**Clinical Chemistry**

**INVESTIGATION OF RENAL FUNCTION** (2)

**Renal Stones:**

Renal stones produce severe pain and discomfort, and are common causes of obstruction in the urinary tract (Fig. 2). Chemical analysis of renal stones is important in the investigation of why they have formed. Types of stone include:

1- Calcium phosphate: may be a consequence of primary hyperparathyroidism or renal tubular acidosis.

2- Magnesium, ammonium and phosphate: these are often associated with urinary tract infections.

3- Oxalate: may be a consequence of hyperoxaluria.

4- Uric acid: may be a consequence



**Fig. 2: Renal stone.**

**ACUTE RENAL FAILURE:**

Renal failure is the cessation of kidney function. In acute renal failure (ARF), the kidneys fail over a period of hours or days. Chronic renal failure (CRF) develops over months or years and leads eventually to end stage renal failure (ESRF). ARF may be reversed and normal renal function regained, whereas CRF is irreversible.

**Aetiology: (**etiology: the cause of disease)

ARF arises from a variety of problem affecting the kidneys and/or their circulation. It usually presents as a sudden deterioration of renal function undicated by rapidly rising serum urea and creatinine concentrations. Kidney failure or uraemia can be classified as (Fig. 3):

1- Pre-renal: the kidney fails to receive a proper blood supply.

2- Post-renal: the urinary drainage of the kidneys is impaired because of an obstruction.

3- Renal: intrinsic damage to the kidney tissue. This may be due to a variety of disease, or the renal damage may be a consequence of prolonged pre-renal or post-renal problems.



**Fig. 3: the classification of acute renal failure.**

**Diagnosis:**

In nearly all cases the clinical history and presentation will indicate that a patient has, or may develop, ARF. The first step in assessing the patient with ARF is to identify any pre-or post-renal factors which could be readily corrected and allow recovery of renal function. The history and examination of the patient, including the presence of other severe illness, drug history and time course of the onset of the ARF, may well provide important clues. It is important to note that in the first 24 hrs of ARF the serum and urine tests may not reveal any abnormality. Factors which precipitate pre-renal uraemia are usually associated with a reduced effective ECF volume and include:

Decrease plasma volume because of blood loss, burn, prolonged vomiting, or diarrhea.

1- Local factors such as an occlusion of the renal artery. Therefore, biochemical finding in pre-renal uraemia include the following:

2- *Serum urea and creatinine are increased:* urea is increased proportionally more than creatinine because of its reabsorption by the tubular cells, particularly at low urine flow rates. This leads to a relatively higher serum urea concentration than creatinine which is not so reabsorbed.

3- *Metabolic acidosis:* because of the inability of the kidney to excrete

hydrogen ions.

4- *Hyperkalaemia:* because of the decreased glomerular filtration rate and

acidosis.

Post-renal factors cause decreased renal function, because the effective filtration pressure at the glomeruli is reduced due to the back pressure accused by the blockage. Caused include:

1- Renal stones.

2- Carcinoma of cervix, prostate, or occasionally bladder. If these pre- or post-renal factors are not corrected, patients will develop intrinsic renal damage (acute tubular necrosis).