

What doctors want patients to know about kidney stones



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Sara Berg, MS

News Editor

Sharp pain that radiates from your back can cause a moment of panic. But what may seem like an ordinary backache could be a telltale sign of a kidney stone, which is an agonizing condition affecting 1 million people in the U.S. each year.

These tiny, crystalline deposits often form silently in the kidneys, waiting to make their painful debut. This sudden onset of symptoms can transform daily routines into urgent medical concerns, highlighting the importance of understanding and addressing kidney stones.

The AMA's What Doctors Want Patients to Know™ series gives physicians a platform to share what they want patients to understand about today's health care headlines.

In this installment, Ryan L. Steinberg, MD, a urologist who specializes in the treatment of kidney stones at the University of Iowa Health Care, discusses what patients need to know about kidney stones.

[University of Iowa Health Care](#) is part of the [AMA Health System Member Program](#), which provides enterprise solutions to equip leadership, physicians and care teams with resources to help drive the future of medicine.

Summer is kidney stone season

Kidney stones tend to be [more common in the summer](#), said Dr. Steinberg. "In fact, we have a time of the year we call stone season, which is roughly June to October where we see things ramp up in terms of people coming into the ER with stone symptoms and new

clinic referrals.”

“There’s this big stripe across the South from Arizona through the Carolinas where stones are more prevalent which we call the stone belt,” he said. “Moving north the incidence of stones decreases as the weather stays a bit cooler.”

Kidney stones are just tiny rocks

The best way to describe kidney stones is they “are literally little, tiny rocks that form on the inside of your kidney,” Dr. Steinberg said, noting “there are some that are harder than others.”

“They can be smooth or jagged on the outside like the inside or outside part of a geode,” he explained. “Some can be kind of crumbly like chalk. Some of them can be hard, almost like concrete. And the question about how hard or soft they are is really based on what kind of mineral they are made out of.”

Watch for these kidney stone symptoms

“Kidney stones typically will present with a backache or flank pain. So, that’s pain in the back, usually not low down such as right above the butt, instead located right underneath the ribs,” Dr. Steinberg said. “Some people will say that the pain wraps around their side and heads down towards their pelvis or towards their private parts.”

Meanwhile, other people “may just have pain by the bladder if the stone is really far down towards the bladder and is trying to pass,” he said. Aside from “pain, blood in the urine and burning or pain with urination are also common symptoms.

“Sometimes if the pain is so bad, people can just have nausea or vomiting and it can be hard for them to stay hydrated with a kidney stone,” he added.

Kidney stone pain is located in your back

“Kidney stone pain can be experienced differently by patients but is most commonly found in the ‘flank’ or the area of the back right below the ribs,” said Dr. Steinberg. “When a stone is passing and gets near the bladder, it can also create pain in the pelvis or low abdomen—area below the belly button.”

“Sometimes, the pain will start in the flank and wrap around the side down to the area by the bladder,” he said. “You should not have kidney stone pain in other parts of the body. For patients with pain in the back or flank that shoots down into the buttock or leg, this is would be far less likely to be from a kidney stone.”

Symptoms are typically the same for men and women

“Overall, symptoms are generally the same between men and women when passing a kidney stone,” said Dr. Steinberg. “The one time that it can differ is when the stone gets near the bladder.”

“In men, the pain can extend down into the groin or scrotum. Sometimes, a stinging sensation can also be felt at the tip of the penis,” he explained. “In women, the pain can extend down to the labia and may feel like a menstrual cramp.”

“Kidney stones in the kidney that do not cause blockage usually cause no pain or symptoms,” he said. “Those that cause blockage can be quite painful. Many women note that their kidney stone pain is worse than childbirth pain.”

Not all kidney stones cause pain

“Kidney stones that are not actively trying to pass out of the kidney, down to the bladder in most cases don’t cause pain,” Dr. Steinberg said. “So, you can live with them for years and years without having problems.”

“But, if that little sucker decides it’s going to dislodge and try to pass, it could cause trouble down the line,” he said.

Kidney stones are very common

“The most recent estimate puts kidney stones now at about one in nine people in their lifetime,” Dr. Steinberg said. “So, just over 11% will have a kidney stone.”

“It used to be that it was way more common in men to get kidney stones and over the last 30 to 40 years that gap has significantly closed,” he said.

This is due to a lot “of different reasons. The classic kidney stone formed in a ‘meat and potatoes’ kind of guy, who consumed a lot of animal protein,” Dr. Steinberg said. “Obesity also plays a role in this. The increasing level of obesity across all patients—regardless of gender—has contributed to the overall increase we are seeing.

“There are other elements that are slightly unique to women,” he added. For example, women have a “higher likelihood of having [urinary tract infections](#), which can then lead them to forming an infectious type of stone called ‘struvite’ as well.”

Kidney stones can come at any age

“People previously would usually show up for the first time in their 40s or 50s. Nowadays, we are seeing more and more people in their 20s and 30s forming their first stone,” Dr. Steinberg said. “Further, with the childhood obesity epidemic we are currently in, we’re also seeing many more stones in the pediatric population as well.”

“While we are definitely seeing more stones in younger populations, it’s less directly about age, and more about some of the risk factors for stone formation that may be present,” he said.

There are different types of stones

“Kidney stones typically are classified as calcium or noncalcium. So, about 80% to 85% of stones will fall into the calcium kind of bin,” Dr. Steinberg said. “The majority of those will be calcium oxalate stones. That’s the most common type that we see.”

“There’s also calcium phosphate stones, which are a little bit less common and can show up as a result of other disease processes or just purely on their own,” he said. “The other 15% to 20% is kind of a mixed bag. You have about 8% of people who will have uric acid stones, which is a totally different type of stone.

“Those stones are made of uric acid, which is a substance that we see in people who often have high meat intake,” Dr. Steinberg added. Then “you have about 8% of patients who have struvite or infectious kidney stones that are created from a really bad urinary tract infection and the bacteria can lead to crystallization.”

“And then there’s a smattering of 5% or less of all sorts of rare types of kidney stones. Cystine stones are one type of rare kidney stone which forms as a result of a rare genetic condition in how the body managed a certain amino acid (cysteine),” he said.

Who’s at higher risk for kidney stones

“There are some people who—based on specific conditions—may be predisposed to forming stones,” Dr. Steinberg said.

That includes people with diabetes, obesity and gastrointestinal issues such as [Crohn’s disease and ulcerative colitis](#). It also includes people who have had [weight-loss surgery](#), or had parts of their intestines or colon removed for cancer or for other reasons.

Additionally, “an overactive parathyroid gland or other thyroid disorders, autoimmune disorders or people with a history of cancer who have gotten chemotherapy are all known risk factors of kidney stones,” he said. “And in fact, the simplest risk factor that we know of is family history. People who have had a family member with a stone are at a higher likelihood of having a stone themselves than somebody who hasn’t.”

But “that doesn’t necessarily mean that all of these people have an underlying genetic disorder. We think that genetics is the main culprit for stones forming in maybe 10% to 15% of all stone diseases,” Dr. Steinberg said, noting “there’s still a lot to be done in that area, but quite a bit of it on a [family history](#) side is really based on learned behaviors as it is your parents who teach you how to eat, how much to eat, and what foods to pick.”

Some kidney stones can pass on their own

A small kidney stone is in the 3–5-millimeter range and “if they’re trying to pass, they will often come out on their own with increased hydration,” Dr. Steinberg said. “So, making lots of urine to help propel the stone out and potentially some medication can help with that.”

“While it may not feel very good coming out, passing the stones on their own can avoid the need for surgery,” he said, noting though that “the passage may take up to six weeks. If it doesn’t pass by six weeks, it’s unlikely to come out on its own so we’re going in to get them out.”

“There are many factors that play a role in whether a kidney stone will pass all the way out of the body including the size of the stone, size of the ureter and how hydrated someone is,” said Dr. Steinberg. “Passing a stone takes the right combination of factors such as good hydration, a small enough stone and a ureter with a large enough caliber to allow for passage.”

A 5 mm kidney stone is not easy to pass

“Some patients who have passed lots of stones will have some mild pain and pass stones of various size without much issue,” said Dr. Steinberg. “Most patients, though, will have more severe pain with passage that may take them to the emergency room.”

“Even small stones can cause major symptoms, so size does not determine the amount of pain someone has. Rather, blockage of the kidney from the stone is what leads to pain or difficulty with passage,” he said. “Even with good hydration and medicine to help the stone pass, a 5 mm stone only has a 40–65% chance of passing on its own over a six-week period, which is the usual time that is allowed to let a stone try to pass on its own. During this time, if the pain waxes and wanes, a patient may require ER evaluation multiple times.”

Other kidney stones require removal

“There are three ways that we do the vast majority—99%—of all stone removals,” Dr. Steinberg said. “One of them is shockwave lithotripsy. ... We propel high-intensity sound waves through people’s backs to try to shake or literally break stones into dust.

“In that case, people will still have to pass those dust particles or pieces, but that’s the least invasive and a very effective way of taking care of kidney stones,” he added. “The most common procedure we do now is called ureteroscopy. That’s a procedure where we take a small telescope which is placed up the urethra—pee tube—into the bladder all the way up into the ureter tube or potentially into the kidney.

“If you think about the way urine comes down from the kidney—down the ureter tube into the bladder and then out the body through the urethra—we put the camera scope up backwards as to how urine normally flows,” he added. “And depending on the size and location of the stone, we may use a laser to break the stone.”

“Sometimes we will use the laser to break the stone into dust or grit where it must pass on its own out of the body,” Dr. Steinberg said. “Other times, we may use the laser to crack the stones into small pieces and use a little grasper to actively remove those stones.”

“Last, probably about 15% of people will need a more invasive surgery called a percutaneous nephrolithotomy,” he said. “We make a small incision in the back about the width of your finger, and use that to pass a telescope in through people’s backs to be able to go and either grab stones and pull them out or grind up a stone and suction out the small pieces with a special device.”

You know a stone passed when you feel pain relief

“In most cases, patients will have relief of their pain and see the stone come out in their urine or hear the ‘clink’ of the stone on the porcelain of the toilet,” Dr. Steinberg explained. “Some patients will not see this, but their pain will go away once the stone passes.

“But in this case, patients should still follow up with a doctor if they feel better but do not see the stone come out. It is possible that patients get pain relief, but the stone continues to be causing blockage,” he said. “It is not fully understood why this occurs—blockage

without pain. It is important to identify these cases so that the kidney does not silently lose function over time from blockage even though the patient feels better.”

Kidney stone pain can be stopped immediately

“Kidney stone pain typically occurs as a result of urine that is being blocked from draining out of the kidney above,” said Dr. Steinberg. “If the stone ‘rolls’ or moves into a position during passage where the urine is able to drain around it, the pain will go away. If it causes blockage again as it continues to pass through, the pain can return.”

“Many times, patients can have significant improvement in their pain with medications such as ibuprofen or Toradol—a prescription strength cousin of ibuprofen,” he said. “These medications have been shown to be equally as effective in relieving pain as narcotic medications.”

“The pain can also be immediately relieved with the placement of a ureteral stent which allows the urine behind the stone to drain around the stone to the bladder,” Dr. Steinberg said. “Stents are not permanent and can lead to other symptoms—the feeling that you need to pee very frequently due to bladder irritation—as well as can block the ability for the stone to pass on its own so another procedure would be needed to remove the stone.

“So, the decision to place a stent has to be weighed with the possibility of needing another procedure in the future,” he added. “Removal of the stone can also relieve the blockage but cannot always be performed right away.”

Many people will have another kidney stone

“Studies have suggested that up to 50% of people will have another stone 5 to 10 years after having their first one,” Dr. Steinberg said. “That means 50% or more of people may not have another stone within five to 10 years, which is great.”

“Obviously, the people who we need to focus most closely on are those who have even more frequent stone issues, such as every one to two years—the really aggressive stone former,” he added. “In general, we prevent stones from reoccurring by being careful with

the salt, animal protein and calcium in our diet and drinking lots of fluids.”

A urine test can help identify areas to focus on and is strongly recommended to guide prevention counseling, Dr. Steinberg said.

It is very rare to die from kidney stones

“Unfortunately, you can die from kidney stones, but it is very rare,” said Dr. Steinberg. “One reason is if the stones create blockage of both kidneys or one kidney in patients with only a single kidney, it can lead to kidney failure which can lead to other problems resulting in death.”

“In most cases though, the kidney dysfunction that happens when a stone is causing blockage is temporary and the kidney will recover function once the kidney is unblocked,” he said. “It can take weeks to months for a kidney to sustain enough of a prolonged injury to lead to permanent dysfunction.”

“The other reason why patients may die is when urine behind a blocking kidney stone becomes infected. This can lead to bacteria getting into the bloodstream and sepsis which can be deadly,” said Dr. Steinberg. “When a patient has symptoms of infection—fevers, fainting, low blood pressure, confusion—and a blocking stone, it is critical that they get their kidney drained as soon as possible.”

Limit how much soda you drink

“It’s always tricky to pin it down to one food, but a few beverages that we know of that are high in things that cause stones are soda pops, especially dark colas,” Dr. Steinberg said. “That’s often a discussion that we have in clinic with patients. It is not necessarily about being punitive and telling them never to have another sip of your Mr. Pibb or Diet Dr. Pepper ever again.”

“Rather, it’s about moderation. If they’re coming in drinking a six-pack of that every day, we have to cut that back,” he added. “There’s something to be said for moderation and not

necessarily taking away the things that people enjoy. Those types of ‘treats’ should be the exception, not the rule in terms of how we should be eating or drinking.”

Drink a lot of water and stay hydrated

The easiest thing to do is “[drink lots of water](#),” said Dr. Steinberg. That means “in the average person, drinking 80 to 100 ounces of fluids a day with the goal being that you get your urine output to be about 2.5 liters per day, so just a little bit more than a two-liter bottle of pop worth of urine coming out.”

This “can help to reduce the risk of stone formation,” he said, noting it is also important to have a low animal protein and low sodium diet “to reduce the amount of uric acid and [sodium](#) that’s in the urine.”

Have a normal calcium diet

“Lots of people think they have a calcium stone, so they better cut their calcium intake down,” Dr. Steinberg said. “There’s a surprising number of people who think they’re overdoing it but are actually doing just fine with their calcium intake.”

“Having a normal amount of calcium, which is very important for your nerves, muscles and bones, is really important,” he emphasized, noting the right amount of calcium depends on age and gender, “but typically we’re talking about 1,000 to 1,200 milligrams per day.”

But remember, “there are varying degrees of calcium in different types of leafy vegetables, dairy, meat and other foods,” Dr. Steinberg said.

Take steps for pain relief, nausea

“Tylenol and ibuprofen are really great at dealing with pain and they actually are effective at reducing inflammation, which can sometimes help stones to pass,” Dr. Steinberg said.

“Patients who do have really terrible pain may need stronger pain medication or anti-nausea medicine.”

“We do everything we can through medication, fluids and whatever we need to do to get that stone out as soon as possible,” he said. “When you’re passing a stone, it’s a pretty miserable time, but we’re here to help.”