

Ureters: tumors and tumor-like lesions

Fibroepithelial polyp • papillary urothelial carcinoma • obstruction

Dr Abu Suraih Sakhri

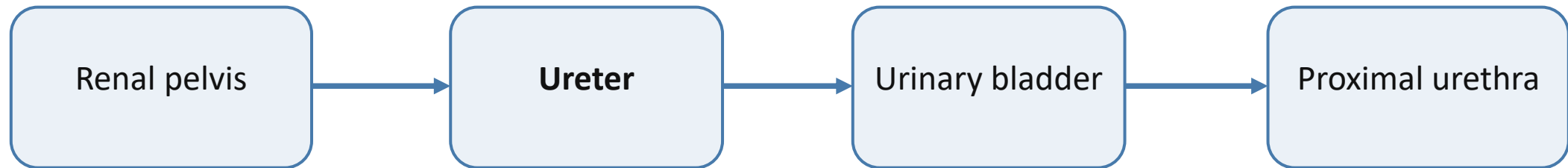
MBBS, MD (Pathology)

www.abusuraihsakhri.com

Learning outcomes

- Distinguish benign fibroepithelial polyps from malignant urothelial tumors
- Explain the papillary architecture of ureteral neoplasia
- Connect luminal growth with hydroureter, hydronephrosis, and infection
- Interpret multifocal disease across the urothelial tract

A ureteral lesion exists in a continuous urothelial tract



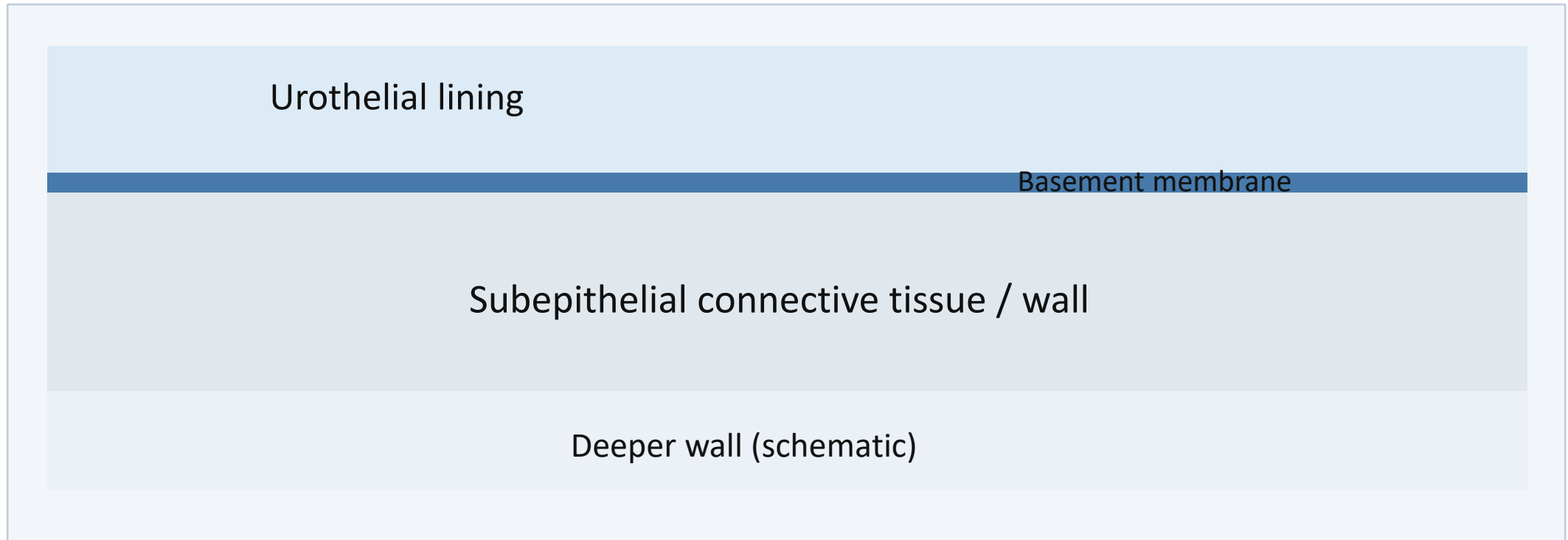
Shared urothelial lining links neoplastic patterns across sites

Schematic—anatomic sequence, not drawn to scale

Normal urothelium: The reference point

- Approximately five to six layers of epithelial cells description
- Large superficial umbrella cells cap the epithelial surface
- The basement membrane separates urothelium from lamina propria
- A papillary mass must be evaluated for both lining cytology and supporting stroma

Cross-section: Mucosa, wall, and lumen



Simplified conceptual cross-section—not diagnostic histology

Two families of primary ureteral lesions

Tumor-like / benign

- Benign primary tumors usually have mesenchymal origin
- Fibroepithelial polyp is a characteristic tumor-like lesion
- A lesion may obstruct despite benign biology

Malignant

- Primary malignant ureteral lesions resemble tumors of pelvis and bladder
- Papillary urothelial carcinoma predominates
- Potential for obstruction and multilevel disease

A rare tumor still requires a complete tissue diagnosis

- Ureteral masses can have mesenchymal or urothelial origins
- A luminal mass can be benign, malignant, or non-neoplastic obstruction
- Distinguish the source compartment before labeling carcinoma
- Document physiologic obstruction separately from tissue classification

Benign and malignant lesions can share a presentation

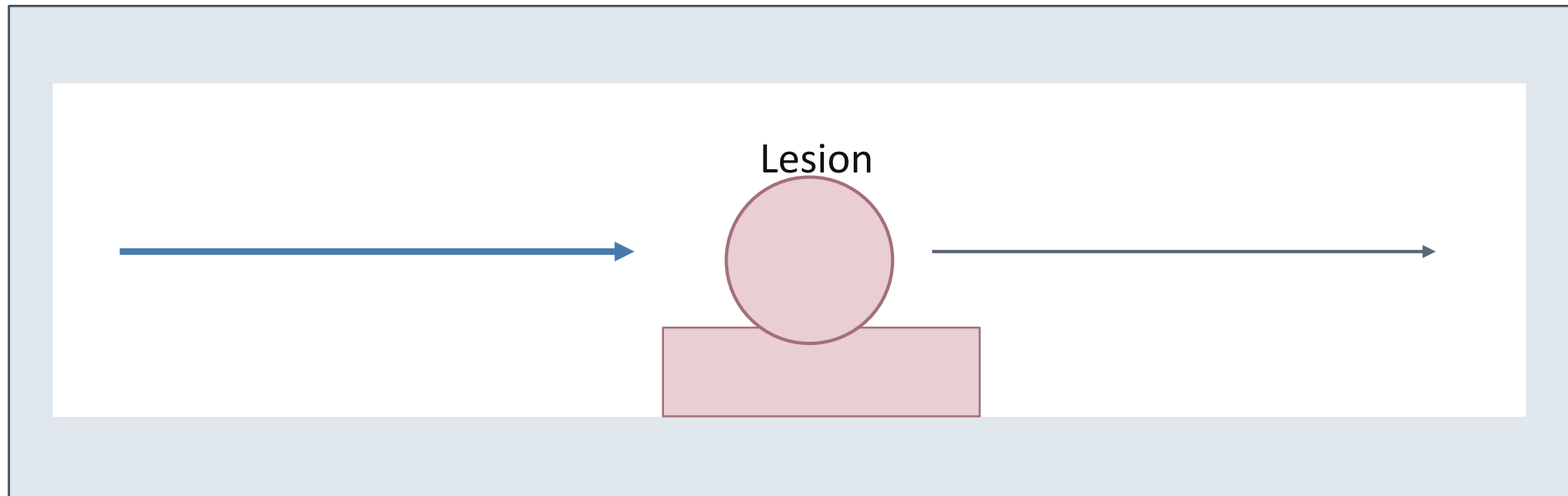
Overlap

- Both may produce an intraluminal mass
- Both may compromise urinary drainage
- A polypoid gross appearance alone is not definitive

Discriminators

- Evaluate the architecture of the stromal core
- Assess urothelial cytologic atypia
- Determine whether invasion is present

From mucosal lesion to obstructed lumen



Upstream urine flow

Narrowed passage

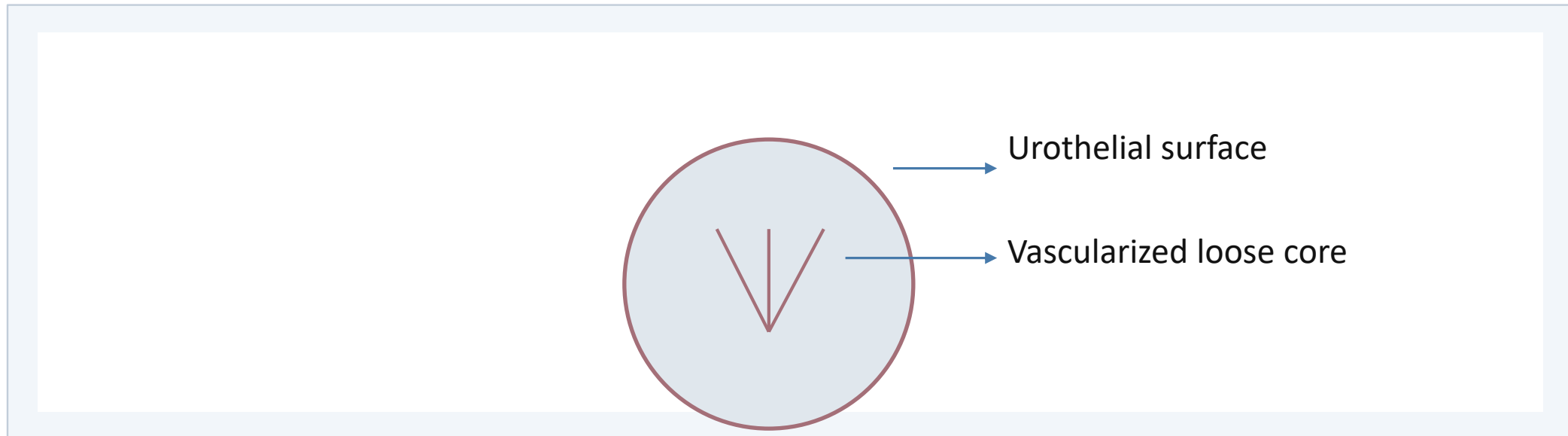
Diagnostic reasoning starts with the lesion compartment

- First ask whether the lesion projects from the mucosal surface
- Then distinguish a stromal polyp from a urothelial epithelial proliferation
- Finally, evaluate cytologic grade, invasion, and accompanying lesions
- Do not treat “polyp” as a synonym for “benign”

Fibroepithelial polyp: The defining lesion

- A tumor-like ureteral lesion, often encountered in children
- Composed of loose, vascularized connective tissue
- Covered by urothelial epithelium
- The supporting stroma—not a malignant epithelial proliferation—defines the polyp

Fibroepithelial polyp: Structural organization

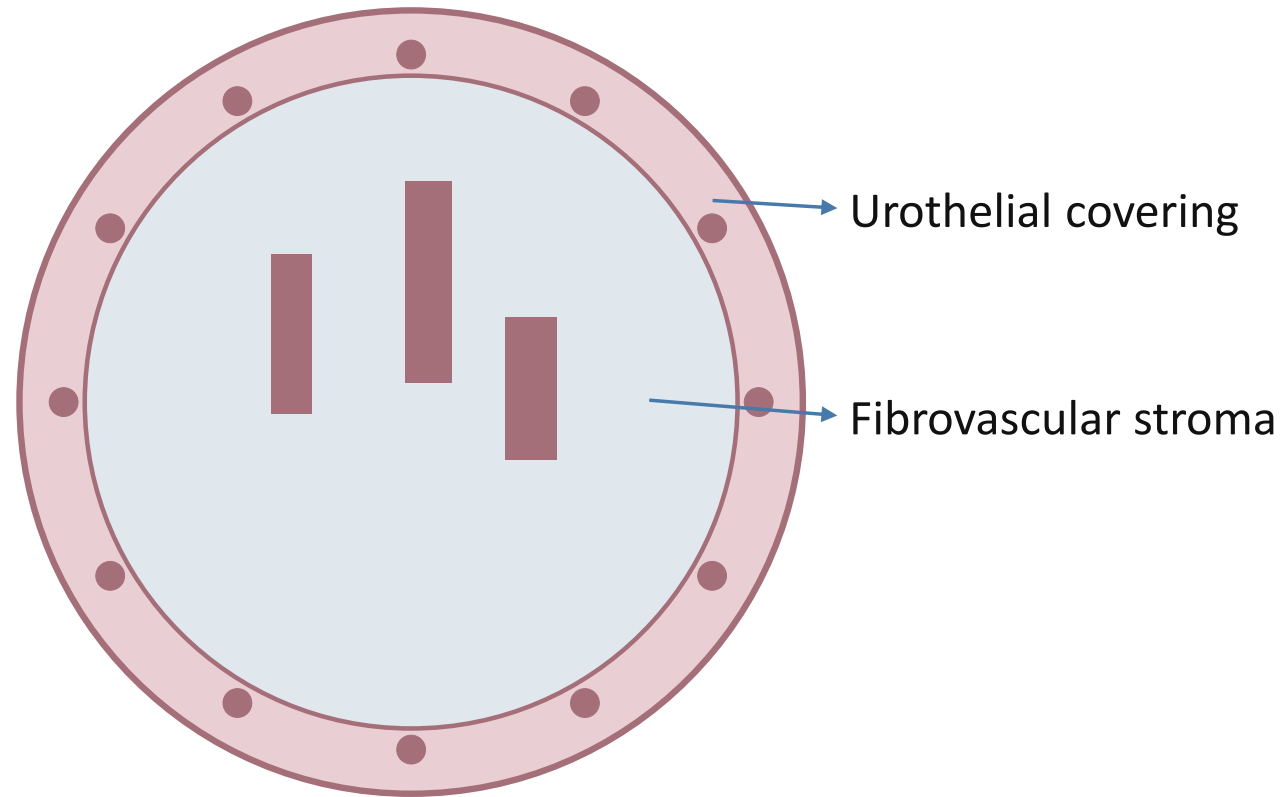


Schematic fibrovascular polyp—not an H&E photomicrograph

Polyp core: What “fibroepithelial” means

- “Fibro-” refers to connective-tissue support
- “Epithelial” describes the urothelial surface covering
- A vascularized stromal axis organizes the protruding lesion
- The two components must be assessed together

Low-power interpretation of a polyp



Schematic polyp cross-section—not diagnostic H&E

A tumor-like lesion is not automatically a carcinoma

- A mass-forming lesion may reflect a benign stromal proliferation
- Luminal protrusion itself does not establish malignancy
- The diagnostic distinction is histologic, not just geometric
- Recognize the fibroepithelial architecture before applying epithelial cancer grades

Why a benign ureteral polyp can matter clinically

- The ureter is a conduit: Luminal occupancy has functional consequences
- An obstructing benign lesion can still impair urinary outflow
- Hydroureter or hydronephrosis reflects obstruction, not necessarily cancer
- Histologic biology and renal physiologic consequences must be reported separately

Fibroepithelial polyp versus urothelial papilloma

Fibroepithelial polyp

- Stromal lesion with loose vascularized core
- Covered by urothelium
- Defined chiefly by supporting mesenchymal tissue

Urothelial papilloma

- A benign epithelial papillary neoplasm
- Delicate fibrovascular papillae lined by normal-appearing urothelium
- An epithelial neoplastic classification

Fibroepithelial polyp versus papillary carcinoma

Polyp

- Stroma is the primary lesion
- Urothelial covering is not, by itself, evidence of cancer
- Obstruction may be present without invasion

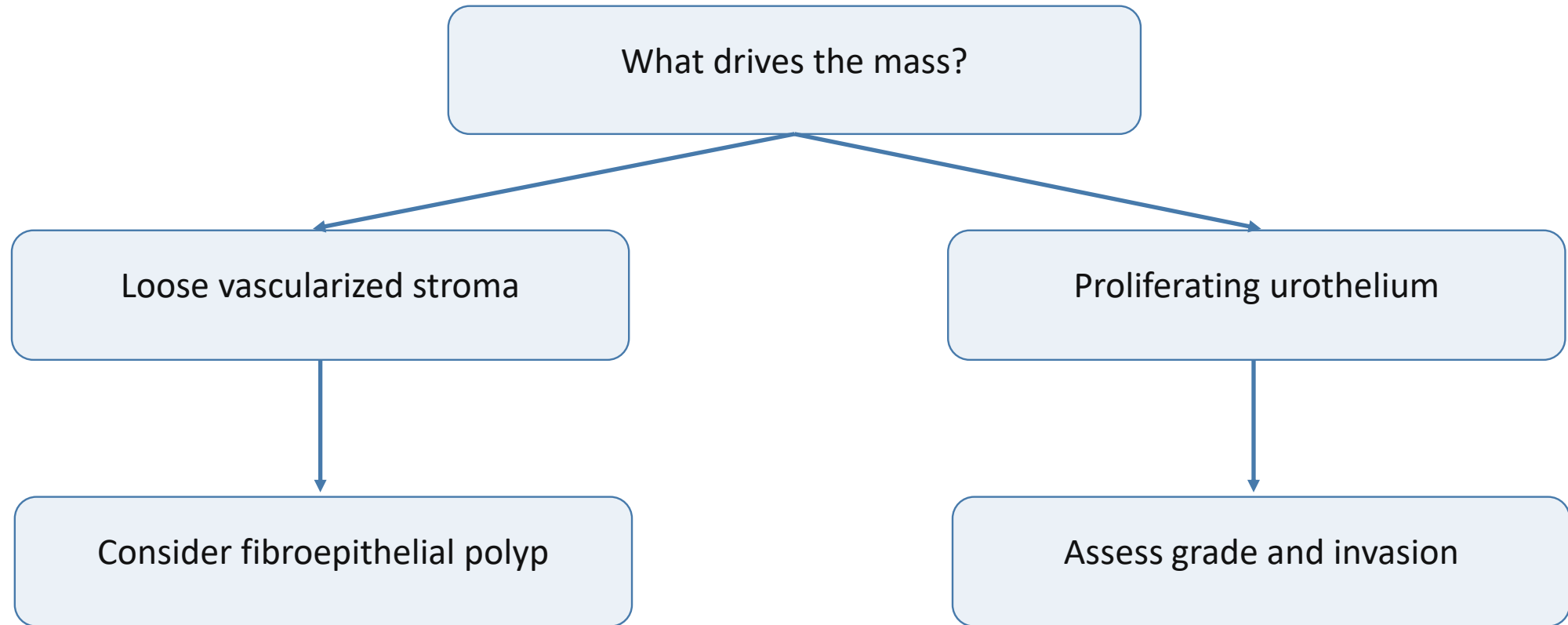
Papillary urothelial carcinoma

- Neoplastic urothelial proliferation lines papillae
- Nuclear atypia and architectural disorder determine grade
- Assess for invasion beyond the basement membrane

When a polypoid specimen is sampled

- Document whether the lesion contains recognizable urothelial lining
- Identify the quality and vascularity of the underlying stroma
- Search for atypical epithelial growth beyond the benign lining
- Avoid a definitive carcinoma classification without adequate supporting morphology

Polyp differential: A structured decision



Case 1: Pediatric ureteral mass

Clinicopathologic application

- A child has a polypoid ureteral lesion and impaired drainage
- Sections show a loose vascularized core beneath urothelial covering
- No destructive epithelial invasion is identified in the examined sections
- What diagnosis best fits the described findings?

Case 1: Interpretation

- Most consistent morphologic diagnosis: Fibroepithelial polyp
- The age and the stromal architecture are concordant with Robbins
- Explain the obstruction separately from the benign classification
- Evaluate the actual sampled lesion rather than relying on age alone

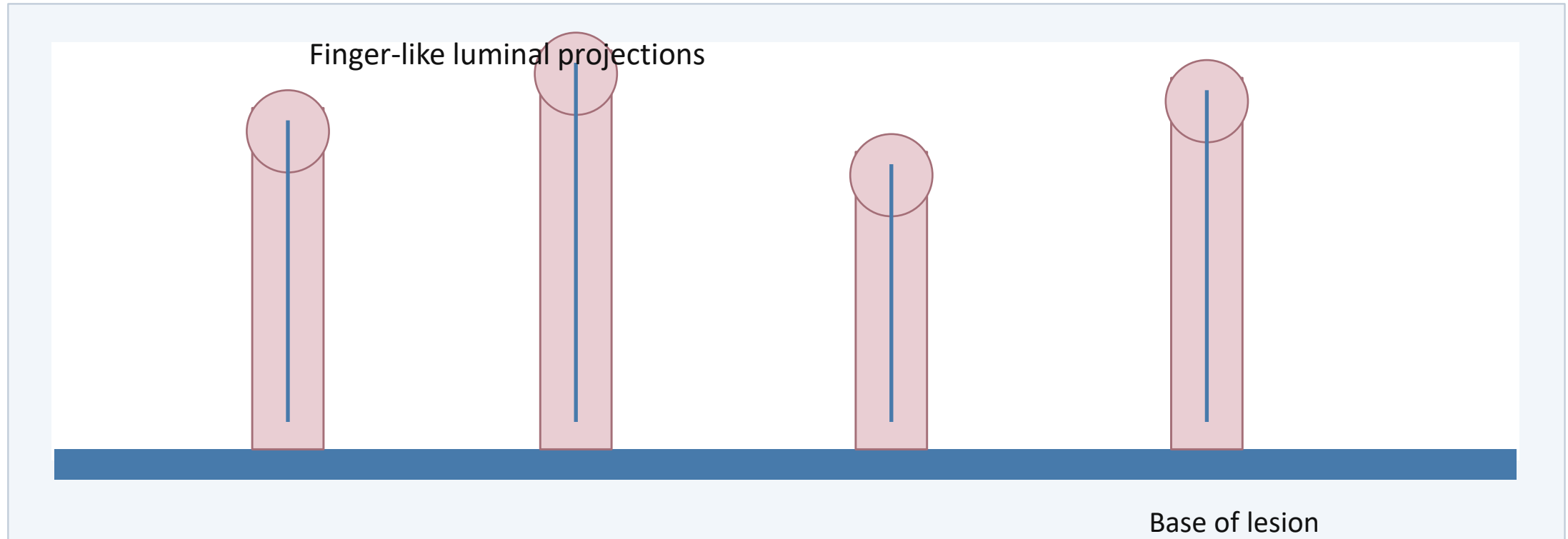
Malignant ureteral tumors: The dominant phenotype

- The majority of primary malignant ureteral tumors are papillary urothelial carcinomas
- They resemble urothelial tumors in renal pelvis, calyces, and bladder
- Their luminal location creates a direct route to mechanical obstruction
- Concurrent tumors elsewhere in the urothelial tract are common

Age distribution of ureteral malignancy

- The peak frequency in the sixth and seventh decades
- This is descriptive age information—not a diagnostic cutoff
- A benign lesion and carcinoma can overlap by age
- Let morphology adjudicate the differential

Papillary carcinoma: Architecture before cytology



Schematic papillary architecture; Cytologic grade not depicted

Papillary and flat urothelial growth

Papillary

- Exophytic projections extend into the lumen
- The source describes most ureteral carcinomas as papillary
- Papillary form may facilitate obstruction

Flat / CIS

- Cytologically malignant urothelium can remain flat
- CIS may extend across urothelial sites
- Flat morphology is not equivalent to benign behavior

Noninvasive papillary tumor spectrum

- Urothelial papilloma: Normal-appearing epithelium on delicate papillae
- PUNLMP: Thicker and more cellular urothelial lining
- Low-grade papillary carcinoma: Ordered architecture with mild atypia
- High-grade papillary carcinoma: Marked cytologic atypia and disorder

Papillary urothelial grading: Morphology

Feature	Low-grade	High-grade
Polarity	Generally maintained	Frequently disordered
Cohesion	Cohesive, orderly	May be discohesive
Nuclei	Limited variation; scattered hyperchromasia	Large, hyperchromatic; irregular chromatin
Mitoses	Infrequent, mainly basal	Often frequent, including atypical forms

Low-grade papillary carcinoma: What to recognize

- The epithelial architecture remains relatively orderly
- Cells tend to be evenly spaced and retain polarity
- Atypia is present, but less pronounced than in high-grade lesions
- Histologic grade is an epithelial descriptor, not a measure of luminal obstruction

High-grade papillary carcinoma: What changes

- Marked nuclear hyperchromasia and irregular chromatin
- Prominent nucleoli; Substantial variation in cell appearance
- Mitoses may be numerous or atypical
- Loss of polarity and discohesion distinguish it from an orderly papillary lesion

Grade and depth are different questions

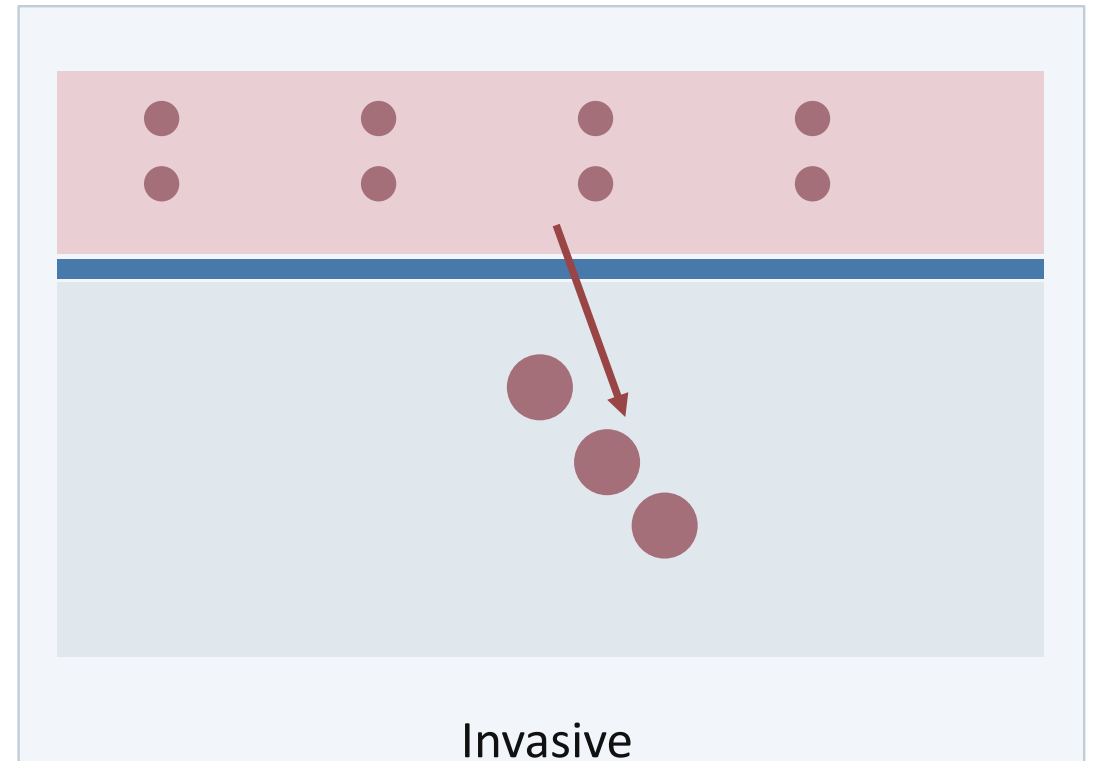
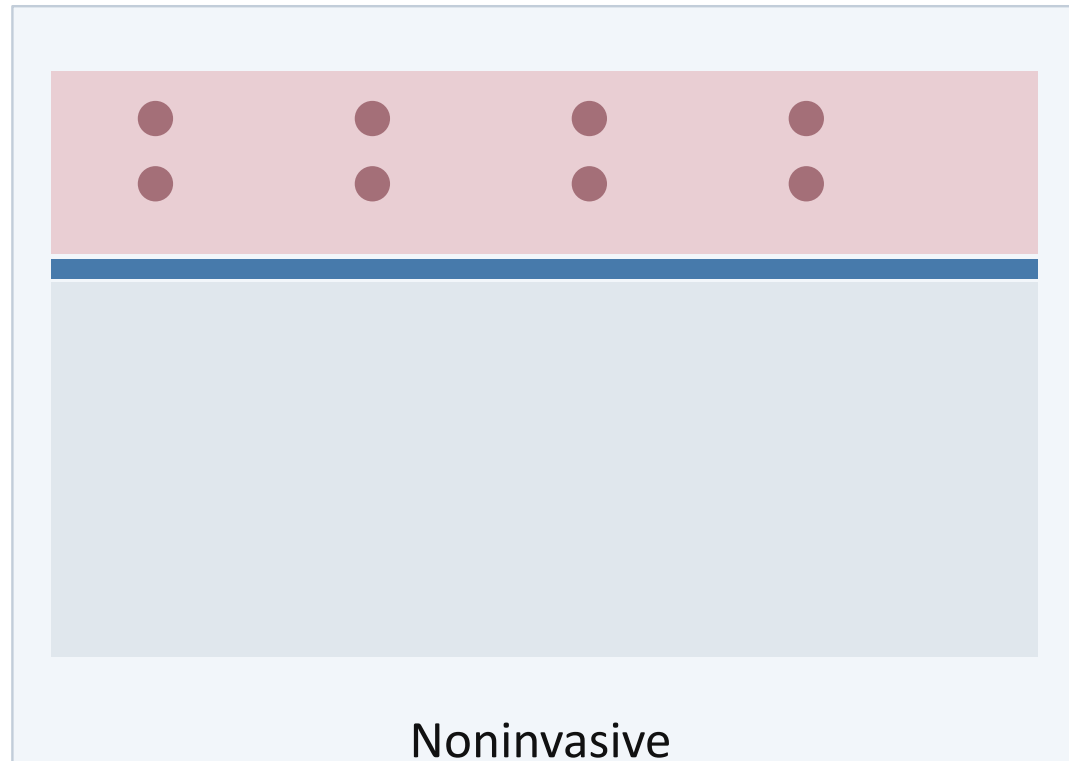
Grade

- How abnormal the tumor cells and architecture appear
- Low-grade versus high-grade cytology
- Assessed within the urothelial epithelial proliferation

Invasion

- Whether tumor has crossed the epithelial basement membrane
- Extent into subjacent tissues, if present
- Requires evaluation of tissue interface and sampling

Noninvasive versus invasive urothelial carcinoma



Schematic: Basement membrane interface defines invasion

Urothelial carcinoma in situ: A second pattern

- Flat urothelium contains cytologically malignant cells
- A visible papillary mass is not required for CIS
- The bladder source notes that CIS can extend to ureters and urethra
- Evaluate surrounding flat urothelium when relevant

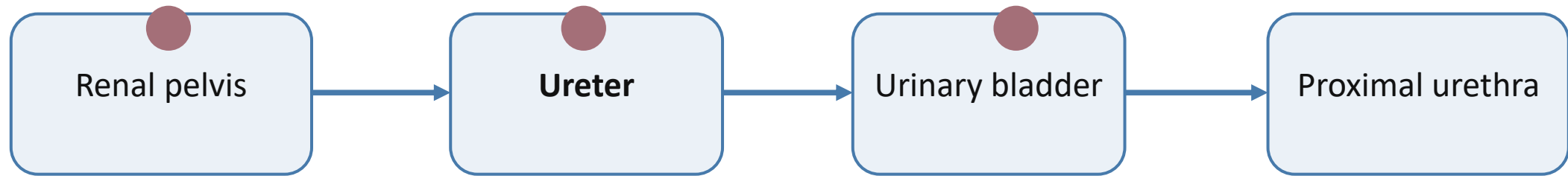
Why a normal-looking adjacent area may matter

- Urothelial neoplasia can be multifocal
- Renal pelvic cancer sections describe atypia or CIS in grossly normal remote urothelium
- Macroscopic normality does not guarantee microscopic normality
- This is a rationale for examining non-mass mucosa when sampled

Ureteral carcinoma and renal-pelvis carcinoma overlap

- Both arise in urothelial-lined upper-tract locations
- Robbins explicitly compares primary ureteral malignancies to renal-pelvis cancers
- Renal pelvic tumors can have associated sites of urothelial atypia
- Site and extent still need careful anatomic designation

Synchronous urothelial tumors: The anatomic map



Shared urothelial lining links neoplastic patterns across sites

Schematic—anatomic sequence, not drawn to scale

Colored markers denote possible separate lesion sites, not observed tumors

Multifocal urothelial disease changes the assessment

- Ureteral carcinoma may coexist with lesions in the pelvis or bladder
- Separate sites require separate anatomic description
- A grossly normal surface may still contain atypia or in situ carcinoma
- Finding one tumor does not exclude a second lesion elsewhere

Cytology and shedding: Relevant background

- High-grade papillary cancers and CIS may have reduced cellular cohesion
- Shedding of atypical cells into urine is described for CIS
- Urinary findings may therefore reflect urothelial disease at various levels
- Urine cytology alone cannot specify anatomic site in this source

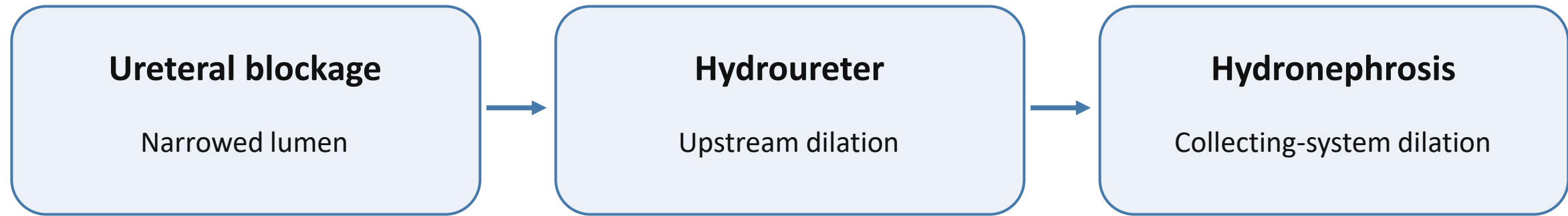
Distinct axes of ureteral tumor description

- Site: Ureteral segment and relation to renal pelvis or bladder
- Architecture: Papillary, flat, or infiltrative pattern
- Biology: Benign / low malignant potential / carcinoma
- Extent: Confined to urothelium or infiltrating the wall

Obstruction is a core consequence of ureteral carcinoma

- Malignant ureteral neoplasms obstruct the lumen
- A growing intraluminal mass reduces the passage available for urine
- Obstruction links tumor morphology with kidney-level damage
- Degree of obstruction should not be inferred from tumor grade alone

Ureteral obstruction: The upstream sequence



Obstruction can also predispose to pyelonephritis

Unilateral and bilateral obstruction patterns

Unilateral

- Often due to a proximal intrinsic or extrinsic cause
- Examples: Ureteral calculus or neoplasm
- Can affect the upstream collecting system on one side

Bilateral

- More often attributed to distal outflow causes
- Textbook example: Nodular hyperplasia of prostate
- Do not assume two ureteral primary tumors are present

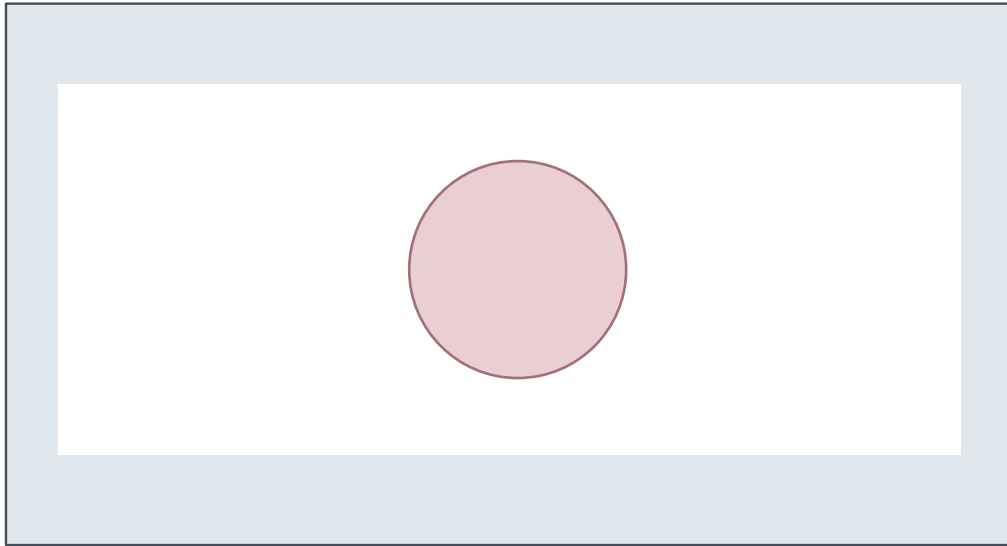
Intrinsic obstruction: Important alternatives

Cause	Pathologic mechanism / clue
Ureteral carcinoma	Primary intraluminal neoplastic growth
Fibroepithelial polyp	Benign mass within the lumen
Calculus	Mechanical intraluminal obstruction
Stricture	Congenital or acquired luminal narrowing
Blood clot	Possible consequence of urinary tract bleeding

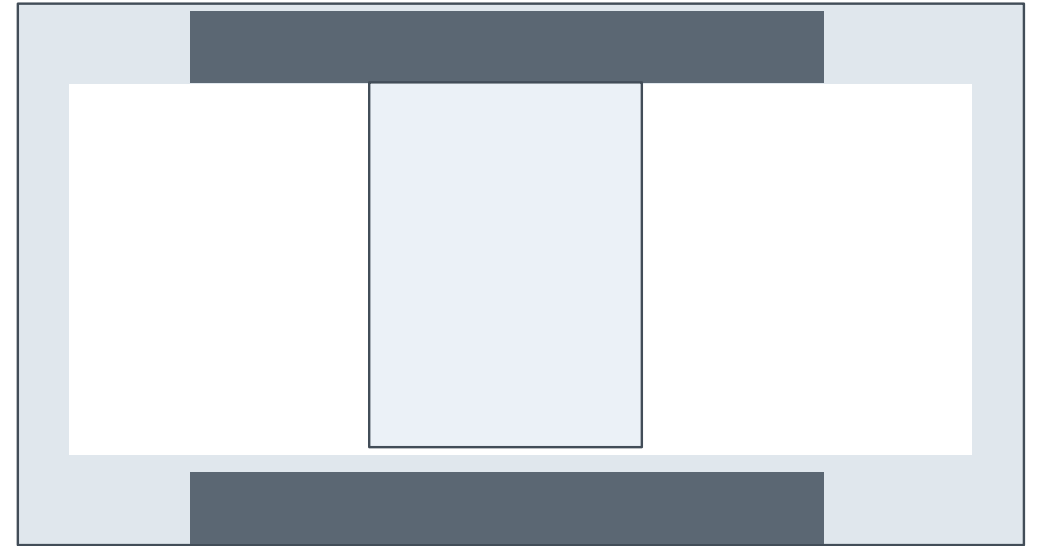
Extrinsic obstruction: Why a mass need not be ureteral

Cause group	Illustrative examples in Robbins
Pelvic / adjacent cancers	Rectum, bladder, prostate, ovary, uterus, cervix
Other neoplasms	Lymphoma, sarcoma
Inflammatory disease	Periureteral inflammatory processes
Fibroinflammatory disease	Sclerosing retroperitoneal fibrosis
Other conditions	Endometriosis; pregnancy

Intrinsic mass versus external encasement



Intrinsic mass



External compression

Schematic compartments—no patient imaging

Hydronephrosis is a consequence, not a diagnosis

- Upstream collecting-system dilation may follow ureteral obstruction
- A calculus, benign polyp, malignant tumor, or external process can be causal
- Hydronephrosis alone cannot identify histologic tumor type
- The etiologic lesion must be investigated separately

Pyelonephritis as an obstructive complication

- Pyelonephritis among consequences of ureteral blockage
- Impaired urine flow may coexist with ascending infection
- Inflammatory injury can compound the effects of urinary stasis
- Obstruction and infection should be assessed as related but distinct problems

Clinical presentation: Integrate site and morphology

- The ureteral section explicitly emphasizes luminal obstruction
- The renal-pelvis section links urothelial tumors with hematuria and flank pain
- Clinical features overlap with non-neoplastic obstruction
- Do not classify tumor grade from symptoms

Hematuria versus obstruction: Distinct clues

Hematuria

- Signals urinary tract bleeding but is not site-specific
- Renal pelvic tumors are described as producing noticeable hematuria
- Bleeding alone does not classify urothelial tumor grade

Obstruction

- Signals impeded drainage, not necessarily carcinoma
- Can cause hydroureter, hydronephrosis, or pyelonephritis
- Requires intrinsic/extrinsic differential

What a pathology description should resolve

- Specify whether the lesion is stromal or urothelial in character
- For urothelial neoplasia, describe grade where evaluable
- Record evidence of invasion if the sampled tissue permits assessment
- Avoid implying that insufficiently sampled wall establishes absence of invasion

Sampling limitation: “not seen” versus “excluded”

- A superficial fragment may show only epithelial papillae
- A sample without underlying wall cannot fully assess deeper invasion
- Do not equate absence of invasion in limited tissue with comprehensive staging
- Interpret negative findings in relation to specimen adequacy

Case 2: Papillary lesion in an older adult

Clinicopathologic application

- A patient in the seventh decade has an obstructing ureteral mass
- Histology reveals a papillary urothelial proliferation with marked atypia
- A bladder lesion is also identified
- What are the two most important diagnostic questions?

Case 2: Interpretation

- Evaluate papillary urothelial carcinoma and its grade
- Determine whether the sampled tumor invades the ureteral wall
- Assess each coexisting urothelial lesion by site
- Obstruction and synchronous disease are expected considerations

Case 3: Dilation with no mucosal mass

Clinicopathologic application

- There is hydroureter and hydronephrosis
- Examination shows periureteral encasement rather than an intraluminal tumor
- Which diagnostic category should be considered before ureteral carcinoma?

Case 3: Interpretation

- An extrinsic obstructive process becomes more likely
- Consider malignant encasement, periureteral inflammation, and fibrosis
- Do not label external disease as a primary ureteral carcinoma
- The pathologic lesion and its anatomic compartment determine terminology

Final synthesis: A four-question framework

Question	Key discriminator
What is the lesion?	Fibroepithelial stromal polyp versus epithelial urothelial neoplasm
Is it malignant?	Urothelial cytologic features, architecture, and invasion
What does it do?	Luminal obstruction; upper-tract dilation; infection
Is disease elsewhere?	Renal pelvis and bladder may harbor coexisting lesions

Essential conclusions

- Primary ureteral tumors are rare; Most malignant lesions are papillary urothelial carcinomas
- Fibroepithelial polyp has a loose vascularized stromal core covered by urothelium
- Tumor biology, invasion, obstruction, and synchronous disease are separate assessments
- Renal-pelvis and bladder pathology provide context, not ureter-specific rate estimates

Core reading

- Robbins, Cotran & Kumar: Pathologic Basis of Disease, 11th ed. (2026)
- Chapter 21: Ureters—Tumors and Tumor-like Lesions
- Related Chapter 21 sections: Urothelial Neoplasms; Obstructive Lesions
- Related Chapter 20: Urothelial Carcinoma of the Renal Pelvis