

Management of Renal Colic during Pregnancy

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Abstract

To determine an optimal medical and invasive intervention for renal colic patients during pregnancy. Among the available interventions, we investigated the reliability of a medical and invasive interventions during pregnancy. Between Nov 2015 and Nov 2016, a total of 200 pregnant patients came to the obstetrics and gynaecology opd, and 15 of these patients had renal colic that were referred to urological opd. The mean patient age was 30.49 years. In this retrospective cohort study, the charts of the patients were reviewed to collect data that included age, symptoms, the lateralities and locations of urolithiasis, trimester, pain following treatment and pregnancy complications. Based on ultrasonography diagnosis, 15 patients had urolithiasis, all had ureteric calculi with one having hydronephrosis and pyonephrosis and other one patient having severe hydronephrosis, pyonephrosis and sepsis. Conservative treatment was successful in 13 patients. Five patients were in the first trimester and ten patients in the second trimester. Out of the five patients in the first trimester four were managed conservatively using antibiotics, hydrations and analgesics and one among them had severe hydronephrosis with pyonephrosis with sepsis with upper ureteric calculi in whom conservative management failed and patient was counselled and MTP was done and following that PCNL was done as a definitive procedure. Ten patients in the second trimester medical expulsive therapy using Tamsulosin .4mg was used and complete stone clearance was achieved in Nine patients and one didn't responded , developed severe hydronephrosis and pyonephrosis in whom USG guided PCN was placed for rest of the gestational period and after delivery patient underwent PCNL and complete stone clearance was achieved. Only one patient required urological intervention that is PCN insertion. Renal colic due to calculus during pregnancy can be effectively managed by conservative measures using hydration, antibiotics, analgesics and tamsulosin .4mg in most of the instances. Cases who do not respond to the conservative measure or who develops severe hydronephrosis, pyonephrosis PCN insertion and Ureteral stent insertion can be done and patient in who develops life threatening sepsis MTP should be done followed by definitive treatment that is PCNL.

Key Words

Urinary catheters, Renal colic, Hydronephrosis, Urolithiasis, Pregnancy

Introduction

Unlike the abdominal discomfort that is frequently observed during pregnancy, renal colic while often infrequent during pregnancy is potentially dangerous because it can lead to hospitalization and adverse effects for both the mother and the fetus.(1)

One of the main causes of renal colic is urolithiasis.(2,3) The incidence of symptomatic urolithiasis during pregnancy varies widely from 1/200 to 1/2,000 women, and this incidence is not different from the incidence that has been reported in the non-pregnant female population of

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reproductive age.(4) The occurrence of a urolithiasis during pregnancy is a risk to both the mother and fetus and may be a contributing factor in premature birth.(5,6)

Furthermore, normal anatomic changes within the urinary tract of the pregnant patient may not only predispose the patient to urolithiasis formation but may also pose a diagnostic challenge. Physiologic hydronephrosis can occur in 90% of right kidneys and up to 67% of left kidneys during pregnancy.(7) The predominance of right upper tract dilation compared to that of the left may be caused by a combination of various factors that include the preferential compression of the right ureter due to uterine dextrorotation and the protection of the left ureter by the gas-filled sigmoid colon.(8)

Regarding the treatment of renal colic during pregnancy, conservative management results in spontaneous calculi passage in approximately 70-80% of pregnant women.(9,10) In cases in which invasive interventions are required, ureteral stent insertion and percutaneous nephrostomy (PCN) are preferred and less invasive interventions. Ureteroscopic stone removal is also occasionally performed.

In this study, the reliability and stability of ureteral stent insertions in pregnant patients with renal colic following unsuccessful conservative treatments were analyzed.

Material and Methods

This is a retrospective cohort study conducted in Dept. of Gynaecology and Obstetrics and Dept. of Surgery in Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu after approval from institutional ethical committee. Between Nov 2015 and Nov 2016, a total of 200 pregnant patients came to obstetrics and gynaecological opd. Of these patients, 15 patients had renal colic that were referred to urological opd. In this study, the charts of the patients were reviewed to collect data that included age, symptoms, the laterality of renal colic, sizes and locations of urolithiasis, trimester of diagnosis, pain after treatment and pregnancy complications. The pregnancy complications included preterm labor, preterm premature membrane rupture, and

pre-eclampsia. The diagnoses of urolithiasis in the pregnant women were based on the clinical presentation, the presence of microscopic hematuria on urinalysis and transabdominal ultrasonography.

Cases with demonstrable hydronephrosis and no evidence of calculi were classified as having renal colic attributable to physiological hydronephrosis consistent with pregnancy. Microscopic hematuria was defined as >5 red blood cells/high power field (RBCs/HPF), and pyuria was diagnosed when >5 white blood cells/high power field (WBCs/HPF) were observed.

Conservative management included observation with hydration or analgesics, antibiotics when bacterial infections were present and use of medical expulsive therapy Tamsulosin .4mg.

The urological interventions included ureteral stent insertion, PCN, and ureteroscopic stone removal and were considered when renal colic resistant to pharmacological treatment, sepsis, or obstruction of a solitary kidney were present. The follow-up information included the outcome for the infant and the additional procedures that were required after the initial procedures.

Results

Of the total fifteen patients with renal colic, ten patients (66.7%) were in the second trimester, five (33.3%) were in the first trimester.

The mean patient age at presentation was 30.49 ± 3.24 years.

Eleven renal colic patients (73.3%) had right-sided colic, and four patients (26.7%) had left-sided colic.

The clinical features included gross hematuria in five patients (33.3%), fever in four patients (26.7%), and increased urinary frequency in two patient (13.3%).

The laboratory tests revealed microscopic hematuria in twelve patients (80%) and pyuria in eight patients (53.3%). Asymptomatic urinary tract infections were found in six patients (40%), and pyelonephritis was observed in one patient (6.7%), hydronephrosis in three patients (20%) and sepsis in one patient (6.7%).

Based on ultrasonography results, fifteen patients were diagnosed with urolithiasis, Among the patients with

Table1. Detail of Calculi

<i>Stone Location</i>	<i>No. of patients</i>
Proximal ureteric calculi	6(40%)
Distal ureteric calculi	8(53.3%)
Renal calculi with proximal ureteric calculi	1(6.7%)

Table2. Detail of Pregnancy and Calculi

<i>Trimester</i>	<i>No. of pregnancy(%)</i>
First (n=5)	
Conservative management	4 (80%)
MTP	1(20%)
Second (n=10)	
Conservative management	9(90%)
Ureteral stent insertion	0
PCN	1(6.7%)

Table3. Detail of Pregnancy and Calculi as per Trimester

	No.of pregnancy (%)
Trimester	
First	5(33.3%)
Second	10(66.7%)
Third	0
Laterality	
Right	11 (73.3%)
Left	4(26.7%)
Accompanied symptoms and signs	
Gross hematuria	5(33.3%)
Fever	4 (26.7%)
Urinary frequency	2(13.3%)
Microscopic hematuria	12 (80%)
Pyuria	8(53.3%)
Asymptomatic urinary tract infection	6(40%)
Pyelonephritis	1(6.7%)
Hydronephrosis	3(20%)
Sepsis	1(6.7%)

urolithiasis, the sizes of the calculi varied from 2 mm to 10 mm (mean: 5.2 mm). Regarding their locations, distal ureteral calculi were observed in eight patients, proximal ureteral calculi were found in six patients, and proximal ureteric calculi with nephrolithiasis was observed in one patient. Management was initially conservative for all patients. Conservative treatment was successful in 13 patients. Five patients were in the first trimester and ten patients in the second trimester. Out of the five patients in the first trimester four were managed conservatively using antibiotics, hydrations and analgesics and one among them had severe hydronephrosis with pyonephrosis with

sepsis with upper ureteric calculi in whom conservative management failed and patient was counselled and MTP was done and following that PCNL was done as a definitive procedure. Ten patients in the second trimester medical expulsive therapy using Tamsulosin .4mg was used and complete stone clearance was achieved in Nine patients and one didn't responded , developed severe hydronephrosis and pyonephrosis in whom USG guided PCN was placed for rest of the gestational period and after delivery patient underwent PCNL and complete stone clearance was achieved. Only one patient required urological intervention that is PCN insertion.

Table4. Detail of Pregnancy and Renal Calculi as per Trimester

	No. of pregnancy (%)
Diagnosis	
Urolithiasis	15
Hydronephrosis	3(20%)
Hydronephrosis with pyonephrosis with sepsis	1(6.7%)
Treatment	
Conservative management	15
With antibiotics,hydration,analgesics and Tamsulosin	10(66.7%)
With antibiotics, hydration and analgesics only	4(26.7%)
Invasive intervention	
Ureteral stent insertion	0
Percutaneous nephrostomy	1 (6.7%)
MTP	1(6.7%)

None of the patients underwent ureteroscopic stone removal or open surgery. One PCN insertion was done in a case of severe hydronephrosis which didn't responded to conservative measures. One pregnancy in the first trimester was terminated due to severe hydronephrosis, pyonephrosis and sepsis after proper counseling of the patient and later patient was taken up for PCNL.

Discussion

The diagnosis of renal colic in pregnancy is based on clinical symptoms and findings from radiographic imaging modalities. The use of imaging to investigate conditions such as urolithiasis or hydronephrosis in pregnant women remains controversial due to the potential teratogenic, carcinogenic, and mutagenic risks to the fetuses. Computed tomography exposes the fetus a momentous radiation dose. Single-shot intravenous pyelography involves the acquisition of a single radiograph 30 minutes after the introduction of contrast medium and is considered to be confirmatory in up to 96% of patients.¹¹ A series of intravenous urography procedures delivers the fetus to a mean radiation dose of 1.7 mGy and a maximal dose of 10 mGy. In contrary, a single X-ray exposes the fetus to a mean radiation dose of 1.4 mGy and a maximal dose of 4.2 mGy.² Therefore, before deciding to choose a suitable imaging modality, pregnant women should be provided with detailed cautions about the teratogenic, carcinogenic, and mutagenic risks to the fetuses which are associated with each imaging technique.

Transabdominal ultrasonography is considered to be the imaging method of choice for routine evaluations of renal colic in pregnant women because it has no risk of radiation exposure. Moreover, in the diagnosis of urolithiasis, transabdominal ultrasonography has an appropriate sensitivity and specificity of 34% and 86%.^(12,13,14)

The management of renal colic during pregnancy is principally conservative. Approximately 70-80% of women with symptomatic hydronephrosis or urolithiasis during pregnancy are sufficiently treated with hydration, analgesics and antibiotics. Additional further medical

treatments are needed in 20-30% of women. Those therapeutic procedures are epidural block for pain relief and the use of beta-adrenoreceptor blockers.⁽⁵⁾ Beta-adrenoreceptor blockers are thought to stimulate the contractility of the renal pelvis and ureter and thus increase the urine flow rate and assist in the spontaneous expulsion of urolithiasis.⁽⁶⁾

The indications for invasive treatment are the severe pain which is resistant to pharmacological treatment, sepsis, and obstruction in a solitary kidney. In pregnant women, ureteral stent insertion and PCN have been used to treat renal colic because these techniques are minimally invasive and are used as the gold standard for the surgical treatment of renal colic in pregnancy. These techniques also have the advantage that they can be performed under local anesthesia. The goal of treatment is to relieve the obstruction and prevent further regression in renal function. PCN is very effective in this scenario. In pregnancy, ureteral stent insertion can be performed through ureteroscopy and the location of the ureteral stent could be confirmed by ultrasonography. Ureteral stent insertion is as effective as PCN and considered to be a safe and effective first-line intervention for later stage pregnant patients with hydronephrosis or urolithiasis.⁽¹⁵⁾ Both ureteral stent and PCN therapies should be exchanged periodically to avoid incrustation.

Additionally, ureteroscopic stone removal during pregnancy is a safe procedure that can be performed with a rigid, semi-rigid, or flexible instrument.⁽¹⁶⁾ Ureteroscopic stone removal, on the other hand, typically requires general anesthesia and has the possibility of ureteral perforation and sepsis. Ureteroscopic stone removal should be avoided during the third trimester due to the anatomical changes in the bladder that are secondary to compression by the gravid uterus.⁽¹⁷⁾ Johnson *et al.*⁽¹⁸⁾ and Lifshitz and Lingeman⁽¹⁹⁾ found no statistically significant risk factors for the development of an obstetric complication following ureteroscopic stone removal during pregnancy.

During pregnancy, percutaneous nephrolithotomy (PCNL) is not advised, nonetheless there have been two

case reports which informed successful PCNLs in early pregnancy.(20,21) Extracorporeal shockwave lithotripsy is contraindicated in pregnant patients due to the effects of the shockwave on the fetus, which can cause a miscarriage.(22)

Conclusion

In this study, we mainly considered what should be done in cases of renal colic due to stones in pregnancy. In most of the cases conservative management in the form of antibiotics, hydration, analgesics and medical expulsive therapy using Tamsulosin .4mg resolve most of the renal colics. Patients in whom conservative management fails PCN insertion is a safe alternative and pregnancy can be continued and after delivery patient can be later on taken up definitive treatment using PCNL. In cases where there is severe hydronephrosis, pyonephrosis and life threatening sepsis not responding to conservative treatment patients should be counselled for MTP.

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