# Stones Cause Pediatric Moans Too: A Case of Ureterolithiasis with Classic Sonographic Artifacts

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## Background

The incidence of pediatric nephrolithiasis is increasing. Although emergency medicine physicians are well-versed in diagnosing a passing kidney stone in adults, this typically requires the use of a computed tomography (CT) scan along with its associated ionizing radiation. In the appropriate clinical context, renal point-of-care ultrasound is a non-radiating diagnostic modality that can identify ureterolithiasis in children. This case describes the use of point-of-care ultrasound in a free-standing emergency department to diagnose the size and location of a kidney stone in a pediatric patient.

## Case Presentation

A 12-year-old girl with a history of recurrent nephrolithiasis and cystinuria presented to a free-standing emergency department with two days of left flank and suprapubic pain with associated nausea and vomiting. Her vital signs were within normal limits and the physical exam was notable for left sided costovertebral angle tenderness. Her urinalysis was positive for the presence of greater than 100 red blood cells, moderate bacteria, and leukocyte esterase; however, the specimen was contaminated with moderate epithelial cells and it was nitrite negative. A urine culture was later found to be negative for growth at 48 hours.

## Ultrasound Findings

A point-of-care ultrasound revealed dilation of the renal pelvis and calices along with the presence of a 1 x 0.5 cm hyperechoic structure in the proximal ureter with posterior-acoustic shadowing (Figure 1) and twinkle artifact appreciated on color flow doppler (Figure 2). These findings were consistent with moderate hydronephrosis due to a renal calculus located in the proximal ureter. Given her pediatric age, CT imaging was deferred. Treatment was initiated for renal colic with ketorolac and ondansetron with good symptom control; she was transferred to a facility with pediatric urology for ureteral stent placement.

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## Images

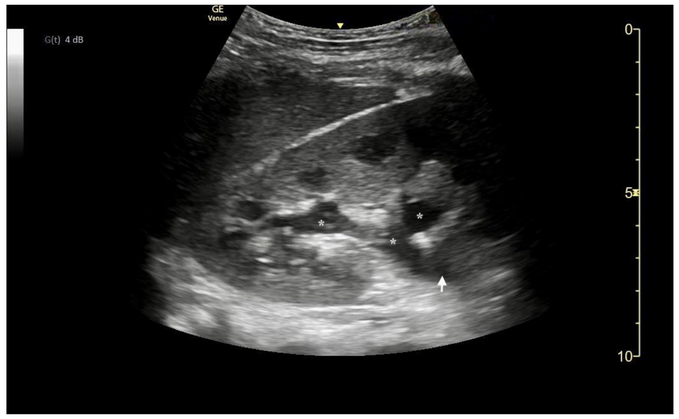


Figure 1. Point-of-care ultrasound of the left kidney in a longitudinal view demonstrating dilation of the renal pelvis (asterisks) and proximal ureter, consistent with moderate hydronephrosis.

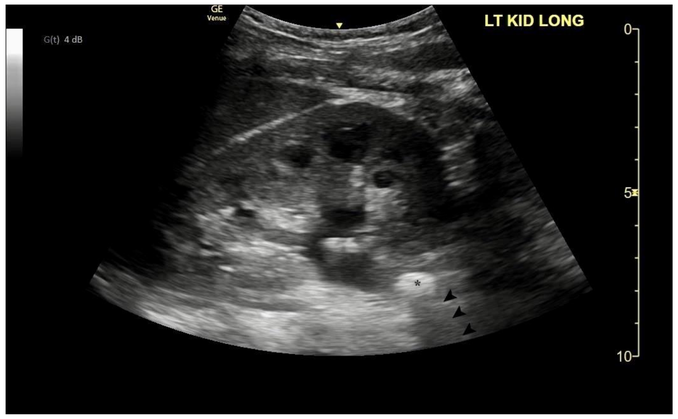


Figure 2. Classic features of an obstructing ureteral stone include hyperechoic structure (asterisk) with posterior acoustic shadowing (arrow heads) located in the region of the proximal ureter.

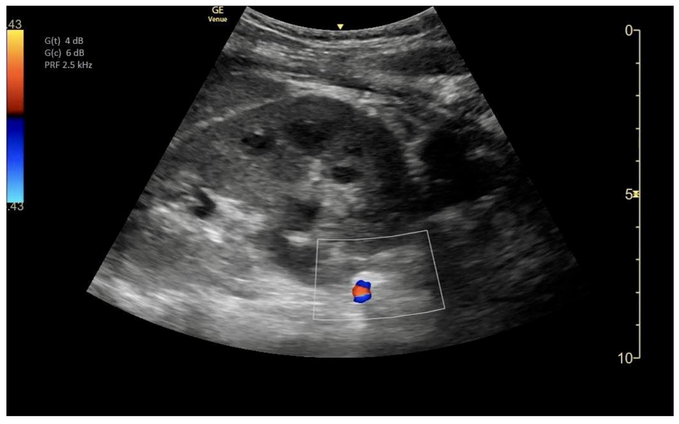


Figure 3. Color flow doppler demonstrates twinkling artifact when placed over the calculus.

## Technique

In a pediatric patient, the kidneys can be visualized using a linear, pediatric curved, phased array, or a curvilinear probe. Start by placing the ultrasound probe along the right posterior axillary line just above the costal margin in a longitudinal orientation with the probe marker towards the patient's head. Slightly rotating the probe counterclockwise will align the probe's footprint between the ribs and reduce rib shadowing. Fan the probe in an anterior-posterior direction to visualize the entirety of the kidney in a longitudinal view, paying attention to any dilation of the renal pelvis and subsequent distortion of the calyces. Next, rotate the probe clockwise 90 degrees to visualize the kidney in a longitudinal orientation. Once visualized, fan the probe in a superior-inferior direction to visualize the entire kidney. Repeat this technique on the left side. Finally, visualize the urinary bladder to evaluate for evidence of outflow obstruction by placing the probe just superior to the pubic symphysis and directed downward into the pelvis. The bladder should be visualized in its entirety in both the transverse and longitudinal planes.

## Conclusions

This report highlights the utility of and technique for point-of-care ultrasound in pediatric patients when evaluating for torso pain. Renal colic due to kidney stones is reported to affect approximately 2% of the pediatric population with an increasing prevalence.[1] Point-of-care ultrasound is a useful tool in diagnosing ureterolithiasis as a cause of a patient's flank pain; however, it relies heavily on the visualization of a stone, with a specificity of greater than 97% when a stone is seen[2] and up to 94% when severe hydronephrosis is present.[3] Additionally, stone identification can be enhanced by the presence of posterior acoustic shadowing and along with visualization of twinkle artifact with the use of color doppler.[4] With repeated and intentional practice, point-of-care ultrasound is a useful clinical tool for evaluating pediatric flank pain by the emergency department physician.

## References

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