

Acquired cystic disease

Pathologic basis, morphology, complications, and cystic renal disease differential

Renal cysts arising in end-stage kidney disease

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Learning outcomes

- Recognize the setting and characteristic renal morphology.
- Explain the two proposed obstructive mechanisms without overstating certainty.
- Relate hemorrhage, hematuria, and carcinoma risk to the entity.
- Differentiate acquired cysts from simple, hereditary, and developmental cystic diseases.

Renal cystic diseases form a heterogeneous group

Hereditary

Polycystic kidney diseases
and nephronophthisis

Developmental

Multicystic renal dysplasia

Acquired

Cysts in end-stage kidney
disease; Simple cysts

Why etiologic context matters

The same structural word

“Cyst” describes a cavity, not its cause. Age, renal background, and distribution change the differential.

The clinical consequence

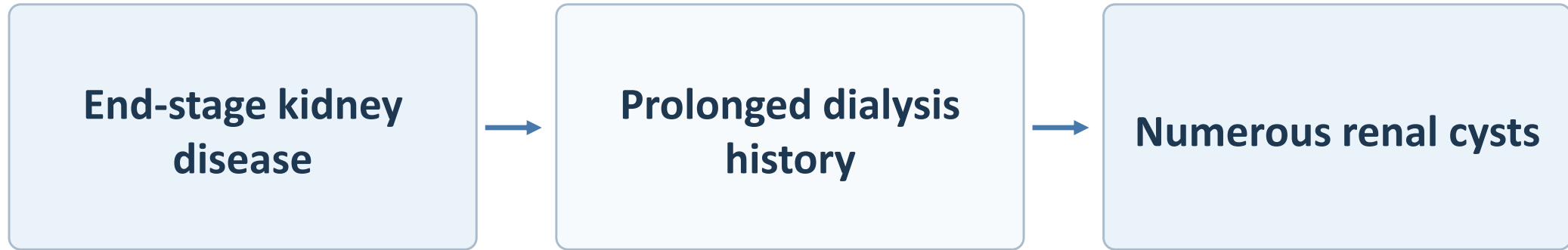
Some disorders cause renal failure. Other cysts arise after severe renal disease already exists.

Acquired cystic disease: Defining setting

End-stage kidney disease (ESKD) with a history of prolonged dialysis

- Numerous renal cysts develop in this clinical setting.
- This is an acquired lesion, not a hereditary cystic syndrome in the Robbins classification.
- Underlying advanced renal dysfunction is part of the diagnostic context.

Clinical sequence: Disease before cysts



Sequence of association; Not proof that dialysis itself directly causes each cyst.

Avoid a causal shortcut about dialysis

What the text establishes

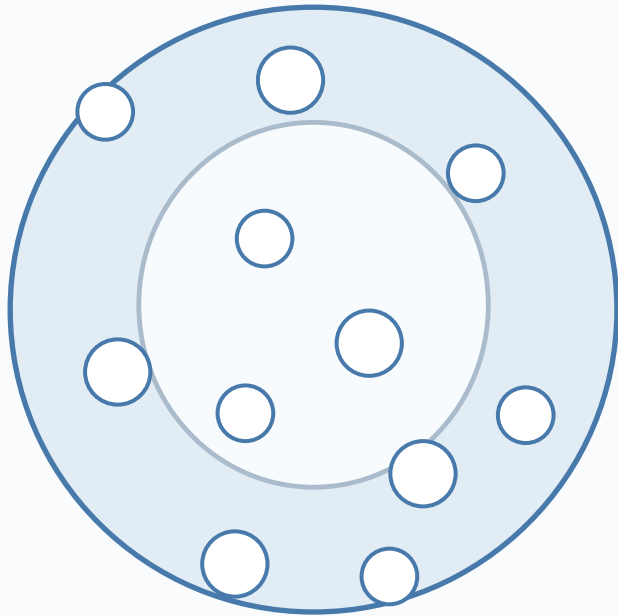
Patients with ESKD who have undergone prolonged dialysis develop numerous cysts.

What it does not establish

Dialysis itself as a sole or necessary molecular cause is not demonstrated by this passage.

Both cortex and medulla contain cysts

Conceptual renal compartment map



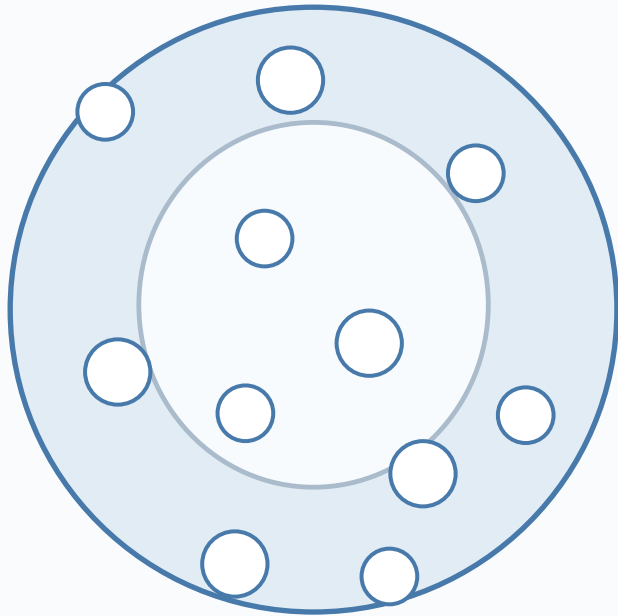
Outer region: Cortex

Inner region: Medulla

- Acquired cysts involve cortical and medullary compartments.
- Distribution across both compartments helps describe the kidney-wide pattern.
- Location alone is insufficient to diagnose the disease.

Numerous cysts define the gross pattern

Conceptual renal compartment map



Outer region: Cortex

Inner region: Medulla

- Multiplicity is central to the textbook description.
- The cysts coexist within kidneys affected by end-stage disease.
- This contrasts with an isolated simple renal cyst.

Cyst diameters extend from 0.1 to 4 cm

0.1 cm

Small end

4 cm

Large end

Reported diameter interval for acquired cysts in the source passage.

- Individual cysts can vary markedly in size.
- Size alone cannot distinguish cyst type without context.

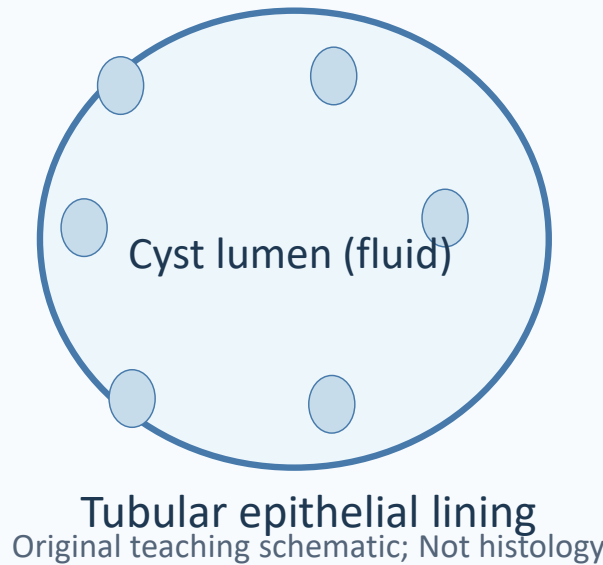
Cyst lumina commonly contain clear fluid

Clear fluid

- Fluid content is part of the described morphologic appearance.
- A clear-fluid cavity is not unique to acquired cystic disease.
- Simple cysts also contain clear fluid.

Tubular epithelium lines acquired cysts

Simplified cyst wall cross-section



- The epithelial lining is derived from renal tubules.
- Either hyperplastic or flattened tubular lining.
- The lining phenotype varies across cysts.

Two epithelial appearances are reported

Flattened

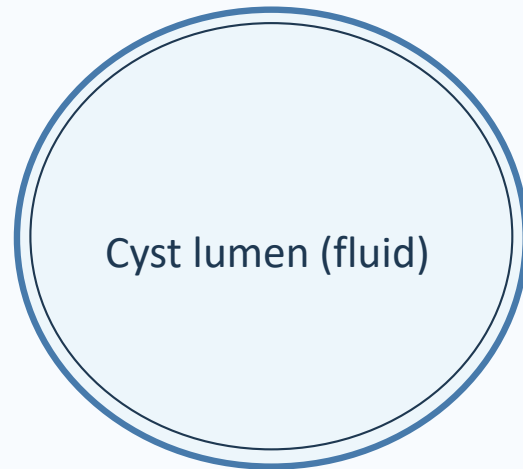
Attenuated tubular epithelial lining of the cyst wall.

Hyperplastic

A more proliferative tubular epithelial lining;
This does not by itself establish carcinoma.

Flattened epithelium reflects a thin lining

Simplified cyst wall cross-section



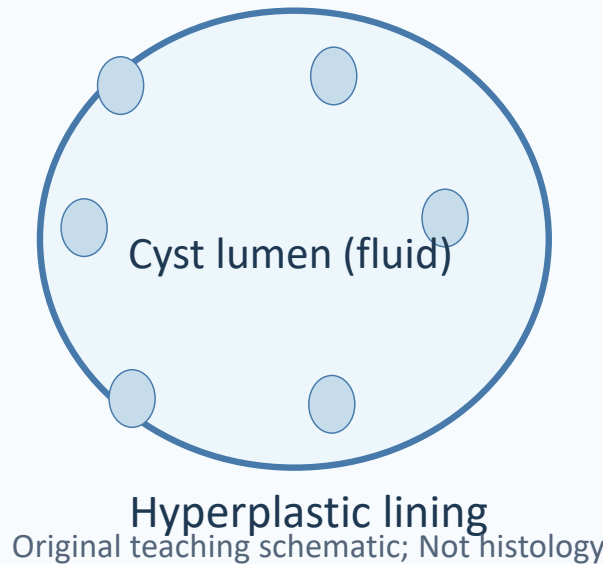
Flattened lining

Original teaching schematic; Not histology

- One of the two lining patterns.
- Morphology should be interpreted in the context of the whole cystic kidney.
- Flattening is also encountered in simple renal cysts.

Hyperplastic lining is a separate feature

Simplified cyst wall cross-section



- Hyperplasia is explicitly noted for acquired cysts.
- The mere presence of hyperplastic epithelium is not equivalent to malignant transformation.
- A malignant tumor requires a separate diagnostic assessment.

Calcium oxalate crystals may occur in cysts

Calcium oxalate

- Crystals are often present in the described acquired cysts.
- They are also implicated in one proposed obstruction mechanism.
- Presence and causation should not be conflated.

Hypothesis 1: Fibrosis obstructs tubules

Interstitial fibrosis



Tubular obstruction



Cyst development

Proposed pathway; The source uses “probably,” not a definitive causal claim.

Hypothesis 2: Oxalate obstructs tubules

Oxalate crystals



Tubular obstruction



Cyst development

Alternative proposed pathway described in the source.

Two candidate pathways converge on obstruction

Interstitial fibrosis

Proposed physical obstruction

Oxalate crystals

Proposed luminal obstruction

Cyst formation

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graph TD; A[Interstitial fibrosis  
Proposed physical obstruction] --> D[Cyst formation]; B[Oxalate crystals  
Proposed luminal obstruction] --> D;
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The diagram illustrates a flowchart where two distinct pathways converge on a single outcome. At the top, a title box states 'Two candidate pathways converge on obstruction'. Below this, two separate boxes represent the pathways: 'Interstitial fibrosis' with the subtext 'Proposed physical obstruction' on the left, and 'Oxalate crystals' with the subtext 'Proposed luminal obstruction' on the right. Vertical lines from the bottom of these two boxes meet a horizontal line, from which a downward-pointing arrow leads to a final box at the bottom labeled 'Cyst formation'.

Mechanistic certainty remains limited

Supported observation

Fibrosis and calcium oxalate are associated with the proposed pathogenesis.

Unresolved causal detail

Robbins does not establish the relative contribution, sequence, or necessity of either proposed pathway.

Morphologic recognition uses a combination

Setting

ESKD after prolonged dialysis

Distribution

Cortical and medullary cysts

Structure

Clear fluid; Flattened or hyperplastic tubular lining

Association

Calcium oxalate may be present

No single feature is independently specific

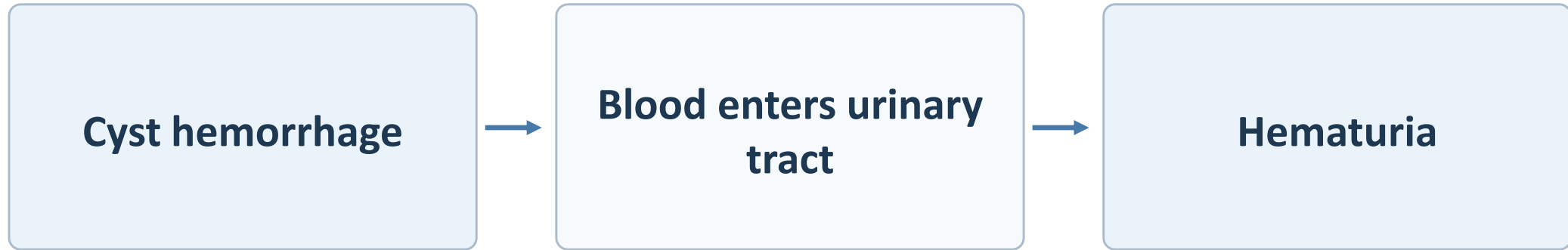
- Clear fluid also occurs in uncomplicated simple cysts.
- Flattened epithelial lining overlaps with other renal cysts.
- Multiplicity, distribution, and ESKD context make the combined pattern more informative.
- Do not diagnose solely from an isolated microscopic detail.

Most acquired cysts are asymptomatic

Usually clinically silent

- Most cysts are asymptomatic.
- Absence of symptoms does not exclude multiple renal cysts.
- Clinically important complications can still arise.

Intracystic bleeding is a recognized event



The text links occasional cyst bleeding to hematuria.

Hematuria provides a clinical clue

Potential clue

Bleeding cysts can produce hematuria.

Interpretation limit

Hematuria is not unique to acquired cysts and does not itself establish a benign cause.

Erythrocytosis appears summary

Erythrocytosis

- Listed among complications in the renal cystic disease classification table.
- The supplied passage does not elaborate its mechanism or frequency.
- Do not infer a specific pathway from the table entry alone.

The complications fall into three categories

Hemorrhage

Bleeding and hematuria

Erythrocytosis

Included summary table

Neoplasia

Increased renal cell
carcinoma risk

Renal cell carcinoma is the pivotal association

Renal cell carcinoma

- Acquired cystic disease is associated with a markedly increased carcinoma risk.
- This association differentiates the condition from ordinary, usually benign simple cysts.
- Cysts themselves are not synonymous with carcinoma.

The reported relative increase is substantial

Up to 100-fold

Increased risk of renal cell carcinoma

- Relative-risk expression quoted.
- “Up to” does not mean exactly 100-fold in every population.
- This value should not be converted into an absolute probability without baseline risk.

A 10-year observation reports carcinoma in 7%

7%

Of patients observed for 10 years

- Absolute proportion as stated by Robbins.
- The statement is attached to the source's observation interval.
- It is not a prediction for each individual patient.

Absolute risk and relative risk answer different questions

Relative comparison

“Up to 100-fold” compares risk with a reference population.

Observed proportion

“7% over 10 years” describes an observed frequency in a follow-up interval.

An increased risk does not mean inevitable cancer

- Most patients in the quoted 10-year observation did not develop carcinoma.
- Numerous cysts may remain clinically silent.
- The carcinoma association remains important despite a minority absolute occurrence.
- Avoid statements that all hyperplastic cysts become malignant.

The excerpt does not specify carcinoma subtype

- The acquired cystic disease paragraph refers to renal cell carcinoma generically.
- It does not provide tumor histotype, grade, staging, or immunophenotype.
- Do not substitute subtype-specific criteria into the textbook passage.
- Those topics require the separate renal neoplasm literature.

Simple cysts form a necessary comparator

Acquired cystic disease

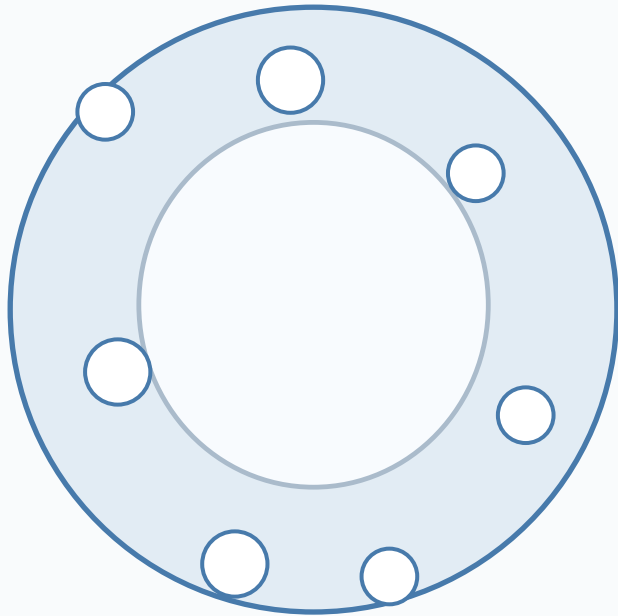
Numerous cysts in the ESKD/prolonged-dialysis setting.

Simple renal cyst

Single or multiple cysts, frequently found in the renal cortex of otherwise normal-sized kidneys.

Simple cysts are usually cortical

Conceptual renal compartment map



Outer region: Cortex

Inner region: Medulla

- Simple cysts most often involve the cortex.
- They may occur singly or multiply.
- Their clinical and renal background differs from acquired cystic disease.

Simple cysts commonly measure 1–5 cm

1 cm

Common lower

5 cm

Common upper

>10 cm

May occur

Size ranges apply to simple renal cysts, not to acquired cystic disease.

- An unusually large simple cyst is possible.
- Cyst diameter by itself cannot determine etiology.

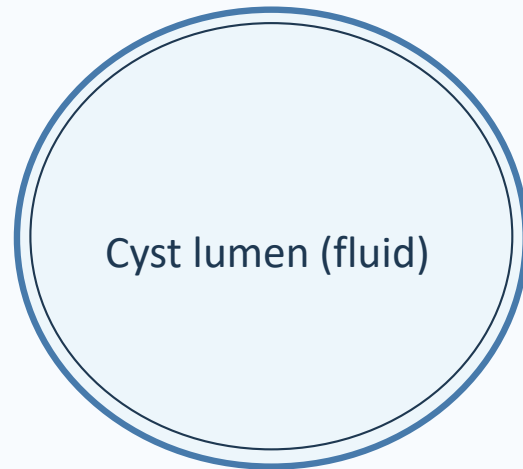
Grossly, simple cysts have a smooth lining

**Gray, glistening, smooth
membrane**

- Simple cysts are translucent and fluid-filled.
- The wall is described as smooth and gray.
- Clear fluid is common to both simple and acquired cysts.

Simple cysts have a thin cuboidal lining

Simplified cyst wall cross-section



Flattened lining

Original teaching schematic; Not histology

- The wall may be lined by a single layer of cuboidal or flattened cuboidal cells.
- The epithelium may become completely atrophic.
- This partially overlaps the flattened lining of acquired cysts.

Most simple cysts have little clinical significance

Usual course

Common postmortem finding without clinical importance.

Important exceptions

Hemorrhage or confusion with renal neoplasms warrants attention.

Simple cyst hemorrhage may cause pain

Hemorrhage into cyst



**Sudden cyst
distention**



Pain

Clinical sequence described for occasionally hemorrhagic simple cysts.

Calcified hemorrhage can confuse radiography

- Hemorrhage within a simple cyst can undergo calcification.
- Calcified material may produce unusual radiographic shadows.
- Morphologic and imaging context helps prevent mislabeling a lesion as a tumor.

Simple cysts versus tumors: Imaging clues

Contour

Simple cyst: Smooth

Vascularity

Simple cyst: Almost always avascular

Ultrasound

Fluid rather than solid signal

These characteristics are described for simple cysts; They are not a complete contemporary imaging classification.

A solid renal lesion is not a simple fluid cyst

Typical simple cyst

Fluid signal; Smooth contour; Generally avascular.

Renal tumor concern

The differential must account for the possibility of a solid mass rather than automatically assuming a cyst.

Acquired versus simple cysts

Feature	Acquired cystic disease	Simple cysts
Background	ESKD; prolonged dialysis	Common finding, often incidental
Number / location	Numerous; cortex + medulla	Single/multiple; usually cortex
Size	0.1–4 cm	Commonly 1–5 cm
Complications	Hemorrhage; neoplasia; erythrocytosis in summary	Usually benign; occasional hemorrhage

ADPKD differs in cause and course

Autosomal dominant PKD

Inherited PKD1/PKD2-related disorder;
Massively enlarged multicystic kidneys possible.

Acquired cystic disease

Appears in established ESKD after prolonged dialysis; Classified as noninherited.

Childhood recessive PKD occurs earlier

Autosomal recessive PKD

Renal cystic disease apparent early in life;
Fibrocystin/PKHD1-related.

Acquired cystic disease

Occurs in patients already affected by ESKD
and exposed to prolonged dialysis.

Medullary sponge kidney is segmental

Medullary sponge kidney

Cystic dilation of collecting ducts in the medulla; Usually normal renal function.

Acquired cystic disease

Cysts in cortex and medulla; Established end-stage disease is the setting.

Nephronophthisis reverses the time sequence

Nephronophthisis

Corticomedullary cysts and progressive tubulointerstitial injury can cause ESKD.

Acquired cystic disease

End-stage disease is already present when the cystic phenotype is described.

Multicystic dysplasia is developmental

Multicystic renal dysplasia

Disorganized architecture with immature ducts and primitive stroma; Cartilage may appear.

Acquired cystic disease

Acquired tubular cysts in ESKD; No claim of embryonic dysplastic tissue.

Age, background, and location narrow the differential

Disease	Context	Characteristic distribution / structure
Acquired cystic	ESKD + prolonged dialysis	Cortex and medulla; numerous
Simple cyst	Often incidental	Usually cortical
Medullary sponge	Adult; often normal function	Collecting ducts in medulla
Nephronophthisis	Often children/young people	Corticomedullary junction; atrophic kidneys
Dysplasia	Congenital/developmental	Disorganized tissue and cartilage

Renal function timing distinguishes entities

**Hereditary /
developmental cysts**



**May precede or
produce renal
insufficiency**



**Acquired cysts follow
established ESKD**

This is a conceptual contrast, not a common causal chain across the disorders.

Across renal cysts, complications are not uniform

Entity	Key textbook concern	Course / implication
Simple cyst	Occasional hemorrhage	Usually benign
Acquired cystic	Hemorrhage; erythrocytosis; neoplasia	Dialysis-dependent setting
ADPKD	Kidney failure; extrarenal lesions	Progressive inherited disorder
Nephronophthisis	Tubulointerstitial destruction	Progressive renal insufficiency

Diagnostic reasoning begins with three questions

Who?

Age and kidney-disease background

Where?

Cortex, medulla, or both

What?

Cyst morphology, symptoms, and tumor concern

Case 1: Multiple cysts during dialysis

An adult with longstanding ESKD undergoing prolonged dialysis has numerous cortical and medullary cysts.

What is the best-fitting cystic disease category?

Acquired cystic disease. The renal background and distribution are decisive.

Case 2: New hematuria in acquired cystic disease

A patient with documented acquired renal cysts develops hematuria.

Which textbook complication could account for this symptom, and what interpretive caution remains?

Hemorrhage into a cyst can cause hematuria; The symptom is not specific or proof of a benign lesion.

Case 3: Do not dismiss malignancy risk

A long-term dialysis patient with numerous cysts is found to have a renal lesion concerning for tumor.

Which disease association makes this finding important?

Renal cell carcinoma risk is substantially increased in acquired cystic disease; The lesion requires independent characterization.

Case 4: Isolated cortical fluid cyst

A renal lesion is described as a solitary smooth, avascular, fluid-signal cortical cyst in a patient without the ESKD/dialysis background.

Which textbook category is more compatible?

Simple renal cyst; The description lacks the typical acquired cystic disease context.

Case 5: Childhood corticomedullary cysts

A child has chronic progressive renal dysfunction and cysts concentrated at the corticomedullary junction.

Which differential should rise above acquired dialysis-associated cysts?

Nephronophthisis is more compatible with the source-described age and distribution.

Avoid five common interpretation errors

- Treating all cystic kidneys as inherited polycystic disease.
- Calling every cyst in dialysis a carcinoma.
- Interpreting proposed obstruction mechanisms as proven.
- Using cyst size or clear fluid in isolation to assign a diagnosis.
- Equating the reported relative risk with an individual absolute probability.

What the source does not provide

- A validated imaging surveillance schedule for these patients.
- A specific renal cell carcinoma subtype or molecular profile.
- Individualized risk prediction factors.
- A proven molecular mechanism for cyst formation.
- A comprehensive therapeutic algorithm.

High-yield morphology-to-clinic map

Observed pathology

Multiple cortical and medullary cysts

Common course

Often asymptomatic; May hemorrhage

**Elevated renal cell
carcinoma risk**

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graph TD; A[Observed pathology<br/>Multiple cortical and medullary cysts] --- B[Common course<br/>Often asymptomatic; May hemorrhage]; B --> C[Elevated renal cell carcinoma risk];
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Rapid knowledge check

1. Where are acquired cysts found within the kidney?

2. What two candidate obstructive mechanisms are proposed?

3. What two risk measures are stated for renal cell carcinoma?

Answers: Anatomy, mechanism, and risk

- Cortex and medulla; Numerous cysts in the ESKD/prolonged-dialysis setting.
- Obstruction by interstitial fibrosis or calcium oxalate crystals (proposed).
- Up to 100-fold increased relative risk; Carcinoma observed in 7% over 10 years.

Acquired cystic disease: Integrated assessment

Identify

ESKD after prolonged dialysis; Numerous cortical and medullary cysts

Describe

0.1–4 cm; Clear fluid; Flattened or hyperplastic tubular epithelium; Oxalate crystals

Interpret

Possible obstruction; Often silent, may bleed; Marked carcinoma association

Reference and scope

Robbins, Cotran & Kumar: Pathologic Basis of Disease, 11th edition. The Kidney — “Cystic Diseases of the Kidney,” including “Acquired Cystic Disease,” “Simple Cysts,” and the renal cystic disease summary table. Comparison slides draw from the adjacent sections on polycystic disorders, medullary cystic disorders, and multicystic dysplasia.