Kidney Stones in Adults

Urolithiasis or kidney stones is a condition which recurs in up to half of all first time stone formers. The incidence of stone disease is also increasing due to change in dietary and lifestyle habits. The advances in medical technology have made it relatively easier for patients to get themselves treated without having to go through the painful open surgery. I have treated successfully thousands of patients with stone disease with the latest available technology. However I still continue to see patients with kidney failure and very large stones due probably to ignorance. In this article I have tried to elaborate few points so as to understand about this disease easily.

What is urinary tract and what are its functions?
The urinary tract consists of the kidneys, ureters, bladder, and urethra. The kidneys are two bean-shaped organs located at the middle of the back, one on each side of the spine. The kidneys produce urine by removing wastes and extra water from the blood. They also balance salts and other substances in the blood and produce hormones responsible to form red blood cells. The tubes called ureters carry urine from the kidneys to the bladder in the lower abdomen.

What is a kidney stone and what causes it?
Kidney stones are solid concretions formed from minerals which are excreted in urine. Normally, urine contains chemicals that prevent these minerals from forming crystals. Some people have imbalances allowing excess minerals like calcium in urine which cannot be dissolved to form crystals and grow in size forming large stones. These chemicals are part of a person’s normal diet. If the crystals remain tiny enough, they will travel through the urinary tract and pass out in urine. We do not always know why stones form. Certain foods may promote stone formation in people who are susceptible; however they do not cause stones in people who are not susceptible. We have some geographical areas called ‘stone belts’, where stone disease is common e.g. dry climate areas such as northern region, Gujarat and some parts of Maharashtra. A person who has family history is more likely to develop stones. Urinary tract infections and some kidney and metabolic disorders e.g. gout is linked to stone formation.

What are the symptoms of kidney stones?
Kidney stone is synonymous with extreme pain, which begins suddenly due to movement of stone and blockage of flow of urine. It’s a cramping pain in the back and side of abdomen usually associated with burning in urination, nausea or vomiting. Patients may also have blood in urine. If urine is infected it causes fever and chills. However kidney stones often do not cause any symptoms and these patients may present later with big size stones and kidney failure.

What tests are done to diagnose stones?
Nowadays adults are being diagnosed with stones on sonography done for general health examination. Often, Patients need to test their urine and do blood test to know kidney function. CT scan is done during severe pain to diagnose the cause of pain as stone disease. They need intravenous pyelogram (IVP) or CT urography which tells the doctor about kidney function being
affected or not, number, size and location of stones. This information is needed to decide the mode of treatment.

How are kidney stones treated?
Surgery is not always necessary and most small stones can pass through the urinary system.

Medical Therapy
The most important lifestyle change to help passage of stones spontaneously and prevent new ones is to drink more liquids, water being the best. The dietary changes may be needed in some depending on the cause of stones. The patient may need medications to control the amount of acid or alkali in the urine responsible for crystal formation e.g. in gout. Antibiotics would be needed for a long term if infection is suspected.

Surgical Treatment
The open surgery with long scars and long hospitalisation is the thing of past. With the advances in technology and understanding of the disease most of the stones can be treated by noninvasive means on day care basis, or by minimally invasive means with couple of days of admission.

**Extracorporeal Shock Wave Lithotripsy**
The discovery of Extracorporeal shock wave lithotripsy (ESWL) made the treatment of stones truly non invasive. In ESWL, The patient is made to lie down on a table with minimal or no anesthesia. The stone is localised by X ray or sonography. The shock waves that are created outside the body are focused on to the stone leading to its breakage into small particles which are then passed in urine. The patient can go home in few hours. In some cases a tube m called as stent may be needed to avoid the blockage of ureter by passage of stone particles. Some patients may have blood in urine for a few and in some bruising in the back from the shock waves can occur. Sometimes the stone is not completely shattered with one treatment, and additional treatments may be needed. If the stone does not get shattered completely in one session the treatment may be repeated.

**Percutaneous Nephrolithotomy**
Percutaneous nephrolithotomy or PCNL is a highly sophisticated minimally invasive procedure in which a small incision (app 1 cm) is made in the back and a tunnel is made into the kidney. A telescope is then passed through the tunnel to reach the stone which is broken with an energy source e.g. LASER or Lithoclast. The broken stone pieces are then removed through the same tunnel. This procedure needs 2 to 3 days of admission in the hospital. It is indicated for large stones in the kidney which are not amenable to ESWL. I see lot of Indian patients almost everyday with large stones and do this procedure on them.

**Ureteroscopy**
Ureteroscopy is a procedure done on stones in the ureter, a tube which carries urine from the kidney into the bladder. Though stones in the ureters can be treated with ESWL, ureteroscopy is needed for stones in mid and lower ureter. Surgeon passes a small fiber optic instrument called an ureteroscope through patients’ urinary passage in the ureter to reach the stone. The stone is then broken into small pieces by LASER and removed. No incision is made in this procedure. A small tube or stent may be left in the ureter for a few days.

With the availability of highly sophisticated instruments such as flexible ureteroscope and Holmium laser I have treated some patients with stones in the upper ureter and even kidney thus avoiding PCNL.

Ureteroscopic stone removal can be done on a day care basis or with overnight stay.

**What is the role of open surgery today?**
The role of open surgery for stone disease is almost negligible. It has become almost redundant with advances in minimally invasive techniques. I have combined techniques such as laparoscopy and PCNL to treat stones in the kidneys which are abnormally located in the body by birth thus
avoiding long scars and hospital stay. It may be done in failed endoscopic procedure or occasionally in very large stones.

**How can I Prevent Kidney Stones? What is the diet restriction?**

Kidney stones can be prevented by following few simple tips and some diet modifications. A patient is asked to undergo some laboratory tests to help determine their cause. The analysis of removed stone is also of help. One must remember that stones can recur anytime during the lifetime and hence the precautions are needed lifelong. One should undergo annual sonography and urine examination without fail.

Some specific type of stones e.g. Uric acid and cysteine stones will need specific medical therapy. However some general advice to be followed by all is as follows

- Take plenty of water throughout the day i.e. at least a glass every hour so as to produce 2 to 2.5 liters of urine. Drink a glass of water before going to bed.
- You should restrict food rich in proteins, nitrogen sodium and oxalate such as Non veg, vegetables like spinach, tomato, cauliflower, brinjals, Nuts like cashew, pistachio, almonds, figs, fruits like chikoo, custard apple. Chocolates, rhubarb, spinach beets, swiss chard, wheat germ, soybean crackers, peanuts, okra, black Indian tea, sweet potatoes are high in oxalates. You should maintain adequate intake of dietary calcium. If you are on calcium supplements continue them but increase citrate and fluids.
- Increase the intake of food items such as Fruits like apple, papaya, watermelon, pineapple, sweetlime, bananas and orange, vegetables like, white gourd, ladyfinger, pumpkin, pulses like toor dal, moong dal, bengal gram, Cereals like jowar corn, wheat, bajra, nachni. Dry fruits like Dates and apricot.
- It’s a mistaken belief that these patients should not consume milk and milk products. They can have a glass or two of milk and as said maintain normal intake of calcium.
- Have a glass or two of lemonade or orange juice daily.
- Reduce salt intake to maximum of one tablespoon daily. Avoid pickles, papads and canned food.
- Another mistaken belief is drinking beer flushes kidney stones. Well it not only causes dehydration but also has substances which can actually increase the risk. Having extra glass of water is more helpful.

**Points to Remember**

- **Kidney stones is a condition which recurs in up to half of all first time stone formers**
- Person with a family history of stones, with habit of drinking less quantity of fluids, outdoor jobs or a past history of stones should get themselves examined.
- The best way avoid formation of any type of stone is to drink plenty of liquids e.g. water, coconut water, juices.
- Some people with metabolic disorders will need medicines to prevent stones.
- People with repeated urinary tract infections and stones must have careful follow-up to be sure that the infection is eradicated.
- Kidney stones may be asymptomatic.
- Most of the stones can be treated by noninvasive means on day care basis, or by minimally invasive means with couple of days of admission.
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