🔥 HIGH-YIELD SURGERY NOTES - TESTICULAR & PEDIATRIC CONDITIONS

1. TESTICULAR TORSION

⚠️ **SURGICAL EMERGENCY - "Golden Period" = 6 hours for salvage | >12 hours = 90% loss | Remember: "TIME IS TESTES"**

TORSION Mnemonic:
Twisted cord on ultrasound
Onset sudden (waking from sleep classic)
Reactive hydrocele may be present
Spermatic cord shortened
Intense pain (sudden, severe)
Orchidopexy both sides
No cremasteric reflex (ABSENT = key sign)

Epidemiology & Pathophysiology

Parameter	Details
Age peaks	Bimodal: Neonatal (1st year) & Pubertal (12-18 years)
Anatomical defect	"Bell-clapper deformity" - High attachment of tunica vaginalis → horizontal lie testis
Direction of twist	Intravaginal (most common) > Extravaginal (neonatal)
Degree of rotation	180° to 720° (complete = worse prognosis)

🔑 **BUZZWORDS:** "Acute scrotum", "Absent cremasteric reflex", "Blue dot sign" (appendix torsion vs testis), "Whirlpool sign" on Doppler, "High-riding testis", "Horizontal lie", "Bell-clapper deformity", "Negative Prehn's sign"

Clinical Presentation - Classic Triad

Feature	Details	Differentiating Points
1. Sudden severe pain	Unilateral, may wake from sleep, may follow minor trauma/exercise	vs Epididymitis (gradual onset)
2. Nausea/vomiting	Due to vagal stimulation	Present in 70% of torsion cases
3. High-riding testis	Shortened cord, abnormal lie (horizontal)	Specific for torsion

Physical Examination Findings

PRESENT in Torsion:
- High-riding testis
- Horizontal lie

ABSENT in Torsion:
- Cremasteric reflex (99% sensitive)
- Prehn's sign (pain relief with elevation)

- Firm, tender testis
- Scrotal edema/erythema (late)
- Reactive hydrocele

- Fever (usually absent)
- Dysuria/pyuria

Diagnostic Workup

DIAGNOSTIC ALGORITHM:

Clinical Suspicion (Acute scrotum + Absent cremasteric reflex)
↓
HIGH SUSPICION?
├─ YES → **Direct to OR (DO NOT DELAY)**
└─ Equivocal → Color Doppler USS
├─ Decreased/Absent flow + Whirlpool sign → **OR**
├─ Normal flow but high clinical suspicion → **Surgical exploration**
└─ Normal flow + alternative diagnosis → Manage accordingly

Investigations Detailed

Investigation	Findings in Torsion	Sensitivity/Notes
Color Doppler USS (First-line imaging)	• Decreased/absent arterial flow • Whirlpool sign (twisted cord) • Enlarged heterogeneous testis • Reactive hydrocele	Sensitivity 88-100% Specificity 99% **Do NOT delay surgery if high suspicion**
Urinalysis	Normal (no WBCs, bacteria)	Helps exclude epididymitis
CBC	Usually normal, mild leukocytosis possible	Less useful than in epididymitis

EXAM PEARLS:
• "Negative exploration better than delayed positive" - If suspicion high, GO TO OR
• Absent cremasteric reflex = 99% sensitive for torsion
• Manual detorsion: "Open the book" - medial rotation usually relieves
• Contralateral orchidopexy ALWAYS done (30-40% risk bilateral bell-clapper)

Management Options

Approach	Indications	Technique	Success Rate
1. Immediate Surgical Exploration (DEFINITIVE)	• All suspected cases • Gold standard	**Scrotal approach:** • Midline raphe/hemiscrotal incision • Deliver testis, untwist • Assess viability (30 min warm wrap) • 3-point fixation with non-absorbable sutures • **Bilateral orchidopexy**	Salvage rate: <6 hrs: 90-100% 6-12 hrs: 50% >12 hrs: <10%
2. Manual Detorsion (Temporary only)	• While awaiting OR • NOT definitive	• "Open the book" technique • Rotate lateral to medial • **Still need surgical fixation**	Success ~30% High failure rate
3. Orchiectomy	• Non-viable testis • >24 hours • Black/necrotic testis	• Remove non-viable testis • Send for histopathology • **Contralateral orchidopexy MANDATORY**	Required in 30-40% if >12 hrs

☆ **HIGH-YIELD POINTS:**
1. **Do NOT delay surgery for imaging if clinical suspicion high**
2. Absent cremasteric reflex = most reliable clinical sign
3. Always perform contralateral orchidopexy
4. Manual detorsion is NOT definitive - still needs surgical fixation
5. "Negative exploration better than missed torsion"

2. HYDROCELE

HYDROCELE Mnemonic:
History - painless swelling
You can get above it (vs hernia)
Diaphanoscopy/transillumination positive
Round, smooth swelling
Occurs around testis
Communicating vs non-communicating
Enlargement gradual
Liquid (clear fluid) in tunica
Easily treated

Types & Classification

Type	Age	Management
Congenital/Communicating	Infants <2 yrs	Observe until 1-2 years Herniotomy if persists
Primary/Idiopathic	Adults >40 yrs	Surgery if symptomatic (Lord's/Jaboulay's)
Secondary/Reactive	Any age	Treat underlying cause

🔍 **BUZZWORDS:** "Transillumination positive", "Can get above swelling", "Fluctuant", "Smooth surface", "Non-tender", "Lord's plication", "Jaboulay's procedure"

Diagnostic Workup

Examination	Findings
Palpation	• Smooth, fluctuant, non-tender • **Can get above swelling** • No cough impulse
Transillumination	• **Brilliantly translucent**

Investigations

Investigation	Purpose	Indications
Ultrasound scrotum	Gold standard imaging	• Failed transillumination • Unable to palpate testis • Young men (<40 yrs)
Tumor markers	Exclude testicular tumor	• Young adults • USS shows mass

DIAGNOSTIC ALGORITHM:

Scrotal swelling → Clinical examination
├─ Can get above? → YES → Scrotal pathology
│ ├─ Transilluminates? → YES → Likely HYDROCELE
│ │ └─ Age <40 OR cannot palpate testis → **USS mandatory**
│ └─ Transilluminates? → NO → Tumor/hematocele
└─ Can get above? → NO → Inguinoscrotal hernia

Management Options

Approach	Indications	Recurrence Rate
1. Conservative/Observation	• Asymptomatic • Congenital (age <1-2 years) • Small hydrocele	N/A (50-80% congenital resolve)
2. Aspiration + Sclerotherapy	• Poor surgical candidates • Temporary relief	**HIGH: 50-90%**
3. Lord's Plication (Procedure of choice)	• Thin-walled hydrocele • <1 year duration	**Low: 5-10%**
4. Jaboulay's Procedure	• Thick-walled hydrocele • Long-standing (>1 year)	Low: 5-10%

⭐ **EXAM PEARLS:**
1. **Always USS in young men (<40)** to exclude tumor
2. Aspiration alone has 90% recurrence - NOT recommended
3. Congenital: observe until 12-18 months (most resolve)

4. Lord's plication preferred for thin-walled
5. If unable to palpate testis → USS MANDATORY

3. TESTICULAR TUMORS

⚠ **Most common solid malignancy in men 15-35 years | 95% cure rate if early | DO NOT BIOPSY - scrotal violation spreads to inguinal nodes**

TESTICULAR TUMOR - "SEMINOMA":
Scrotal mass - painless, hard
Elevated markers (AFP, hCG, LDH)
Most common cancer in young men
Inguinal orchiectomy (NOT scrotal)
Non-transilluminating
Orchiectomy first, then staging
Metastases via lymphatics
Always suspect if testicular mass

Classification

Type	% of GCTs	Age Peak	Markers	Key Features
Seminoma	40-45%	35-45 yrs	β-hCG (15-20%) AFP negative	Radiosensitive, excellent prognosis
Embryonal CA	20-30%	25-35 yrs	AFP ↑ (70%) β-hCG ↑ (60%)	Aggressive, hemorrhagic
Yolk sac tumor	Pediatric	Infants	**AFP markedly ↑**	Schiller-Duval bodies
Choriocarcinoma	<1%	20-30 yrs	**β-hCG very high**	Most aggressive, gynecomastia
Teratoma	5-10%	Any age	Markers negative	Heterogeneous on imaging

🔑 **BUZZWORDS:** "Painless testicular mass", "Heavy testis", "Does NOT transilluminate", "Radical inguinal orchiectomy", "Retroperitoneal lymphadenopathy", "AFP elevated", "Gynecomastia", "Cannon-ball metastases"

Clinical Presentation

Symptoms	Frequency
Painless testicular mass	80-90%
"Heavy" sensation	30-40%
Dull ache/discomfort	30-40%
Gynecomastia	5-7%
Metastatic symptoms (back pain, cough)	10-15%

Diagnostic Workup

DIAGNOSTIC ALGORITHM:

Testicular mass/suspicious findings
↓
Testicular ultrasound
├─ Intratesticular mass → **Serum tumor markers** (AFP, β-hCG, LDH)
│ ↓
│ **Radical INGUINAL orchiectomy**
│ ↓
│ Histopathology confirms diagnosis
│ ↓
│ **Staging CT chest/abdomen/pelvis**
│ ↓
│ Treatment (surveillance, chemo, RPLND)

Investigations

Investigation	Purpose	Notes
Scrotal Ultrasound	Confirm intratesticular mass	100% sensitive Bilateral USS (1-5% bilateral)
Serum Tumor Markers	Diagnosis, prognosis, monitoring	**Draw BEFORE orchiectomy** AFP, β-hCG, LDH
CT Chest/Abdomen/Pelvis	Assess metastases	Performed AFTER orchiectomy

Tumor Marker Interpretation - "AFP Never Lies":
AFP elevated = ALWAYS non-seminoma
Pure seminoma = AFP NEVER elevated
β-hCG can be elevated in both
LDH = non-specific but prognostic

☆ **BIOPSY WARNING:**
NEVER perform scrotal biopsy for suspected testicular cancer
Why? Scrotal violation changes lymphatic drainage → inguinal node involvement → worse prognosis
ALWAYS use inguinal approach

Management

Radical Inguinal Orchiectomy (PRIMARY TREATMENT)

Surgical Technique:

1. **Inguinal incision** (NOT scrotal)
2. **Early high ligation** of spermatic cord at internal ring
3. Deliver testis, examine outside wound
4. If tumor confirmed → divide cord, remove testis
5. Send for histopathology

Post-Orchiectomy Management

Histology	Stage	Management
SEMINOMA	**Stage I**	**Surveillance** (preferred) OR Adjuvant carboplatin
	Stage IIA/IIB	**Radiotherapy** to para-aortic nodes
	Stage IIC/III	**Chemotherapy (BEP)** ± Post-chemo RPLND
NON-SEMINOMA	**Stage I**	Surveillance OR Adjuvant BEP x1 OR RPLND
	Stage IIA/IIB	Primary RPLND OR Primary chemotherapy (BEP x3)
	Stage IIC/III	**Chemotherapy (BEP x3-4)** → RPLND if residual mass

Chemotherapy Regimens

Regimen	Drugs	Indication
BEP	Bleomycin, Etoposide, Platinum (Cisplatin)	First-line for metastatic GCT
EP	Etoposide + Cisplatin	If bleomycin contraindicated
VIP	Etoposide, Ifosfamide, Cisplatin	Salvage (relapsed/refractory)

☆ **EXAM HIGH-YIELD POINTS:**
1. **INGUINAL orchiectomy** - NEVER scrotal
2. Draw tumor markers **BEFORE surgery**
3. **AFP elevated = NOT pure seminoma**
4. Cryptorchidism = strongest risk factor
5. 95% cure rate with appropriate treatment
6. BEP = standard chemotherapy
7. Seminoma is radiosensitive

4. EPIDIDYMO-ORCHITIS

ORCHITIS Mnemonic:
Onset gradual (vs torsion = sudden)
Reactive hydrocele common
Cremasteric reflex PRESENT
History of UTI, STI, catheter
Infection = cause
Tender, swollen testis
Increased blood flow on Doppler
Support + antibiotics = treatment

Etiology & Classification

Age Group	Common Organisms	Risk Factors
14-35 years (STI)	**Chlamydia trachomatis** (most common) Neisseria gonorrhoeae	Multiple sexual partners Unprotected sex
>35 years (UTI)	**E. coli** (most common) Klebsiella, Pseudomonas	BPH/obstruction Recent catheter
Any age (special)	Mumps virus Tuberculosis	Mumps outbreak TB endemic areas

🔑 **BUZZWORDS:** "Gradual onset pain", "Prehn's sign positive", "Cremasteric reflex present", "Reactive hydrocele", "Increased Doppler flow", "Pyuria", "Urethral discharge", "Dysuria", "Fever"

Differentiating from Testicular Torsion

Feature	Torsion	Epididymo-orchitis
Onset	**Sudden, severe**	**Gradual**
Fever	Absent	Often present
Urinary symptoms	Absent	Often present
Cremasteric reflex	**ABSENT**	**PRESENT**
Prehn's sign	Negative	Positive (pain relief with elevation)
Doppler flow	**Decreased/absent**	**Increased**
Urinalysis	Normal	Pyuria, bacteriuria

⭐ **CRITICAL POINT:**
If ANY uncertainty exists → **EXPLORE SURGICALLY**
"Better a negative exploration than a missed torsion"

Diagnostic Workup

Investigations

Investigation	Findings	Purpose
Urinalysis	Pyuria, bacteriuria, positive nitrites	Support diagnosis
Urine culture	Organism identification	Tailor antibiotics
Urethral swab (NAAT)	Chlamydia, Gonorrhea	**ESSENTIAL if age <35**
Doppler USS	**Increased blood flow** Enlarged epididymis	Differentiate from torsion

Management

General Measures

- **Bed rest** during acute phase
- **Scrotal support**
- **Ice packs**
- **NSAIDs** for analgesia

Antibiotic Therapy

Clinical Scenario	Empiric Antibiotic	Duration
Age <35, STI suspected	**Ceftriaxone 250 mg IM** (single dose) **PLUS** **Doxycycline 100 mg PO BD**	Doxycycline: **10-14 days**
Age >35, UTI-related	**Ciprofloxacin 500 mg PO BD** OR **Levofloxacin 500 mg PO OD**	**10-14 days**
Systemically unwell	**Ceftriaxone 1-2 g IV OD** ± **Gentamicin 5-7 mg/kg IV**	IV until afebrile 24-48 hrs

⭐ **ANTIBIOTIC CHOICE PEARLS:**
1. **Age <35 with discharge?** → Ceftriaxone + Doxycycline
2. **Age >35 with UTI?** → Fluoroquinolone
3. **Always treat sexual partners** if STI-related
4. **Re-evaluate at 48-72 hours**

Complications

Complication	Incidence
Chronic epididymitis	5-10%
Abscess formation	2-5%
Testicular infarction	<3%
Infertility (bilateral)	Variable

5. HYPOSPADIAS (PEDIATRIC SURGERY)

⚠ **DO NOT CIRCUMCISE - Foreskin needed for repair | Refer to pediatric urologist | Most common congenital penile anomaly (1 in 200-300 boys)**

HYPOSPADIAS Mnemonic:
Hypoplastic foreskin (dorsal hood)
Y ventral curvature (chordee)
Proximal meatus (abnormal location)
Operation at 6-18 months
Surgery in stages (severe cases)
Preserve foreskin (NO circumcision)
Abnormal ventral opening of urethra
Dorsal hooded prepuce
Increased risk if family history

Associated with other anomalies
Spray of urine (downward)

Definition & Classification by Location

Type	Location of Meatus	Frequency	Chordee Severity	Surgical Complexity
ANTERIOR (DISTAL)		**70%**		
• Glanular	Glans penis	20%	Minimal/none	Simple (single-stage)
• Coronal	Coronal sulcus	30%	Mild	Simple (single-stage)
• Distal penile	Distal shaft	20%	Mild-moderate	Moderate
MIDDLE (PENILE)	Mid-penile shaft	**20%**	Moderate-severe	Complex
POSTERIOR (PROXIMAL)		**10%**		
• Proximal penile	Proximal shaft/penile base	5%	Severe	Very complex
• Penoscrotal	Penoscrotal junction	3%	Severe	Multi-stage surgery
• Scrotal/Perineal	Scrotum or perineum	2%	Very severe	Multi-stage + Consider gender assignment

🔑 **BUZZWORDS:** "Dorsal hood prepuce", "Ventral curvature (chordee)", "Meatal stenosis", "Bifid scrotum", "Cryptorchidism associated", "Single-stage repair" (distal), "Staged repair" (proximal), "Foreskin reconstruction", "MAGPI", "TIP repair", "Onlay graft"

Clinical Features - Classic Triad

1. **Abnormal ventral urethral meatus** (opening on underside instead of tip)
2. **Ventral curvature of penis (chordee)** - due to fibrous tissue, becomes apparent during erection
3. **Abnormal foreskin ("dorsal hooded prepuce")** - excess skin dorsally, deficient ventrally

Associated Features

Feature	Details	Significance
Chordee	Ventral penile curvature	• More severe in proximal types • Assessed during artificial erection test intraoperatively • Requires release of fibrous tissue
Dorsal hood	Excess prepuce dorsally	Used for reconstruction (DO NOT circumcise)
Meatal stenosis	Narrow urethral opening	Can cause obstructive symptoms
Bifid scrotum	Scrotal cleft/separation	More common in proximal types
Undescended testis	Cryptorchidism	Present in 10% (higher in proximal)
Inguinal hernia	Patent processus vaginalis	Present in 9-15%

Associated Anomalies & Screening

System	Anomalies	Screening Indicated
Urinary tract	• VUR (vesicoureteral reflux): 5-10% • Ureteropelvic junction obstruction • Megaureter • Renal anomalies (rare)	**Proximal hypospadias** + other anomalies: • Renal USS • Voiding cystourethrogram (VCUG) if indicated
Genitourinary	• Cryptorchidism (10%) • Inguinal hernia (9-15%)	Clinical examination at presentation
Disorders of Sex Development (DSD)	• Ambiguous genitalia • Congenital adrenal hyperplasia	**Proximal/perineal hypospadias + ANY:** • Bilateral undescended testes • Bifid scrotum • Micropenis **Workup:** • Karyotype • Hormonal studies (17-OH progesterone, testosterone) • Pelvic USS (look for müllerian structures)

☆ **WHEN TO SUSPECT DSD:**
Proximal hypospadias + bilateral cryptorchidism + bifid scrotum = HIGH SUSPICION for DSD
→ Karyotype + hormonal workup + imaging BEFORE any surgery
Consider 46,XX CAH (congenital adrenal hyperplasia) or 46,XY DSD

Diagnostic Workup

Clinical Assessment

Examination	Purpose	Findings
Meatal location	Classify severity	Anterior (70%), middle (20%), posterior (10%)
Penile examination	Assess chordee severity	• Ventral curvature • Penis length • Glans appearance (bifid?)
Foreskin	Plan for repair	Dorsal hood (preserve - needed for repair)
Scrotum	Detect anomalies	Bifid scrotum? Penoscrotal transposition?
Testes	Rule out cryptorchidism	Palpable bilaterally? If not → USS/further workup
Inguinal examination	Detect hernias	Present in 9-15%
Stream of urine	Assess function	Downward spray vs normal stream

Investigations

Investigation	Indication	Purpose
Renal ultrasound	• Proximal hypospadias • Associated anomalies • Bilateral cryptorchidism	Detect renal anomalies, VUR (indirect)
VCUG (Voiding cystourethrogram)	• Proximal hypospadias with UTI • Suspected VUR • Renal anomalies on USS	Diagnose VUR, bladder anomalies
Karyotype	**Proximal + bilateral cryptorchidism ± bifid scrotum**	Rule out DSD (46,XX CAH, 46,XY DSD)
Hormonal studies	If DSD suspected	17-OH progesterone (CAH), testosterone, LH, FSH
Pelvic USS/MRI	If DSD suspected	Look for müllerian structures (uterus, ovaries)

☆ **WORKUP ALGORITHM:**
Distal hypospadias → No investigations needed (clinical diagnosis)
Proximal hypospadias → Renal USS + assess for associated anomalies
Proximal + bilateral cryptorchidism → DSD workup (karyotype, hormones, imaging)

Management

Principles of Surgical Repair

Goals of Surgery:

1. **Straight penis** (release chordee)
2. **Meatus at tip of glans** (orthotopic position)
3. **Cosmetically normal appearance** (straight, cone-shaped glans)
4. **Functional urethra** (good stream, no fistula/stricture)

Key Principles:

- **DO NOT circumcise** before repair - foreskin used for reconstruction
- **Optimal age:** 6-18 months (before toilet training, psychological awareness)
- **Single-stage vs multi-stage** based on severity
- **Hairless skin** used for neourethra (to prevent calculi)

Surgical Techniques by Severity

Hypospadias Type	Recommended Repair	Technique	Stages
DISTAL (Glanular/Coronal)			
• Minimal chordee • Adequate tissue	**MAGPI** (Meatal Advancement & Glanuloplasty)	• Advance meatus distally • Reconstruct glans • Minimal tissue needed	Single-stage
• Distal meatus • Good urethral plate	**TIP** (Tubularized Incised Plate)	• Incise urethral plate • Tubularize over catheter • Cover with dartos flap	Single-stage
MIDDLE/PENILE			
• Moderate chordee • Mid-penile meatus	**Onlay island flap**	• Use inner prepuce as onlay patch • Preserve urethral plate • Cover with skin flaps	Single-stage (usually)
• Severe chordee • Poor urethral plate	**Tubularized flap**	• Create complete neourethra from prepuce • Excise abnormal tissue/chordee	Single-stage or staged
PROXIMAL (Penoscrotal/Perineal)			
• Severe chordee • Very proximal meatus • Bifid scrotum	**Two-stage repair** (Bracka/Byars)	**Stage 1:** Release chordee, create urethral plate **Stage 2** (6 months later): Tubularize urethra, create meatus	Two-stage (6 months apart)

Most Common Techniques (Exam Favorites)

1. MAGPI (Meatal Advancement & Glanuloplasty Incorporated)

- **Indication:** Glanular/coronal hypospadias, minimal chordee
- **Technique:** Advance meatus with V-flap, reconstruct glans around meatus
- **Advantage:** Simple, preserves urethral plate
- **Success:** >95%

2. TIP (Tubularized Incised Plate) - Snodgrass Repair

- **Indication:** Distal/mid-penile hypospadias with adequate urethral plate
- **Technique:**
  1. Incise urethral plate longitudinally
  2. Tubularize plate over catheter (creates neourethra)
  3. Cover with dartos/subcutaneous flap (prevent fistula)
  4. Reconstruct glans
- **Advantage:** Most versatile, good cosmesis
- **Success:** 85-95%
- **Complication:** Fistula (5-10%), meatal stenosis (5%)

3. Onlay Island Flap

- **Indication:** Mid-penile, preserve urethral plate
- **Technique:** Use vascularized inner preputial flap as onlay patch over urethral plate
- **Advantage:** Preserves urethral plate (less stenosis)

4. Two-Stage Repair (Bracka)

- **Indication:** Severe proximal hypospadias, severe chordee

- **Stage 1:** Release chordee, graft urethral plate (buccal mucosa or skin)
- **Stage 2** (6+ months later): Tubularize neourethra, create glans
- **Advantage:** Best for complex cases
- **Disadvantage:** Two surgeries, longer recovery

Perioperative Management

Aspect	Details
Timing of surgery	• **Optimal:** 6-18 months of age • Before toilet training & psychological awareness • Tissue adequate size for manipulation
Preoperative	• **Testosterone stimulation** may be used for micropenis (improves tissue quality) • Counsel parents re: expectations, complications • **NO circumcision**
Intraoperative	• **Artificial erection test** to assess chordee before/after release • Urethral catheter (5-7 days post-op) • Compression dressing
Postoperative	• Urethral catheter/stent 5-14 days (depends on complexity) • Compression dressing 24-48 hrs • Prophylactic antibiotics while catheterized • Anticholinergics (oxybutynin) to prevent bladder spasms • Analgesia (paracetamol, avoid NSAIDs initially)
Follow-up	• Catheter removal 5-14 days • Assess healing at 2 weeks, 6 weeks, 3 months • Long-term: Assess urinary stream, cosmesis, erectile function (adolescence)

Complications

Early Complications (Perioperative)

Complication	Incidence	Management
Bleeding/Hematoma	2-5%	• Compression dressing • Rarely requires drainage
Wound infection	3-5%	• Antibiotics • Wound care • May delay healing
Catheter-related	Common	• Bladder spasms (anticholinergics) • Catheter blockage (irrigation) • UTI (antibiotics)
Wound dehiscence	2-3%	Wound care, may require revision

Late Complications (Long-term)

Complication	Incidence	Presentation	Management
Urethrocutaneous fistula (MOST COMMON)	**5-30%** (varies by severity)	• Urinary leak through skin • Multiple streams • Usually ventral	• Wait 6 months for spontaneous closure • **Surgical repair** if persistent (fistula closure + tissue interposition)
Meatal stenosis	5-15%	• Narrow stream • Straining to void • Spraying	• Meatal dilation (mild) • **Meatoplasty** (severe)
Urethral stricture	5-10%	• Obstructive voiding • Recurrent UTI • Difficulty voiding	• Urethral dilation • **Urethroplasty** (if severe/recurrent)
Recurrent/Residual chordee	5-10%	• Ventral curvature on erection • Sexual dysfunction (if severe)	• Observation if mild (<20°) • **Surgical correction** if >30° (plication or grafting)
Diverticulum	2-5%	• Ballooning during voiding • Post-void dribbling • Recurrent UTI	**Surgical excision** if symptomatic
Cosmetic issues	Variable	• Abnormal glans shape • Skin bridges • Scarring	• Observation • Revision surgery if desired
Hair-bearing urethra	Rare (if scrotal skin used)	• Hair in urine • Stone formation • Recurrent UTI	**Endoscopic laser hair removal** or urethroplasty

Complications Mnemonic - "FIST CHORDS":
Fistula (urethrocutaneous) - MOST COMMON
Infection (wound, UTI)
Stenosis (meatal or urethral stricture)
Tissue breakdown/dehiscence

Chordee (recurrent/residual)
Hematoma
Obstruction (urethral stricture)
Revision needed (cosmetic/functional)
Diverticulum
Sexual dysfunction (rare, severe cases)

☆ **HIGH-YIELD EXAM POINTS:**
1. **DO NOT CIRCUMCISE** before repair - foreskin used for reconstruction
2. **Optimal age for repair: 6-18 months** (before toilet training)
3. **TIP repair (Snodgrass)** = most common technique for distal/mid-penile
4. **Urethrocutaneous fistula** = MOST COMMON complication (5-30%)
5. **Proximal + bilateral cryptorchidism** → ALWAYS workup for DSD (karyotype + hormones)
6. **Two-stage repair** for severe proximal hypospadias
7. Fistula management: Wait 6 months for spontaneous closure → surgical repair if persistent
8. Associated anomalies: Cryptorchidism (10%), inguinal hernia (9-15%), VUR (5-10%)
9. **Artificial erection test** used intraoperatively to assess chordee

Prognosis & Long-term Outcomes

Aspect	Outcome
Overall success rate	85-95% (single surgery) for distal 70-85% for proximal (may need revision)
Cosmetic appearance	Excellent in 80-90% (straight penis, orthotopic meatus)
Functional voiding	Normal stream in 90-95% Some may have slight downward deflection
Sexual function	• Normal erectile function in vast majority • Severe proximal cases may have mild curvature • Psychological impact (body image)
Fertility	• Generally normal • Some studies show slightly reduced fertility (unclear if due to hypospadias or associated anomalies)
Need for revision	10-30% (higher for proximal types) Usually for fistula or cosmetic refinement