

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

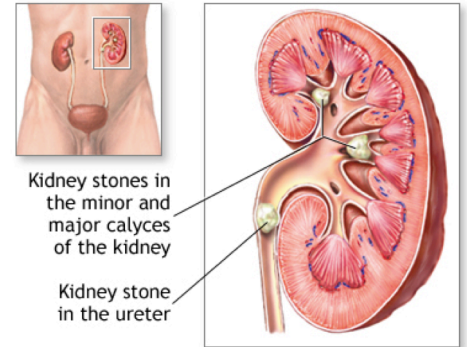
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Nephrolithiasis

A 25-year-old male with no past medical history presents to the ED with right-sided flank pain for two days. The pain is described as severe, 8/10 with radiation to the right groin. Additionally, he admits to dysuria and hematuria. He denies fever, shortness of breath, and chills. Patient is afebrile and vitals are within normal limits. On physical exam, the patient is unable to find a position of comfort. The abdomen has bowel sounds present with no guarding or rebound. The patient has lower abdominal tenderness and costovertebral angle tenderness. What medical intervention has been shown to more effectively facilitate kidney stone passage?

- A. Bactrim DS (800mg/160mg) BID for 10 days
- B. Conservative Management
- C. Tamsulosin
- D. Ketorolac 15 mg
- E. Furosemide



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The left image shows the anatomical location of the kidneys, ureters, and bladder.

The right image is a cross-section of a kidney with a stone in the ureter, major calyx and minor calyx.

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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Figure 1. Noncontrast CT Abdomen and Pelvis (via <http://urologystone.com/CH06DiagnosisofStones/helical.html>)

Noncontrast CT of the abdomen and pelvis is the best imaging modality for diagnosis of nephrolithiasis as it is highly accurate and can help with planning of care. Ultrasound of the kidney and bladder is a less sensitive alternative to CT but it minimizes radiation dose, making it the preferred method for pregnant patients. Ultrasound can reliably detect hydronephrosis but it is not reliable for detecting the number of stones, size of the stone, or location of the renal calculi.

Persistent obstruction due to nephrolithiasis can lead to renal damage that is irreversible. Other potential complications of nephrolithiasis include upper urinary tract infection, pyelonephritis, pyonephrosis and urosepsis.

Treatment

Often, nephrolithiasis can be managed conservatively. Medical management includes pain medication, hydration, and straining of urine for stone retrieval. Both NSAIDs and opiates have been used for pain relief. Alpha blockers such as tamsulosin have been shown to facilitate stone passage compared with conservative treatment alone.¹

Stone passage is dependent on both size and location. Stones less than 5 mm in diameter are more likely to spontaneously pass. Additionally, ureteral stones that are more distal are more likely to pass spontaneously.

In instances of urosepsis, acute kidney injury, anuria, or intractable pain, nausea and vomiting necessitates an urgent urological consult. Additionally, stones that are larger than 10 mm in diameter or patients that have failed to expel a stone larger than 4 mm with conservative management and continue to have pain should also have a urological consultation.

Surgical options for renal calculi include extracorporeal shock wave lithotripsy, percutaneous nephrolithotomy, and uteroscopic lithotripsy with laser.

The correct answer is C. In patients with nephrolithiasis, data suggest that treatment with an alpha blocker, such as Tamsulosin, facilitates faster spontaneous stone passage if the stone is less than 10 mm in diameter.¹

Discussion

Nephrolithiasis also known as “kidney stones” refers to calculi found inside of the kidney that can cause colicky pain when it passes through the ureter (ureterolithiasis). The most common type of renal calculi is the calcium oxalate stone. Additional types of kidney stone include calcium phosphate, cysteine, uric acid, and struvite stones.

Risk Factors for nephrolithiasis include prior episode of nephrolithiasis, family history, malabsorption which may be secondary to weight loss surgery, frequent UTIs, low fluid intake, acidic urine, and struvite formation in individuals with upper urinary tract infections with Proteus or Klebsiella.

Common signs and symptoms of nephrolithiasis include renal colic with possible radiation to groin, gross or microscopic hematuria, nausea, vomiting, dysuria and urgency.

For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and **click** on the **“Conference”** link.

All are welcome to attend!

Warriors

Following the resolution of acute nephrolithiasis, the stone should be analyzed to determine the composition and if further treatment is necessary. As recurrence of nephrolithiasis is common, it is important to make recommendations to patients for follow up and preventative measures.

Recommendations for the Prevention of Future Stones	
All Stones	Increased fluid intake
Calcium Oxalate Stones	Most common type 80% Increased fluid intake Decreased calcium, sodium and sucrose/fructose intake ³ Decreased intake of foods known to cause oxaluria such as dark leafy vegetables, beets, nuts, seeds, soy, vitamin C supplements, chocolate, tea, and strawberries ³ Reduced protein intake ³
Uric Acid	Consideration of medical therapies such as xanthine oxidase inhibitors such as allopurinol, urine alkalization with potassium bicarbonate or potassium citrate ⁴
Cystine Stones	Reduction of sodium and protein intake Consideration of medical therapies such as urine alkalization with sodium bicarbonate, tipronin or penicillamine ⁶
Struvite Stones	Treatment of urease-producing bacteria such as Proteus or Klebsiella with antibiotics ¹

Take Home Points

- The most common type of renal calculi contains calcium oxalate.
- Presenting symptoms of nephrolithiasis include colicky flank pain that radiates to the groin and hematuria.
- The diagnostic test of choice for nephrolithiasis is CT abdomen and pelvis without contrast.
- Medical therapy including hydration, antispasmodics, and analgesia is appropriate for stones less than 10 mm.
- Stones greater than 10 mm may require surgical intervention such as ureteral stent placement, extracorporeal shockwave lithotripsy, or percutaneous nephrostomy.



ABOUT THE AUTHOR

This month's case was written by Amanda Hunter. Amanda is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in September 2017. Amanda plans on pursuing a career in Internal Medicine after graduation.

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