

What are Kidney Stones?

Kidney stones are formed in the body from different compounds. Most are calcium oxalate, but they can also be calcium phosphate, a combination of calcium oxalate and calcium phosphate, magnesium ammonium phosphate, also known as struvite or infection stones, uric acid, cystine, or miscellaneous types such as occur with drug metabolites.



Causes of Kidney Stone formation

There are a number of conditions that predispose some individuals to make kidney stones. Some of the more common conditions include:

- Genetics - Family history of kidney stones may indicate an increased propensity to form stones.
- High protein and salt intake - Diets rich in meat, fish and chicken lower urinary pH and cause increased excretion of uric acid



- Vitamin B6 deficiency leads to increased formation and excretion of oxalate
- Dehydration, excessive vitamin C intake, calcium supplementation and antacids containing calcium may also lead to stone formation.
- Geography – more stones are diagnosed in the southeast United States earning it the name “the stone belt”

Symptoms of a Kidney Stone

Kidney stones not causing pain may be found during the workup for unrelated conditions. These stones are usually in the kidney and do not impede the flow of urine from the kidneys. No additional evaluation is indicated for these patients unless there are many stones identified in the kidney.

Kidney stones that obstruct urine flow are the ones that cause pain, which is the most common presenting symptom. This pain may be in the flank with radiation into the lower abdomen and inguinal areas as well as to the testicle in males and the labia in females. The severity of stone pain, also called renal colic, can vary from a mild ache to excruciating pain. Typically, patients are unable to find a comfortable position to be in.

Hematuria, or blood in the urine, occurs in 95% of the cases. The blood may be visible to the eye, or can be detected by microscopic exam of the urine.

Nausea and vomiting are common, and patients may present in a dehydrated state.

Once a kidney stone reaches the point where the ureter drains into the bladder, patients often experience frequency, urgency, and burning with urination, as a result of bladder

irritation by the kidney stone. Sometimes a stone in this location can be confused with a urinary tract infection which typically has the same symptoms. If fever is present, one has to suspect urinary tract or kidney infection, which if combined with kidney stone obstruction may lead to serious consequences.

Detecting and Eliminating Kidney Stones

Your doctor may use laboratory test, xray, CT scan, or ultrasound to confirm the presence of kidney stones.

70-80% of kidney stones are less than 6mm in size and can be treated conservatively. If pain, nausea and vomiting, infection can be controlled, most of these stones will pass spontaneously. Those that do not resolve spontaneously are treated by one of the following methods:

ESWL or extracorporeal shock wave lithotripsy can be used to break up stones less than or equal to 2cm in size in the kidney or upper ureter. This is an outpatient procedure under IV sedation. The stone is visualized and then a shock wave is generated that penetrates the body and impacts upon the stone. After several hundred to several thousand shocks are given, the stone gradually pulverizes, and the fragments are passed spontaneously over the next several days to weeks.

Percutaneous Nephrolithotomy is used when stones are larger than 2-3 cm. Kidney stones that fill the entire renal collecting system, or staghorn stones, sometimes require both percutaneous debulking and subsequent ESWL of remaining fragments. With percutaneous nephrolithotomy, the kidney is accessed through the flank with a guide wire that is passed down to the ureter. Under anesthesia the tract is dilated, a scope is inserted and the kidney stone is grasped with a basket and removed or it may be fragmented through the scope with ultrasound, laser, or electrohydraulic lithotripsy. Fragments are then grasped and removed through the scope.

Cytoscopic-ureteroscopic procedures are best used for kidney stones located in the mid to distal ureter. Access is gained to the bladder through the urethra with a scope and a guide wire is placed into the affected ureter. Then either a rigid or flexible ureteroscope is placed into the ureter and under direct vision is guided to the level of the stone. Smaller stones may be grasped or entrapped in a small basket and pulled from the ureter. Larger stones may require fragmentation with lithotripsy through the scope. This may be accomplished with a lithoclast or by using electrohydraulic, ultrasonic, or laser lithotripsy.