UROLITHIASIS

CASE DEFINITION

The deposition or formation of stones in the urinary tract is called Urolithiasis. Urinary stone disease is a worldwide common health problem and causes significant morbidity and contributes even to mortality. A stone is an aggregation of solute materials from urine into a solid form. Most often it is a hard substance and calciferous due to its calcium content. Usually it is the solute constituents of urine such as calcium, oxalate, phosphate and uric acid which form stones but occasionally products of bacterial infection can form soft stones also called matrix stones.¹

Urinary stones, according to its location in the urinary system, are labeled as renal calyceal or pelvic stone, ureteral stone, bladder stone and urethral stone.

INCIDENCE

The epidemiology of urolithiasis differs according to geographical area in term of prevalence and incidence, age and sex distribution, stone composition and stone location. Such differences have been explained in terms of race, diet and climate factors. Furthermore changing socio-economic conditions have generated changes in the prevalence, incidence and distribution for age, sex and type of urolithiasis in terms of both the site and the chemical-physical composition of the calculi.

Epidemiological surveys have been previously reviewed showing that in economically developed countries the prevalence rate ranged between 4% and 20%.²

In developing countries the prevalence of stones is probably underestimated considering that silent and not yet discovered kidney stones were diagnosed by renal sonography in 3% of non-symptomatic subjects.³

AETIOPATHOGENESIS

Calcium is the most common component of urinary calculi. It is a major constituent in nearly 75% of stones. Following are types of stone and their compounds.

¹Central Council for Research in Homoeopathy; Urolithiasis; Disease Monograph-4; Central council for Research in Homoeopathy, New Delhi: 2009
²Hesse A. Reliable data from diverse regions of the world exist to show that there has been a steady increase in the prevalence of urolithiasis. World J Urol.2005;23:302–303
Mechanism of stone formation

Stone formation is the culmination of a series of physiochemical events that occurs as the glomerular filtrate traverses through the tubules of nephron. The most fundamental step in stone formation is the supersaturation of urine with stone forming salts resulting in crystallization of the dissolved ions or molecules. Once formed, crystals may flow out with the urine or become lodged in the kidney at different sites. Once retained at such sites there is further growth of the crystal and aggregation leading to stone formation.

Types of stones

<table>
<thead>
<tr>
<th>Type</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium stones</td>
<td>Calcium oxalate dehydrate</td>
</tr>
<tr>
<td></td>
<td>Calcium oxalate monohydrate</td>
</tr>
<tr>
<td></td>
<td>Calcium phosphate</td>
</tr>
<tr>
<td>Non-calcium stones</td>
<td></td>
</tr>
<tr>
<td>Infection stones</td>
<td>Magnesium ammonium phosphate</td>
</tr>
<tr>
<td></td>
<td>Carbonate apatite</td>
</tr>
<tr>
<td></td>
<td>Matrix calculi</td>
</tr>
<tr>
<td>Uric acid and urates</td>
<td>Uric acid, Ammonium urate, Sodium urate</td>
</tr>
<tr>
<td>Cystine</td>
<td>Cystine</td>
</tr>
<tr>
<td>Drugs</td>
<td>Indinavir, Triamterene</td>
</tr>
</tbody>
</table>

Calcium oxalate makes up about 60% of all stones; mixed calcium oxalate and hydroxyapatite makes up 20%; and brushite stones constitute 2% of the stones. Both uric acid and struvite (magnesium ammonium phosphate) stones occur approximately 10% of the time. Cystine stones are very rare and only 1% of all urinary stones contain cystine.

Recurrence rates are estimated at about 10% per year, totaling 50% over a 5-10 years period and over 75% over 20 years. Age and sex differentials in urinary stone formers are substantial: more common in males of age group 30-40 years in the industrialized countries and in children under 10 years in the developing countries.

RISK FACTORS

The risk factors for stone formation are discussed under the following four headings:

1. General risk factors:
   - Occupation that involve exposure to radiant heat. Mostly people who are working outdoors or near heated equipment’s
   - Gender
• Climate and geography
• Intake of hard water for drinking purpose

2. Metabolic risk factors
   ➢ Calcium stones
     • Hypercalciuria (35% to 65%)
     • Hyperoxaluria
     • Hyperuricosuria
     • Hypocitraturia (20% to 60%)
     • Low Urine pH
     • Hypomagnesuria
   ➢ Uric Acid Stones
     • Low Urine pH
     • Low urine volume
     • Hyperuricosuria

3. Urinary tract infections (5% to 15%)
   • Proteus
   • Klebsiella
   • Pseudomonas
   • Staphylococcus species
   • Proteus mirabilis

4. Anatomic risk factors
   • Ureteropelvic Junction Obstruction (20%)
   • Horseshoe Kidneys (0.25%)
   • Caliceal Diverticula (40%)

DIAGNOSIS

Diagnosis will be based on clinical signs and symptoms followed by confirmation with radiological evidence of stone by X-ray & ultrasound (Kidney, Ureter & bladder) and laboratory investigations.

Clinical Presentation

Symptoms:

• Symptoms of Acute Renal colic - Pain in flank which may spread downwards and anteriorly towards ipsilateral groin, and testis in male and vulva in females, sometimes extending to thigh, excruciating pain.
SEVERE PAIN: Most of the patients with urolithiasis experience pain which may vary from dull aching to severe colicky in nature. The site of pain differs depending upon the position of stone.

Acute Renal Colic- When stone is at the renal pelvis.
Acute Ureteric Colic- When stone is in the ureter.

- Strangury- It is severe pain experienced at the tip of penis in males and at labia majora in females accompanied by intense desire to pass urine but resulting only in the passage of few drops of urine, which may or may not be blood stained. This is typical of urinary bladder calculi. Sometimes similar type of pain is experienced, when the stone becomes impacted in posterior urethra
- Burning micturition
- Haematuria or reddish discoloration of urine
- Urgency and frequency of urine
- Dysuria
- Fever
- Vomiting

**Signs:**

- Rigidity of lateral abdominal wall
- Tenderness over renal angle/kidney region.
- Percussion over kidney or renal angle leading to stabbing pain.
- Reduced output of urine
- Haematuria
- Rise in body temperature
- Increase in Blood Pressure

**Investigations**

1. **PLAIN X-RAY OF KUB:** A plain film of kidney, ureter and bladder area (KUB) usually shows a radio-opaque density. In case of doubt a lateral radiograph is done. Ninety percent of urinary stones are radio-opaque and will be seen on plain film.

2. **ULTRASONOGRAPHY OF KUB:** Ultrasound examination of kidneys can reveal the presence, position of stone and also helps in measuring the exact size of the stone in kidney. At the same time the structural alterations in terms of hydronephrosis or any other anatomical changes taking place in the kidneys can be known. The location and the size help in determining the approach to treatment and therapeutic strategy. It is most valuable in locating stone for treatment by extracorporeal shock wave lithotripsy (ESWL).
3. **EXCRETORY UROGRAPHY (INTRAVENOUS UROGRAPHY IVU):** Kidney function should be normal for this investigation. It will establish the presence and exact location of calculus within the urinary tract. It also gives important information regarding the function of kidney on the same side as well as function of the other kidney. IVU is done before any surgical treatment.

**Other laboratory investigations include:**
- Routine urine examination-and culture if required
- Renal/kidney function test
- Complete Haemogram
- Serum calcium, uric acid, phosphate, Alkaline Phosphatase
- Stone analysis (for recurrent stone formers)

Most of the cases of Urolithiasis will require only these above mentioned investigation for diagnosis. However, in some difficult situations few other investigations are also helpful as mentioned below:

1. **RETROGRADE URETEROPYELOGRAPHY (RGP)**
   It is used when there is doubt about an intraluminal lesion or if the renal function is deranged where Intra venous Pyelogram cannot be done. It is valuable in cases with radiolucent stone. It is usually performed as an immediate preliminary to an endoscopic procedure for stone removal.

2. **SPIRAL CT-SCAN:** Non contrast spiral CT scan has now become an important investigation for acute ureteric colic and for diagnosing ureteric calculi.

3. **URETHROCYSTOSCOPY:** Usually not required for diagnosis of Urolithiasis but it is used for endoscopic treatment of lower urinary tract calculi. An impacted urethral stone can be confirmed and treated by urethrocystoscopy.

**COMPLICATIONS**

**ACUTE**

a. **Acute retention of urine:** A large urethral stone may completely block the urethra and may cause acute retention of urine. Patient presents with symptoms of acute retention with painful and distended bladder. Sometimes the impacted stone can be felt with fingers palpating the anterior urethra and glans.
b. **Urinary infection:** The urinary tract infection is dangerous in presence of obstruction. There is a risk of life threatening septicaemia.

**LONG TERM**

a. **Hydronephrosis:** It is the most common delayed complication of an obstructing calculus untreated for some time. Any calculus which is causing proximal hydronephrosis with significant back pressure should be treated and removed before the kidney function deteriorates.

b. **Pyonephrosis:** It results from infection of hydronephrosis. The Kidney becomes a multilocular sac containing pus or purulent urine. Pyonephrosis is usually unilateral. There is real danger of permanent renal damage and lethal septicaemia.

c. **Renal failure (Uraemia):** When there are bilateral renal stones, especially stag horn for long time, there is gradual derangement of renal functions without any symptoms and leads to chronic renal failure. All the features of uremia are present and on investigation they are found to have bilateral obstructing urolithiasis. Similarly, bilateral ureteric calculi may also cause uremia.

d. **Anuria:** Anuria is defined as complete absence of urine production or urine <100ml in 24 hours.

e. **Development of cancer in pelvicalyceal system:** Occasionally long standing stone in renal pelvis may be associated with the development of renal pelvic tumor.

**DIFFERENTIAL DIAGNOSIS**

It is important to distinguish urolithiasis from the many other conditions (gynecologic and nongynecologic) that can cause flank pain: Abdominal Abscess, Acute Glomerulonephritis, Appendicitis, Cholecystitis, Cholelithiasis, Diverticulitis, Epididymitis, Gastritis and Peptic Ulcer Disease, Gastrointestinal Foreign Bodies, Ileus, Inflammatory Bowel Disease, Large Bowel Obstruction, Liver Abscess, Pancreatitis, Papillary Necrosis, Pelvic Inflammatory Disease, Pyonephrosis, Rectal Foreign Bodies, Renal Arteriovenous Malformation, Renal Cell Carcinoma, Renal Vein Thrombosis Imaging, Small Bowel Obstruction, Splenic Abscess, Testicular Torsion, Urinary Tract Infection in Females, Urinary Tract Infection in Men, Urinary Tract Obstruction, Viral Gastroenteritis.
RED FLAG

1. Fever or other features, e.g. rigors, consistent with systemic infection which can lead to life-threatening sepsis
2. Suspected bilateral obstructing stones
3. Known clinically significant renal impairment
4. The presence of only one kidney
5. Pregnancy

ASSESSMENT AND EVALUATION

MANAGEMENT

Several preventive measures when followed can aid in reduction of formation of urinary calculi. Advice about such measures must be given to all the patients to check the incidence of recurrence of stone formation as well as part of effective general management during treatment:

- Maintenance of adequate water and fluid intake (at least 2.5–3.0 l) so as to produce a daily urine output of about two and a half liters,
- Consumption of a diet rich in fiber and natural forms of citrate in diet,
- Restriction of salt intake,
- Regular exercise and maintenance of BMI between 18.5–24.9 kg/m²,
- Reduction of factors associated with obesity i.e. excessive consumption of animal proteins, fats or refined carbohydrates (particularly fructose).

Not all urinary stones require surgical intervention. Kidney stones may present as acute renal colic requiring immediate management or sometimes may even remain asymptomatic for long. Homoeopathic medicines can play a role in management of acute/chronic condition as well in result in expulsion of stone.

Homoeopathy has wide scope in managing patients from urolithiasis. Apart from managing acute attacks, recurrence of renal stones is the area where homoeopathic medicines have greater scope when prescribed along with ancillary measures. Individualized constitutional medicines as per indications are helpful in such cases to prevent recurrent episodes of pain and recurrence of stone formation, once the acute episode has tided over and managed effectively.

---

Few research studies and case reports show the beneficial role of homoeopathic medicines in such cases.\textsuperscript{5,6,7} There are 32 medicines in Homoeopathic Medical repertory\textsuperscript{8} for “kidney stones”. Many rubrics reflect medicines which are indicated in conditions where renal colic is associated with other concomitant symptoms. Few medicines are known for their beneficial role in acute renal colic include: \textit{Cantharis}: used when there is \textit{constant desire to micturate} with violent paroxysms of cutting and burning pain in renal region; \textit{Equisetum hyemale, Thuja & Sarsaparilla}: for frequent urging with severe pain at close of micturition; \textit{Hydrangea}: for renal calculi with colic, hematuria and profuse deposit of white amorphous salts in urine; \textit{Ocimum canum} for right sided renal colic with red sand in the urine and the urine has odour of musk. \textit{Hydrangea – sharp pain in left loins with enlarged prostate}. \textit{Morgan gaertner}-renal colic especially with lithiasis.

Given below are indications of medicines commonly prescribed in urolithiasis:

<table>
<thead>
<tr>
<th>S.no</th>
<th>Medicines</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Belladonna</td>
<td>Indicated in acute renal colic which causes spasmodic, crampy pains; straining along the ureter as far as the bladder. Pains; of maddening severity; coming and going in repeated attacks. Pain as if clutched by hand; &lt; jar, pressure. Extreme sensitiveness to touch, bedclothes. Colicky pains comes quickly and goes quickly; &gt;bending double or bending backward; also&gt; lying on the abdomen. Urine is scanty with tenesmus; dark and turbid, loaded with phosphates. Urine may even be frequent and profuse. Suited to plethoric persons with red face; and to conditions where there is local plethora. Tendency to be chilled easily, with great sensibility to cold air. Internal coldness with external, pungent, burning heat. Belladonna always is associated with hot, red skin, flushed face, glaring eyes, throbbed carotids, excited mental state, hyperaesthesia of all senses, delirium, restless sleep, convulsive movements, dryness of mouth and throat with aversion to water.</td>
</tr>
</tbody>
</table>

\textsuperscript{7}V. A. Siddiqui etal. A multicentre observational study to ascertain the role of homoeopathic therapy in Urolithiasis. Indian Journal of Research in Homoeopathy Vol. 5, No. 2, April - June, 2011
\textsuperscript{8}Murphy Robin Homoeopathic Medical Repertory. Third Edition. Lotus Health Publishers; 2005
<table>
<thead>
<tr>
<th>S.no</th>
<th>Medicines</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Berberis vulgaris</td>
<td>Indicated when there is pain in small of back; very sensitive to touch in renal region; &lt; when sitting and lying, from jar, from fatigue. Burning and soreness in region of kidneys. Numbness, stiffness, lameness with painful pressure in renal and lumbar regions. Stitching, cutting pain from left kidney following course of ureter into bladder and urethra. Renal colic. &lt; left side with urging and strangury. Rubbing sensation in kidneys. Urine: greenish, blood-red, with thick, slimy mucus; transparent, reddish or jelly-like sediment. The emission of urine is frequently accompanied by pains in thighs and loins. Movement brings on or increases urinary complaints. Of value in persons with hepatic and rheumatic affections, particularly with urinary, hæmorrhoidal and menstrual complaints. Persons with pale, earthy complexion, with sunken cheeks and hollow, blue-encircled eyes. Worse motion, walking or carriage riding; any sudden jarring movement.</td>
</tr>
<tr>
<td>3.</td>
<td>Pulsatilla nigricans</td>
<td>Pressure in abdomen and small of back as from a stone. Colic, with chilliness in the evening. Increased desire; &lt; when lying down. Burning in urethral orifice, during and after micturition. Involuntary micturition at night, while coughing or passing flatus. After micturating, spasmodic pain in the bladder. Sensation of a stone rolling in the bladder. Urine passes only in drops and stream interrupted. Urine watery, colorless; brown, bloody. Suitable for mild, timid, peevish, tearful, emotional and sensitive persons. Symptoms are changeful &amp; shifting. Chilly, yet averse to heat; in a warm room; with the pain; on lying down at night. Thirstlessness with dryness of mouth. Better open air, consolation.</td>
</tr>
<tr>
<td>4.</td>
<td>Sulphur</td>
<td>This drug is of value when there is a fullness, heaviness, tension, and pressure, as if from stone in abdomen, chiefly in epigastrium and hypochondria. Violent pain in region of kidneys after stooping a long time. Aching in small of back all day, esp. &lt; while urinating. Frequent urination, esp at night. Burning in urethra during micturition, lasts long after. Mucus and pus in urine; parts sore over which it passes. Must hurry, sudden call to urinate. Great quantities of colorless urine. Suitable for nervous, quick tempered, emotionally irritable and sluggish persons. Hot patient, dirty filthy, lean thin, with stoop shoulders. Sinking feeling at stomach about 11 a.m. Local throbbing, burning or congestion; soles; vertex is seen in this drug. Ebullitions of heat, red orifices; dry skin and hair, dislike for water.</td>
</tr>
<tr>
<td>S.no</td>
<td>Medicines</td>
<td>Indications</td>
</tr>
<tr>
<td>------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>clavatum</td>
<td>Indicated in kidney affections. Pain in the back before urinating; ceases after flow. Renal colic in ureter to bladder Urine slow in coming; must strain. Urine scanty; person cries before urinating. Polyuria at night. Hematuria from gravel or chronic catarrh. Frequent urging to urinate, &gt; riding in cars, etc.. Red sand in urine. Acrid urine Urine milky, turbid. Sensitive, intelligent, dominating, dictating and headstrong. Peevish and depressed in mind. Miserly and coward. Irritable, contradiction aggravates. Adapted to old persons or children who age prematurely and have a weak body but sharp mind (intellectually keen but bodily weak). Great weakness of digestion, Eating ever so little creates fullness. Earthly complexion and yellowish spots on skin with or without vertical furrows on forehead. Desire sweets, warm drinks. Aversion to breads. All complaints &lt; 4-8 pm Better: warm drinks, food, cold applications, eructation, urinating.</td>
</tr>
<tr>
<td>6.</td>
<td>Sarsaparilla</td>
<td>Suitable for persons with tendency to gravel. Renal colic; pain from right kidney downward. Tenesmus of bladder; urine passes in thin feeble stream. Can pass urine only when standing. Gassy urine. Crusty urinary sediment; deposit in the urine which looks like grey sand. Urine is high-coloured with lithates, enuresis day and night. Indicated in gloomy, ill-humoured, thin frail, shrivelled and old looking patients. Worse at the close of urination, cold etc. Better standing.</td>
</tr>
<tr>
<td>7.</td>
<td>Terebinthina</td>
<td>The remedy has a selective affinity for mucous membranes of the kidneys. Affections of kidneys and rheumatism. Sensation of heaviness and pain in region of kidneys. Inflamed kidneys following any acute disease. Burning or pain along ureters. Burning sensation, incisive pains, and spasmodic tenesmus of bladder. Urine; smoky; with coffee grounds or thick, yellow, slimy, muddy sediment; odor of violets; bloody. &quot;Drowsy with retention of urine.&quot; Smooth, glossy, red tongue, as if deprived of papillae. With cystitis and uro-genital and rectal troubles there is sensitiveness of hypogastrium and pains in symphysis pubis. Pains alternate between navel and bladder, &gt; walking. Worse dampness, night, lying, when urinating. Better motion, stooping, walking.</td>
</tr>
</tbody>
</table>
Suspected case of Urolithiasis

Patient with acute renal pain

Select a most similar medicine on the basis of acute symptoms present during acute phase

Relief of pain

With removal stone

- Start homoeopathic individualized treatment for prevention of recurrence
- Advise lifestyle modifications

Stone still present

Clinical examination and laboratory investigations

Refer for emergency allopathy treatment

Follow up regularly till 6 months

Patient without acute renal pain

No/partial relief of pain despite correct selection

Look for:
- Obstruction
- Bleeding
- High Blood Pressure
- Renal function affected
- Complications

Clinical examination and laboratory investigations
Plain X-ray & USG (KUB) for diagnosis of Urolithiasis

Detail case taking
Start individualized homoeopathic medicine and advise lifestyle modifications