

EM CASE OF THE WEEK

BROWARD HEALTH MEDICAL CENTER DEPARTMENT OF EMERGENCY MEDICINE

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I think I have a kidney stone ☹️



It is important to understand the differences in the work up of urolithiasis in the emergency department in pregnant patients vs. the non-obstetric patient. This month we explore the facts about kidney stones in pregnancy.

EM CASE OF THE WEEK

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.



Urolithiasis in Pregnancy

A 27 year old female G1P000 with no significant past medical history presents to the ED with a 2 day history of 8/10 left sided, colicky flank pain and blood in her urine. She denies any medication usage other than prenatal vitamins and denies any smoking, drinking, or illicit drug use. She does have a family history of kidney stones, however. Her vital signs are T 98.7, HR 76, RR 16, BP 118/76, O2 sat 100% on room air. Physical examination was benign except for mild left-sided CVA tenderness. She is triaged and sent to the medium acuity side of the emergency department with a b-HCG and urinalysis ordered. Which of the following tests is not recommended in the work-up of a pregnant female with renal calculi?

- A. b-HCG and urinalysis
- B. Contrast-enhanced CT of the abdomen and pelvis
- C. Well-hydrated bilateral renal ultrasound
- D. Low-dose non-contrast CT of the abdomen and pelvis
- E. Magnetic Resonance Urography non-contrast of the abdomen and pelvis



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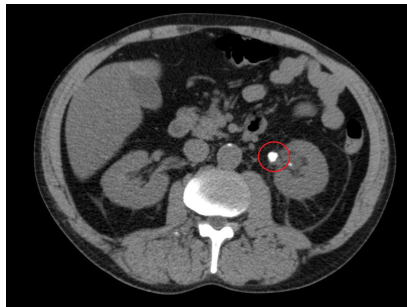


Figure 1

http://www.mghradrounds.org/index.php?src=genodocs&link=2003_november

Urolithiasis in Pregnancy

The correct answer is B. Contrast does not help identify urolithiasis in any population. Rather, contrast is more effective in visualizing enhancing lesions such as abscesses or cancer. All females who have the potential to become pregnant should have a urine pregnancy test conducted prior to any kind of imaging modality that may demonstrate exposure to ionizing radiation. Patients with suspected urolithiasis should also have an initial urinalysis conducted to demonstrate any blood in the urine.

A well-hydrated bilateral renal ultrasound is the first imaging modality that should be conducted in any pregnant female with a suspected kidney stone. If the clinician suspects a distal obstruction as evidenced by a physical examination that elicits pain in the pelvic region or groin, a transvaginal ultrasound may be warranted. Low dose non-contrast CT of the abdomen and pelvis is safe and is the most sensitive and specific imaging modality for evaluating stone disease. Non-contrast Magnetic Resonance Urography is also a potential choice to image a pregnant female with suspected urolithiasis. However, due to the expensive cost of MRI and lengthy time to conduct the imaging, this is rarely utilized in the Emergency Department.

Discussion:

Females undergo numerous physiological adaptations when they become pregnant. There is an increase in cardiac output, ultimately leading to an increase in renal blood flow, and an increase in the glomerular filtration rate (GFR). There is also a hydroureteronephrosis of pregnancy secondary to the gravid uterus compressing the ureters. Furthermore, women have urinary stasis and diminished fluid intake secondary to compression of the bladder by a gravid uterus. The increases in RBF and GFR ultimately lead to an increased sodium, urine calcium, and uric acid, all of which are risk factors for stone formation. However, the overall risk of stone formation does not increase because inhibitors of stone formation such as citrate, magnesium, and glycosaminoglycans are also filtered.

Take Home Points

- The initial step in diagnosing urolithiasis in a pregnant female is to obtain a b-HCG as well as urinalysis to look for hematuria.
- A well-hydrated b/l U/S is the initial imaging modality that should be used in the evaluation of these patients.
- Low-dose non-contrast CT of the abdomen and pelvis is a safe option in evaluating a pregnant patient with presumed stone disease. All risks and benefits of the procedure should be discussed between the physician and patient prior to imaging.
- Patients with stones < 5 mm have a spontaneous rate of passage of approximately 80%. Therefore, medical expulsive therapy is the treatment of choice. Patients with stones >5 mm should be referred to a urologist for definitive management.

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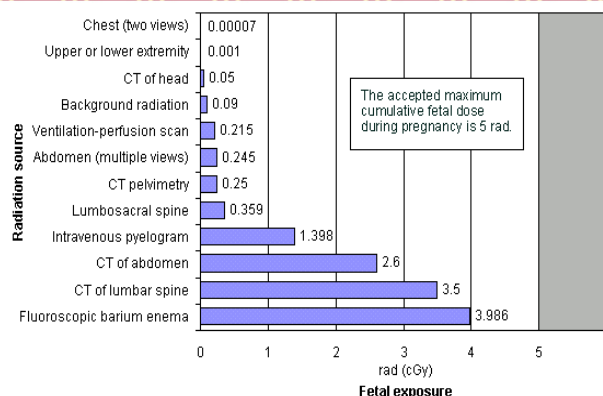
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and click on the "Conference" link. All are welcome to attend!

Epidemiology. Renal colic is the most common non-obstetric cause of hospitalization during pregnancy. It is estimated that approximately 1 in 1500-3000 pregnant women will suffer from symptomatic stone disease. Complications of stone disease and renal colic during pregnancy include obstruction, uncontrolled pain, preeclampsia, premature rupture of the membranes, and premature onset of labor. Colicky flank pain is noticed in 85-100% of patients with confirmed stones. 75-95% of patients will have microscopic hematuria. 80-90% of stone cases during pregnancy occur in the second and third trimester.

Imaging. Well-hydrated U/S is the first line recommended imaging modality in pregnant patients with suspected stone disease for any gestational age. However, U/S is often unable to delineate between the physiologic hydroureteronephrosis of pregnancy vs. that caused by an obstructing stone. Non-contrast CT is the gold standard for nephrolithiasis in the non-pregnant patient with sensitivity and specificity approaching 99%. In pregnancy, if CT is utilized, low dose CT averages less than 1 rad/exam. However, many physicians are still hesitant to expose pregnant females to ionizing radiation during pregnancy.

It is for these reasons that numerous societies have put forth recommendations in regards to fetal exposure to radiation. The National Council on Radiation Protection and Measurements states that the fetal risk of abnormality is negligible at 50mGy (5rad) or less. This is a cumulative dosage effect over the course of a single pregnancy. The American College of Obstetrics and Gynecology (ACOG) stated that exposure to less than 5 rads has not been associated with an increase in fetal anomalies or pregnancy loss. Table-1, as shown to the right, demonstrates fetal exposure to radiation for various imaging modalities. A multicenter longitudinal study consisting of 51 pregnant patients who had confirmed urolithiasis demonstrated by ureteroscopy showed the following sensitivity values for different imaging modalities: U/S + low dose CT = 95.8%, U/S + MRI = 80%, and U/S alone = 77%.



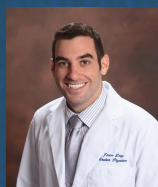
Medical Management and Treatment. IV Hydration is vital to help encourage stone passage. Pain control is the basis of medical management. Oral or IV opiates are the first line therapy. Acetaminophen has sufficient efficacy and safety throughout pregnancy as well. NSAID's are discouraged in pregnancy secondary to bleeding risks and a risk of oligohydramnios, spontaneous abortion, and closure of the ductus arteriosus. Anti-emetics can be given if necessary.

Conservative treatment including watchful waiting is successful in approximately 48-65% of patients. The patient's urine should be strained for fragments. Alpha blockers such as Flomax (Tamsulosin) are category B medications and can be used during pregnancy, but evidence of any benefit is unclear.

If the patient is in the 1st or 2nd trimester and fevers, severe kidney injury, or sepsis occur, nephrostomy tubes are the first line treatment for decompression, followed by stent placement. During the 3rd trimester, stent placement is the first line treatment for decompression, followed by nephrostomy tube placement.

Ureteroscopy offers definitive treatment and is clinically recommended over delayed treatment and minimizes repeat procedures. Stone free rates are btw 70 and 100%.

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 This month's case was written by Jason Levy. Jason is a 4th year medical student from NSU-COM. He did his emergency medicine rotation at North Broward Medical Center in November 2015. Jason plans on pursuing a career in Urology after graduation.