The Hard Facts about Kidney Stones

Kidney stone season is upon us once again and there is no better time than the present for a refresher on the diagnostics, treatment options, and recommendations for prevention of stones. The warmer months are often associated with insufficient fluid intake, which directly correlates with a higher incidence of stone formation.

Clinical presentation:

As a brief overview, the most common types of stones seen clinically are composed of calcium oxalate or uric acid. Many patients with stones have small, non-obstructing stones within the kidneys for years without having symptoms. The typical presentation of a patient actively passing a stone can include any or all of the following:

- Mild to severe flank pain w/o radiation to the lower abdomen and groin
- Pain that comes in waves and fluctuates in intensity
- Dysuria
- Microscopic or gross hematuria
- Cloudy or foul-smelling urine
- Nausea and vomiting
- Urgency and frequency of urination
- Fever and chills if infection is also present

Diagnostics:

The initial evaluation for a patient suspected to be actively passing a kidney stone includes a thorough abdominal exam, urinalysis w/ culture, and upper tract imaging. KUB is one of the least invasive, most cost effective, and most time-sensitive options as far as imaging is concerned. KUB can identify radiodense calculi fairly easily, but is limited in patients with excessive bowel gas or in those who are obese. KUB is also unable to determine the presence/absence of hydronephrosis. If there is concern for hydronephrosis or if KUB shows no evidence of radiodense calculi, the next best options would be combination KUB and renal US, or CT scan of the abdomen and pelvis w/o contrast. Referral to urology for these tests is reasonable, especially when there is high suspicion of stone presence and possible need for surgical intervention. Metabolic evaluation of kidney stone disease is done if the patient has a history of recurrent stones.

Treatment:

Stones measuring 5 mm or less can usually pass through the urinary tract without requiring surgical intervention. This may not be the case for those patients with narrow ureters or in the presence of ureteral stricture. First line treatment for ureteral stones less than 1 cm in patients with no known history of ureteral stricture/stenosis and with no other contraindications, usually includes Flomax (Tamsulosin) 0.4 mg by mouth
daily, adequate hydration, pain management, and anti-emetics. In some cases, dissolution agents, such as sodium bicarbonate and potassium citrate can be used. However, this option is not ideal in patients with acute symptoms, as 24-hr urine testing and blood testing (metabolic panel, uric acid, and PTH) are necessary before initiating one of these agents. In the case of larger stones that do not pass with conservative treatment, options include ureteroscopy with laser lithotripsy, extracorporeal shockwave lithotripsy, or percutaneous nephrolithotomy. None of the above mentioned surgical treatments are recommended in the presence of infection in the urinary tract, as this can lead to the development of urosepsis. In the case of a patient with a symptomatic ureteral stone and presence of an infection, ureteral stent is typically placed until the infection has resolved and the stone can be treated. If placement of a ureteral stent is not possible and there is concern for progression of infection to urosepsis, it may be necessary to have a temporary percutaneous nephrostomy (PCN) tube placed by an interventional radiologist. Some degree of hydronephrosis must be present in order for a PCN tube to be placed.

Stone prevention:

Stone prevention is typically centered around dietary/lifestyle modifications. In general, recommendations should include increasing one's water intake to 1.5-2 Liters/day, unless on fluid restriction for some other medical condition, increasing dietary citrate, and decreasing sodium intake. More specific recommendations can be made based on results of serologic testing and 24-hr urine testing. Stone prevention is often where the use of dissolution agents is most appropriate.

Factors that increase one's risk of developing kidney stones include:

- **Family or personal history.**
- **Being an adult male:** Kidney stones are most common in men 40 years and older. Although, presence of stones are becoming more prevalent in women.
- **Dehydration:** People who live in warm climates and those who sweat a lot may be at higher risk than others. Dehydration is the number one risk factor for nephrolithiasis.
- **Certain diet trends:** Eating a diet that is high in protein, sodium and/or sugar may increase one's risk of some types of kidney stones. This is especially true with a high-sodium diet. High sodium intake increases the amount of calcium your kidneys must filter and significantly increases your risk of kidney stones.
- **Obesity:** High body mass index (BMI), large waist size and weight gain have been linked to an increased risk of kidney stones.
- **Digestive diseases and surgery:** Inflammatory bowel disease or chronic diarrhea can cause changes in the digestive process that affect the absorption of calcium and water, increasing the levels of stone-forming substances in the urine. This can also be the case following bariatric surgery.
- **Other medical conditions:** Diseases and conditions that can also increase the risk of kidney stones include renal tubular acidosis, cystinuria, medullary sponge kidney disease, hyperparathyroidism, and others.

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