Renal Cysts – What should I do now?

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What are renal cysts?

- Fluid-filled structures in the kidney that are not continuous with the nephron or collecting system
- Believed to originate from diverticulae of DCT or collecting tubules, possibly due to weakening of basement membrane

**Types of renal cysts:**
1. Simple cysts
2. Complex cysts
3. Others – acquired, pyogenic, parapelvic
### Types of renal cysts

#### Simple cysts:
- Usually an incidental finding on ultrasound / CT / MRI
- Arise from renal parenchyma
- Can be solitary or multiple and/or bilateral
- Usually small (<2cm)
- Can grow very large (>10cm)

#### Parapelvic cysts:
- Arise from renal sinus
- Occasionally cause compression & obstruction to renal pelvis / ureter
- Sometimes confused with hydronephrosis

#### Complex cysts:
- Contain features not consistent with a simple cyst:
  - Increased fluid density (hyperdense cyst)
  - Internal thick-walled septations
  - Thickened cyst wall
  - Nodular projections into the lumen
  - Calcifications
  - Contrast enhancement
- **Significance:** Risk of malignancy is higher with increasing complexity
Types of renal cysts

**Acquired cysts:**
- Associated with chronic haemodialysis
- Increased incidence with duration of dialysis
  - 10-20% after 3 years of dialysis,
  - 40-60% after 5 years of dialysis,
  - >90% after 10 years of dialysis

**Epidemiology & Natural History**
- Incidence increases with age:
  - 0.2% from 0-18 yrs
  - 20% from 20-40 yrs
  - 33% from 41-60 yrs
- Most simple cysts grow slowly with time:
  - 3.9 mm per year for <50 yrs old
  - 1.8 mm per year for >50 yrs old
- Some may involute and disappear over time
Risk factors & associated conditions

- Increasing age
- ESRF on haemodialysis
- Polycystic kidney disease - both autosomal dominant and recessive types
- Von Hippel-Lindau syndrome - AD, individuals develop cysts in multiple organs (kidney, pancreas, liver, epididymis), cerebellar haemangioblastomas, pheocromocytomas - increased risk of RCC (35-40% incidence)
- Tuberous sclerosis - Renal angiomyolipomas & cysts (20-25%), hamartomas in brain & skin - 2% incidence of RCC

Presentation of renal cysts

- Incidental (most common), largely asymptomatic
- Few may present with symptoms such as:
  - abdominal mass and pain – large cysts or cysts that cause obstruction/hydronephrosis (more commonly parapelvic cysts that impinge on the proximal ureter)
  - haematuria – from bleeding cysts
  - hypertension – also seen in APKD
  - obstructing cysts may cause UTI or pyelonephritis
Complications

• Compression of adjacent structures by large cysts
• Hydronephrosis due to obstruction by large or parapelvic cysts
• Infected cyst
• Haemorrhage
• Rupture

Management for renal cysts

• History taking
• Physical examination
• Investigations and imaging
• Treatment &/or Follow-up
Management for renal cysts –
History

- Local or urinary symptoms eg. flank pain, haematuria
- Personal or family hx of:
  - Polycystic kidneys
  - Co-morbidities – e.g. ESRF on haemodialysis
  - other associated conditions

Management for renal cysts –
Physical examination

- Syndromic features (particularly in younger patients):
  - Tuberous sclerosis: adenoma sebaceum, Ashleaf macules, Shagreen patches

- Abdominal examination:
  - usually normal
  - Abdominal mass due to large cysts are rare
  - Bilateral ballotable kidneys from APKD
Management for renal cysts – Investigations

Blood tests
- Renal function test (s. creatinine, eGFR)

Urine tests
- Urinalysis
  - Haematuria
  - pyuria
- Urine culture

Management for renal cysts – Imaging

Ultrasound of the kidneys

Simple cysts
- No further imaging

Complex cysts
- No renal impairment or contrast allergy
  - CT kidneys (Gold standard)
- Renal impairment or contrast allergy present
  - MRI kidneys
Ultrasound kidneys

- Features of simple cysts:
  - no internal echoes
  - distinct wall with defined margins
- Sufficient for evaluation of simple cysts

Simple renal cyst

Renal cyst with septa

Contrast CT kidneys

- Helps discriminate cysts from collecting system
- Allows evaluation & classification for complex cysts
- Bosniak classification

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<tr>
<th>Bosniak class</th>
<th>Features</th>
<th>Significance</th>
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</table>
| I             | Benign simple cysts:
  - Thin wall without septa / calcifications / solid components / water density
  - No contrast enhancement |Benign |
| II            | Benign cysts with few thin septa
  - Wall or septa may contain fine calcification
  - Sharp margins
  - No contrast enhancement | Largely benign, 0-5% risk of malignancy |
### Contrast CT kidneys

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| II F          | - Well-marginated  
- May have minimal smooth thickening of septa or wall  
- Calcification may be thick & nodular  
- No contrast enhancement | Largely benign but needs follow-up |
| III           | Indeterminate cysts with thickened walls or septa  
- Contrast enhancement present | 40-60% are malignant (cystic RCC or multiloculated cystic RCC)  
Others are benign and include:  
- Haemorrhagic cysts  
- Infected cysts  
- Multiloculated cystic nephroma |
| IV            | Contain contrast-enhancing soft tissue components | 75-90% risk of malignancy |

### Simple and complex cysts

- **Bosniak I**: 
- **Bosniak II**: 
- **Bosniak III**: 
- **Bosniak IV**:

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The table outlines the features and significance of contrast CT kidneys, classifying them into Bosniak categories from I to IV.
MRI kidneys

MRI has a role especially when:

- Renal impairment
- Iodine contrast allergy
- Require multiple long term imaging & concerned of excessive radiation eg. VHL
- May be superior to characterize dense cyst contents (due to bleeding or mucin)
Follow-up of renal cysts

• Bosniak I cysts:
  – No action necessary or option to monitor at 1 yr to document stability (ultrasound)
  – repeat ultrasound if symptoms occur

• Bosniak II cysts: option to monitor with ultrasound at 6-12 month intervals

• Periodic imaging for VHL, APKD or acquired renal cysts while on dialysis

Follow-up of renal cysts

When to refer to Urology?

• Bosniak IIF, III and IV cysts

• Symptomatic / rapidly enlarging cysts
  - persistent or worsening flank pain due to large size or obstruction
  - bleeding or ruptured cysts: acute severe flank pain +/- haematuria
  - infected cyst or cyst causing recurrent infections
Management for renal cysts

- For complex or suspicious cysts (Bosniak III & IV):
  partial or radical nephrectomy

- Cyst aspiration and injection of sclerosant
  - usually done for large symptomatic cysts
  - Cytology usually sent
  - multiple seasons may be required
  - not recommended for parapelvic cysts

- Cyst decortication with marsupialization
  (laparoscopic, open, percutaneous resection)

Other management:

- Exclude other associated syndromic causes

- Manage all co-existing medical conditions e.g. hypertension, chronic kidney disease

- Screening of family members must be done for patients with ADPKD and VHL
Take Home Summary

• Evaluation of patient with renal cysts:
  – Symptoms or complications arising from cyst
  – Associated conditions or syndromes
  – Baseline renal function & urine parameters

• Evaluation & management of renal cyst:
  – Further imaging (CT or MRI) according to complexity of cyst
  – Follow-up if Bosniak I or II
  – Refer if Bosniak IIF, III, IV or symptomatic

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Questions?