SURGICAL INFECTIONS

BY
Dr. Musarrat Hussain
Assistant Professor
Department of Surgery,
HMC/KGMC

SURGICAL INFECTIONS
&
ANTIBIOTICS

- Definition
- Pathogenesis
- Clinical features & investigations (general)
- Common pathogens
- Common infections
- Antibiotics use

  Therapeutic

  Prophylactic

INFECTION

Invasion of the body by pathogenic microorganisms and reaction of the host to organisms and their toxins

SURGICAL INFECTIONS

- A surgical infection is an infection which requires surgical treatment and has developed befor, or as a complication of surgical treatment.

Surgical Infection

- *A major challenge*
- *Accounts for 1/3 of surgical patients*
- *Increased cost to healthcare*

Factors contributing to infections

- *Adequate dose of microorganisms*
- *Virulence of microorganisms*
- *Suitable environment (closed space)*
- *Susceptible host*

Pathogenicity of bacteria

Exotoxins: specific, soluble proteins, remote cytotoxic effect
Cl.Tetani, Strep. pyogenes

Endotoxins: part of gram-negative bacterial wall,
lipopolysaccharides e.g., E coli

Resist phagocytosis: Protective capsule
Klebsiela and Strep. pneumoniae

Host Resistance

- *Intact skin / mucous membrane.*
  (surgery/ trauma-break it)

- *Immunity:*
  Cellular (phagocytes)
  Antibodies

Prevention of surgical infection

- *Patient in best general condition. (host defense)*
- *Minimize introduction of pathogens during surgery.*
- *Good surgical technique.*
- *Peri-operative care (support defense)*

Clinical features

- *Local-* pain, heat, redness, swelling, loss of function
  (apparent in superficial infections)
- *Systemic-* fever, tachycardia, chills
- *Investigations:*
  - Leukocytosis
  - Exudates- Gram stain, culture
  - Blood culture (chills & fever)
  - Special investigations (radiology, biopsy)

Principles of surgical treatment

- *Debridement- necrotic, injured tissue*
- *Drainage- abscess, infected fluid*
- *Removal- infection source, foreign body*
- *Supportive measures:*
  - *immobilization*
  - *elevation*
  - *antibiotics*

STREPTOCOCCI

- Gram positive
- Flora of the mouth and pharynx, (bowel)
- Streptococcus pyogenes –(β hemolytic) 90% of infections e.g.,lymphangitis, cellulitis, rheumatic fever
- Strep. viridens- endocarditis, urinary infection
- Strep. fecalis – urinary infection, pyogenic infection
- Strep. pneumonae – pneumonia, meningitis

STREPTOCOCCAL INFECTIONS

Erysipelas

- Superficial spreading cellulitis & lymphangitis
- Area of redness, sharply defined irregular border
- Follows minor skin injuries
- Strep pyogenes
- Common site: around nose extending to both cheeks
- Penicillin, Erythromycin

SREPTOCOCCAL INFECTION

Cellulitis

- Inflammation of skin & subcutaneous tissue
- Non-suppurative
- Strep. Pyogenes
- Common sites- limbs
- Affected area is red, hot & indurated
- Treatment : Rest, elevation of affected limb
  Penicillin, Erythromycin
  Fluocloxacillin (staph. suspected)

13.10.2004

NECROTIZING FASCIITIS

- Necrosis of superficial fascia, overlying skin
- **Polymicrobial**

  strep, staph, enterococci, bacteroides, enterobacteriaceae
- Sites- abd.wall (Meleny's),
  perineum (Fournier's),
  limbs,
- Usually follows abdominal surgery or trauma

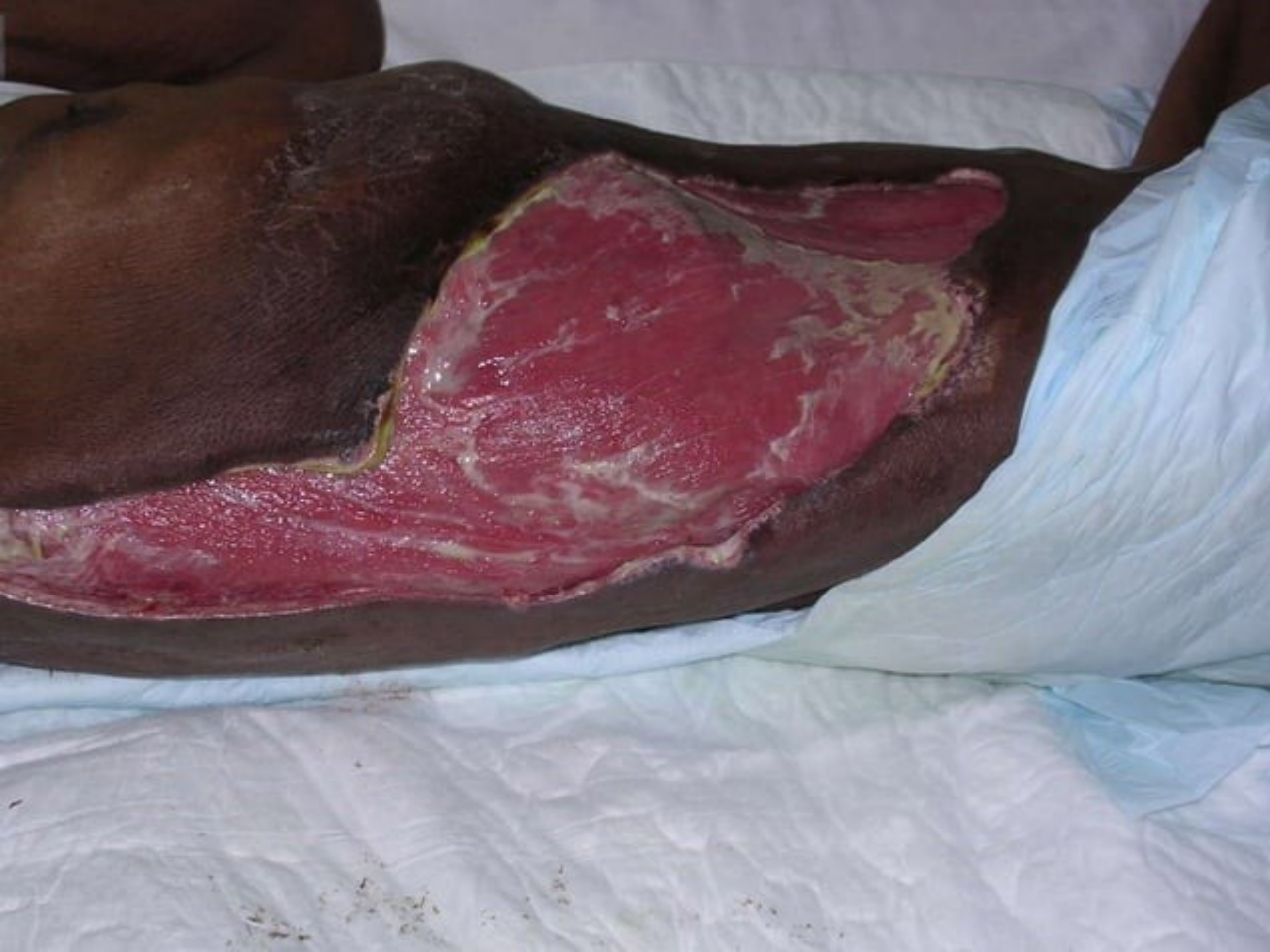
NECROTIZING FASCIITIS

- More in diabetic patient
- Starts as cellulitis, edema, systemic toxicity
- Appears less extensive than actual necrosis
- Treatment:

  Debridement , repeated dressings, skin grafting

  Broad spectrum antibiotics

  ampicillin, clindamycin, aminoglycosides



STAPHYLOCOCCI

- Inhabitants of skin, Gram positive
- Infection characterized by suppuration
- **Staph.aureus-** ***SSI, nosocomial ,superficial infections***
- Staph. epidermidis- opportunistic (wound, endocarditis)
- Antibiotics: Penicillin, Cephalosporin, Vancomycin
- MRSA: Vancomycin

STAPHYLCOCCAL INFECTIONS

- ***Abscess-*** *localized pus collection*
  Treatment- drainage, antibiotics

- ***Furuncle-*** *infection of hair follicle / sweat glands*

- ***Carbuncle-*** *extension of furuncle into subcut. tissue*
  common in diabetics
  common sites- back, back of neck
  Treatment: drainage, antibiotics, control diabetes

Surgical site infection (SSI)

- 38% of all surgical infections
- Infection within 30 days of operation
- Classification:

  Superficial: Superficial SSI–infection in subcutaneous plane (47%)

  Deep: Subfascial SSI- muscle plane (23%)

  Organ/ space SSI- intra-abdominal, other spaces (30%)
- **Staph. aureus**- most common organism
- **E coli**, Entercoccus ,other Entetobacteriaceae- deep infections

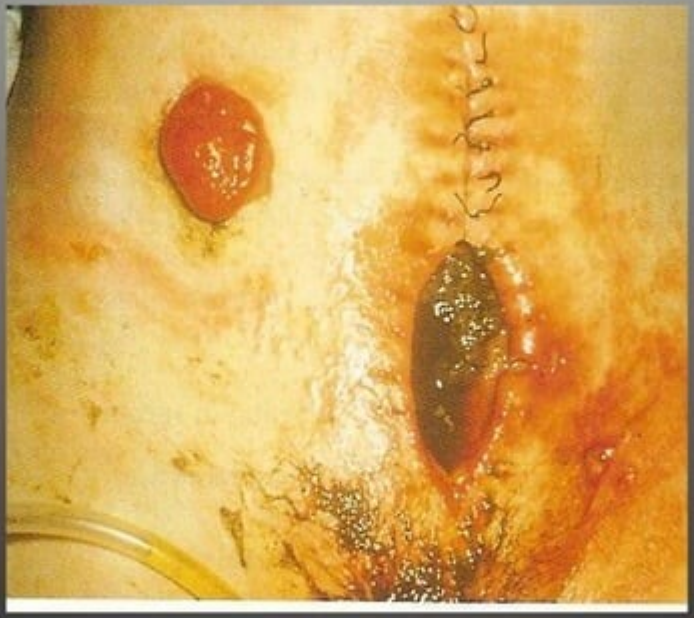
  B fragilis – intrabd. abscess

Surgical site infection (SSI)

- *Risk factors:* age, malnutrition, obesity, immunocompromised, poor surg. tech, prolonged surgery, preop. shaving and type of surgery.
- *Diagnosis:*

  Sup.SSI- erythema, oedema, discharge and pain

  Deep infections- no local signs, fever, pain, hypotension. need investigations.
- *Treatment:* surgical / radiological intervention.



Surgical site infection (SSI)

Intra-abdominal infections

- Generalized
- Localized
- Prevention- good tech., avoid bowel injury, good anastomosis.
- Diagnosis- History, exam., investigations.
- Treatment- surgery/ intervention

  Antibiotics (aerobe+ anaerobe)

GRAM NEGATIVE ORGANISMS

(Enterobactericiae)

Escherichia coli

Facultative anaerobe, Intestinal flora

Produce exotoxin & endotoxin

Endotoxin produce Gram-negative shock

Wound infection, abdominal abscess,
UTI, meningitis, endocarditis

Treatment- ampicillin, cephalosporin, aminoglycoside

GRAM NEGATIVE ORGANISMS

Pseudomonas

- *aerobes, occurs on skin surface*
- *opportunistic pathogen*
- *may cause serious & lethal infection*
- *colonize ventilators, iv catheters, urinary catheters*
- *Wound infection, burn, septicemia*
- *Treatment: aminoglycosides, piperacillin, ceftazidime*

CLOSTRIDIA

- *Gram positive, anaerobe*
- *Rod shaped microorganisms*
- *Live in bowel & soil*
- *Produce exotoxin for pathogenicity*
- *Important members:*
  - *Cl. Perfringens, Cl. Septicum (gas gangrene)*
  - *Cl. Tetani (tetanus)*
  - *Cl. Difficile (pseudomembranous colitis)*

GAS GANGRENE

- ***Cl. Perfringens, Cl. Septicum***
- *Exotoxins: lecithinase, collagenase, hyaluridase*
- *Large wounds of muscle (contaminated by soil, foreign body)*
- *Rapid myonecrosis, crepitus in subcutaneous tissue*
- *Seropurulent discharge, foul smell, swollen*
- *Toxemia, tachycardia, ill looking*
- *X-ray: gas in muscle and under skin*
- *Penicillin, clindamycin, metronidazole*
- *Wound exposure, debridement , drainage, amputation*
- *Hyperbaric oxygen*

TETANUS

- *Cl. Tetani, produce neurotoxin*
- *Penetrating wound (rusty nail, thorn)*
- *Usually wound healed when symptoms appear*
- *Incubation period: 7-10 days*
- *Trismus- first symptom, stiffness in neck & back*
- *Anxious look with mouth drawn up (risus sardonicus)*
- *Respiration & swallowing progressively difficult*
- *Reflex convulsions along with tonic spasm*
- *Death by exhaustion, aspiration or asphyxiation*

TETANUS

- **Treatment:**

  wound debridement, penicillin
  Muscle relaxants, ventilatory support
  Nutritional support

- **Prophylaxis:**

  wound care, antibiotics
  Human TIG in high risk (un-immunized)
  Commence active immunization (T toxoid)
  Previously immunized-
  booster >10 years needs a booster dose
  booster <10 years- no treatment in low risk wounds

PSEUDOMEMBRANOUS COLITIS

- *Cl. Difficile*
- *Overtakes normal flora in patients on antibiotics*
- *Watery diarrhea, abdominal pain, fever*
- *Sigmoidoscopy: membrane of exudates (pseudomembranes)*
- *Stool- culture and toxin assay*
- *Treatment :*

  stop offending antibiotic

  oral vancomycin/ metronidazole

  rehydration, isolate patient

GRAM NEGATVE ANAEROBES

Bacteroides fragilis

- *Normal flora in oral cavity, colon*
- *Intra-abdominal & gynecologic infections (90%)*
- *Foul smelling pus, gas in surrounding tissue, necrosis*
- *Spiking fever, jaundice, Leukocytosis*
- *No growth on standard culture*
- *Needs anaerobe culture media*
- *Treatment:*

  Surgical drainage

  Antibiotics- clindamycin, metronidazole

ANTIBIOTICS

Chemotherapeutic agents that act on organisms

- *Bacteriocidal: Penicillin, Cephalosporin, Vancomycin Aminoglycosides*
- *Bacteriostatic: Erythromycin, Clindamycin, Tetracycline*

ANTIBIOTICS

- **Penicillins**- *Penicillin G, Piperacillin*
- **Penicillins with β-lactamase inhibitors**- *Tazocin*
- **Cephalosporins (I, II, III)**- *Cephalexin, Cefuroxime, Ceftriaxone*
- **Carbapenems**- *Imipenem, Meropenem*
- **Aminoglycosides**- *Gentamycin, Amikacin*
- **Fluoroquinolones**- *Ciprofloxacin*
- **Glycopeptides**- *Vancomycin*
- **Macrolides**- *Erythromycin, Clarithromycin*
- **Tetracyclines**- *Minocycline, Doxycycline*

ROLE OF ANTIBIOTICS

- *Therapeutic:*

  To treat existing infection

- *Prophylactic:*

  To reduce the risk of wound infection

ANTIBIOTIC THERAPY

(Guideline for surgical infections)

- ***Pseudomembranous colitis-*** *oral vancomycin/ metronidazole*
- ***Biliary-tract infection-*** *cephalosporin or gentamycin*
- ***Peritonitis-*** *cephalosporin/ gentamycin + metronidazole/ clindamycin*
- ***Septicemia-*** *aminoglycoside + ceftazidime, Tazocin or imipenem, (may add metronidazole)*
- ***Septicemia due to vascular catheter-*** *Flucloxacillin/ vancomycin or Cefuroxime*
- ***Cellulitis-*** *penicillin, erythromycin (flucloxacillin if Staphylococcus infection. Suspected)*

ANTIBIOTIC PROPHYLAXIS

- Prophylaxis in clean-contaminated/ high risk clean wounds
- Antibiotic is given just before patient sent for surgery
- Duration of antibiotic is controversial (one dose- 24 hour regimen)

ANTIBIOTIC PROPHYLAXIS
BASED ON SURGICAL WOUND CLASSIFICATION

- A. Clean : CLASS I e.g. surgeries on thyroid gland, breast, hernia,
- • No need for prophylaxis in clean surgeries, except for :

o Immunucompromised patients, e.g. diabetics, patients using corticosteroids.

o If the surgery include inserting foreign materials such as artificial valves.

o High risk patients like those with infective endocarditis.

The risk of postoperative wound infection is around 2%.

ANTIBIOTIC PROPHYLAXIS

- B. Clean/Contaminated (minimal contamination) : CLASS II
  e.g., biliary,urinary, GI tract surgery

- Prophylaxis is advisable, and the risk of infection is about 5-10%.

ANTIBIOTIC PROPHYLAXIS

- C. Contaminated (gross contamination) : CLASS III e.g. during bowel surgery
- Prophylaxis is advisable and the risk of infection is up to 20%.

ANTIBIOTIC PROPHYLAXIS

- D. Dirty : CLASS IV *through established infection*
  e.g., peritonitis (up to 50%)
- The use of antibiotic is considered to be of therapeutic nature (not prophylactic).

- The risk of infec@on is up to 5CD.

рахмат
danke
謝謝
ngiyabonga
شكراً جزيلاً
Баярлалаа
teşekkür ederim
спасибо
mersi
barka
welalin
tack
dank je
misaotra
paldies
grazzi
vinaka
спасибі
blagodaram
malondo
kiitos
dankie
thank you
gracias
tapadh leat
хвала
dhanyavad
asante
manana
bedankt
hvala
maururu
köszönöm
obrigada
enkosi
mochchakkeram
djiere dieuf
tenki
dziękuję
mamnun
дякую
chnorakaloutioun
gracies
sulpay
go raibh maith agat
sukriya
kop khun krap
taiku
sobodi
dekuji
obrigado
sagolun
ありがとう
arigatô
takk
dakujem
trugarez
grazie
tanemirt
mesi
didi madloba
najis tuke
terima kasih
rahmet
shukriya
мерси
dhanyavadagalu
diolch
kam sah hamnida
rahmat
তোমাকে ধন্যবাদ
감사합니다
xiexie
ευχαριστώ
merci