

Sclerosing Retroperitoneal Fibrosis

Fibroinflammation · Ureteral obstruction · IgG4-related subset

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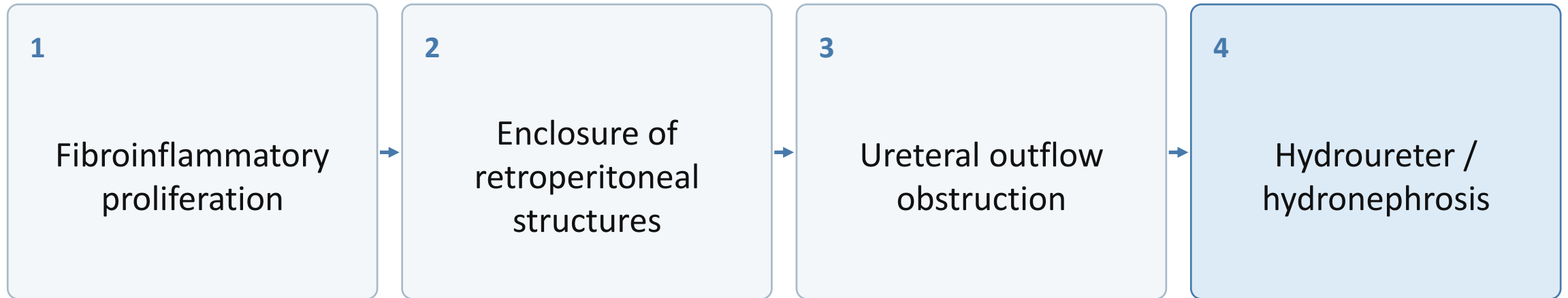
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Learning objectives

- Define retroperitoneal fibrosis as an extrinsic fibroinflammatory cause of ureteral obstruction.
- Distinguish idiopathic disease, IgG4-related disease, and recognized secondary associations.
- Interpret its characteristic histology and explain the renal consequences of obstruction.
- Relate disease biology to corticosteroids, urinary diversion, and ureterolysis.

From retroperitoneal lesion to renal injury

Schematic causal sequence



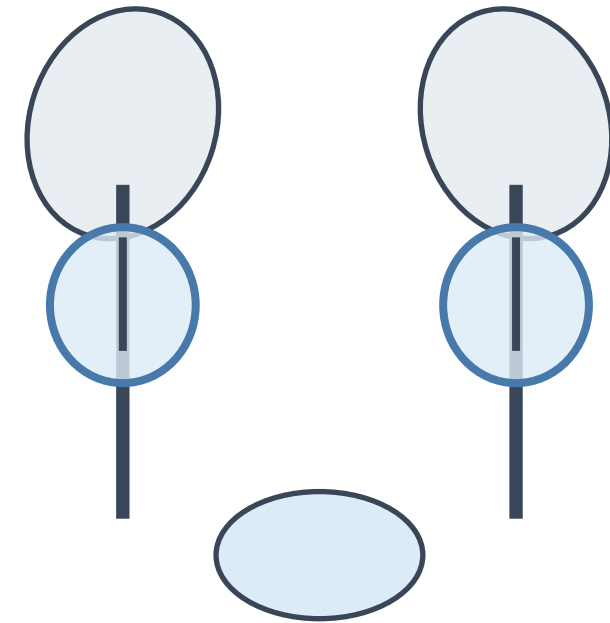
Interpretation

The lesion lies outside the ureter, but the principal clinical consequence is within the urinary collecting system.

Anatomic setting: The ureters are at risk

- Fibrosis occupies retroperitoneal connective tissue.
- The ureters traverse the retroperitoneal compartment.
- Envelopment can compromise urinary drainage despite an extraluminal origin.

Conceptual urinary outflow anatomy



Fibrosis surrounding ureters

Definition: A fibroinflammatory lesion

- Characterized by proliferating fibrous tissue and accompanying inflammation.
- Encloses retroperitoneal structures; Ureteral obstruction is a dominant consequence.
- Clinically important because obstruction may culminate in hydronephrosis.

Clinicopathologic implication

The hallmark is an external sclerosing process, not a primary urothelial lesion.

Extrinsic and intrinsic ureteral obstruction

Intrinsic

A lesion in the urinary tract lumen or wall blocks urine directly; Examples include calculi, strictures and ureteral carcinoma.

Extrinsic

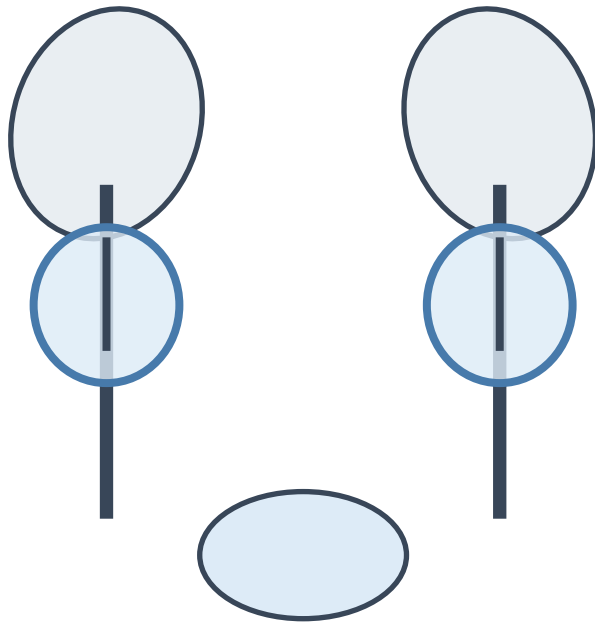
A process outside the ureter presses on or envelops it; Retroperitoneal fibrosis is a classic inflammatory example.

Interpretation

The distinction directs attention to different anatomic sites and etiologic categories.

Why an external plaque can obstruct both ureters

Conceptual urinary outflow anatomy



Fibrosis surrounding ureters

- A retroperitoneal field of fibrosis may surround the ureteral paths.
- Urinary collecting systems upstream of obstruction become dilated.
- Bilateral involvement can threaten the function of both kidneys.

Age and sex distribution

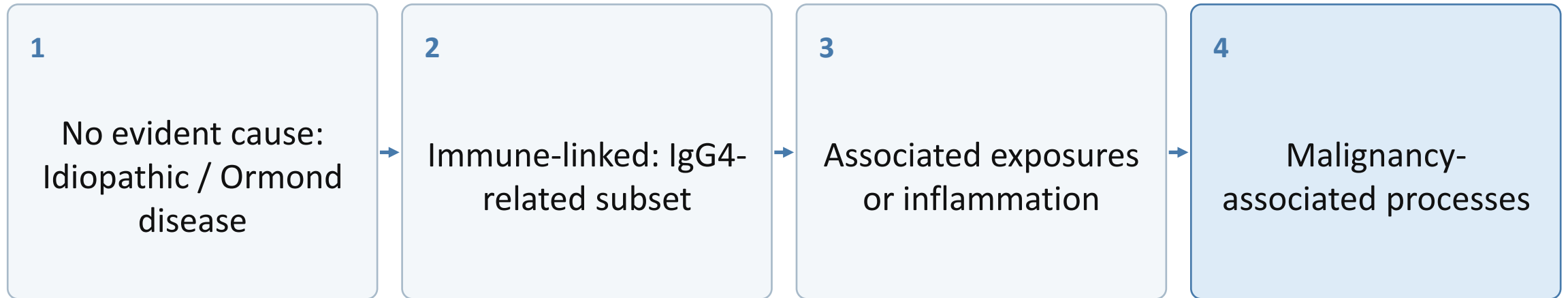
- Disease principally in middle to late adulthood.
- Males are affected more commonly than females.
- This epidemiologic pattern overlaps with the profile of IgG4-related disease.

Clinicopathologic implication

A compatible demographic profile is contextual information, not a stand-alone diagnostic criterion.

Etiologic framework

Schematic causal sequence



Interpretation

The labels represent etiologic categories, not mutually exclusive microscopic patterns.

Idiopathic disease: Ormond disease

- Most cases have no obvious cause in the account given by Robbins.
- These are designated primary or idiopathic retroperitoneal fibrosis.
- Ormond disease is the traditional synonym used for this group.

Clinicopathologic implication

Idiopathic means that an etiology is not established; It does not prove absence of immune involvement.

Idiopathic is not equivalent to IgG4-related

Idiopathic designation

An etiologic label used when the cause is not apparent after consideration of recognized associations.

IgG4-related designation

A clinicopathologic association with a systemic fibroinflammatory disease; It identifies at least a subset of cases.

Interpretation

Do not apply the IgG4 label to every case of idiopathic retroperitoneal fibrosis.

IgG4-related retroperitoneal fibrosis

- At least some cases form part of the IgG4-related disease spectrum.
- IgG4-related disease produces lymphoplasmacytic inflammation and fibrosis across multiple organs.
- IgG4-secreting plasma cells are often conspicuous in affected tissues.

Clinicopathologic implication

Retroperitoneal involvement is one manifestation of a wider immune-mediated fibroinflammatory disorder.

IgG4-related disease is multiorgan

System / site	Robbins examples	Connection to this lecture
Pancreatobiliary	Autoimmune pancreatitis; sclerosing cholangitis	Distinct organs; shared fibroinflammatory spectrum
Head and neck	Salivary glands; thyroid; periorbital tissues	An extraretroperitoneal clue to systemic disease
Vascular / abdominal	Aorta; retroperitoneum	Periaortic and ureter-associated fibrosis
Other sites	Kidney, lung, meninges and others	Broad distribution, not a ureter- only condition

Organ examples illustrate the spectrum, not a diagnostic checklist.

Drug-associated retroperitoneal fibrosis

- Ergot derivatives are specifically mentioned among drug exposures.
- β -Adrenergic blockers are another associated drug category.
- A medication history is therefore relevant when considering secondary causes.

Clinicopathologic implication

The source lists associations; It does not specify exposure duration, incidence or causal strength.

Inflammatory secondary associations

Associated condition	Disease group	Interpretive relevance
Vasculitis	Vascular inflammation	Consider a vascular/systemic inflammatory context
Diverticulitis	Gastrointestinal inflammation	A regional inflammatory process may coexist
Crohn disease	Chronic inflammatory bowel disease	An inflammatory history can inform etiologic assessment

These associations without defining their relative frequencies.

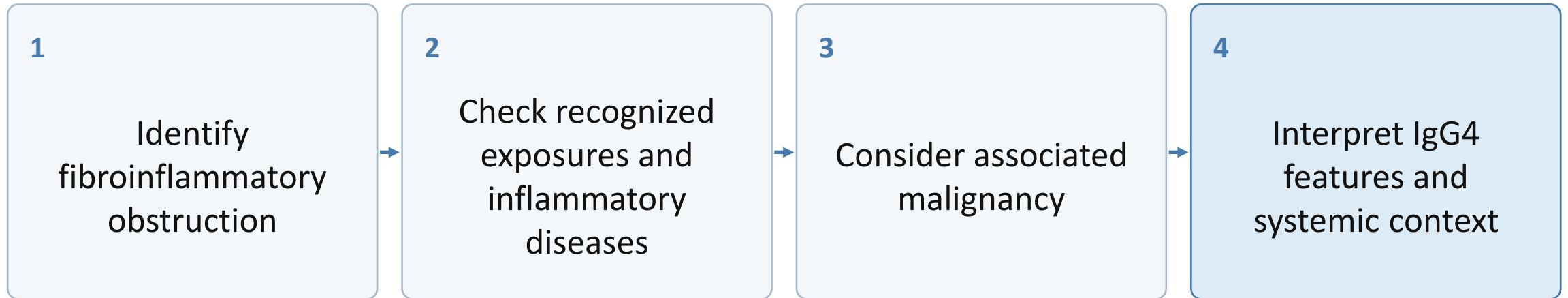
Malignancy-associated retroperitoneal fibrosis

Association listed in Robbins	Important disease context
Lymphoma	A lymphoid malignancy may be associated with retroperitoneal fibroinflammatory change.
Urinary tract carcinoma	A carcinoma in the urinary system can create an alternative or associated obstructive process.
Other pelvic / retroperitoneal tumors	Table 21.1 includes multiple extrinsic tumor categories causing ureteral obstruction.

Fibrosis and obstruction do not, by themselves, exclude an underlying malignancy.

Why the etiologic search matters

Schematic causal sequence



Interpretation

An etiologic category should follow evidence; A fibrotic appearance alone cannot settle the cause.

Cause, association and mechanism are different claims

- Several secondary associations but does not supply a single unifying cause.
- IgG4-related disease is a recognized subset, not a synonym for all retroperitoneal fibrosis.
- Similar obstructive consequences can arise from etiologically distinct processes.

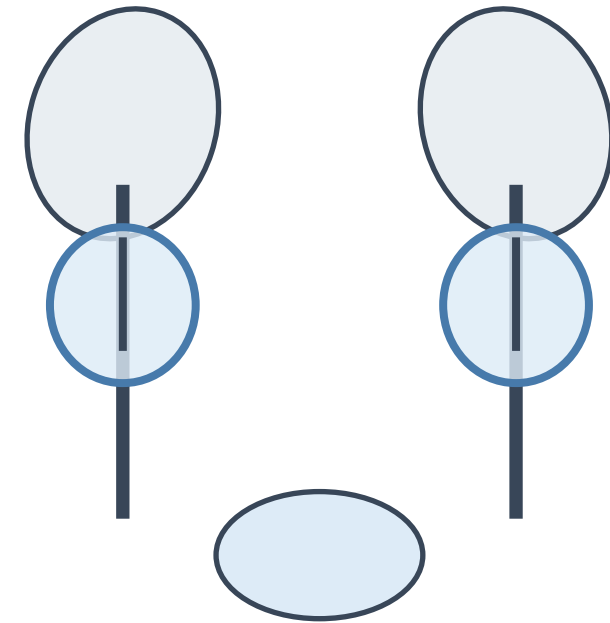
Clinicopathologic implication

The lecture avoids converting reported associations into proven causal mechanisms.

Macroscopic concept: Periureteral encasement

- Dense fibroinflammatory material develops outside the ureter.
- Circumferential involvement may impede the urine stream.
- Upstream dilation is an effect of impaired outflow.

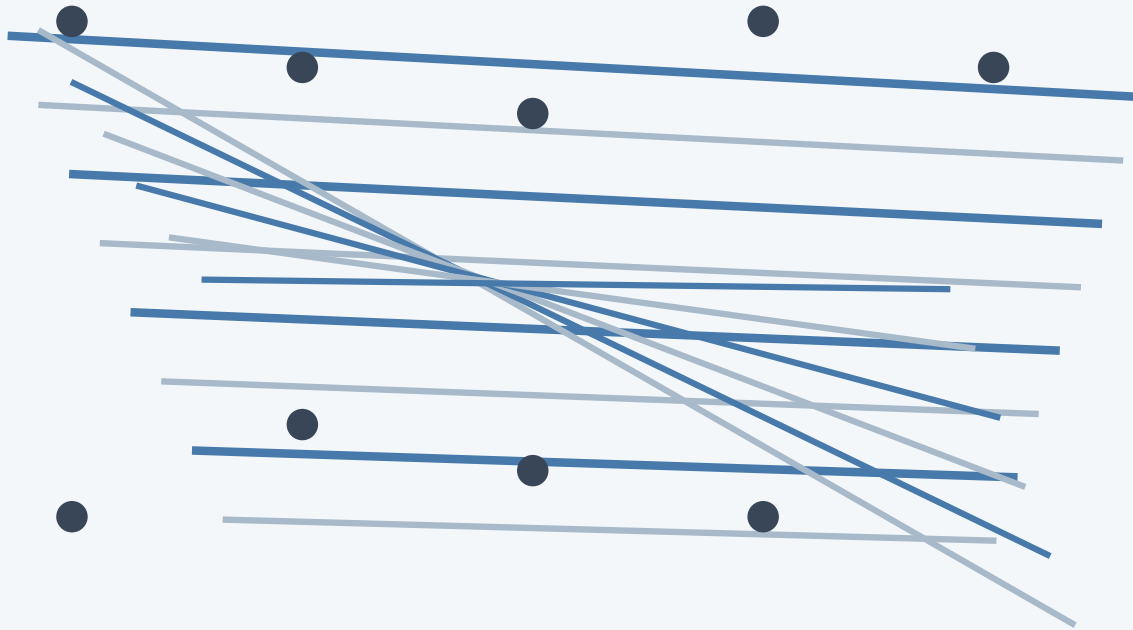
Conceptual urinary outflow anatomy



Fibrosis surrounding ureters

Storiform fibrosis: A defining microscopic pattern

Schematic — not a histology image

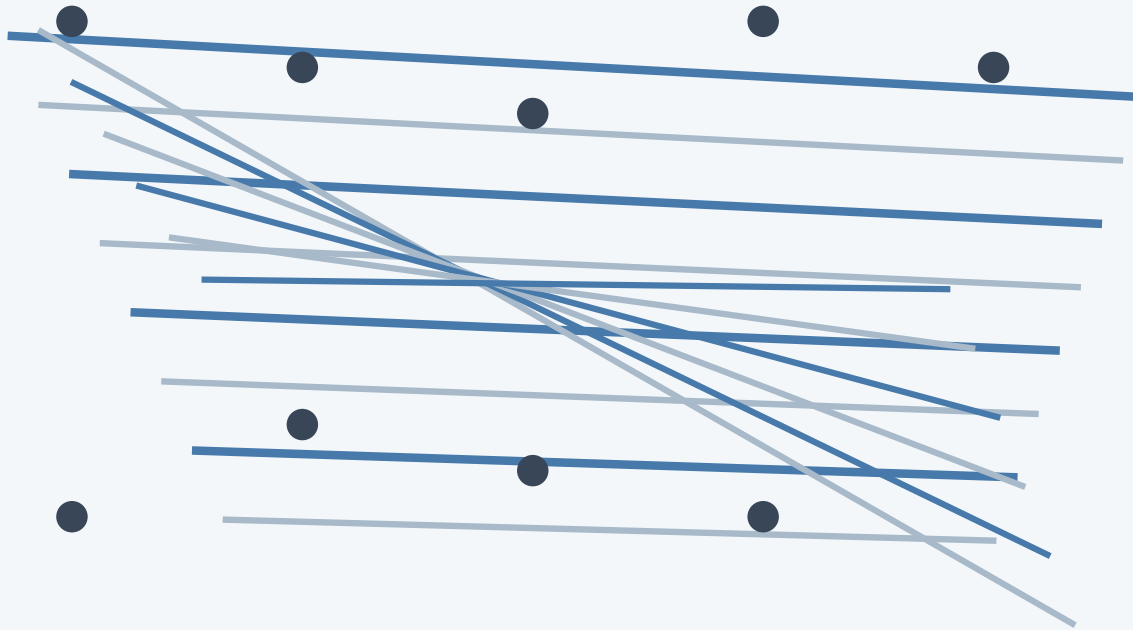


What the pattern emphasizes

- Intersecting bundles of fibrous tissue create a woven or whorled architecture.
- Storiform is a pattern of organization; It is not a molecular diagnosis.
- Storiform fibrous tissue in retroperitoneal fibrosis.

Lymphocytes: Prominent chronic inflammation

Schematic — not a histology image

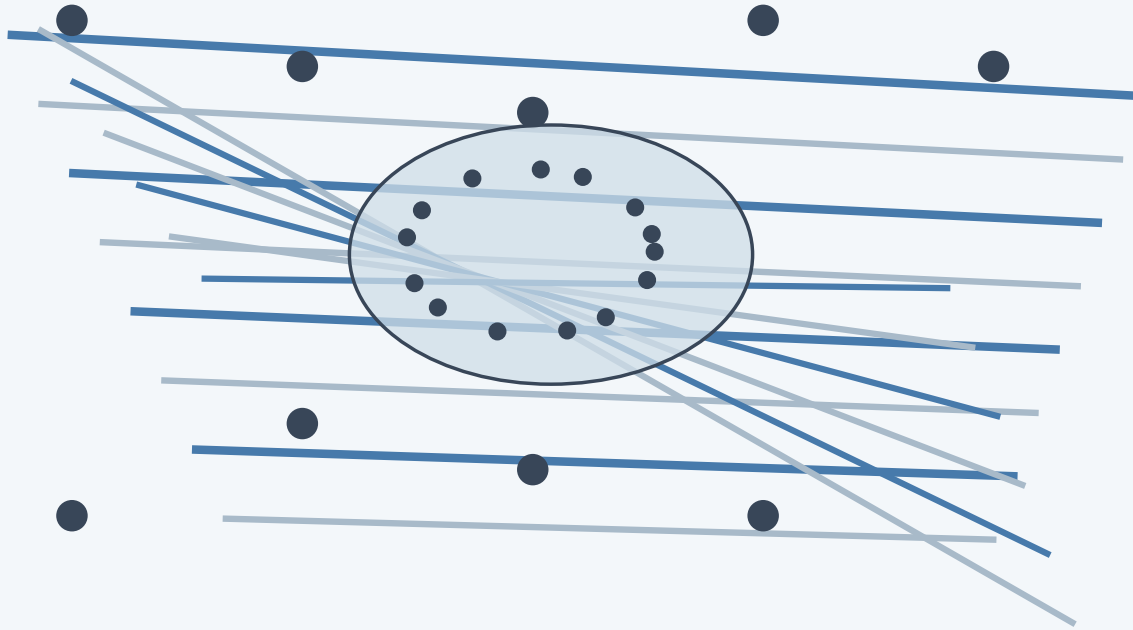


What the pattern emphasizes

- Lymphocytes form a substantial inflammatory component.
- They coexist with fibrosis rather than replacing it.
- Pattern recognition requires examination of both stroma and infiltrate.

Germinal centers may occur in the infiltrate

Schematic — not a histology image

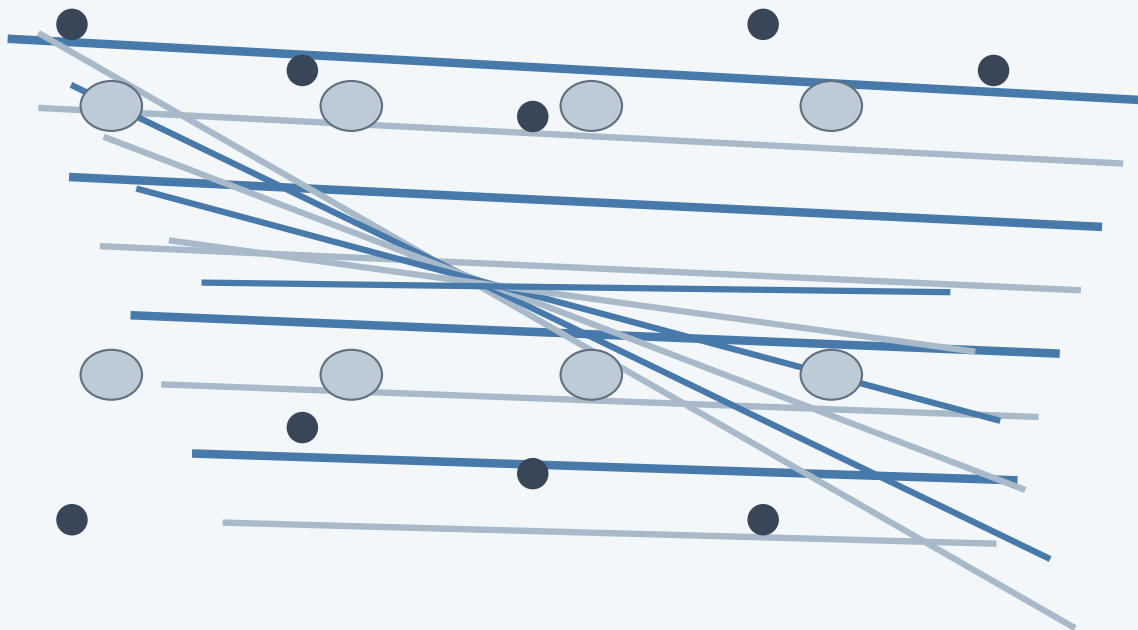


What the pattern emphasizes

- Lymphocytes often arranged with germinal centers.
- Organized lymphoid aggregates support a chronic immune-inflammatory milieu.
- Their presence alone does not identify a unique etiology.

Plasma cells are frequent in the lesion

Schematic — not a histology image



What the pattern emphasizes

- Plasma cells accompany lymphocytes within the fibrotic tissue.
- Many cases contain IgG4-positive plasma cells.
- Cell positivity must be interpreted together with tissue morphology.

What does IgG4 positivity establish?

Supported inference

IgG4-positive plasma cells occur frequently in the lesion; An IgG4-related subset is recognized.

Unsupported shortcut

IgG4-positive cells alone are insufficient to prove that every lesion has IgG4-related disease.

Interpretation

Robbins provides no retroperitoneal quantitative staining threshold in this passage.

Eosinophils complete the mixed infiltrate

- Eosinophils are included among the microscopic inflammatory cells described.
- They occur alongside lymphocytes and plasma cells in storiform fibrous tissue.
- The composition reflects a mixed chronic inflammatory background.

Clinicopathologic implication

Do not substitute a single cell type for the broader composite histologic pattern.

Integrated histopathologic profile

Component	Observed / expected finding	Interpretive role
Stroma	Storiform fibrosis	Provides the architectural pattern
Lymphoid cells	Prominent lymphocytes; sometimes germinal centers	Shows chronic immune-inflammatory component
Plasma cells	Common; often IgG4-positive	Supports possible IgG4 association
Eosinophils	May accompany the infiltrate	Additional component of the mixed inflammation

Composite patterns are more informative than any isolated feature.

The histologic pattern does not establish every cause

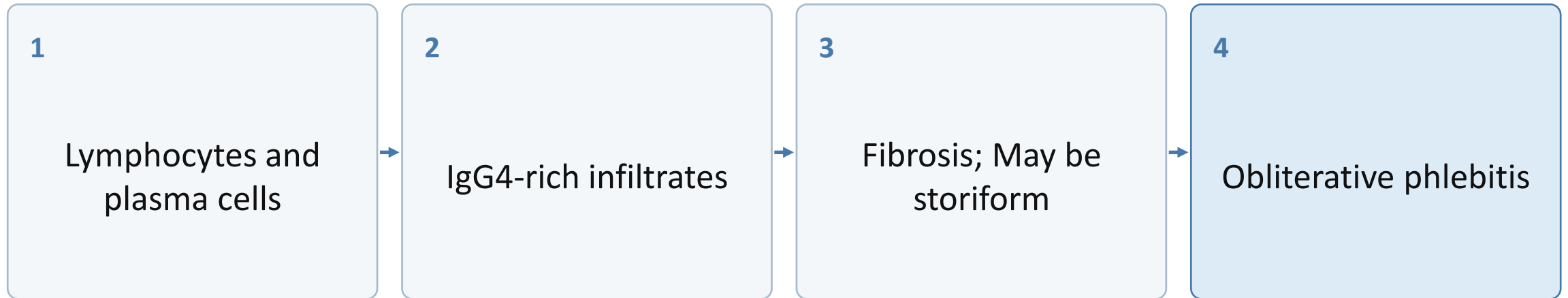
- Idiopathic, IgG4-associated and secondary conditions require etiologic interpretation.
- Morphologic resemblance does not erase the need to consider malignancy or exposures.
- Tissue findings and etiologic categories as related but distinct domains.

Clinicopathologic implication

An etiologic diagnosis requires correlation beyond descriptive fibrosis.

IgG4-related disease: Broader tissue signature

Schematic causal sequence



Interpretation

This is the textbook profile of systemic IgG4-RD; Individual lesions may not display every feature.

Obliterative phlebitis in the systemic IgG4 pattern

Normal concept

A vein has a recognizable lumen and wall surrounded by tissue.

IgG4-related change

Inflammation and fibrosis may obliterate venous structures (obliterative phlebitis).

Interpretation

A characteristic systemic IgG4-RD feature—not claimed by the short retroperitoneal passage to occur in every case.

Serum IgG4: Useful but not absolute

What Robbins says

Serum IgG4 is usually elevated in systemic IgG4-related disease.

What it does not say

A particular serum concentration by itself establishes or excludes retroperitoneal IgG4-RD.

Interpretation

No diagnostic cutoff, sensitivity or specificity is supplied in the source.

Pathogenesis remains incompletely explained

- The cause and pathogenetic mechanism of IgG4-related disease remain unclear.
- Autoimmune reactions are suspected, but causative autoantigens are unidentified.
- Production of IgG4 is a lesion hallmark, not proof of pathogenic action.

Clinicopathologic implication

Separate immune association from demonstrated antibody-mediated injury.

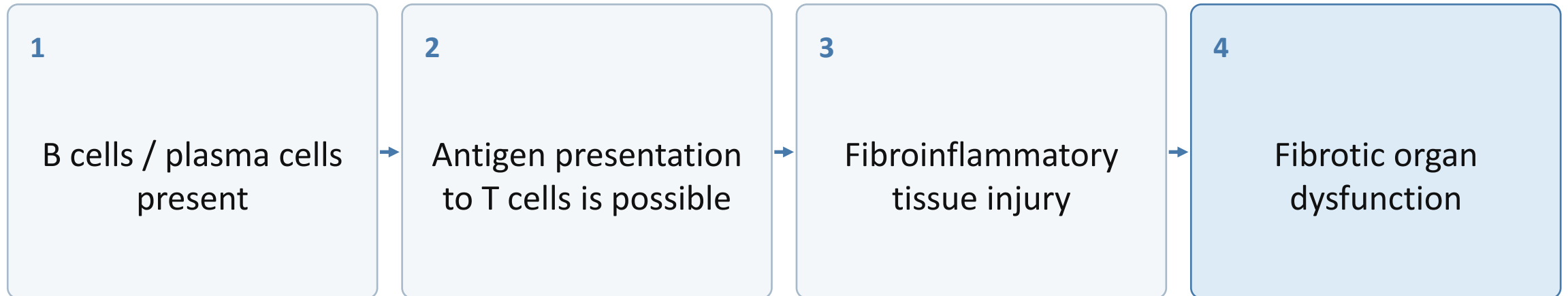
IgG4 production and causality

Observation in Robbins	Inference allowed	Inference not established
IgG4-positive plasma cells	B-cell lineage participates in tissue response	IgG4 antibody itself drives fibrosis
Usually raised serum IgG4	May provide systemic context	A stand-alone diagnostic rule
Anti-B-cell therapy benefit	B cells have an important role	A known pathogenic autoantigen

The antibody's role in generating fibrosis remains uncertain.

Immune-cell involvement: Evidence and limits

Schematic causal sequence



Interpretation

This pathway is a conceptual hypothesis, not a fully proven molecular cascade; Uncertainty.

Clinical benefit from B-cell depletion

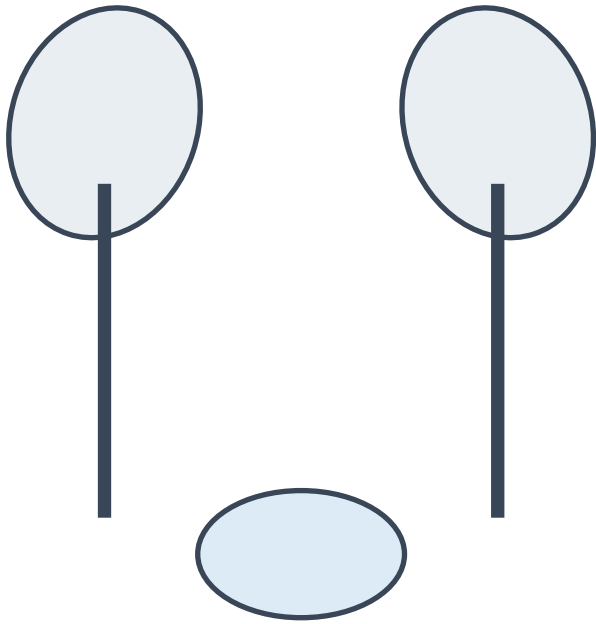
- Benefit of anti-B-cell antibodies in systemic IgG4-related disease.
- This supports a pathogenetic role for B cells, possibly through antigen presentation.
- The passage does not prescribe this therapy for all retroperitoneal fibrosis.

Clinicopathologic implication

Evidence supporting a cell population is not equivalent to identifying a specific autoantibody-mediated mechanism.

Normal urine drainage establishes the contrast

Conceptual urinary outflow anatomy



Patent ureteral drainage

- Urine passes from renal collecting systems into ureters.
- Unimpeded drainage prevents pressure accumulation in the collecting system.
- An extrinsic lesion may interrupt this path along the ureter.

Obstruction can vary across three axes

Axis	Examples described by Robbins	Why it matters
Tempo	Sudden versus insidious	Symptoms and adaptation can differ
Degree	Partial versus complete	Determines severity of impaired flow
Distribution	Unilateral versus bilateral	Changes the extent of renal risk

RPF is one of several extrinsic causes; It does not impose one uniform pattern of obstruction.

Where RPF fits among obstructive lesions

Intrinsic categories

Calculi, strictures, intraluminal tumors, blood clots; Neurogenic abnormalities affect drainage.

Extrinsic categories

Pregnancy, periureteral inflammation including RPF, endometriosis and surrounding tumors.

Interpretation

The table classifies mechanisms of urinary outflow interruption, not histologic disease subtypes.

Intrinsic causes: Contrasting mechanisms

Intrinsic entity	Typical obstructive mechanism
Calculus	A stone lodged within the ureteral lumen
Stricture	Fixed narrowing due to congenital or acquired ureteral change
Ureteral neoplasm	Tumor involving the ureter
Blood clot	Intraluminal blockage associated with substantial hematuria

RPF is external to the ureter and must not be confused with an intraluminal calculus.

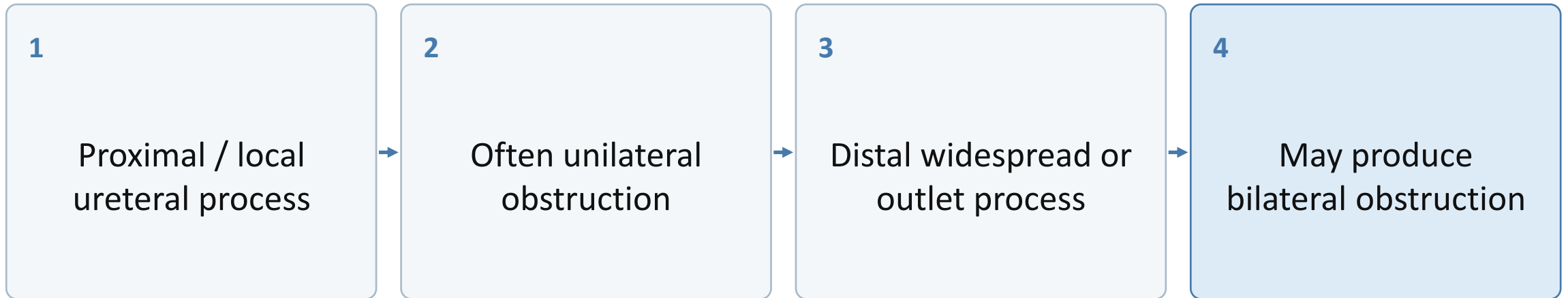
Extrinsic causes: Contextual differential

Extrinsic lesion	Pathologic context
Periureteral inflammation	Includes sclerosing retroperitoneal fibrosis
Endometriosis	Pelvic lesions and associated scarring
Pregnancy	Smooth muscle relaxation or pressure from enlarged fundus
Adjacent malignancy	Pelvic / retroperitoneal tumors may compress ureters

Different external causes can have similar downstream urinary consequences.

Laterality and level of obstruction

Schematic causal sequence

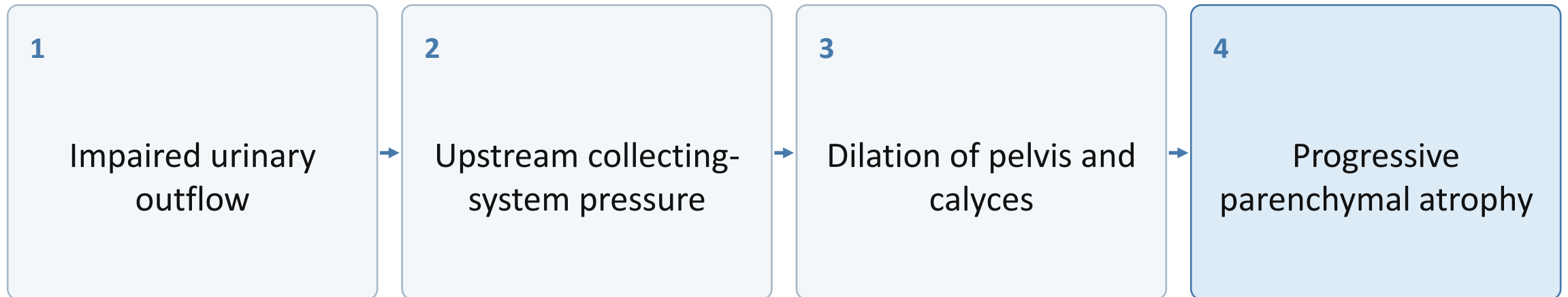


Interpretation

This is a typical pattern described in the chapter, not an absolute rule for every cause.

How hydronephrosis develops

Schematic causal sequence

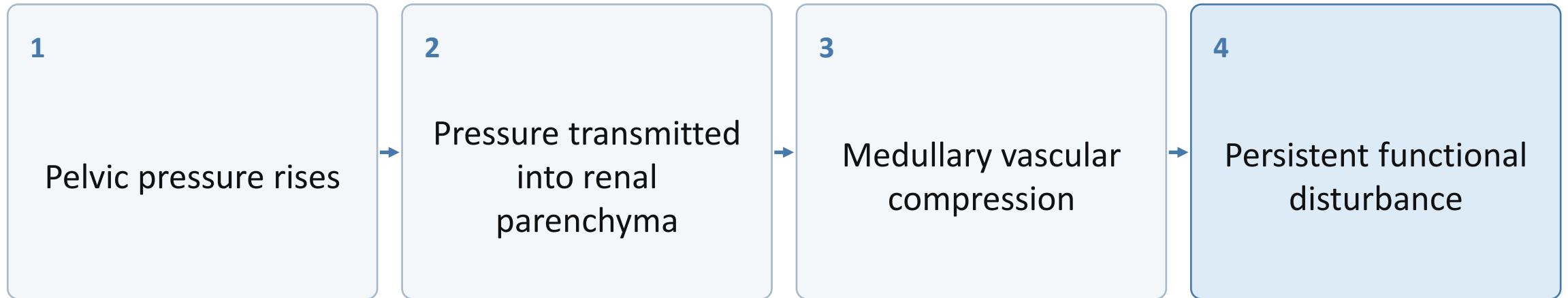


Interpretation

Hydronephrosis denotes collecting-system dilation with injury from urinary obstruction.

Pressure transmission links obstruction to injury

Schematic causal sequence

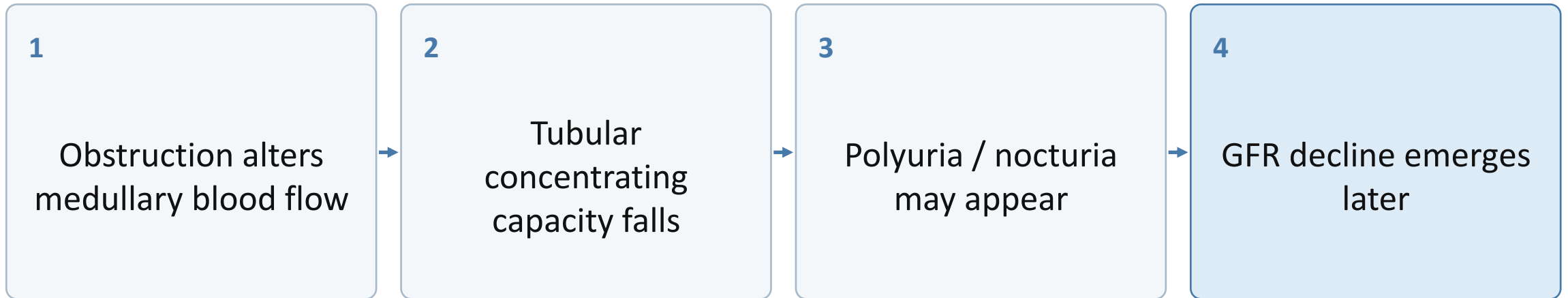


Interpretation

The kidney response explains why an extrarenal ureteral lesion may cause intrarenal functional damage.

Early functional injury is predominantly tubular

Schematic causal sequence



Interpretation

The order of changes matters: Concentrating defects can precede a substantial filtration decline.

The medullary circulation is vulnerable

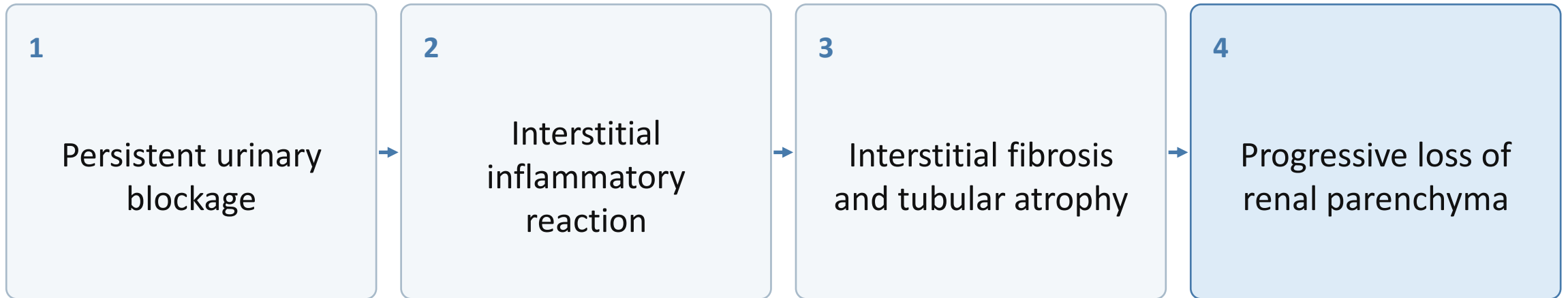
- Increased pressure compresses intrarenal vessels, particularly in the medulla.
- Reduced inner medullary blood flow initially produces potentially reversible disturbances.
- Prolonged damage can impair concentrating function.

Clinicopathologic implication

The hemodynamic consequences are mediated through obstruction, not a direct renal lesion from the fibrosis.

Long-standing obstruction produces scarring

Schematic causal sequence



Interpretation

Relief of obstruction is important before structural injury becomes advanced.

Renal morphology evolves with duration

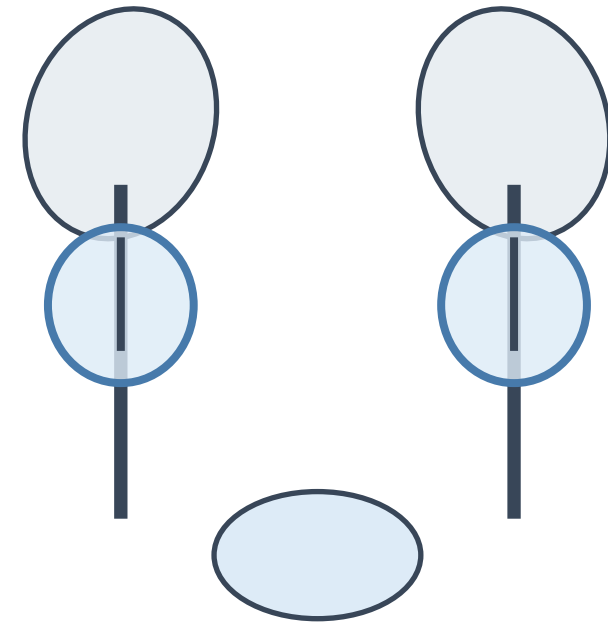
Earlier obstruction	Long-standing obstruction
Pelvic and calyceal dilation	Marked dilation with parenchymal thinning
Interstitial inflammation may occur	Diffuse interstitial fibrosis develops
Potentially reversible functional changes	Cortical tubular atrophy and loss of pyramidal architecture

Morphology reflects severity and duration; These are renal consequences, not the primary retroperitoneal lesion.

Hydronephrosis is the downstream morphology

- Collecting-system dilation is an effect of urinary obstruction.
- Progressive atrophy reflects sustained upstream pressure and injury.
- The original fibrosis may be outside the kidney, along the ureter.

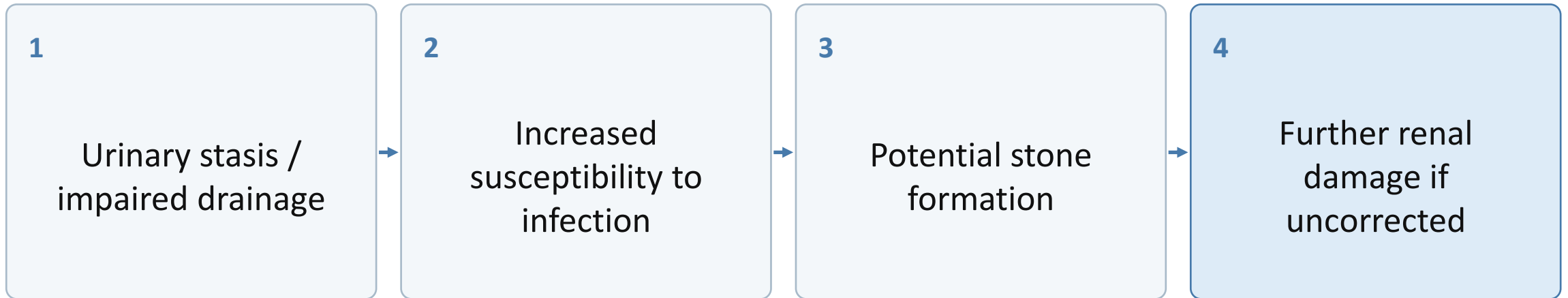
Conceptual urinary outflow anatomy



Fibrosis surrounding ureters

Obstruction increases additional renal risks

Schematic causal sequence



Interpretation

Robbins explicitly links urinary obstruction with infection and stone susceptibility.

Unilateral obstruction can be silent

- One unaffected kidney may preserve adequate global renal function.
- Complete or partial unilateral hydronephrosis may remain unrecognized for a prolonged period.
- The abnormality can be found incidentally on imaging.

Clinicopathologic implication

A normal global filtration assessment does not necessarily rule out unilateral obstruction.

Bilateral partial obstruction may present functionally

- Loss of concentrating ability may occur early.
- Polyuria and nocturia are characteristic initial manifestations.
- Tubular acidosis, salt wasting and chronic scarring can occur with progression.

Clinicopathologic implication

The symptoms follow tubulointerstitial dysfunction rather than solely a fall in GFR.

Complete bilateral obstruction is an emergency pattern

- Rapid, complete bilateral obstruction can cause oliguria or anuria.
- Persistently blocked outflow jeopardizes renal survival.
- RPF can produce bilateral hydronephrosis; Severity must be assessed in each patient.

Clinical danger

No claim is made that every retroperitoneal fibrotic lesion causes complete bilateral obstruction.

Pain and silence in obstructive uropathy

Possible symptomatic pattern

Acute distention of the collecting system or renal capsule may produce pain.

Possible silent pattern

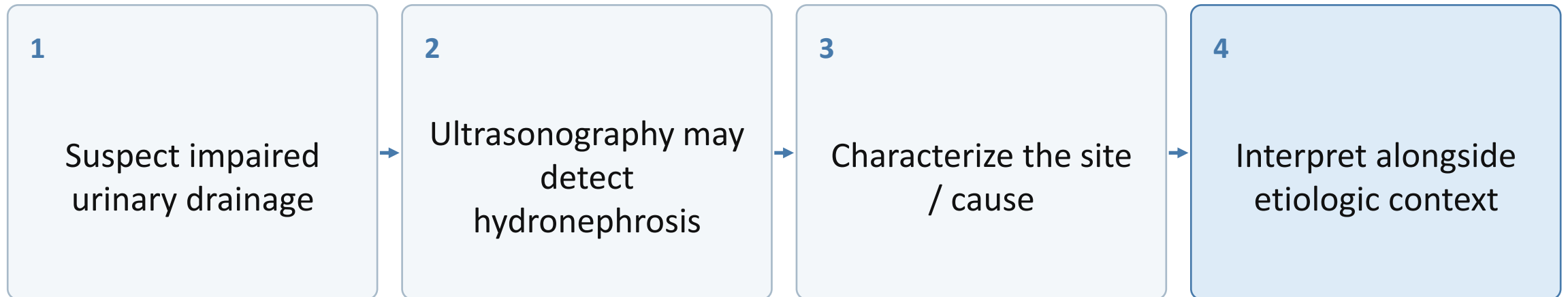
Insidious or unilateral obstruction may remain clinically inconspicuous until imaging.

Interpretation

Presentation depends on both tempo and distribution of obstruction.

Imaging starts with the effect of obstruction

Schematic causal sequence



Interpretation

Robbins specifically describes ultrasonography as a useful noninvasive modality for obstructive uropathy; This is not a detailed imaging guideline.

Integrated pathologic interpretation

Information domain	What it contributes
Anatomic	Fibroinflammatory tissue around ureteral/retroperitoneal structures
Microscopic	Storiform fibrosis with mixed lymphoplasmacytic inflammation
Etiologic context	Idiopathic, IgG4-associated or recognized secondary conditions
Functional	Hydroureter, hydronephrosis and renal dysfunction from obstruction

The disease is best understood across tissue, cause and organ-function levels.

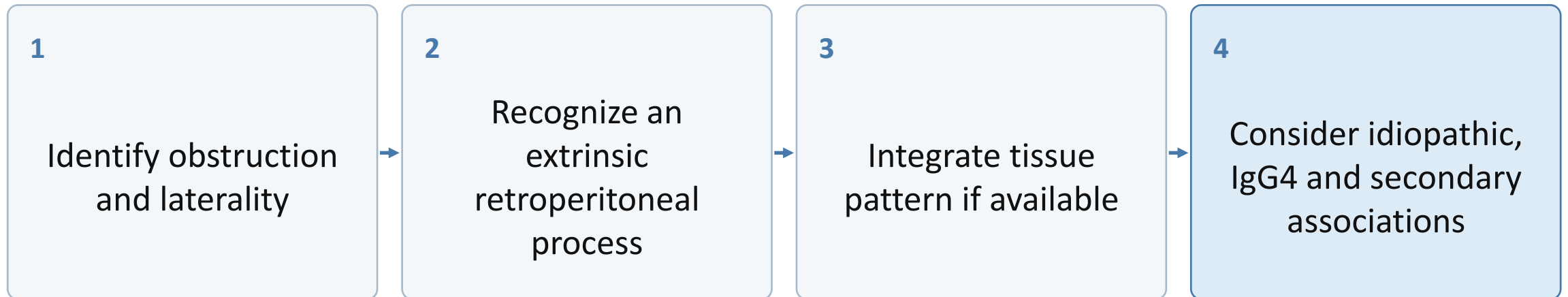
Inflammatory fibrosis versus tumor-associated obstruction

Feature	RPF framework	Malignancy-associated framework
Tissue explanation	Primary fibroinflammatory proliferation	Tumor may directly obstruct or accompany fibrosis
Histology	Storiform fibrous tissue; chronic inflammatory cells	Evidence of a neoplastic process would change interpretation
Etiologic action	Evaluate IgG4 spectrum and exposures	Assess plausible underlying lymphoma or carcinoma

This is a conceptual distinction, not a source-derived numerical diagnostic classifier.

Reason through a suspected case

Schematic causal sequence



Interpretation

Priorities are conceptual and based on Robbins' pathology account; Local clinical protocols determine the actual investigation sequence.

Corticosteroids are the initial treatment

- Corticosteroids as the initial treatment of retroperitoneal fibrosis.
- This approach addresses the inflammatory component of the lesion.
- Stopping progression of obstruction is a separate functional priority.

Clinicopathologic implication

A treatment response does not itself specify the complete etiology or guarantee long-term urinary patency.

Disease may become resistant to corticosteroids

- Many patients eventually become resistant to steroid treatment.
- Persisting fibrosis may maintain urinary outflow obstruction.
- Anatomic intervention may therefore be required even when inflammation was treated.

Clinicopathologic implication

Anti-inflammatory treatment and mechanical relief of obstruction address different components of the problem.

Restoring urinary flow: Two interventions

Ureteral stenting

Maintains a drainage route through the ureter when fibrotic encasement threatens its patency.

Ureterolysis

Surgically frees the ureter from surrounding fibrous tissue; Termed surgical extrication.

Interpretation

The source names both options but does not prescribe patient-specific indications or procedural timing.

Treatment response should be interpreted narrowly

- Fibroinflammatory lesions may be steroid responsive without proving a single underlying mechanism.
- IgG4-related disease can show benefit from B-cell–targeted treatment in the broader systemic setting.
- Renal function and urinary drainage require assessment regardless of immunologic attribution.

Clinicopathologic implication

Do not extrapolate systemic IgG4-RD efficacy directly into an unqualified RPF treatment recommendation.

Case 1 — pathology-pattern recognition

Hypothetical teaching vignette

A middle-aged patient has bilateral hydroureteronephrosis and a retroperitoneal fibrotic lesion. Tissue contains storiform collagen, abundant lymphocytes, plasma cells and eosinophils; Many plasma cells stain for IgG4.

Interpretation task

What does the tissue pattern support, and what cannot it prove alone?

Case 1 — interpretation

Supported

The specimen fits the fibroinflammatory morphology described for RPF, with features compatible with an IgG4-associated subset.

Not established

IgG4 immunostaining alone does not establish every diagnostic or etiologic requirement for systemic IgG4-related disease.

Interpretation

Assess the morphologic pattern together with clinical and possible multisystem findings.

Case 2 — reconsidering the cause

Hypothetical teaching vignette

An older adult has ureteral obstruction with retroperitoneal fibrotic change. A clinical history identifies a urinary tract carcinoma.

Interpretation task

Which etiologic category must remain under consideration?

Case 2 — interpretation

Correct concern

Malignancy-associated fibrosis or direct neoplastic obstruction must remain in the differential.

Incorrect shortcut

Labeling the process idiopathic merely because dense fibrosis is visible.

Interpretation

The coexistence of malignancy alters etiologic reasoning; It does not establish the exact mechanism without more evidence.

Case 3 — physiology before filtration failure

Hypothetical teaching vignette

A patient with progressive bilateral partial ureteral obstruction develops nocturia and difficulty concentrating urine; Serum filtration measures have not yet fallen markedly.

Interpretation task

How can this sequence occur?

Case 3 — pathophysiologic answer

Early event

Urinary back-pressure and medullary hemodynamic disturbance impair tubular concentrating function.

Later event

Prolonged obstruction may lead to tubulointerstitial fibrosis, atrophy and decline in GFR.

Interpretation

This is a renal consequence of obstruction, independent of whether the initiating lesion is RPF or another obstructive cause.

Final synthesis: Six durable anchors

Question	Core answer
What is it?	Rare retroperitoneal fibroinflammatory encasing process
What is the danger?	Extrinsic ureteral obstruction and hydronephrosis
What causes it?	Often idiopathic; IgG4 subset; drug, inflammatory or malignant associations
What does tissue show?	Storiform fibrosis with lymphocytes, plasma cells and eosinophils
How does renal injury evolve?	Early tubular dysfunction; later atrophy and reduced function
How is it approached?	Corticosteroids initially; stenting or ureterolysis may be needed

References

- Robbins, Cotran & Kumar. Pathologic Basis of Disease. 11th ed. (2026).
- Primary section: Sclerosing Retroperitoneal Fibrosis.
- Related section: IgG4-Related Disease.
- Related section: Urinary Tract Obstruction (Obstructive Uropathy).
- Also consulted: ureteral obstruction, inflammatory aortic disease, and sclerosing retroperitonitis.