UROLITHIASIS

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Introduction

- A disease described in antiquity by many observers.
- Mentioned in Oath of Hippocrates.
- Over last 150 years, pattern of stone disease has changed .
- Lower tract urate calculi still a problem in the third world.

Introduction

- Urolithiasis denotes stones originating anywhere in the urinary tract, including the kidneys and bladder.
- NEPHROLITHIASIS.
- URETEROLITHIASIS.
- CYSTOLITHIASIS.

ETIOLOGY

- **Dietetic**
- Deficiency of vitamin A causes desquamation of epithelium.
- The cells form a nidus on which a stone is deposited.
- **Altered urinary solutes and colloids**
- Dehydration increases the concentration of urinary solutes
- Reduction of urinary colloids, which adsorb solutes, or mucoproteins, which chelate calcium, might also result in a tendency for crystal and stone formation.

ETIOLOGY

- **Decreased urinary citrate**
- The presence of citrate in urine, 300–900 mg 24 h–1 as citric acid, tends to keep otherwise relatively insoluble calcium phosphate and citrate in solution.
- **Renal infection**
- with urea-splitting streptococci, staphylococci and especiallyProteus spp.

ETIOLOGY

- **Inadequate urinary drainage and urinary stasis**
- Stones are liable to form when urine does not pass freely.
- **Prolonged immobilisation**
- Immobilisation from any cause results in skeletal decalcification and an increase in urinary calcium.

- **HYPRECALCIURIA**

Idiopathic hypercalciuria, Primary hyperparathyroidism, Renal tubular acidosis, sarcoidosis and vitamin D intoxication.

- **HYPREOXALURIA**

Primary hyperoxaluria ,Enteric hyperoxaluria, Toxic hyperoxaluria

- **HYPERURICOSURIA**
- **Urinary Acidification and Alkalinization**

ETIOLOGY

- Infection with urea splitting organisms.
- The urea is split to ammonia, which is hydrolyzed to ammonium hydroxide, raising urine pH to 8 to 9, struvite precipitates.
- Struvite stone disease has been called "stone cancer"
- The stones tend to be very large (staghorn), and frequently result in renal damage, but patients may be relatively symptom free until the stone occupies entire collecting system.

ETIOLOGY

- ***Cystinuria***
- An inborn error of metabolism characterized by increased urinary excretion ofcystine,ornithine, lysine, arginine (COLA), due to a defect in renal tubular reabsorption of these amino acids.
- Cystine is insoluble and precipitates in concentrated urine.
- The stones are large ,radiolucent and recurrent.

ETIOLOGY

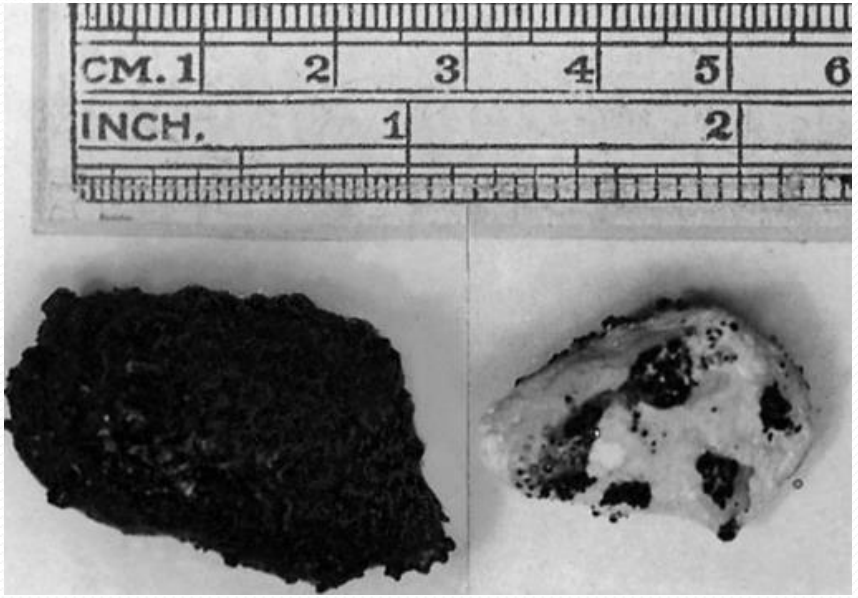
- Some drugs (triamterene, some of the older sulphas) can be metabolized to insoluble compounds which can precipitate in urine.
- The carbonic anhydrase inhibitor, acetazolamide, causes a combined Type 1 and Type 2 RTA which may result in nephrolithiasis.

Stone Composition - Frequency

Calcium Stones	70-80%
Ca Phosphate	5-10%
Ca Oxalate/Phosphate	30-45%
Ca Oxalate	20-30%
Struvite	15-20%
Cystine	1-3%
Uric acid	5-10%

Types of renal calculus

- ***Oxalate calculus (calcium oxalate)***
- Irregular in shape.
- Covered with sharp projections, which cause bleeding.
- The surface of the calculus is discoloured by altered blood.
- Is hard and radiodense.



- ***Phosphate calculus***
- It is smooth and dirty white.
- Tends to grow in alkaline urine, especially when urea-splitting organisms are present.
- It may enlarge to fill most of the collecting system, forming a staghorn calculus.
- Even a very large staghorn calculus may be clinically silent for years.
- Presents with haematuria, urinary infection or renal failure.
- Easy to see on radiographic films.

- ***Uric acid and urate calculi***
- These are hard, smooth and multiple.
- They vary from yellow to reddish brown, multifaceted.
- Are radiolucent and appear on IVP as a filling defect, which can be mistaken for a tumour.
- The presence of uric acid stones is confirmed by CT.

- **Cystine calculus**
- Associated with a congenital error of metabolism that leads to cystinuria.
- Hexagonal, translucent, white crystals of cystine appear only in acid urine.
- They are multiple and may grow to form a cast of the collecting system.
- Pink or yellow when first removed, they change to a greenish colour when exposed to air.
- Cystine stones are radioopaque because they contain sulphur, and they are very hard.

- Xanthine calculus
- Extremely rare.
- Smooth and round, brick-red in colour, and show lamellation on cross-section.