

## XIX. Diseases of the Urinary System



### Calculosis

#### *Kidney:*

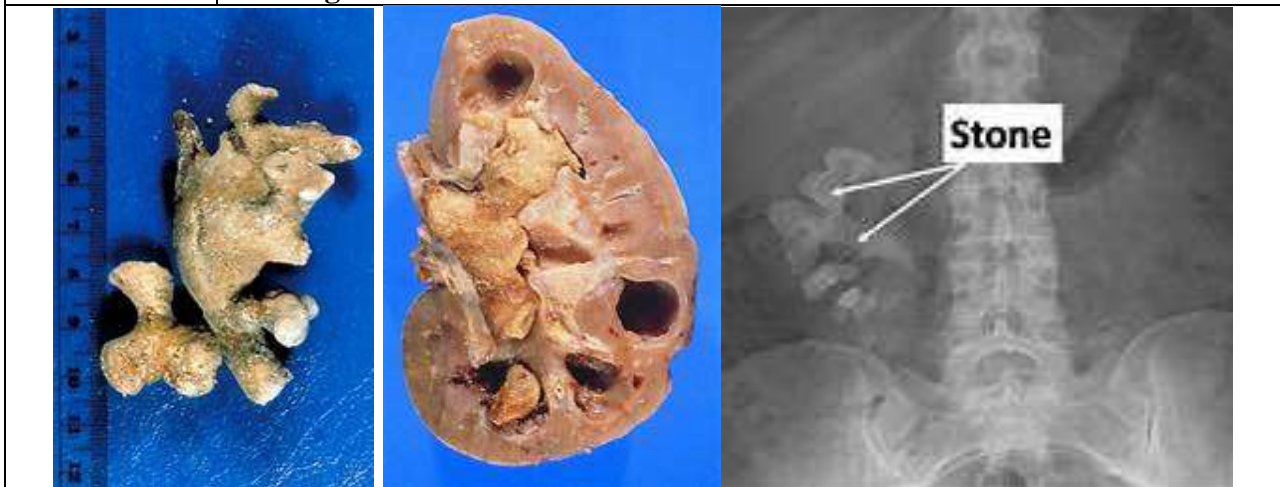
Is enlarged  
Cystic (moderately)

#### *Shows:*

- Dilated calyces
- Calculosis

#### *The calculus:*

- In the calyces
- Extending till the renal pelvis
- Single Large (4 x 3.5 x 3 cm.)
- Brownish in colour
- Firm in consistence
- **Stag horn**



**N.B.:**

- A urinary calculus is a stone-like body composed of urinary salts bound together by a colloid matrix of organic material.

**The calculus:**

1. **Primary which forms in the urine without any apparent causal factor**, antecedent inflammation or obstruction (uric acid stone, urate stone and oxalate stone); forms usually in an **acid urine**; is common in the renal pelvis.
2. **Secondary which forms as a result of inflammation, obstruction or/and stasis** (ammonium magnesium phosphate stone, amorphous phosphate stone and ammonium urate stone); occurs usually in an **alkaline urine**; is common in the urinary bladder.

**Factors reacting together (or separately) to produce calculus formation**

1. Infection.
2. High concentration of urinary salts + reduced water intake + excessive water-loss.
3. Disturbance in the colloid content of urine; and, excessive calcium-mobilization.
4. Nature and constituents of the diet specially absence of vitamin-A and hypervitaminosis-D.
5. Urinary obstruction and stasis (stagnation) of urine.
6. Reaction of urine.
7. Hyperparathyroidism; a tumour in the parathyroid gland; metastases in bones.
8. Calculus-diathesis (in certain families); a slight preponderance in males over the age of 35 years.



## Calculosis and Pyelonephritis IV-1. 51

<b><i>Kidney:</i></b>	<ul style="list-style-type: none"> <li>• Shows a reduced renal tissue proper</li> <li>• False appearance of enlargement (due to cystic dilatation)</li> </ul>
<b><i>Cortex:</i></b>	<ul style="list-style-type: none"> <li>• Is rather indistinct from medulla</li> </ul>
<b><i>Calyces:</i></b>	<ul style="list-style-type: none"> <li>• Show a coralline stone</li> <li>• Hydronephrosis is apparent</li> <li>• Evidence of pyonephrosis</li> <li>• <b><i>Lined by:</i></b> Dirty yellow suppurative material</li> </ul>
<b><i>The calculus:</i></b>	<ul style="list-style-type: none"> <li>• Present in calyces</li> <li>• Extending into renal pelvis</li> <li>• Branching (<b>coralline or stag-horn calculus</b>)</li> <li>• Moderately large in size</li> <li>• Has a smooth surface (in most parts)</li> <li>• Irregular (in some parts)</li> <li>• Dark brown</li> <li>• Moderately hard</li> </ul>
<b><i>Renal pelvis:</i></b>	<ul style="list-style-type: none"> <li>• Shows increased peri-pelvic fat</li> <li>• Extension of the coralline stone into it.</li> </ul>



**N.B.:**

The gross features are those of uric acid and urate stone.

**The stone has produced :**

1. An obstructive type of pyonephrosis.
2. Some degree of pyelonephritis.

**Effects and complications of stones**

1. Haematuria.
2. Infection./
3. Ulceration.
4. Obstruction.
5. Stricture.
6. Anuria.
7. Pain and renal colic.

**Staghorn Calculus**

- ▶ Stone occupying the renal pelvis and calyces
- ▶ Triple phosphate stone
- ▶ White in color, soft, smooth occur in pre-existing infection.
- ▶ Unilateral/Bilateral



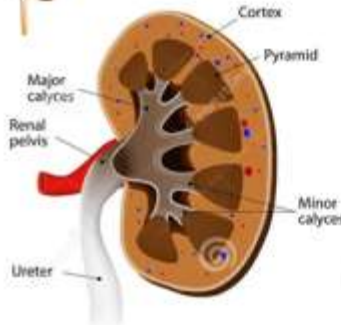
Normal



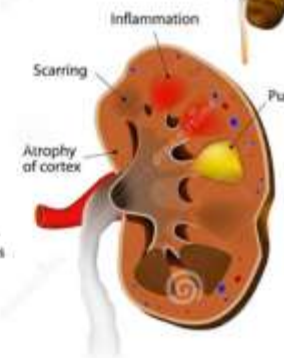
Chronic Pyelonephritis



**PYELONEPHRITIS**



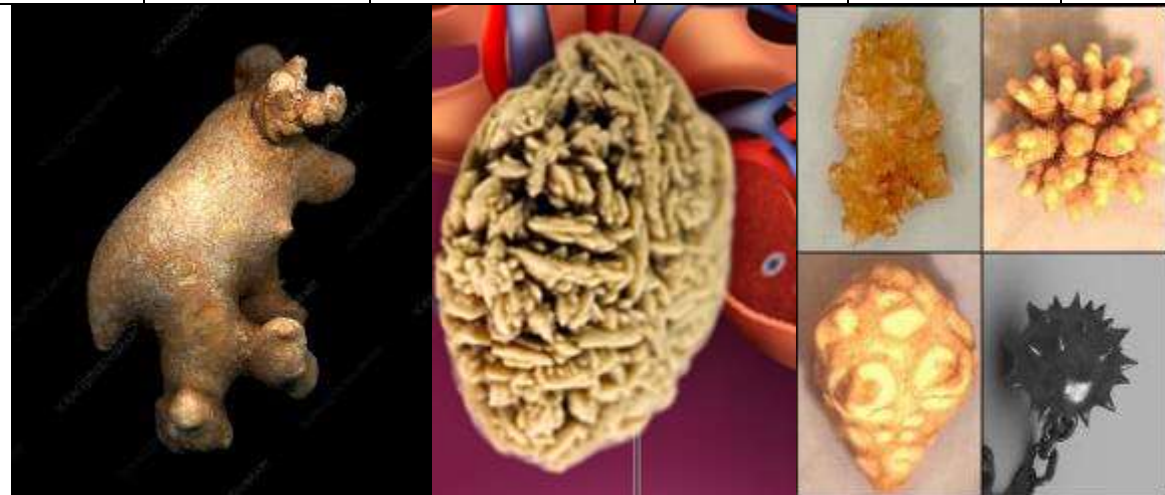
Normal kidney



Pyelonephritis

**Renal Calculi and Chronic Pyelonephritis**

<b>Kidney:</b>	<b>Cortex:</b>	Is reduced in thickness Irregular Ill-defined from medulla			
	<b>Calyces:</b>	Dilated Show a stone			
<b>Renal pelvis and calyces:</b>		Show evidence of infection Contain calculi			
	<b>Calculi:</b>	More than one Moderately big Dark to light brown (uric acid stone)			
	<b>Cut surface:</b>	Wavy concentric markings (rings)			
	<b>Colour:</b>	Brownish tan			
	<b>Consistence:</b>	Fairly hard			

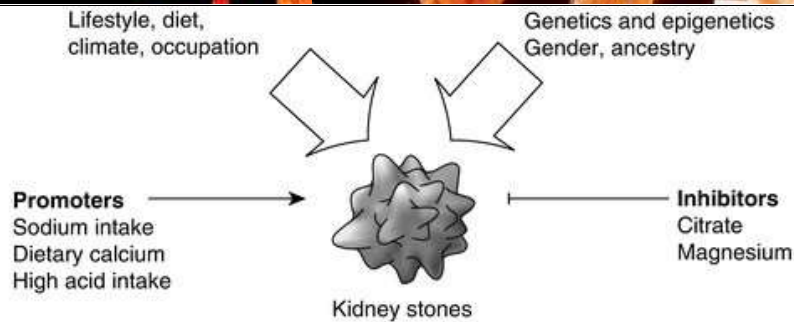
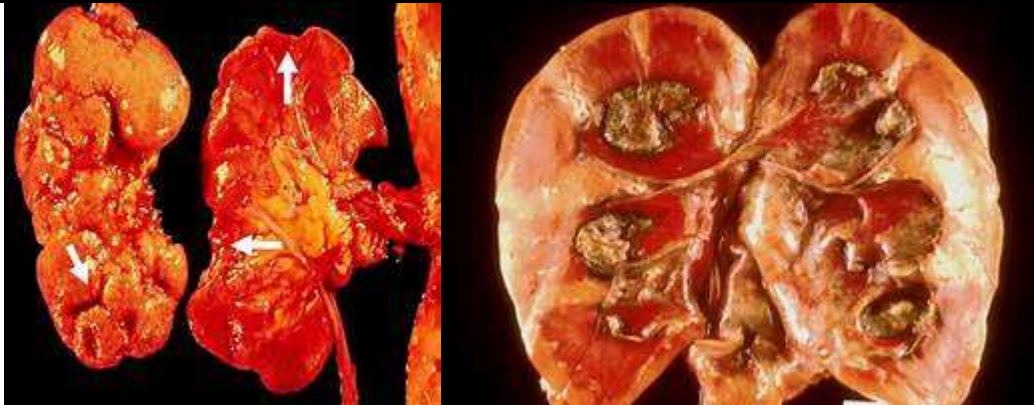




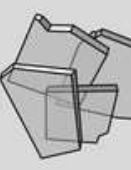


**N.B.:**

**Some effects of renal calculi on the kidneys**

1. **Retention of urine** due to obstruction
2. Calculus **anuria**.
3. **Atrophy** of kidney.
4. **Infection** and suppuration:
  - Pyelonephritis.
  - Pyonephrosis.
5. **Ulceration** due to pressure of calculus:

- Ulcer of pelvis.
- Destruction of kidney tissue.
- Escape into abdominal cavity.



	Non-infection stones			Infection stones	Genetic stones
					
	Ca oxalate	Calcium phosphate	Uric acid	Struvite	Cystine
Metabolic aspects	Hypercalciuria Hyperoxaluria Acidic urine	Hypercalciuria Alkaline urine	Uric acid (Urine and blood) Acidic urine	Alkalized urine from urinary bacterial infection	Defective transporter
Drug treatment	Citrates NaHCO <sub>3</sub> Thiazides Pyridoxine Ca supplements	Citrates L-Methionine Thiazides	Citrates NaHCO <sub>3</sub> Allopurinol	L-Methionine Antibiotics Lithostat NH <sub>4</sub> Cl	Alkaline citrates NaHCO <sub>3</sub> Tiopronin Ascorbic acid

- click the photos for a larger image -

			
Uric Acid	Brushite	Carbonate Apatite	Calcium Oxalate Monohydrate deposited over Silica
			
Silica (Carnoy)	Struvite	Uric Acid	Calcium Oxalate Monohydrate
			
	Calcium Oxalate		