

Penis — Congenital Anomalies

Hypospadias · Epispadias · Phimosis

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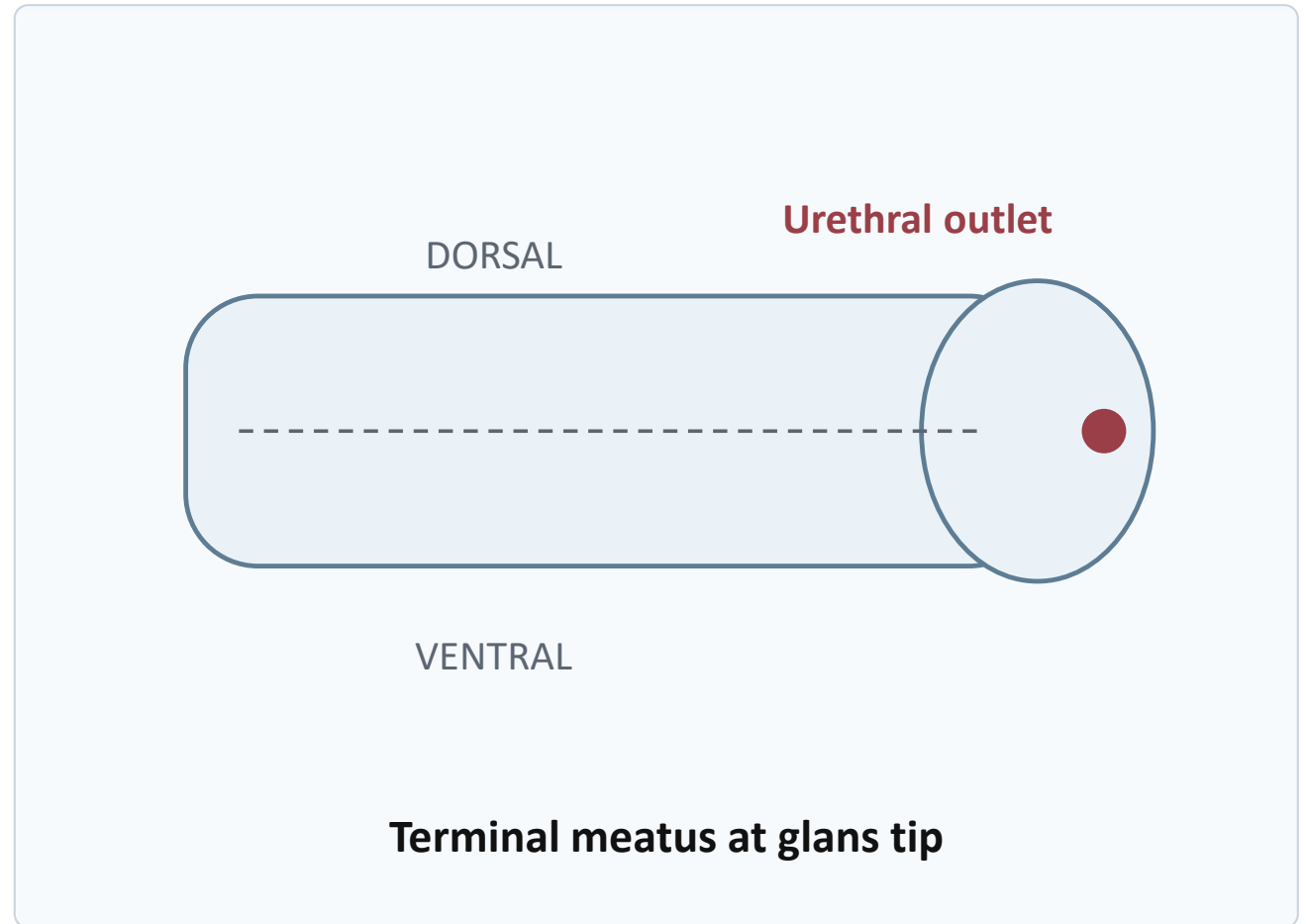
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Learning objectives

- Locate the normal urethral meatus and distinguish ventral from dorsal displacement.
- Classify hypospadias by meatal location and interpret associated penile findings.
- Explain the urinary, reproductive, and infectious consequences of urethral defects.
- Differentiate physiologic non-retractability from scar-related pathological phimosis.
- Apply a focused clinical assessment to common diagnostic presentations.

Reference anatomy: Orient the penile surfaces

- Dorsal and ventral describe opposite surfaces of the penile shaft.
- The normal urethral meatus lies at the tip of the glans.
- Prepuce refers to the foreskin; Its ring is distinct from the urethral opening.



Three lesions, three anatomical sites

Entity	Anatomical abnormality	Dominant assessment
Hypospadias	Urethral meatus on ventral surface	Position, curvature, urinary stream
Epispadias	Urethral defect on dorsal surface	Exstrophy association, continence
Phimosis	Preputial orifice too narrow for retraction	Physiologic vs scarred ring

Developmental error and clinical phenotype

**Abnormal urethral groove
/ canal formation**



**Displaced external
urethral opening**



**Altered urinary function ±
associated anomalies**

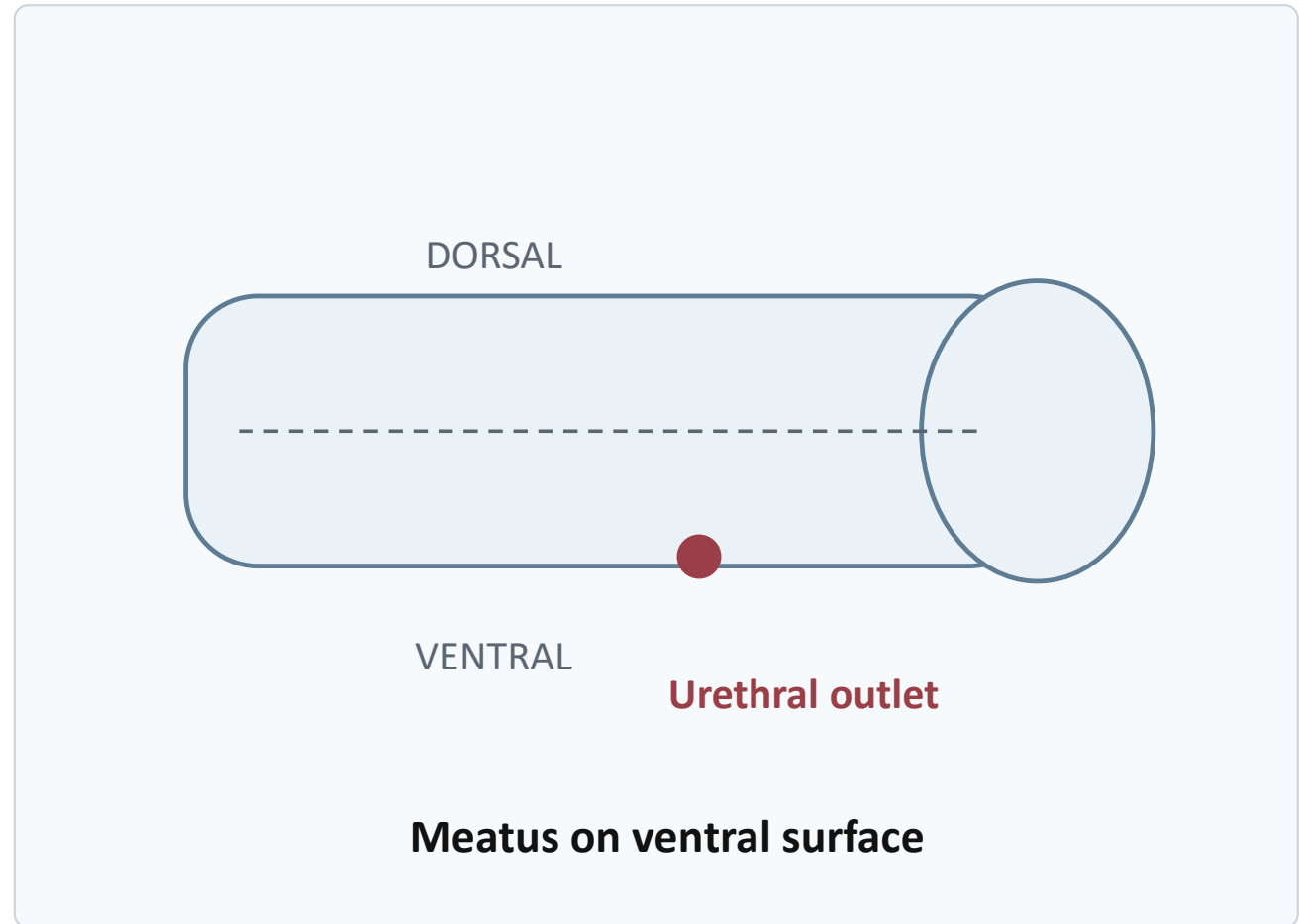
This sequence describes hypospadias/epispadias; Phimosis involves the preputial ring.

Hypospadias: Anatomical definition

- External urethral opening lies on the ventral surface rather than at the glans tip.
- The opening may lie near the glans, along the shaft, or proximally.
- Anatomical position and associated curvature determine clinical importance.
- Ventral meatal placement differentiates it from epispadias.

Visual recognition: Ventral meatal displacement

- Locate the ventral surface before naming the defect.
- Describe the actual meatal position rather than simply calling it “hypospadias”.
- The schematic exaggerates separation for clarity; It is not an individual case.



Hypospadias: Frequency and interpretation

- Approximately 1 affected infant per 300 live male births.
- It is substantially more common than epispadias.
- Population estimates vary by registry, geography, and case ascertainment.
- A population estimate is not an individual risk prediction.

Hypospadias: Multifactorial associations

- Contemporary guidance describes genetic, placental, and environmental contributions.
- Family history may be present, but most cases are not explained by one known gene.
- Low birth weight or small-for-gestational-age status is associated with risk.
- Maternal hypertensive and diabetic disorders have reported associations; Causality is not implied.

Classify the meatus from distal to proximal

**Distal: Glanular / distal
penile**



Middle: Penile shaft



**Proximal: Penoscrotal /
scrotal / perineal**

An anatomical classification; Severity assessment also includes curvature and tissues.

Distal hypospadias: Examine function

- The ectopic meatus lies on the glans or distal shaft.
- Position alone does not establish urinary obstruction or need for repair.
- Document the urinary stream, orifice calibre, and penile curvature.
- Individualize counselling because untreated distal cases have heterogeneous outcomes.

Mid-penile hypospadias: Assess the shaft

- The meatus opens along the ventral penile shaft.
- Describe its location and apparent urethral plate quality.
- Examine for an associated ventral bend rather than assuming a straight shaft.
- Function and reconstructive complexity cannot be inferred from the meatus alone.

Proximal hypospadias: Broader anatomical assessment

- Meatus may lie near the penoscrotal junction, scrotum, or perineum.
- Assess curvature, preputial configuration, phallus size, and testes.
- Associated undescended testes increase concern for a broader developmental condition.
- A specialist assessment is especially important in severe proximal presentations.

Why meatal position is not a severity score

Finding	What it reveals
Meatal location	External urethral endpoint
Penile curvature	Mechanical bending and potential function
Glans / urethral plate	Available anatomy for reconstruction
Preputial cover / scrotum	Associated surface and genital anomalies

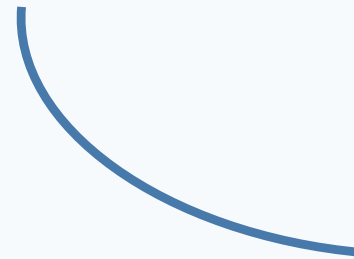
Ventral penile curvature: Mechanism and relevance

- Curvature may accompany hypospadias; It is not required for the diagnosis.
- A ventral bend reflects asymmetric penile tissues or tethering.
- More pronounced curvature can impair future penetrative function.
- Its degree and cause are assessed during reconstructive planning.

Ventral curvature: Separate bend from meatal site

- The meatus and curvature are two distinct findings.
- A distal meatus does not guarantee the absence of curvature.
- Curvature matters to both urinary and future sexual function.

TWO FINDINGS — ASSESS SEPARATELY



Ventral bend

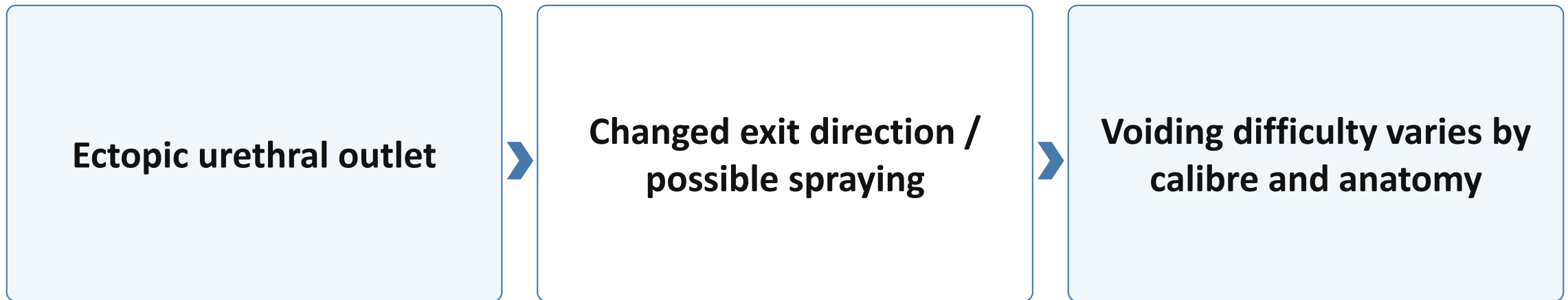


Ectopic outlet

Preputial hood: A useful inspection clue

- Many patients have relatively deficient ventral preputial coverage.
- Dorsal tissue may form a conspicuous preputial hood.
- The hood is supportive morphology, not the defining criterion.
- Some variants have a deceptively intact prepuce.

Why an ectopic meatus alters the urinary stream



Do not equate every ventral opening with urethral obstruction.

Meatal narrowing changes the clinical picture

- A narrowed external opening can restrict urinary outflow.
- Stenotic urethral defects with obstruction and ascending infection risk.
- Contemporary evaluation uses symptoms, stream observations, and examination.
- Urinary tract infection is a possible consequence, not a universal accompaniment.

Proximal meatus and reproductive consequences

**Urethral outlet near
penile base**



**Ejaculate deposited away
from usual distal outlet**



**Potential difficulty with
insemination**

A possible fertility consequence; It is not synonymous with inevitable infertility.

Associated undescended testes

- Urethral defects may coexist with impaired testicular descent.
- Always record whether both testes are palpable within the scrotum.
- A second anomaly changes the scope of diagnostic evaluation.
- The finding is especially important with proximal hypospadias.

When to consider a difference of sex development

- Hypospadias with bilaterally undescended testes requires prompt specialist assessment.
- Document external genital anatomy carefully and without premature assumptions.
- EAU guidance recommends endocrine and genetic evaluation in this setting.
- This escalation is not indicated for every otherwise isolated distal defect.

Newborn examination: Descriptive checklist

Examine	Record explicitly
Urethral meatus	Ventral site, width, shape, stream if observed
Penile shaft	Curvature, size, ventral tissue
Glans and prepuce	Glans shape, urethral plate, hood / coverage
Scrotum and testes	Scrotal configuration, testicular descent

Imaging is not a reflex test for isolated hypospadias

- Diagnosis is primarily based on direct genital inspection.
- EAU panel consensus does not recommend routine imaging for hypospadias alone.
- Suspected associated abnormalities or atypical clinical findings warrant individualized workup.
- Investigations should answer a specific anatomical or functional question.

The defect is not diagnosed by histology

- Hypospadias and epispadias are defined by external urethral anatomy.
- Biopsy is not needed for routine identification of a congenital meatal anomaly.
- Clinical documentation should identify associated deformities and function.
- Histopathology becomes relevant for separate suspected inflammatory or neoplastic lesions.

Functional objectives of hypospadias repair

**Correct clinically
significant curvature**



**Reconstruct an adequate
urethral outlet**



**Preserve voiding, future
function, and tissue cover**

Surgery is individualized; The operation is not defined solely by “moving the meatus”.

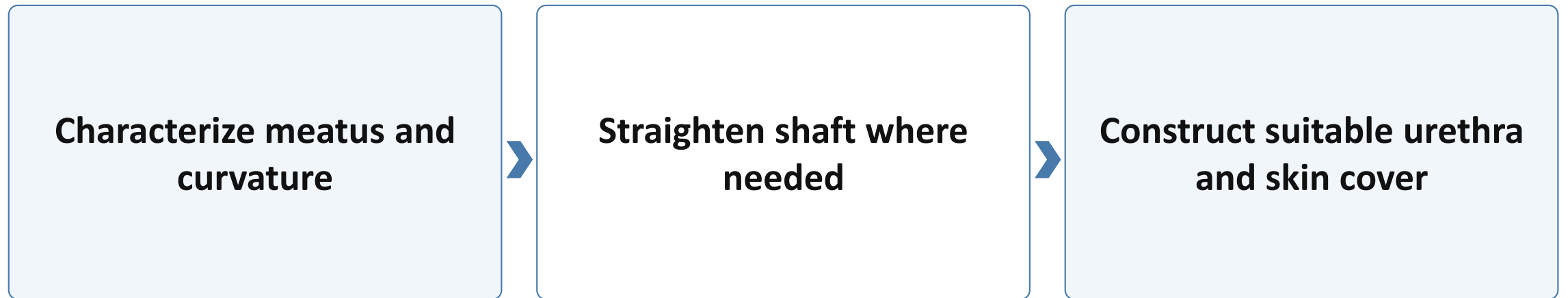
Surgical decision-making is individualized

- A proximally displaced outlet with severe spraying may be functionally significant.
- Meatal stenosis and important ventral curvature are additional indications.
- Appearance-related considerations should be discussed separately from function.
- Counselling includes anticipated benefits, complications, and uncertainty.

Preserve reconstructive tissue at presentation

- Do not perform routine circumcision before assessing a suspected urethral anomaly.
- Preputial tissue may be needed for skin cover or urethral reconstruction.
- The same precaution applies to epispadias and other congenital penile anomalies.
- Refer for pediatric urologic assessment before irreversible local procedures.

Reconstruction: Conceptual sequence



Editable conceptual overview only; Not a procedural surgical technique diagram.

Timing of repair: Supplementary guidance

- EAU guidance commonly places primary hypospadias repair at 6–18 months.
- Age is one factor within an individualized reconstructive plan.
- Technical selection depends on anatomy, not a universal operation.
- Pathological effects but does not specify this timing.

Complications after reconstruction

- Urethrocutaneous fistula creates an abnormal communication and urine leakage.
- Meatal stenosis or urethral stricture may impair urinary flow.
- Recurrent curvature and glans or wound dehiscence are recognized problems.
- Risk differs markedly between distal and complex proximal defects.

Follow-up extends beyond wound healing

- Assess urinary stream and possible obstructive voiding symptoms.
- Monitor for fistula, stenosis, recurrent curvature, or repeated operations.
- Pubertal and adult concerns include ejaculation, sexual function, and satisfaction.
- Late outcomes cannot be inferred from an uncomplicated early postoperative visit.

Case: Ventral distal meatus

Clinical presentation

At newborn examination, a urethral opening is seen on the ventral distal penile shaft. Both testes are in the scrotum. No major curvature is visible.

Question

What anatomical descriptors and immediate precautions matter?

Case interpretation: Distal hypospadias

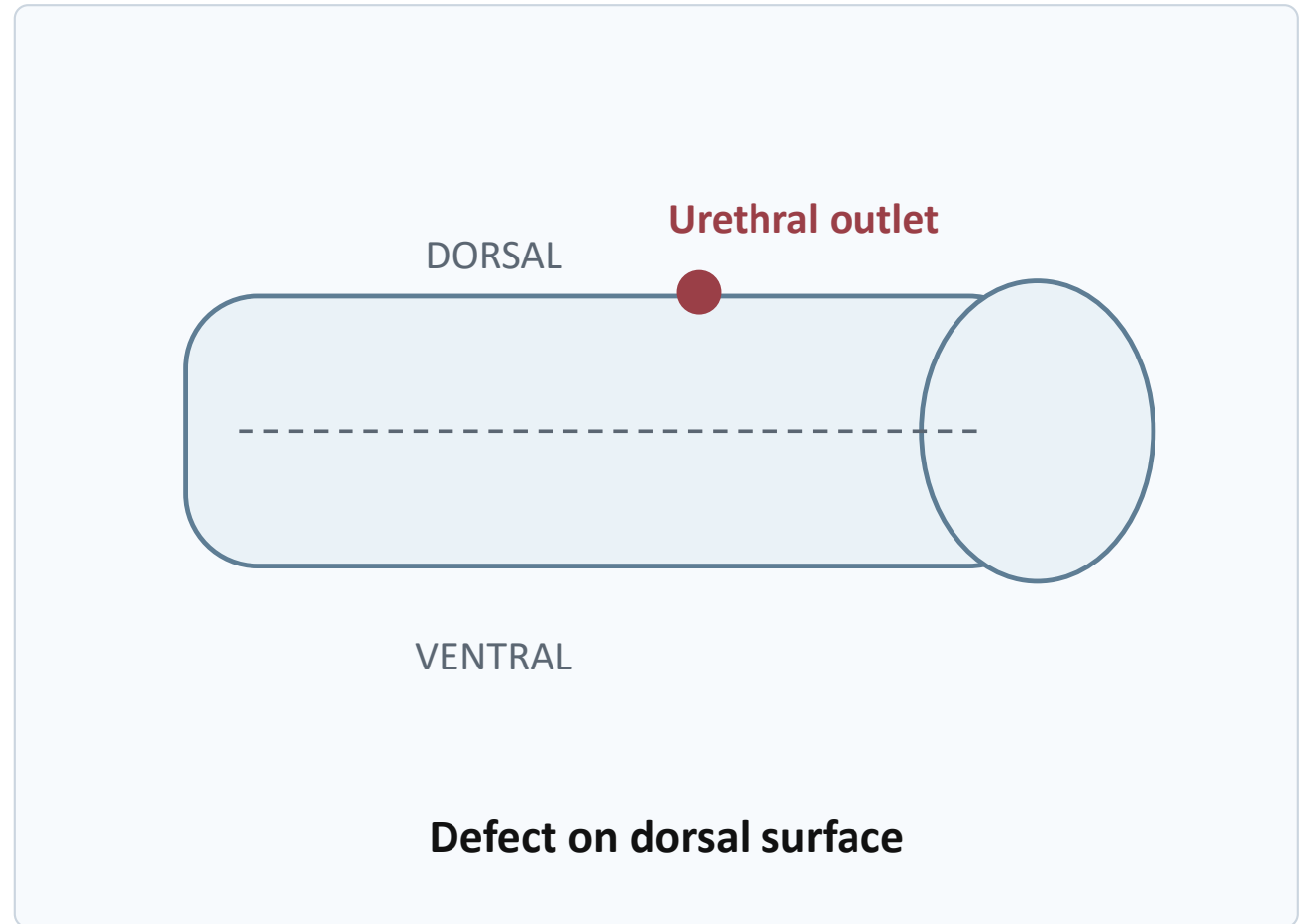
- Document the precise meatal site, glans/prepuce, curvature, and urinary stream.
- The genital finding is anatomically consistent with distal hypospadias.
- Preserve preputial tissue: Avoid routine circumcision before assessment.
- No routine renal imaging solely for an otherwise isolated meatal anomaly.

Epispadias: Anatomical definition

- The urethral outlet or plate opens dorsally rather than at the penile tip.
- Its dorsal location distinguishes it from ventral hypospadias.
- Epispadias is less frequent than hypospadias.
- Assess urinary continence and the surrounding pelvic/urinary anatomy.

Visual recognition: Dorsal urethral defect

- The diagram uses a dorsal viewpoint; An opening is placed on the top surface.
- Epispadias may involve a dorsal urethral plate rather than only a pinhole meatus.
- An isolated-appearing penile defect must prompt consideration of bladder association.



Epispadias has a wider severity spectrum

- A limited distal form may present chiefly as an abnormal meatus.
- More extensive forms alter the penile shaft and urinary continence.
- Associated bladder-neck and pelvic defects can dominate functional outcome.
- Describe the observed anatomy rather than assigning severity from a single label.

Epispadias and the exstrophy spectrum

**Dorsal urethral
malformation**



**Consider exstrophy–
epispadias association**



**Assess bladder exposure,
outlet and continence**

Associated exstrophy is important but is not present in every case of epispadias.

Bladder exstrophy: Recognize the associated phenotype

- Classic exstrophy involves an exposed, everted bladder on the abdominal surface.
- The epispadias phenotype may coexist with a short, broad penis and dorsal curvature.
- Bladder closure and continence are major specialist management priorities.
- This association is contextual, not a separate bladder-anomalies lecture.

Epispadias: Clinical consequences

- Urine may emerge through an abnormal dorsal urethral opening.
- Bladder-neck involvement can cause incontinence, beyond local stream deflection.
- Complex cases require attention to urinary tract preservation and continence.
- Future sexual and reproductive function is part of long-term assessment.

Hypospadias versus epispadias

Feature	Hypospadias	Epispadias
Ectopic surface	Ventral	Dorsal
Relative occurrence	More common	Less common
Associated structures	Testes, urinary tract	Exstrophy/bladder neck
Key assessment	Meatus, bend, stream	Meatus, bladder, continence

Epispadias: Focused assessment

- Identify the dorsal defect and its proximal extent.
- Inspect the lower abdominal wall and bladder region.
- Assess urinary continence and evidence of urinary tract involvement.
- Early referral to an experienced pediatric reconstructive team is appropriate.

Reconstruction in complex epispadias

**Define penile, bladder,
pelvic anatomy**



**Plan urethral and bladder
reconstruction**



**Follow continence and
upper urinary tract**

Specialist care may be staged; A meatal repair alone may be insufficient.

Case: Dorsal meatus and wetness

Clinical presentation

A newborn has a dorsal penile urethral defect and continuous leakage of urine. The lower abdominal wall also appears abnormal.

Question

Which associated malformation must be considered?

Case interpretation: Evaluate the exstrophy spectrum

- Dorsal urethral opening suggests epispadias.
- Abnormal lower abdominal wall raises concern for associated bladder exstrophy.
- Continence issues may reflect bladder outlet involvement.
- This presentation requires specialist assessment, not an isolated meatal diagnosis.

Phimosis: The structure involved is the prepuce

- Phimosis is inability to retract the foreskin over the glans because of a narrow preputial ring.
- The urethral meatus is not necessarily displaced.
- Both developmental narrowing and inflammation-related scarring.
- Clinical assessment must establish whether narrowing is physiological or pathological.

Phimosis: Two distinct mechanisms

Developmental / physiological

- Non-retractile foreskin without a scarred ring
- May resolve with normal maturation
- Observation often appropriate if asymptomatic

Acquired / pathological

- Fibrotic, often whitish constricting ring
- Can follow repeated inflammation or trauma
- Symptoms or persistent scarring change management

Physiologic non-retractability is common in childhood

- The foreskin may initially remain adherent or narrow as a normal developmental state.
- Spontaneous loosening often occurs over childhood.
- Absence of pain, infection, or scarring supports conservative observation.
- Non-retractability alone does not prove diseased foreskin.

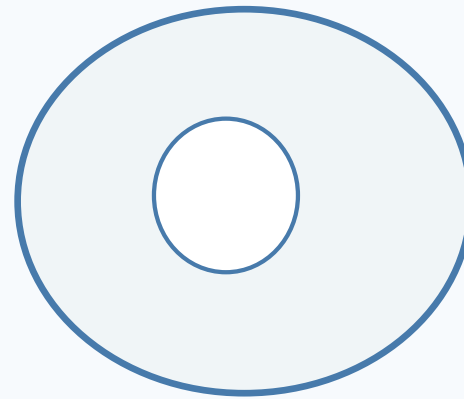
Preputial adhesions are not a fibrotic ring

- Adhesions involve attachment between inner foreskin and glans.
- A narrow ring and adhesions can coexist but are not interchangeable.
- Accumulated epithelial debris may appear as small subpreputial white nodules.
- Asymptomatic adhesions generally separate spontaneously.

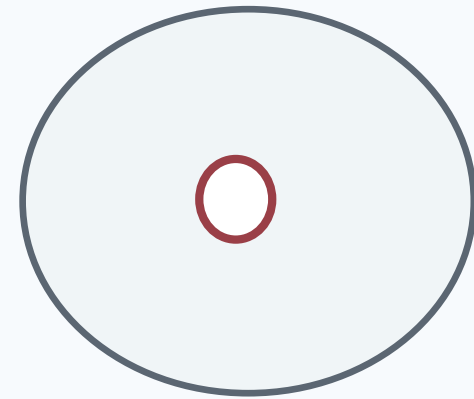
Compare flexible and scarred preputial rings

- Physiological narrowing: No obvious cicatricial ring.
- Pathological narrowing: Pale, thickened, scar-like constriction.
- These are simplified conceptual outlines—not clinical photographs.

PREPUTIAL RING — SCHEMATIC



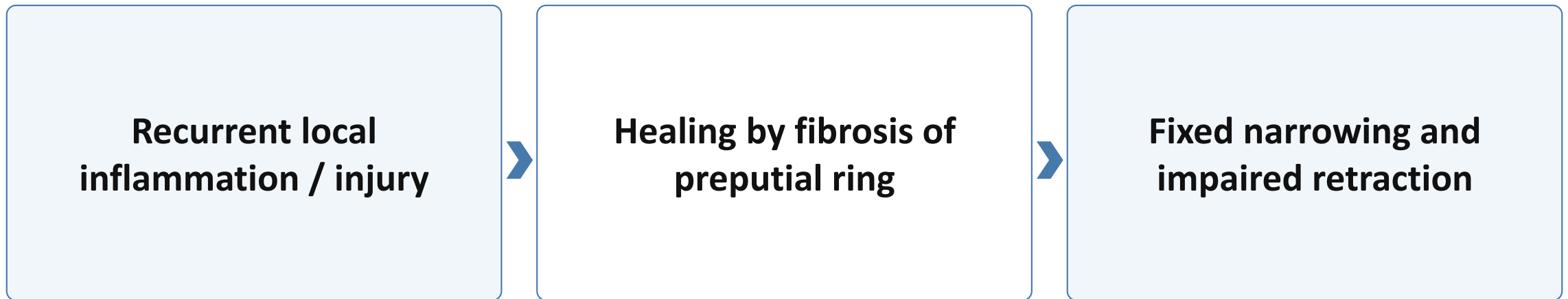
No visible scar ring



Thickened fibrotic ring

Not a diagnostic clinical image

From repeated inflammation to scar-related phimosis



This scar mechanism is emphasized by Robbins; Avoid implying all childhood narrowing is scarred.

Lichen sclerosis (BXO): A specific pathological cause

- Balanitis xerotica obliterans is genital lichen sclerosis.
- Chronic inflammatory changes can cause preputial scarring and phimosis.
- The meatus or urethra may also become involved.
- Histopathology can confirm the diagnosis when excised tissue is assessed.

Why retention and hygiene matter in scarred phimosis

- Fixed narrowing may make cleansing beneath the prepuce difficult.
- Secretions and epithelial detritus may accumulate in a poorly accessible space.
- Local inflammation can recur and reinforce fibrosis.
- These consequences to secondary infection and penile cancer risk.

Balanoposthitis is a potential consequence

- Balanitis affects the glans; Posthitis affects the prepuce.
- Their combination presents with inflammation of both surfaces.
- Recurrent inflammation can promote a cycle of ring scarring.
- Do not diagnose infection solely from physiological smegma or transient mild redness.

Penile carcinoma association: Interpret cautiously

- Chronic phimosis, retained material and inflammation with increased cancer risk.
- This does not imply that every uncircumcised person is high risk.
- Contemporary guidance does not recommend routine neonatal circumcision solely to prevent cancer.
- Persistent adult inflammatory or suspicious lesions require separate assessment.

Phimosis, adhesions and paraphimosis

Problem	Underlying anatomy	Clinical implication
Phimosis	Constricting preputial ring	Assess scarring and symptoms
Adhesions	Prepuce adherent to glans	Often physiological
Paraphimosis	Retracted foreskin trapped behind glans	Urgent reduction

Paraphimosis: Different from phimosis

- The foreskin has been retracted and cannot be returned over the glans.
- The tight ring may cause oedema and impair local perfusion.
- This is an acute urological problem requiring prompt management.
- Patients should replace the foreskin after any retraction.

Initial phimosis evaluation

Assess age, symptoms and retractability



**Look for fibrotic ring / BXO
/ infection**



Separate observation from active treatment

Urinary ballooning in isolation may be physiological and is not proof of obstruction.

Topical therapy: Guideline-based, not Robbins text

- EAU recommends topical corticosteroids as first-line treatment for symptomatic phimosis.
- Application is directed to the narrow ring with gentle—not forced—retraction.
- Responses may be less reliable when dense pathological scarring is present.
- Treatment choice depends on symptoms, anatomy and clinician assessment.

When surgery becomes relevant

- Recurrent balanoposthitis or therapy-resistant symptomatic narrowing may require surgery.
- BXO-associated phimosis is a separate indication for circumcision consideration.
- Preputioplasty may preserve foreskin in selected cases.
- A coexisting urethral defect changes surgical planning: Avoid simple circumcision.

Forceful preputial retraction can create disease

- Asymptomatic, physiologically narrow foreskin should not be forcibly retracted.
- Traumatic retraction can initiate local tears and scarring.
- Scarring may convert normal non-retractability into secondary pathological phimosis.
- Once retractable, foreskin should be returned to cover the glans.

Follow-up after treatment: Targeted assessment

- Confirm symptom resolution and comfortable foreskin care.
- After surgery, evaluate healing and urinary outlet complaints.
- Patients with BXO require attention to possible meatal or urethral stenosis.
- Follow-up differs between uncomplicated physiologic narrowing and chronic inflammatory disease.

Case: Preschool foreskin does not retract

Clinical presentation

An asymptomatic preschool child has a non-retractile foreskin. There is no thick white ring, recurrent infection, or urinary complaint.

Question

Is this automatically pathological phimosis requiring circumcision?

Case interpretation: Likely physiological

- Lack of scarring and symptoms supports normal developmental non-retractability.
- Provide non-traumatic hygiene guidance; Do not force retraction.
- Observation is appropriate unless another concerning finding develops.
- Simple ballooning alone would not necessarily prove obstruction.

Case: Recurrent inflammation and white ring

Clinical presentation

An older child has repeated balanoposthitis and a fixed, pale fibrotic preputial ring. Retraction is painful.

Question

What pathological process should be assessed?

Case interpretation: Scar-associated phimosis

- A fibrotic ring indicates pathological rather than purely physiological narrowing.
- Recurrent inflammation may have contributed to progressive scarring.
- Evaluate for lichen sclerosus/BXO and possible meatal involvement.
- Management and any histopathology depend on the specialist treatment plan.

Integrated anatomical differential

Observation	Leading consideration	Next clinical question
Ventral ectopic meatus	Hypospadias	Curvature? Testes descended?
Dorsal urethral defect	Epispadias	Exstrophy? Incontinence?
Fixed scarred prepuce	Pathological phimosis	BXO? Recurrent balanitis?
Retracted trapped prepuce	Paraphimosis	Is urgent reduction needed?

Choose evaluation by the actual finding

- Urethral defect: Map meatus, curvature, testes, and associated anatomy.
- Preputial narrowing: Distinguish physiological adhesions from scarred ring.
- Dorsal defect with incontinence: Assess beyond the penis for exstrophy.
- Avoid routine biopsy or blanket imaging without a targeted diagnostic question.

Errors that change care

Tempting shortcut	Correct interpretation
“Any non-retraction is diseased”	Physiological variation is common
“Meatal site fully grades severity”	Curvature and tissue anatomy matter
“A ventral meatus means obstruction”	Assess calibre and actual function
“Circumcise before referral”	Preserve foreskin with meatal anomalies

Synthesis: Link anatomy to consequences

- Ventral meatus → hypospadias; Describe level and curvature.
- Dorsal meatus → epispadias; Investigate bladder/continence association.
- Tight foreskin → consider age, physiological development, and fibrosis.
- Clinical risks arise from associated anatomy, outlet function, and chronic inflammation.

Principal references

- Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th edition. Chapter 21, p. 876.
- European Association of Urology. Paediatric Urology: Hypospadias (online guideline, chapter 9).
- European Association of Urology. Paediatric Urology: Phimosis and other penile skin abnormalities (chapter 3).
- University of Florida Department of Urology. Bladder Exstrophy and Epispadias (clinical reference).