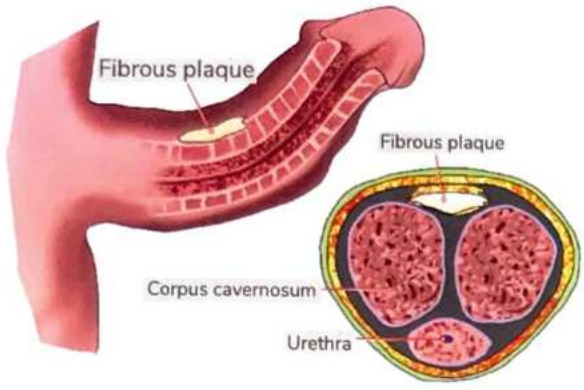
- Aka Penile fibromatosis
- Chronic vasculitis involving tunica albuginea
- Characterized by

  fibrous plaque over dorsolateral aspect of penis

  ↓

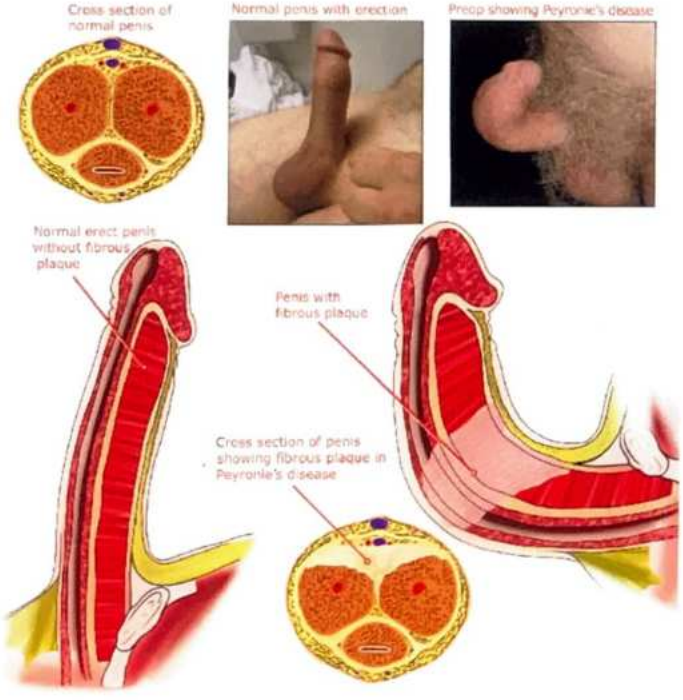
  Contraction causes Characteristic curvature of penis
- Associated with GALEZIA'S triad
  - DUPUYTREN'S contracture (+)
  - PEYRONIE'S disease (+)
  - RPF- Retroperitoneal fibrosis

Peyronie's Disease



Clinical features

- Painful erection
- Poor erection (Distal to plaque)
- Upward curvature on erection
- Impotency & infertility
- Dorsolateral plaque over the penis



Treatment

- >50% cases spontaneous resolution-observation+ emotional support
- If doesn't reduce we go for-NESBIT Operation by placement of Non–absorbable suture opposite to the plaque

CARCINOMA PENIS

01:29:17

- MC histological type – SCC
- Common in Low socio-economic status
- Poor hygiene, 6th decade
- 40 % of patients < 40 years of age
- > 50 % cases associated with phimosis only
  - Neonatal circumcision is protective for CA Penis, HIV/ STDs
- Viral infection is cause i.e. HPV infection – (16,18,31,33)

Important points about CA Penis

- In CA penis - Skin and Colle's fascia is involved
- MC route of spread in CA penis - Hematogenous
- MC cause of death in CA penis - Bleeding caused by enlarged inguinal lymph nodes leading to erosion of Femoral blood vessels
- In Ca Penis - Incidence of Pulmonary metastasis is rare

  ↓ (even in advanced cases)

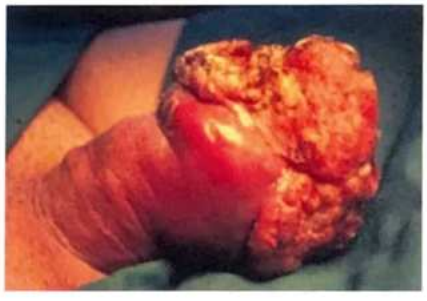
  Tunica Albuginea & Buck's fascia (Strong barriers)

  ↓

  Prevents invasion vessels

Premalignant lesion in CA penis

- BUSHKEE LOWENSTEIN TUMOR – locally malignant also known as verrucous carcinoma.
- BXO (balanitis xerotica obliterans)
- Cutaneous Horns
- Genital Warts
- Leukoplakia



BushkeelowesteinTumor

Carcinoma in situ forms in CA Penis

01:34:28

- If it involves penis known as BOWEN'S disease
- Erythroplasia of Queyrat - Glans Penis Malignancy in this Case I.e. MC site. Glans > Prepuce > Sulcus (G>P>S)

Clinical features

- MC Presentation is lesion itself associated with foul smelling discharge & is associated with minimal or no pain
- More than 50% cases are having enlarged inguinal lymph nodes out of which half are because of

Metastasis Sepsis

- And in all cases prophylactic antibiotics are again 4 -6 Weeks.
- So, MC cause of death is bleeding caused by erosion of femoral vessels.
- 2nd MC causes of death are sepsis
- Earliest & MC symptom of metastasis or CA Penis – priapism
- MC route of spread – Hematogenous

Diagnosis

- IOC – Biopsy
- IOC for staging - MRI
- SLN Biopsy
  - CA Breast
  - Malignant melanoma
  - CA Penis
  - H& N malignancy
  - Vulval CA
  - 1st SLN Biopsy was performed by CABANA & Procedure was known as CABANA Procedure.

8th AJCC. TNM Classification for CA Penis 01:45:20

Tis	Carcinoma in-situ
Ta	Non–invasive Verrucous Carcinoma
T1a	Invades sub epithelial connective tissue without Lymphovascular invasion & it's not poorly differentiated
T1b	Invades sub epithelial connective tissue with Lymphovascular invasion or poorly differentiated
T2	Invades corpus spongiosum with or without invasion
T3	Invades corpus cavernosum with or without invasion
T4	Invades other adjacent structure
N1	Palpable, mobile, unilateral inguinal lymph node
N2	Palpable, mobile, multiple or bilateral inguinal lymph node.
N3	Fixed inguinal nodal masses or pelvic lymphadenopathy which is unilateral or bilateral.
M0	No metastasis
M1	Distant metastasis

Other staging

- Jackson staging – CA Penis
- Robson Staging – RCC
- Gleason Grading – CA Prostate

Treatment

- Circumcision for CA Penis involving prepuce
- CA involving distal part
  - Partial penectomy with 2cm margin
- CA Penis involving proximal Part
  - Total penectomy + perineal urethrostomy

Chemotherapy agents

- Bleomycin + cisplatin

CA MALE URETHRA 01:54:01

- Chronic irritation
- Infection (HPV – 16%)
- Stricture (24 – 76 %)

Clinical features

- Palpable mass + obstructive symptom
- M.C site of CA male Urethra - Bulbomembranous> Penile urethra > Prostatic urethra
- MC histological type - SCC > TCC > Adenocarcinoma
- Penile Urethra - SCC > TCC
- Prostatic – TCC > SCC

Investigations

- MRI + Gadolinium contrast

Treatment

- Surgery ± radiotherapy
- If lymph node involvement, then ilioinguinal lymph node dissection

34 TESTIS & SCROTUM PART-1

DESCENT OF TESTIS

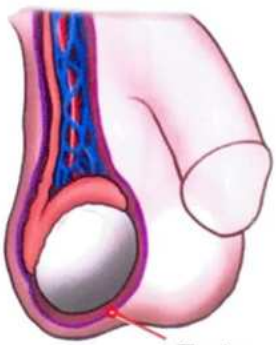
00:00:23

- Lumbar Region
- Pelvis → Scrotum (-2° C lower than body)

Factors responsible for Descent of Testis

- Most important: - Disproportionate growth of upper abdominal region away from the pelvic region.
  - **Pull of Gubernaculum**
  - Hormonal factors.

Normal



Tunica vaginali

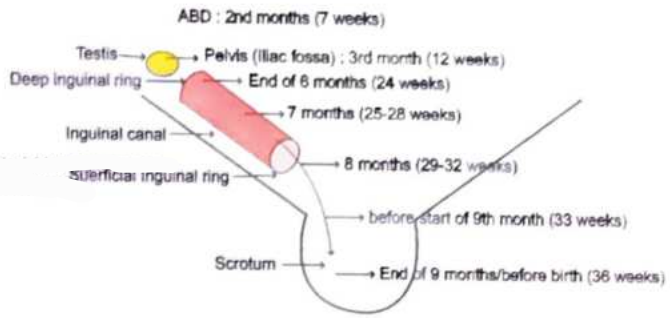
- Peritoneum invaginates along with gubernaculum and forms:

Processusvaginalis
↓obliterates
Tunica vaginalis (remnant)

POSITION OF TESTIS IN INTRAUTERINE LIFE

00:04:13

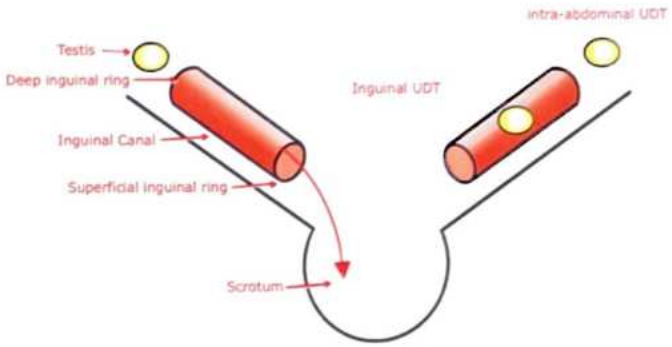
- Abdomen->2nd Month / 7TH Week
  - Pelvis (ILIAC FOSSA) -> 3rd month (12th week)
  - Deep inguinal ring-> at the end of 6th month (24th week)
  - Pass inguinal canal-> During 7th Month (25th – 28th week)
- Superficial inguinal Ring -> 8th month (29-32 week)
  - Enters Scrotum -> Beginning of 9th Month (33 week)
  - At the base of scrotum-> Before birth end of 9th Month/ 36 Week



UNDESCENDED TESTIS (UDT)

00:07:09

- Incidence of UDT at Birth- 3%
- Incidence of UDT at 1 Year of age – 1%
- Spontaneous descent occurs in 70-77% patients by 3 months of age
- Location
  - Inguinal/Palpable UDT – 80%
  - Abdominal/Non-Palpable UDT – 20%



Risk factors

Two independent factors

- Prematurity
- Low birth weight

LEYDIG CELLS- are less sensitive to temperature
↓
Testosterone
↓
Secondary Sexual Characters

By 5-6 Years of age there is complete absence of spermatogenesis

Histopathology- Abnormal germ cell histology

- 1-2 Years:
  - Earliest change - Hypoplasia of Leydig cells (1 month of age)
- Degeneration of Sertoli Cells
- Delayed disappearance of gonocytes
- Delayed appearance of adult dark spermatogonia

Complication

- S- Sterility
- A- Atrophy
- T-Trauma, tumor, torsion
  - Most common tumor- Seminoma
  - Maximum risk of tumor- Abdominal > Inguinal Testes
- H- Hernia (>90% cases PPV- Patent Processes vaginalis)
- I- Inflammation

MNEMONIC: SATHI

Previous Year's Questions

Q. All of the following are true about undescended testis except? neet pg 2015

A. Palapable in 80% cases

B. Hypoplasia of the leydig cells is the earliest postnatal histologic abnormality

C. IOC for diagnosis is diagnostic laparoscopy

D. Best time for orchidopexy is 6 months.

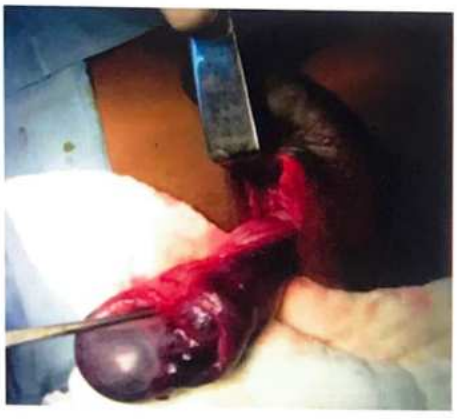
ORCHIDOPEXY

00:18:11

- Doesn't decrease the risk of testicular tumor
- **Only Facilitates->Early diagnosis**

INVESTIGATION OF CHOICE FOR UDT- Inguinal exploration

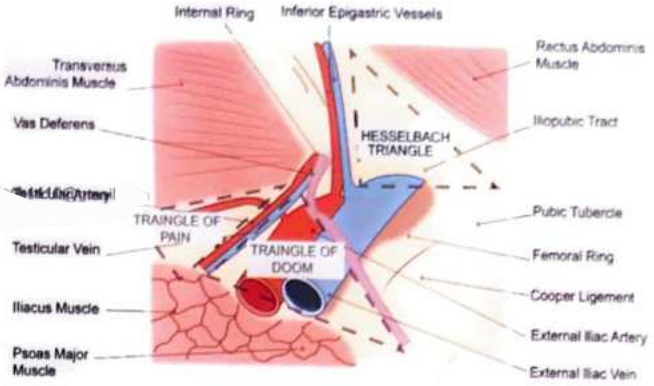
INVESTIGATION OF CHOICE FOR "NON- PALPABLE" UDT- Diagnostic laparoscopy



Diagnostic Laparoscopy

Find the Deep Ring and trace Vas Deferens

- If Vas Deferens-> is blind-> Testis +/- →start tracing Testicular artery-> if testicular artery also blind-> Testicular agenesis



- **If testis is present need to bring it into scrotum:** Orchidopexy
- Best age of orchidopexy-> 6 MONTHS Should not be delayed by 12 months (6-12 months)
- Named orchidopexy are
  - Ombridannes
  - Keetley- Torek
  - Stephen- Fowlers
  - Ladd & Gross
  - Placing testis in Dartos Pouch
  - Best results- Microvascular Testicular Auto Transplantation

ECTOPIC TESTIS

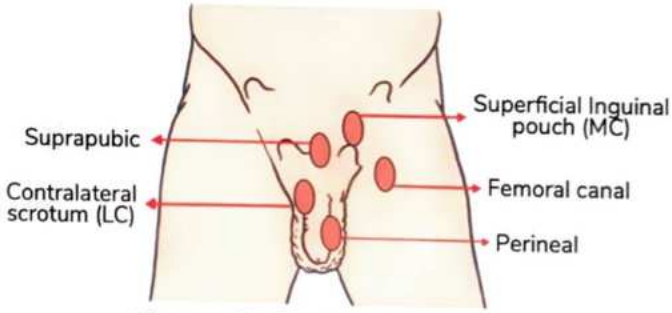
00:26:16

- Normal descent till inguinal canal
- Due to abnormality of Gubernaculum

↓

Abnormal location in the groin

- MC location: Superficial Inguinal Pouch
- Least Common location: Contralateral Scrotum
- Normal developed testis & palpable



Ecotopic Testis Location

Rx

- Surgical treatment: orchidopexy– 6 months
- Not be delayed by 2 years

Previous Year's Questions

Q. All of the following statements are correct about ectopic testis except? FMGE 2020

A. an ectopic testis is usually fully developed

B. MC location is superficial inguinal pouch

C. most ectopic testicles are non-palable.

D. surgical treatment should be done after 6 months of age.

RETRACTILE TESTIS 00:30:12

- Testis has completed process of normal descent but found in Groin
  - Because of
    - → Overactive cremasteric reflex
    - → Increased tone of cremasteric muscle.
  - No treatment required

ACUTE EPIDIDYMO- ORCHITIS (EDO) 00:32:06

- Inflammation of testis & epididymis
- Associated with Ascending bacterial infection from lower urinary tract (via UTI or STI)
- Most common organism - Acute EDO

  ↓

  Sexually active male (<35 years)-Chlamydia (Tx: DOXYCYCLINE)
- Most common organism -> Acute EDO ->
  - Children
  - Elderly
  - Homosexuals

  — E. coli

Clinical features

- Fever
- Pain in inguino-scrotal region
- Burning micturition

On Examination

- Prehn's Sign - +VE
  - The affected hemiscrotum is elevated. This action relieves the pain of epididymitis but exacerbates the pain of torsion (positive Prehn sign).
- Cremasteric reflex- +VE
  - In males is elicited when the inner part of the thigh is stroked. Stroking of the skin causes the cremaster muscle to contract and pull up the ipsilateral testicle toward the inguinal canal. (positive Cremasteric sign)
- Thickened Cord
- IOC- Ultrasound
  - Thickened/ enlarged cord
  - Secondary hydrocele-minimal amount or fluid collected

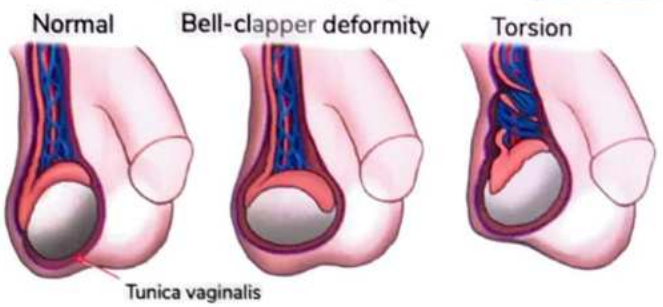
NOTE: MCC of Secondary hydrocele: Acute Epididymo-orchitis.

- Urine routine microscopic examination: WBCs
- Urine culture and sensitivity: UTI±

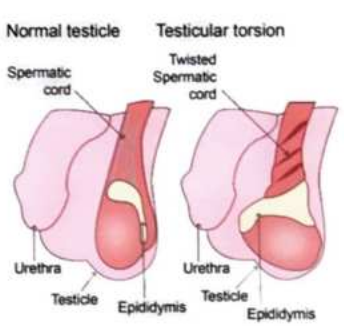
Treatment

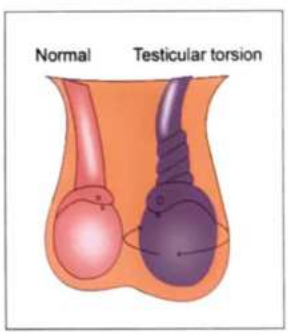
- Antibiotics
- Scrotal support
- NSAIDS

TESTICULAR TORSION (TT) 00:39:01



EXTRA VAGINAL	INTRA VAGINAL
• Extra Vaginal Torsion occurs outside the tunica vaginalis	• Torsion occurs within the tunica vaginalis • Most common





INTRAVAGINAL TESTICULAR TORSION 00:41:11

- 10-25 Years (Pre-Pubertal males)
- Spiral attachment of Cremasteric fibers over the cord

  ↓

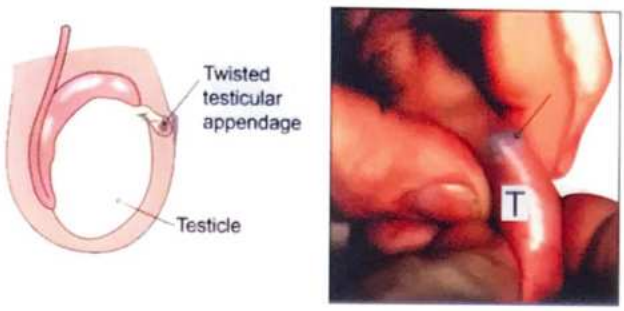
  Brisk cremasteric reflex

  ↓

  Testicular torsion

Predisposing factor

- MC - Inversion of Testes
- Bell clapper's deformity
- Separation of testis from body of epididymis
- Blue Dot sign: Torsion of appendage of testis



Bluedot Sign

Clinical features

- Severe agonizing pain
- Nausea & Vomiting
- **On examination affected testis->**

High Riding in upper part of scrotum

↓

Deming Sign

Contralateral testis is normally lying, placed transversely

↓

Due to mesorchium-> Angel Sign

- PREHNS SIGN - -ve
- Cremasteric reflex – Absent
- **Treatment-** Emergency Orchidopexy within 4 Hours

Diagnosis

- USG – Anatomy
- Doppler – for flow
- Combined - Duplex scan

IOC - Doppler

- Anywhere flow needs to be assessed: Doppler is IOC like:
  - Portal Hypertension
  - DVT
  - VV
  - TT
  - Varicocele

Duplex – IOC → VV, DVT

- Tc Pertechnate scan-> decrease uptake of radionuclide

Treatment - Orchidopexy

- Contralateral hemiscrotum should be explored.
- In case of bell- clappers deformity

↓

Bilateral Orchidopexy- Performed.

- In case of ischemic testis->Orchidectomy ± Prosthesis

EXTRAVAGINAL TESTICULAR TORSION 00:51:06

- Perinatal Period
- No anatomical defect
- No testicular fixation in perinatal period is primary cause (Spermatic cord + Tunica Vaginalis)

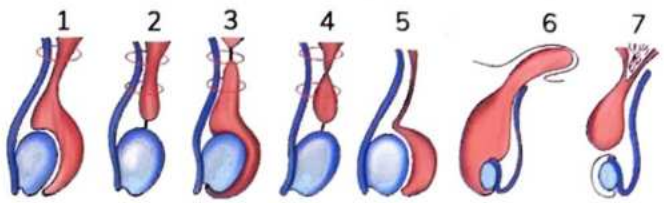
↓

Rotates as a single unit

Refer Table 34.1

HYDROCELE 00:54:06

- Collection of fluid within the layers of tunica Vaginalis



1. Congenital Hydrocele
2. Funicular Hydrocele
3. Infantile Hydrocele
4. Encysted Hydrocele
5. Vaginal Hydrocele
6. Bilocular Hydrocele
7. Hydrocele of Hernia sac

Vaginal hydrocele

Most common type

- Large/tense
- Clear fluid
- Trans illumination test is +ve

Congenital hydrocele

Patent Processus vaginalis

- Size varies with the activity level and posture
- Spontaneous Obliteration - 2 Years
- Treatment - Herniotomy (if spontaneous obliteration does not occur)

Funicular Hydrocele

- Processus Vaginalis patent up to top of testis where it shuts off from tunica vaginalis

Infantile hydrocele

- Processus vaginalis is patent up to deep ring
- Doesn't communicate with peritoneal cavity

Hydrocele of cord/ of canal of neck

- Obliteration of upper & lower part of PV
- When testis pulled-cystic swelling goes down and when testis is released cystic swelling goes up.

Bilocular hydrocele / Hydrocele en-bisac

- Two sacs communicating with each other near neck of scrotum

Hydrocele of Hernial sac

- Neck of hernial Sac is closed by adhesion/ plugged by omentum
- Retention of fluid secreted by peritoneum of hernial sac.

Vaginal Hydrocele

Refer Table 34.2

Treatment

- Small hydrocele - LORD's PLICATION OF SAC
- Medium hydrocele - Jaboulay's eversion of sac
- Large hydrocele - Excision of Sac

Table 34.1

PRENATAL	POSTNATAL
Testis is hard and fixed to the skin, non viable, located in inguinal canal ↓ Orchidectomy	• Tender scrotum • Testis is not fixed to skin • Treatment - Orchidopexy. • 20% - Bell- clapper's deformity

Table 34.2

Primary Hydrocele	Secondary Hydrocele

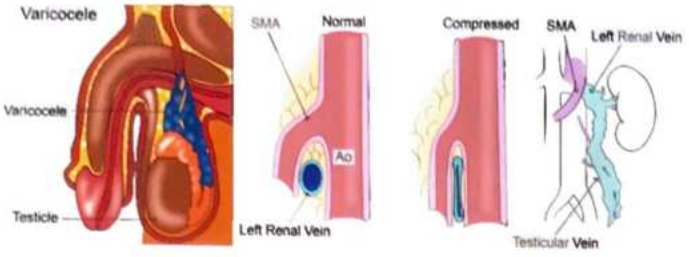
• Collection of fluid in Tunica Vaginalis
• Large
• Dense
• M/C
• Testis can't be felt separately
	• Causes
	  ○ Trauma
	  ○ Tumor
	  ○ Epididymo – orchitis (MC)
	• can be felt separately
	• Small
	• Lax
	• Diagnosis- Ultrasound

35 TESTIS AND SCROTUM PART-2

VARICOCELE

00:00:15

- Dilated Pampiniform plexus of veins, located posterior and above testis
- Tortuous
- MC surgically correctable cause of male subfertility (i.e. borderline fertility)
- MC cause reversible atrophy of testis in adolescent males
- 90% left side

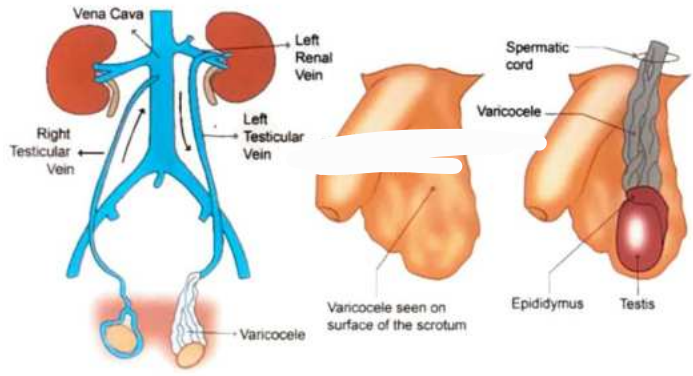


Predisposing factors

- LGV drains at right angle into left RV
  If left gonadal vein has incompetent or defective valves - increase transmission of pressure.
- Nutcracker's phenomenon: LRV compressed between aorta and renal vein
- Sigmoid colon – loaded fecal matter→compresses LGV

Clinical features

- Seen in tall, thin adults
- Discomfort in scrotal region
- Swelling in scrotal region-> more prominent in standing position
- Decompress in lying down position
- On palpation –
  'Bag of worm' sensation



Suspiciousvaricocele – RCC

SUSPICIOUS VARICOCOELE:

- Elderly males
- Short history
- Does not decompress on lying down position
- Due to large veins around scrotum →increase in temperature of testes:

↓sperm motility
↓sperm number
} Semen analysis

Investigations

- IOC for diagnosis – Doppler
- Gold standard - Venography

Varicocele classification

- Subclinical varicocele
  - neither visible nor palpable at rest or during Valsalva maneuver
  - Demonstrable after special test.
- Grade 1 - palpable during Valsalva maneuver
- Grade 2 - palpable at rest
- Grade3 - visible and palpable

Indication of treatment

- Significant discomfort
- Infertility
- Poor Testicular growth in adolescents
- ↓ motility / sperm count
- Recruitment in army and police services

Treatment

- High inguinal ligation (near deep ring) of pampiniform plexus of veins
- Microvascular sub inguinal ligation of pampiniform plexus of veins (best results)
- **Palomo's operation: ligation of Left Gonadal Vein in retroperitoneum**
- Alternative venous drainage via cremastric veins.

SPERMATOCELE

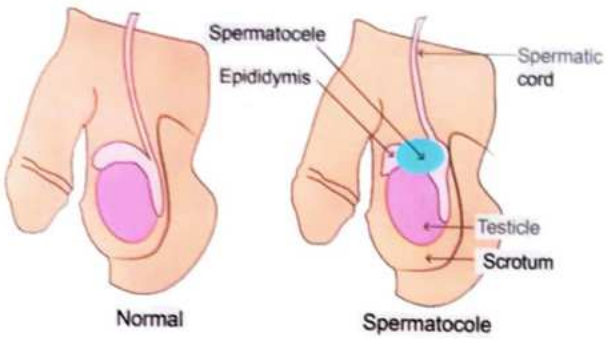
00:18:40

- Unilocular retention cyst
- Derived from some portion of sperm conducting mechanism of epididymis
- Location: Epididymal head; above and behind upper pole of testis
- Presence of spermatozoa

↓

(Barley – water appearance)

- Softer, laxer
- Transillumination is positive



Treatment

- Small spermatocele– observation (ONLY)
- Large spermatocele – aspiration or excision
- Chinese lantern pattern – seen in epididymal cyst

FOURNIER'S GANGRENE

00:22:18

- Also known as idiopathic scrotal gangrene
- Type of necrotizing fasciitis of scrotal region
- Abrupt onset
- Idiopathic Polymicrobial infections(aerobes + anaerobes)

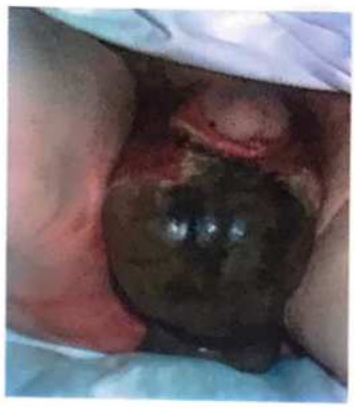
↓

Obliterative end arthritis of arterioles of scrotal region

↓

Gangrene

- **Involved structures**
  - Skin
  - Superficial Fascia
  - Deep Fascia
- **Spared structures**
  - Corpora Cavernosa
  - Corpora Spongiosa
  - Urethra
  - Testis
  - Cord Structures



Predisposing factors

- DM
- Local Trauma
- Para phimosis
- Anal infections
- H/O recent instrumentation.
- Immunosuppression

Clinical features

H/O perineal trauma/infection/instrumentation

↓

Cellulitis

↓

Swollen, tender, erythematous skin

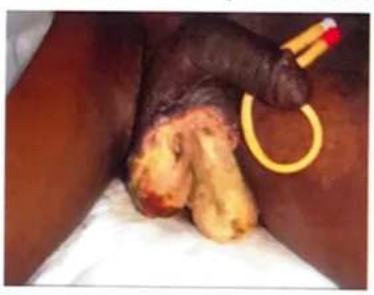
↓

- Purplish to Blackish discoloration
- Dish water like discharge
- Fetid odour

↓

Necrosis of skin

- Pain, high grade fever, marked systemic toxicity



Management

- IV fluids + IV antibiotics
- Extensive surgical debridement
- After extensive debridement skin grafting is done over testes.
- Mortality rate – 7-75% (avg-20%)

TESTICULAR TUMOURS

00:30:40

Risk factors for testicular tumors

- Cryptorchidism
- Testicular feminization syndrome(androgen insensitivity

syndrome)
- Klinefelter's syndrome
- H/O testicular tumor in siblings
- Personal H/O Testicular Tumor- increases risk of contralateral testicular tumor
- In-utero exposure of DES (Diethylstilbestrol)

WHO classification of testicular tumor

Germ cell tumors

Seminoma

Non-Seminomatous GCT
- Yolk sac tumor
- Teratoma
- Embryonal carcinoma
- Choriocarcinoma

Sex cord / gonadal stromal tumors
- Leydig cell tumor
- Sertoli cell tumor
- Granulosa cell tumor
- Thecoma / fibroma

Mixed (germ cell & gonadal stromal tumors)
- Gonadoblastoma

Lymphoid / hematopoietic:
- Lymphoma
- Leukemia
- Plasmacytoma

One liners for Testicular tumor (TT):
- MC TT – seminoma (mixed if given in option)
- MC primary B/L TT - Seminoma
- MC Radiosensitive TT - Seminoma
- MC TT in children (1-3 years) – Yolk sac tumor
- TT with best prognosis – Yolk sac tumor
- MC TT in pre-pubertal children (11-13 years) – Teratoma
- MC TT in elderly
- MC TT (B/L)

  } Lymphoma (diffuse large B cell lymphoma variant of NHL)
- MC secondary TT
- TT with early hematogenous spread
  With early pulmonary metastasis — Choriocarcinoma

Worst prognosis Variant (Hurricane tumor)

- Tumors with increased risk of gynecomastia - any tumor with gonadal stromal component –
  - Leydig cell tumor
  - Sertoli cell tumor
  - Granulosa cell tumor
  - Thecoma
  - Fibroma
  - Gonadoblastoma

NON – HODGKIN LYMPHOMA (NHL) 00:40:42

- Extra nodal lymphoma
- MC type – DLBL (Diffuse large B cell lymphoma)
- DLBL is MC type of lymphoma in
  - Primary CNS Lymphoma
  - Orbital Lymphoma
  - Thyroid Lymphoma
  - Breast lymphoma
  - Gastric lymphoma – DLBL (52%) case followed by MALToma (35%)
  - Small intestine lymphoma
  - Appendicular lymphoma
  - Colonic lymphoma
  - Rectal lymphoma
  - Testicular Lymphoma

Testicular tumors :
- MC TT – seminoma (3rd and 4th decades)
- MC TT in elderly – lymphoma (6th decade)

Clinical features of Seminoma
- Painless swelling or mass in relation to testis
- 10% cases have secondary hydrocele
- 5% cases - Gynecomastia
  - MC in Leydig cell tumors
  - Sertoli cell tumors
  - Granulosa cell tumor
  - Gonadoblastoma
- Seminoma -2/3rd – localized tumor
- NSGCT – widespread metastasis
- MC route of spread – Lymphatics

- Choriocarcinoma
  - Early hematogenous spread
  - Early metastasis to lungs
  - Cannon Ball 20 (RCC>Choriocarcinoma)

Diagnosis
- Ultrasound:
  - Enlarged and hard affected testis
  - Secondary hydrocele (10%)
  - Hypoechoic mass in relation to testis

FNAC / trans scrotal biopsy – contraindicated
↓ (Seeding of tumor cells in tract)
lead to inguinal lymph node metastasis

Treatment

- High inguinal orchidectomy(even on suspicion of TT- Because most TT are malignant)
- Chevassu maneuver - Isolate testis from cord and placement of soft clamp over the cord

↓

Take frozen section biopsy

↓

If Malignant tumor

↓

High inguinal orchidectomy

- CECT – for retroperitoneal LN involvement
- Primary landing site from right testicular tumor
  - inter -aortocaval LN
- Primary landing site from left testicular tumor- Para-aortic LN
- Cross over metastasis from right to left but NOT left to right
- MC group LN involved in TT- Para aortic LN

Tumor markers

AFP

- Y -Yolk Sac Tumor
- E-Embryonal Carcinoma
- T-Teratoma

B-HCG

- C – Choriocarcinoma
- E – embryonal carcinoma
- S– Seminoma (10% which have Syncytiotrophoblast)

Markers based on bulk of disease

- LDH
- PLAP
- GGT

} Seminoma

8th AJCC TNMS classification

Serum markers

- AFB
- HCG
- LDH

PATHOLOGICAL STAGING (P) 01:01:10

- P Tis – ITGCN (carcinoma-in-situ)
- P T1 – limited to testis without Lymphovascular invasion Tumor may invade tunica albuginea but not the tunica vaginalis
- PT2 – Limited to testis and epididymis with Lymphovascular invasion or extending to tunica albuginea with involvement of tunica vaginalis
- PT3 – invades the spermatic cord with or without Lymphovascular invasion
- PT4 – invades scrotum with or without Lymphovascular invasion

Lymph node staging

- N1 – LN mass ≤ 2cm or multiple LN mass, none ≥ 2cm
- N2 – LN mass > 2cm but <5cm or multiple LN mass anyone one mass is >2cm but <5cm
- N3– LN mass > 5cm

Metastasis

- M0 – no distant metastasis
- M1 – metastasis to non-regional LN or pulmonary metastasis
- M2– Non-pulmonary visceral metastasis

Management 01:03:44

Refer Table 35.1

Chemotherapy regimens

B– Bleomycin
E– Etoposide
P– cisplatin

} x 6 cycles

Intra tubular germ cell neoplasm (ITGCN) 01:06:20

- A/K testicular CA-in-situ
- Pre invasive precursor of all testicular germ cell tumor except
  - Spermatocyte seminoma
  - Yolk sac tumor
  - Teratoma

Risk factors

- H/O germ cell tumor
- Cryptorchidism
- Infertility
- Extra gonadal germ cell tumor
- Atrophic – contra lateral testis
- Somatosexual ambiguity

Clinical features

- Affected Testis is normal or atrophic
- No established tumor maker
- USG testis – not reliable for diagnosis
- **Gold standard investigation for ITGCN: testicular biopsy**

Treatment

- Observation
- Radiotherapy
- Orchidectomy

CA SCROTUM

01:10:33

- A/K Chimney sweeps cancer
- MC histological type - SCC
- 5th / 6th decades

Risk Factors

- TAR
- SOOT
- Hydrocarbon

Clinical features-ulcer with everted edges and indurated base (MC LN involved: Inguinal)

IOC for diagnosis – Biopsy

Treatment – wide local excision with 2cm margin

IMPORTANT POINTS ASKED IN UROLOGY

01:13:17

MC group of LN involved

- CA penis
- CA scrotum

} Inguinal LN

- CA Bladder
- CA prostate

} Obturator LN

- Primary landing site from right testicular tumor- inter-aortocaval LN
- Primary landing site from left testicular tumor- Para-aortic LN (Overall MC)

Composition of stone in various organs

- MC gall stone – cholesterol
- MC pancreatic stone- calcium carbonate
- MC salivary stone- calcium carbonate
- MC renal stone – calcium oxalate
- MC radiolucent renal stone – uric acid
- MC 10 Bladder stone: Ammonium Urate
- MC 20 Bladder stone: Uric Acid >Struvite
- MC Prostatic Stone: Calcium Phosphate

Table 35.1

	Seminoma	Non-Seminomatous GCT
IA IB IIA IIB	• Radiotherapy	• RPLND
IIc III Is	• Chemotherapy	• Chemotherapy± RPLND

PREP NUGGETS

Prep Nuggets

Axillary LN Levels in relation with Pectoralis minor

Level	Relation with Pectoralis minor	Axillary LNs Included
I	Below or lateral	_____
II	_____	_____
III	_____	Apical

Prep Nuggets

	TSH	T4	T3
Graves disease	_____	High	_____
Hashimoto's thyroiditis	Elevated	_____	_____
Pituitary failure	_____	_____	Low
Hypothalamic failure	Low	_____	_____

Indications of Liver Transplantation (LT)

Most common indications of LT	HCV Induced Cirrhosis
Most common indication of pediatric LT	_____
Most common metabolic disorder requiring LT in paediatric patients	_____
Most common indication for LT following acute liver failure	_____