

Ureteroscopy – First-line Treatment Alternative in Ureteral Calculi During Pregnancy?

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Rezumat

Ureteroscopy – tratament de primă linie al litiazei ureterale la gravide?

Introducere: Litiiza urinară la gravide, deși are o incidență redusă constituie o provocare atât din punct de vedere diagnostic cât și terapeutic. Scopul acestui studiu este reprezentat de evaluarea rezultatelor ureteroscopiei ca modalitate de tratament definitiv a litiazei ureterale obstruative la gravide.

Material și metodă: În perioada 2006-2012 în clinica noastră, 54 de paciente au necesitat tratament intervențional al litiazei ureterale, la 38 din acestea efectuându-se ureteroscopie retrogradă. Vârsta medie a pacienților a fost de 27,2 ani (între 20 și 37 de ani) iar perioada gestațională a fost cuprinsă între 9 și 35 de săptămâni. Cel mai frecvent simptom a fost reprezentat de durerea lombară (52/54 de cazuri), 4 paciente au prezentat febră iar în 14 cazuri s-a înregistrat simptomatologie iritativă de tract urinar inferior. Ureterosopia retrogradă semirigidă a reprezentat prima alternativă terapeutică în primele 2 trimestre de sarcină, ureterosopia flexibilă sau endoprotezarea ureterală fiind modalitățile de elecție în ultimul trimestru.

Rezultate: Ureterosopia retrogradă semirigidă a permis extragerea calculului în 28/32 de cazuri. La 17 paciente, s-a practicat litotriția calculilor cu laser Ho:YAG sau balistică, în timp ce în 11 cazuri calculii au fost extrași intacti. Complicații

intraoperatorii minore au survenit în 5 cazuri. Postoperator, au fost înregistrate 4 cazuri cu infecții urinare, 2 cu colică renală, un caz cu hematurie prelungită, în timp de 4 paciente au prezentat simptomatologie iritativă vezicală indusă de stentul ureteral. Ureterosopia flexibilă a permis rezolvarea litiazei în toate cazurile. Nu s-au înregistrat complicații secundare acestei proceduri. Toate nașterile au avut loc la termen.

Concluzii: Ureterosopia poate fi considerată o alternativă de primă linie, sigură și eficientă, de tratament a litiazei ureterale la gravide.

Cuvinte cheie: ureteroscopia retrogradă, gravide, litiază

Abstract

Background: Urolithiasis during pregnancy is not common but remains both a diagnostic and treatment challenge. The aim of the study was to assess the ureteroscopy results as definitive treatment option in pregnant women with obstructive ureteral calculi.

Material & Methods: Between 2006 and 2012, in our clinical department, 54 pregnant women underwent active treatment for ureteral lithiasis and in 38 of these cases ureteroscopy was applied as definitive therapy. The average patients' age was 27.2 years (range 20-37 years) and the gestation period varied between 9 to 35 weeks. Flank pain was the common presenting symptom (52/54 cases), 4 women had associated fever, and 14 complained of irritative voiding symptoms. Semirigid ureteroscopy was the first choice alternative for the first 2 trimesters while flexible approach or double J indwelling were preferred for patients in the last trimester of pregnancy.

Results: Semirigid ureteroscopy allowed stone treatment in 28/32 cases. In 17 patients, calculi fragmentation using

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Ho:YAG laser or ballistic lithotripsy were performed, while in 11 cases, the stone was removed intact. Minor intraoperative complications were encountered in 5 patients. Postoperatively, urinary tract infection developed in 4 patients, renal colic in 2 and prolonged hematuria in one case, while 4 patients complained of stent-induced bladder irritation. Flexible ureteroscopy was successfully completed in all patients. There were no complications related to this procedure. All pregnancies were carried out to full term.

Conclusions: Ureteroscopy may be considered a safe and effective first-line definitive therapeutic option in pregnant patients requiring intervention for ureteral stone.

Key words: retrograde ureteroscopy, pregnancy, lithiasis

Background

Urolithiasis during pregnancy is not common but still remains a difficult condition concerning diagnosis as well as treatment. It may represent a clinical dilemma due to the potential risks for both mother and fetus.

Most of the cases occur in the second or third trimester and approximately two thirds of the stones pass spontaneously with conservative treatment. (1) As the guiding therapeutic principle aims at minimizing patient and fetus' risk, Horowitz and Schmidt sustained the idea "expectant therapy for the expectant mother". (2) However, the remaining third can be intractable to analgesic treatment and cause severe pain and urinary infection, resulting in early labor. (3) In case of conservative treatment failure, inserting a JJ stent, placing a percutaneous nephrostomy tube or performing ureteroscopy constitute the primary therapeutic approaches. Among these, ureteroscopy is being reported more and more frequently as the first-line treatment. (4,5)

The aim of the present study was to assess the results of ureteroscopy as a definitive treatment option in women presenting obstructive ureteral calculi during pregnancy.

Material and Method

Between January 2006 and January 2012, 54 pregnant patients with ureteral lithiasis requiring active therapy were referred to our center. The average patients' age was 27.2 years (range 20 to 37 years) and the gestation period varied between 9 and 35 weeks.

Six patients were admitted during the first trimester, 32 in the second and 16 in the third trimester. Flank pain was the commonly presenting symptom (52/54 cases), 4 women had associated fever, and 14 complained of irritative voiding symptoms.

The evaluation protocol included blood tests, urinalysis, urine culture, blood culture if indicated, ultrasound and gynecologic consultation. Limited intravenous pyelography was used in 2 patients.

Microscopic hematuria was emphasized in 38 patients, leukocyturia in 18 and positive urine culture in 6 cases. Ultrasound revealed normal pyelocaliceal system in 3 cases, 1st degree hydronephrosis in 12, 2nd degree in 27 and 3rd degree in 12 cases. An ultrasound image of obstructive ureteral calculi was obtained in 33.3% of patients, with a mean stone diameter of 8 mm.

All patients had previously undergone initial conservative treatment. The indication for active measures was established due to the presence of fever, urinary tract infection, uncontrolled pain and progressive hydronephrosis.

The therapeutic decision was discussed in detail with each case and was based upon a locally approved informed consent.

Semirigid ureteroscopy was the first choice alternative during the first 2 trimesters (32 from 38 patients) and the flexible one (12 from 16 cases) or double J indwelling in the last trimester of pregnancy. Stenting was performed in 9 patients, of which 5 presented urinary tract infection, and 4 were in the third trimester. Percutaneous nephrostomy was applied in one case of sepsis.

No attempt was made to remove the stone in cases of urinary tract infection. Fluoroscopy was not used in any of the cases. Ureteroscopy was carried out under antibiotic coverage. Spinal anesthesia was performed in 78% of patients, while general anesthesia for the rest of 22%.

Semirigid ureteroscopy was performed using a 9.5 F device (Karl Storz GmbH, Tuttlingen, Germany) while the flexible approach was achieved with a Storz 11274AA, Olympus URF-Vo or a Storz Flex-Xc instrument.

In all patients, a safety guidewire was inserted into the affected collecting system under ultrasound control. In 32 cases, the semirigid ureteroscope was used for localizing, fragmenting or one-piece removal of the existing calculi. Ureteral dilation was necessary only in 25% of these cases. The stones were fragmented with a Swiss lithoclast or Holmium: Yttrium Aluminum Garnet (Ho:YAG) laser. If the calculi could not be visualized with the semirigid ureteroscope, flexible ureteroscopy would afterwards be performed, eventually followed by Ho:YAG lithotripsy and large fragments' extraction.

The stone location was established in accordance with the ureteroscope position inside the ureter. The flexible ureteroscope was inserted along the guidewire, without ureteral access sheath, and the calculi were fragmented using Ho:YAG laser. Ureteral double J stents were routinely placed in all patients.

The postoperative follow-up included obstetric care aiming to ensure maternal and fetal health as well as outpatient urological follow-up represented by clinical assessment, ultrasound examination, urinalysis and urine culture.

Results

Semirigid ureteroscopy allowed definitive stone treatment to be achieved in 28 of 32 cases (success rate – 87.5%). The stones were fragmented with pneumatic lithotripsy in 11

patients and using Ho:YAG in 6 patients. The stone was removed intact with a basket in 11 cases. Of the 28 stones, 14 were located in the distal, 8 in the middle and 11 in the proximal ureter.

The stones were not reached in 4 cases and a flexible ureteroscope was subsequently used. This allowed the finding and extraction of calculi which migrated into the collecting system in 2 cases, increasing the success rate of the procedure to 93.75%. In other 2 patients, only double J stent insertion was applied as a result of unreached or migrated stone.

Flexible ureteroscopy was successfully performed as first-choice option in 12 patients.

The mean stone size was 8 mm (range 4-16 mm). The mean operative time was 19 minutes and the hospitalization period was 72 hours.

A ureteral 4.7F double J stent was left in place in all patients. In 48 cases, it was removed by flexible cystoscopy under local anesthesia one week after the initial procedure. In 6 patients, the stent was extracted after successful pregnancy completion.

Minor intraoperative complications such as ureteral edema, mild ureteral laceration or bleeding were encountered in 5 patients.

Postoperatively, urinary tract infection developed in 4 patients, renal colic in 2, prolonged hematuria in one case and 4 patients complained of stent-induced bladder irritation.

Uterine contraction was observed after the procedure in one patient, but no serious obstetric or urologic complications were described in any of the cases.

All pregnancies were carried to full term and all babies were born normally.

Discussions

It was estimated that there is one case of urolithiasis requiring active treatment in every 1500 pregnancies. (6)

Symptoms caused by urinary tract obstruction during pregnancy are difficult to diagnose and treat. Investigation challenges arise from the anatomic and physiologic changes to the female urinary tract during pregnancy as well as due to the limitations on the use of ionizing radiation.

Although randomized studies in this field have not yet been accomplished, the majority of symptomatic ureteral stones pass spontaneously during pregnancy, partially caused by the normally dilated upper urinary tract during pregnancy. (1)

Renal colic and ascending urinary tract infections can turn into life-threatening sepsis and associated complications for both mother and fetus. On the other hand, the use of X-rays, anesthesia, medication and invasive diagnostic and therapeutic interventions may harm the fetus. (7,8)

However, 20% to 30% of this category of patients will ultimately necessitate some form of active treatment. Indications for intervention are largely based on individual patient factors and generally include uncontrolled pain, sepsis, progressive hydronephrosis, obstructed solitary kidney, bilateral obstruction, obstetric complications (premature labor onset,

pre-eclampsia) and poor access to urological care/equipment. (9)

Preoperative counselling is intended to make the patient aware of the nature of the proposed intervention, the potential risks for both the mother and the fetus, alternative therapies and locally available expertise. It is also imperative that a multidisciplinary team approach be adopted, including urologist, obstetrician, anesthesiologist and radiologist.

In such cases, inserting a pigtail catheter, placing a percutaneous nephrostomy (PCN) tube or performing ureteroscopy constitute the primary treatment alternatives. Pregnancy is the only absolute contraindication for ESWL due to its' potential disruptive effects of the shock wave energy upon the fetus. (10)

The efficacy of a percutaneous tube and retrograde ureteral stenting in decompressing the collecting system was firmly established. The advantages of percutaneous drainage include the fact that this procedure can be safely accomplished under local anesthesia and ultrasound guidance in acutely ill or septic patients.

Alternatively, internal ureteral stents could be inserted under general/local anesthesia and transabdominal ultrasound guidance or limited fluoroscopy. The most common complication of stent insertion is represented by encrustation. Therefore, it was suggested that stents placed during the first trimester should be changed on a monthly basis. Urinary tract infection and migration constitute other complications of internal stent placement. As a consequence of these difficulties, Denstedt and Razvi suggested that a ureteral stent should be reserved for the later stages of pregnancy. (11)

Advances in instrument design, flexibility and downsizing have broadened both the diagnostic as well as the therapeutic capabilities of retrograde ureteroscopy. A number of studies reported the successful outcomes of ureteroscopy in pregnant patients harboring ureteral stones. The first substantial report by Ulvik et al. emphasized the performances of ureteroscopy, without adverse events, in 24 pregnant women. (12)

Similar results were reported by Lifshitz et al. (13) and Watterson et al. (13), who showed that the ureteroscopy holds both diagnostic and therapeutic value in pregnant patients. This type of approach was also associated with very low morbidity as well as the need for only short-term ureteral stenting, if any.

A systematic review of the literature published by Laing et al. (14) identified 239 abstracts and 15 retrospective studies on this field. The analysis of these studies suggests that ureteroscopy is a procedure with high efficacy, with 86% of cases achieving complete stone clearance.

Ureteroscopy in pregnant women can usually be performed without ureteral orifice dilation, probably because of the muscle-relaxing effects of progesterone-like hormones. Most distal-ureteral stones may be retrieved with a stone basket. In our experience 39.3% of calculi were removed intact.

However, some calculi could require fragmentation, which can be safely accomplished by Ho:YAG laser or pneumatic lithotripsy. (15)

Therefore, the stone fragment device must have the ability to deliver the energy to a localized area with minimal or no collateral damage. Holmium lasers and pneumatic

lithotripsy both fulfil these criteria. When intracorporeal fragmentation is necessary during the ureteroscopic treatment of calculi in pregnant patients, the holmium laser has the advantage of minimal tissue penetration, thereby theoretically limiting the risk of fetal injury.

The Ho:YAG laser can be used through a rigid or flexible ureteroscope with comparable maneuverability. (16) The pneumatic lithoclast might only be applied through semirigid ureteroscopes with an end channel owing to the semirigid probe.

In our series, the negative ureteroscopy rate was 3.7%. By comparison, according to a recent study by White et al. (17), the frequency of negative ureteroscopy subsequent to solely ultrasound imaging was 23%. While aiming to optimize the therapeutic management and obviate unnecessary interventions, the respective authors recommended alternative imaging techniques such as low-dose computed tomography.

Even if successful semirigid calculi approach up to the renal pelvis during the third trimester was occasionally reported in the literature (18), the anatomic distortion of the bladder and distal ureter (particularly frequent during the third trimester) might substantially increase the difficulty of semirigid ureteroscopy. Therefore, in the last trimester, the first choice is usually represented by the flexible technique.

While recent reports enthusiastically supported the use of ureteroscopy during pregnancy, we should always be aware of the potential risk of ureteral perforation and sepsis. Consequently, while aiming to avoid complications that may jeopardize the fetal well-being, such procedures should be performed by experienced endourologists. (5)

In a study evaluating 46 ureteroscopic procedures in 45 pregnant patients at 5 institutions, Johnson et al. described a 4.3% incidence of obstetric complications. Based on this potential risk, the authors underlined the idea that a multidisciplinary approach is more prudent in pregnant patients undergoing ureteroscopy. (19)

Contraindications for the use of ureteroscopy during pregnancy include lack of endourologic experience, inadequate endoscopic instruments, large or multiple stones, transplanted kidney and sepsis. Caution must be taken when performing ureteroscopy in a pregnant patient with a solitary kidney and delaying such procedures should be considered in these situations.

Conclusions

During pregnancy, urolithiasis is a diagnostic and therapeutic challenge. Ureteroscopy with intracorporeal pneumatic or holmium laser lithotripsy may be considered a safe and effective first-line definitive therapeutic option in pregnant patients requiring intervention for stone disease. Nevertheless, one cannot overemphasize the necessity for care during ureteroscopy, which should be performed only in centers with sufficient experience.

Conflict of interest

None

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