

# Assessment of ureteroscopy during pregnancy



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## INTRODUCTION

Urolithiasis during pregnancy is an infrequent condition, with an incidence of 0.026 to 0.531 percent in the medical literature (1). Renal colic is the most common presentation of urolithiasis, as well as the most common nonobstetric cause of hospitalization during pregnancy and a predetermining factor of premature labor especially if accompanied by urinary tract infection(2, 3). In approximately 70 percent of the cases the stone is passed spontaneously with the use of analgesics and hydration. (4-7) In other cases the onset of infection, fever and refractory ureteral colic require a variety of endourologic actions such as stent placement treatment(8).

The diagnosis of ureteral calculi in pregnant women is often difficult because of the serious risks presented by radiation exposure, especially during the first trimester. As such, the diagnosis is best based on clinical data, urinalysis and ultrasound examinations; however, ultrasound does not always provide a clear diagnostic picture, even though at times color flow Doppler ultrasound may be useful (9). Further diagnostic efforts are indicated when the patient has intractable pain or upper urinary tract infection, or if renal function is decreasing for which a more precise diagnosis aims at specific treatment. In this situation ureteroscopy was considered a useful option, since it combines the diagnostic procedure with definitive treatment(10).

Because of the recent advances in the techniques and technology in the field of ureteroscopy, the new and thinner semirigid and flexible ureteroscopes have allowed easy access to the ureter without any need for dilation and with minimal manipulation. (11) Ureteroscopy can be performed successfully

for ureteral calculi in pregnant women and stones can be removed with the stone basket or fragmented with ultrasonic ballistic or laser lithotriptors under sedation-analgesia (12-14). Ureteroscopy can be performed with greater care when the patient is under sedation-analgesia than if spinal or general anesthesia is used, since the patient can collaborate during the procedure. Therefore, sedation-analgesia may be preferred when ureteroscopy is performed in pregnant patients (15, 16). For reasons mentioned above, we have started use of minureterscopes for managing pregnant patients with complicated stone disease not responding to medical measures and herein we present our experience with 15 patients.

## **PATIENTS AND METHODS**

Between 2000 and 2005 we performed ureteroscopy and ureterolithotripsy on 15 pregnant patients 21 to 32 years old. All patients underwent extensive diagnostic evaluation including urinalysis, urine culture and antibiogram, complete blood picture, bleeding and coagulation times, renal and liver function tests as well as, complete abdomino-pelvic ultrasound, and an accurate obstetrical examination to evaluate the fetal condition.

The women were placed on the operating table in an oblique position with the left side down when necessary to decrease the pressure of the pregnant uterus on the inferior vena cava. Sedation-analgesia with 2.5 mg midazolam and 50 mg pethidine intravenously was used in the first 7 patients. In the following 8 cases 10 mg nalbuphine HCL was used in addition to midazolam. Prophylactic therapy with ampicillin/ sulbactam 1.5 gm was administered before the procedure. Ureteroscopy was performed with ultrasound monitoring. The use of ionizing radiation was avoided before, during and

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after the procedures. Constant obstetrical monitoring was available throughout the procedures.

All patients underwent ureteroscopy with thin rigid 7.0F ureteroscopes without dilation of the ureteral meatus. We used either the micro-six ACMI ureteroscope or Karl-Storz 6.9 F semirigid ureteroscope. Floppy tip guide wire 0.035 was inserted over a 6 F open tip ureteric catheter through the 22 F cystoscopy. The wire was advanced first to the collecting system where it has been fixed. In cases with difficult guide wire insertion through the cystoscope, direct ureteroscopy was then performed and a safety wire was inserted through the ureteroscope. Then the ureteroscope was advanced alongside the wire and visualization of the whole ureter was done. Once a stone is visualized a decision was made in regard to the best means of extraction. Factors, such as size, amount of speculation, degree of impaction, location within the ureter and condition of the distal ureter, were considered. Our method of choice was the use of the stone basket under direct vision. If the size of the stone precluded the use of the basket technique, we elected to disintegrate the stone using pneumatic intracorporeal lithotripsy. At the end of the procedure, a double pigtail ureteral stent or external ureteral catheter was placed in the ureter to avoid partial urinary obstruction and flank pain due to mucosal edema. If external stent was used, it is tied to a Foley catheter. The Foley and ureteral catheters were removed within 1 to 2 days.

The operating time, hospital stay, perioperative and postoperative complications, outcome of the pregnancies and deliveries, and condition of

the neonates postpartum were all recorded. All women underwent PUT and abdomino-pelvic ultrasound 6weeks after delivery.

## RESULTS

The mean age of our patients was 25. 3 years (range 21-32 years) and the mean gestation time was 28 weeks (range16-32 weeks). The main presenting symptoms and indication of surgical intervention were recurrent ureteric colic not responding to analgesics, fever, recurrent UTIs, and hematuria (table1).

Urine culture was positive for ampicillin-sensitive strains of E-coli and proteus vulgaris in 3 patients. Macroscopic hematuria was found in 3 patients while microscopic hematuria was present in in 2 patients. Leukocytosis was found in 2 patients. Ultrasonography showed dilation of the renal pelvis in all cases and stones were identified in 8 cases. Upper ureteral stones were found in 3 patients while lower ureteric stones were diagnosed in 5 patients. The mean stone size diagnosed with ultrasound was 0. 6cm (range from 0. 5-1. 2 cm). Ureteroscopy was done for all cases with the entire ureter examined without the need for ureteric orifice dilatation. Stones were extracted from the lower ureter by Dormia basket in 7 patients. Stone fragmentation with the pneumatic lithotripter was used for stones above the iliac vessels in 6 cases and no stones have been found in 2 patients (table 2).

A double pigtail ureteral catheter was inserted in 8 cases (6 patients with fragmented calculi and the 2 cases with no confirmed stone) and ensured to be in the proper position by watching its distal end in the bladder and monitoring of the upper end curling in the renal pelvis through ultrasound

examination. In the 7 patients with extracted calculi, a 6 F ureteric catheter was inserted for one or two days postoperatively.

Duration of the procedure ranged from 15-30 minutes and obstetric monitoring showed no signs of fetal distress or pre-term delivery. No complications encountered and convalescence was uneventful. Patients who had pain were improved remarkably and fever disappeared within the next 24 hours after the procedure. Patients were discharged home 72 days after the procedure and the external ureteric catheter was removed. Patients with double J stenting had their stent removed after labor in the two patients with negative ureteroscopic finding while patients underwent stone fragmentation had stent withdrawal after 3 weeks. All pregnancies progressed to full term delivery. Five patients had an elective Cesarean section as they had a history of previous section and no fetal abnormalities were detected. The follow up PUT and U/S performed 6 weeks postpartum revealed disappearance of renal pelvis dilatation and no calculi were found in all patients.

## **DISCUSSION**

The first publications on ureteroscopic diagnosis and management of ureteral calculi during pregnancy appeared in 1988. 12 The differential diagnosis of ureteral calculi versus physiological dilatation in pregnancy was rendered possible by this procedure with great assistance in management. Using ureteroscopy and stent placement, under ultrasound monitoring, was an important step forward in stone manipulation during pregnancy (12, 13). It was supposed that anatomic distortions caused by the fetal presence would not allow the introduction of the rigid ureteroscope and this procedure could be of high risk to the pregnancy. However, it was proved that the

natural ureteral dilation in pregnancy facilitates the introduction of the ureteroscope and the procedure could be performed easily by following the usual rules, except for the use of fluoroscopy (17).

The diagnosis of ureteral calculi in pregnant women is often difficult because of the serious risks presented by radiation exposure, especially during the first trimester(9). Several investigators have highlighted the problems related to the exposure of the pregnant patients to x-rays in regard to the incidence of tumors in children who were irradiated during fetal life(9, 18). Therefore, the use of x-ray for the diagnosis or management of stones during pregnancy remains controversial (19).

Ultrasonography is the main diagnostic method in these cases, because besides its non-invasive nature, it does not use radiation, and is universally available (3, 8). However, Ultrasound does not always provide a clear diagnostic picture, even though at times color flow Doppler ultrasound by using resistive indices may be useful (10). In our study, we avoided the use of x-ray for the diagnosis of stones during pregnancy and we depend mainly on clinical diagnosis and ultrasound examination. Renal pelvic dilatation alone or combined with calyceal dilatation was diagnosed by U/S in our patients and ureteral stones were found in 8 (61. 5%) out of 13 ureteroscopically confirmed stones. Although U/S is safe under all circumstances of pregnancy, its utilization in diagnosing obstruction is of limited value owing to its sub-optimal view of the ureter and presence of hydroureteronephrosis as a physiologic concomitant of pregnancy.

Hematuria, both macro and microscopic, is a frequent sign, but is not specific (4, 8, 20) while urinary tract infection is present in 20 to 45% of the cases of calculus during pregnancy (1, 21-22). Among our patients, hematuria was present in 5 (33. 3%) patients and asymptomatic bacteriuria was detected in 4 (26. 7%) patients while pyelonephritis complicated 2 (13. 3%) pregnant women.

In the early protocols for stone management in pregnant patients, the double pigtail catheters were used to treat renal dilatation and in cases of failure, an ultrasound guided nephrostomy was preferred over the risks inherent with ureteroscopy (19). Stents and drains may have many disadvantages including accidental dislodgment, obstruction or bladder irritability and unpleasant symptoms (1). In addition, incrustation on double pigtail stents with resultant obstruction is frequent in pregnant women and it is advised that stents should be changed every few weeks during pregnancy. The repeated insertions of tubes and stents may have potential risks that may be comparable to the risk associated with ureteroscopy performed as a single procedure. (11-14). In the present series, we have used the 7F semirigid ureteroscope, without need of dilating the ureteral meatus in any of the cases. In fact, this procedure is simpler than it was supposed in the past.

It was suggested that pregnant patients with ureteral calculus and fever should be treated with antibiotics and drainage by a double-J catheter. The advantage of this method is that it is an efficient and less invasive method.

Ureteroscopy was not advised in these patients because ureteral manipulation and liquid injection under pressure in the excretory system may lead to bacteruria and dissemination of the infection (23). However,

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stent should be left until the end of pregnancy, which can be a predisposing factor to infections and may cause vesical discomfort in most patients. We have used ureteroscopy in 2 pregnant patients with pyelonephritis and obstructing ureteral calculi and stones were removed and double J stents were inserted for 3 weeks without complications. Those patients were given antibiotics according to culture and sensitivity test prior to the procedure and during ureteroscopy fluid pressure was kept at minimum and non-refluxing double J stents were used.

A further advantage of ureteroscopy as a diagnostic and therapeutic option is that general anesthesia can be avoided during pregnancy. With the application of mini-ureteroscopes and small instruments, general anesthesia was replaced by sedation analgesia among our patients. This aspect has already been highlighted by others who reported on flexible ureteroscopy (12).

In conclusion, ureteroscopy during pregnancy can be performed safely under sedation analgesia for diagnosis and removal of ureteral calculi in cases of failure of conservative management in experienced centers with the use of miniureteroscopes and without using fluoroscopy.