Bilateral obstructing ureteric calculi in pregnancy: a rare cause of acute renal failure

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Bilateral obstructing ureteric calculi is a rare cause of acute renal failure. Although urolithiasis in later pregnancy is not uncommon, the development of bilateral obstruction secondary to ureteric calculi in the first trimester is rare and poses difficulty to diagnosis and management. Symptoms of diseases and physiological changes associated with pregnancy can obscure diagnosis of urolithiasis and obstructive uropathy. Advances in minimally invasive endourology afford intervention with reduced risk to fetal health. We present the second case of acute renal failure caused by bilateral obstructing ureteric calculi in a pregnant patient and discuss current management algorithms for this group.

Key Words: pregnancy, urolithiasis, bilateral, obstruction, acute renal failure

Introduction

Bilateral obstructing ureteric calculi is a rare cause of acute renal failure (ARF) within all population groups.[1] Although urolithiasis is common in the second and third trimesters of pregnancy, only one case of bilateral obstructing ureteric calculi accurately diagnosed in pregnancy has been described to date.[2]

Acute abdominal and flank pain during pregnancy presents a diagnostic dilemma and up to 28% of patients with acute renal colic are misdiagnosed with other intra-abdominal disorders such as appendicitis, diverticulitis, or placental abruption.[3] This could be attributed to a limitation of safe and accurate diagnostic imaging modalities in pregnancy, leading to the inherent reliance on renal ultrasound (USS) which can miss up to 40% of renal calculi.[4] We herein present a rare case of bilateral distal ureteric calculi causing obstruction and subsequent ARF in a young female patient in the first trimester. In this article we discuss the current literature specifically regarding the challenges of diagnosis and current management of urolithiasis in pregnancy.

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Case report

A 27-year-old gravida-2 parity-0 (G2PO) female at 12 weeks gestation presented to the emergency department with left sided abdominal pain on a background of persistent nausea and vomiting. Antenatal investigations were normal up to date. She had no history of per-vaginal bleeding or voiding symptoms suggestive of irritation or infection. A renal and trans-abdominal USS identified mild unilateral hydronephrosis and no evidence of urolithiasis. Ureteral jets were assessed bilaterally and were absent. A live intra-uterine pregnancy was confirmed. The patient was admitted for medical management of nausea and intravenous (IV) hydration. Within hours of admission the patient's clinical condition rapidly deteriorated. She developed severe generalized abdominal pain and increased opioid analgesic requirements. She was tachycardic with a low grade fever of 37.6 degrees Celsius but remained normotensive. Respiratory rate and oxygen saturations were normal. On examination she displayed signs of dehydration, including oliguria, and had generalized abdominal tenderness with guarding.

Blood laboratory results indicated the presence of acute renal impairment and abnormal liver function, Figure 1. In the setting of identified hydronephrosis, significant opioid resistant pain, microscopic hematuria and persistently rising creatinine (peak 365 umol/L), Figure 1, despite appropriate IV rehydration, a low radiation dose protocol non-contrast CT abdomen and pelvis was performed. This demonstrated two small (4 mm) bilateral obstructing ureteric calculi at the vesico-ureteric junction (VUJ), Figure 2, with prominent peri-nephric fat stranding, Figure 3.

Urgent transfer was made to a tertiary center for immediate urological review and insertion of bilateral ureteric JJ stents. The patient was managed on intensive care unit (ICU) with IV antibiotics and aggressive fluid resuscitation for post-obstructive diuresis. She was discharged on oral antibiotics and successfully delivered her baby at term. She returned once during her pregnancy at 32 weeks for bilateral stent change, which was completed without complication. She was then reviewed post-partum for definitive management of her ureteric stones, and subsequently underwent successful bilateral ureteroscopy (URS) and laser lithotripsy with complete stone clearance.

Figure 2. Non-contrast CT abdomen/pelvis with bilateral obstructing ureteric calculi (arrows)

Figure 3. Non-contrast CT abdomen/pelvis with prominent perinephric stranding.

	Day 0	15hrs	18hrs	24hrs	Day 2 Midday	Day 2 Evening	Day 3 Ureteric stents inserted	Day 4	Day 5	Day 6	Day 7
Hb	14.7	13.3	12.3	13.0	12.0	12.0		11.2	10.2	9.9	9.7
WCC	10.6	11.2	**13.6**	**22.0**	**19.1**	**19.2**		**11.2**	9.2	7.2	6.4
Nt	8.6	9.6	**12.1**	**17.2**	**17.6**	**17.7**		**9.9**	7.7	5.7	4.5
K	3.1	3.3	3.3	3.5	3.5	3.3		3.7	3.7	4.1	4.1
Urea	2.0	1.5	2.0	2.5	3.4	4.6		4.8	3.6	3.3	2.2
Creatinine	45	**89**	**135**	**232**	**291**	**365**		**343**	**73**	34	28
ALT	**202**	**153**	**116**	**87**	**50**	31		6	<3		
AST	**92**	**71**	**57**	**47**	**35**	31					
Bili	**28**	**25**	**29**	**32**	**28**	**25**		**30**	**35**		
GGT	**114**	**85**		**70**	**58**	**57**		**50**	**46**		
CRP		**20**	**35**	**124**	**205**	**293**				**62**	**28**

Figure 1. Blood results over course of admission.

Discussion

Post-renal obstruction accounts for 5% to 15% of cases of ARF but bilateral obstructing ureteric calculi remain a rare cause.[1] Urinary calculi are more common in the second and third trimesters of pregnancy with flank pain as the most frequent primary presenting symptom. In our reported case the presenting symptoms were atypical. Persistent nausea and vomiting in early pregnancy are usually associated with a diagnosis of hyperemesis gravidum rather than renal colic. Although initial renal USS showed unilateral hydronephrosis it is widely accepted that this can be a normal physiological finding in pregnancy occurring in up to 90% of pregnant women.[5] Due to the inherent risks of radiation to the fetus, ultrasound is recommended as the first imaging modality used in the investigation of suspected renal colic in pregnant women. Unfortunately, with a sensitivity of approximately 60% for detecting calculi in the urinary tract[4] it is often unhelpful in guiding management and may lead to diagnostic delay in the setting of this falsely "normal" result in pregnancy. Further changes seen during pregnancy such as increased renal blood flow (resulting in saturation of urinary calcium, sodium and uric acid[5]), hormonal influences of progesterone and mass effect from a gravid uterus causing ureteric compression, particularly in the third trimester, can all contribute to the promotion of urolithiasis.[6,7]

Investigations involving radiation, such as CT, must be used judiciously in pregnant patients especially during the first trimester when fetal development can be severely affected by radiation or other teratogens. Ideally these should be reserved as second or third line diagnostic tools and only performed in extreme circumstances when a positive result will result in a change in definite management of the patient. At a dose of 10 Gray (Gy) the risk for fetal malformation is increased by approximately 5% but inherent difficulties in calculation of true radiation exposure arise due to differences in fetal depth from exposure radius and the size of the mother.[5] Some have suggested that reserved use of these scans in exceptional circumstances may be appropriate and that radiation based imaging should not be entirely excluded.[8]

Management of obstructive urolithiasis in pregnancy is fraught with challenges. As with non-pregnant patients the diagnosis of bilateral obstruction requires immediate surgical intervention in form of percutaneous antegrade or endoscopic retrograde ureteric stent insertion to ensure urinary decompression and drainage.[9] With the advancement of minimally invasive treatment options such as ureteroscopy, laser lithotripsy and ureteric stenting under vision, techniques that expose the mother and fetus to radiation can potentially be avoided. These procedures can now be performed with relative safety and efficacy in pregnancy provided they are performed by experienced endourologists in high volume centers.[10]

Conclusion

Abdominal pain in pregnancy delivers a significant diagnostic challenge. Thorough evaluation is warranted and judicious use of imaging modalities especially those with radiation should be carefully considered. Although many instances of urolithiasis in pregnancy resolve with conservative management, bilateral obstruction in the setting of physiological compromise remains a surgical emergency. Ongoing developments in minimally invasive endourology continue to evolve and current best clinical practice relies on risk stratification to mother and fetus. Techniques such as ureteroscopy and placement of ureteric stents, with or without the removal of calculi, offer intervention that is relatively lower risk than other techniques that are becoming less common. The physiological changes associated with pregnancy and symptoms associated with hyperemesis gravidarum can contribute to the difficulty in diagnosis of obstructive uropathy in pregnancy. Our reported case is a reminder that all diagnostic possibilities should be considered in the expectant mother and that the use of radiation is occasionally warranted, especially in those with physiological compromise. □

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