

Kidney Stones

Kidney stones are among the most painful and prevalent of urologic disorders. More than a million kidney stone cases are diagnosed each year, with an estimated 10 percent of Americans destined to suffer at some point in their lives.

Fortunately, most stones pass out of the body without any intervention. If you are not so lucky, the following information should help you and your doctor address the causes, symptoms and possible complications created by your kidney stone disease.

Anatomy and Function

The urinary tract, or system, consists of the kidneys, ureters, bladder and urethra. The kidneys are two bean-shaped organs below the ribs in the back of the torso (area between ribs and hips). They are responsible for maintaining balance by removing extra water and wastes from the blood and converting it to urine. The kidneys keep a stable balance of salts and other substances in the blood. They also produce hormones that build strong bones and help form red blood cells. Urine is carried by narrow muscular tubes, the ureters, from the kidneys to the bladder, a triangular-shaped reservoir in the lower abdomen. Like a balloon, the bladder's walls stretch and expand to store urine and then flatten when urine is emptied through the urethra to outside the body.

Causes and Risks

A stone forms in the kidney when there is an imbalance between certain urinary components — chemicals such as calcium, oxalate and phosphate — that promote crystallization and others that inhibit it.

Most common stones contain calcium in combination with oxalate and/or phosphate.

A less common type of stone is caused by infection in the urinary tract. This type of stone is called a struvite or infection stone. Much less common are the pure uric acid stones. Much rarer is the hereditary type of stones called cystine stones. Even more rare are those linked to hereditary disorders.

For unknown reasons, the number of people in the United States with kidney stones has been increasing over the past 20 years. Caucasians are more prone to develop kidney stones than African Americans. Although stones occur more frequently in men, the number of women who get them has been increasing over the past 10 years, causing the ratio to change. Kidney stones strike most typically between the ages of 20 and 40. If a person forms a stone, there is a 50 percent chance they will develop another stone.

A number of risk factors play major roles in stone formation. The first is loss of body fluids (dehydration). When one does not consume enough fluids during the day, the

urine often becomes quite concentrated and darker. This increases the chance that crystals can form from materials within the urine, because there is less fluid available to dissolve them.

Diet can also affect the probability of stone formation. A high-protein diet can cause the acid content in the body to increase. This decreases the amount of urinary citrate, a "good" chemical that helps prevent stones. As a result, stones are more likely to form. A high-salt diet is another risk factor, as an increased amount of sodium passing into the urine can also pull calcium along with it. The net result is an increased calcium level in the urine, which increases the probability for stones. Intake of oxalate-rich foods such as leafy green vegetables, tea or chocolate may also worsen the situation.

Finally, a family history of stones, especially in a first-degree relative (parent or sibling), dramatically increases the probability of having stones.

Scientists do not always know what makes stones form. While certain foods may promote stones in susceptible people, researchers do not believe that eating a specific item will cause stones in people who are not vulnerable. Yet they are confident that factors — such as a family or personal history of kidney stones and other urinary infections or diseases — have a definite connection to this problem. Climate and water intake may also play a role in stone formation.

Stones can also form because of obstruction to urinary passage like in prostate enlargement or stricture disease. Stone formation has also been linked to hyperparathyroidism, an endocrine disorder that results in more calcium in your urine. Susceptibility can also be raised if you are among the 70 percent of people with rare hereditary disorders such as cystinuria or primary hyperoxaluria who develop kidney stones because of excesses of the amino acid, cystine or the oxalate in your urine.

Another condition that can cause stones to form is absorptive hypercalciuria, a surplus of calcium in the urine that occurs when the body absorbs too much from food. The high levels result in calcium oxalate or phosphate crystals forming in the kidneys or urinary tract. Similarly, hyperuricosuria, excess uric acid tied to gout or the excessive consumption of meat products, may also trigger kidney stones.

Consumption of calcium pills by a person who is at risk to form stones, certain diuretics or calcium-based antacids may increase the risk of forming stones by increasing the amount of calcium in the urine. Calcium oxalate stones may also form in people who have chronic inflammation of the bowel or who have had an intestinal bypass operation or ostomy. This is because of loss of more water from the body as well as absorption of oxalate from the intestine.

Symptoms

Usually, the symptom of a kidney stone is extreme pain that has been described as being worse than child labor pains. The pain often begins suddenly as the stone moves

in the urinary tract, causing irritation and blockage. Typically, a person feels a sharp, cramping pain in the back and in the side of the area of the kidney or in the lower abdomen, which may spread to the groin. Also, sometimes a person will complain of blood in the urine, nausea and/or vomiting.

Occasionally stones do not produce any symptoms. But while they may be "silent," they can be growing, even threatening irreversible damage to kidney function. More commonly, however, if a stone is not large enough to prompt major symptoms, it still can trigger a dull ache that is often confused with muscle or intestinal pain.

If the stone is too large to pass easily, pain continues as the muscles in the wall of the tiny ureter try to squeeze the stone along into the bladder. One may feel the need to urinate more often or feel a burning sensation during urination. In a man, pain may move down to the tip of the penis. If the stone is close to the lower end of the ureter at the opening into the bladder, a person will frequently feel like they have not fully completed urination.

Stones as small as 2 mm. have caused many symptoms while those as large as a pea have quietly passed. If fever or chills accompany any of these symptoms, then there may be an infection. You should contact your urologist immediately.

Diagnosis

When a urinary stone is suspected, an immediate evaluation is required. Blood is obtained to check on overall kidney function as well as to exclude signs of infection throughout the body. Urine is sent for a urinalysis and culture. A simple X-ray of the abdomen is sometimes enough to pinpoint a calcification in the area of the kidneys or ureters, thus identifying a likely obstructing stone. If the X-ray film does not provide enough information to make a diagnosis, then an intravenous pyelogram (IVP) may be performed. A kidney blocked by a stone will not be able to excrete the dye from the IVP test as quickly and may appear enlarged. A final diagnostic exam that can be done is an abdominal/pelvic CT scan, which is very sensitive and can detect almost all types of urinary stones.

The above mentioned tests give your urologist information about the size, location and number of stones that are causing the symptoms. This allows the urologist to determine appropriate treatments.