UNIVERSIDAD NACIONAL AUTÓNOMA

DE MÉXICO

Facultad de Medicina, División de Estudios Superiores

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Hospital de Especialidades "Dr. Bernardo Sepúlveda Gutiérrez"

OUTPATIENT URETEROSCOPY IN URETERAL CALCULI: COMPARISON OF FOUR DIFFERENT LITHOTRIPTORS

TESIS (ARTÍCULO DE PUBLICACIÓN)

Para Obtener el título de Especialista en Urología que presenta:

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México, D.F. Septiembre 2002

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DEL CURSO DE POSTGRADO DE UROLOGÍA

SUBDIVISION DE ESPECIALIZACION
DIVISION DE ESTUDIOS DE POSGRADO
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Gracias...

A Dios:

Por haberme dado la vida y la fuerza necesaria para continuar hasta el final

A mis padres:

Por su fé en mí, su incondicional amor y su ayuda durante toda mi vida, sin la cual no estaría aquí

A mi esposa:

Laura, por darme su amor, su paciencia, su apoyo y por querer compartir conmigo aún los momentos más difíciles... por amarme

A mi hija:

Daniella, por tu incansable espíritu, por los sacrificios que a pesar de tu corta edad has realizado y por haberme hecho tan feliz con tu llegada a mi vida

A mis hermanos:

Paola y Alejandro, por existir en mi vida a pesar de la distancia, por su apoyo y su amor, siempre los sentí conmigo

A mis abuelos:

Por su infinito e incondicional apoyo y cariño desde siempre, por sus bendiciones, por creer en mí, por contagiarme de su fortaleza de espíritu

A mi familia:

Por esa unidad y ese gran amor que a pesar de las distancias he sentido siempre conmigo. Jovita siempre te recordaré

A mis compañeros:

Juan Carlos, Gilberto, Ricardo, Mario y Manolo, por haber compartido conmigo estos años de la residencia, por su amistad y apoyo

A mis maestros:

Por su paciencia y por compartir sus invaluables conocimientos y experiencia conmigo, por su apoyo y por el tiempo que me dedicaron

Indice:

OUTPATIENT URETEROSCOPY IN URETERAL CALCULI: COMPARISON OF FOUR DIFFERENT LITHOTRIPTORS

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ABSTRACT

Although ureteroscopy has become a routine procedure in most urologic centers, it is still mainly done as an inpatient procedure. Since 1992, we have done our ureteroscopies as outpatient procedures. We report 186 consecutive cases of patients treated endoscopically for ureteral calculi using an 8.5 Fr rigid ureteroscope and separated into four groups according to the fragmentation device: 1) alexandrite laser, 2) electrohydraulic, 3) ultrasonic and 4) pneumatic lithotriptors. The overall success rate was 85.5%, 91.6% for distal and mid ureteral calculi and 76.9% for upper ureteral calculi. Laser lithotripsy was the most effective in distal and mid ureter and pneumatic was the most effective in upper ureteral stones. The overall complication rate was 8.1%. Only 4 patients (2.15%) required hospitalization. Our results support the concept of ureteroscopy for the treatment of ureteral calculi as a safe outpatient procedure. Hospitalization should only be reserved for patients with preexisting medical problems or complications arising during ureteroscopy.

INTRODUCTION

Ureteroscopy has become a routine procedure in most urological centers [1-5] since the introduction of the technique by Perez-Castro and Martínez-Pineiro in 1980 [6]. The complications reported in the first series [2,7,8], are less frequent now [9,10], mainly because of the increased experience in this technique and by the development of smaller ureteroscopes [11]. Although ureteroscopy is still done in some centers as an inpatient procedure, with a reported hospital stay between 2.9 and 4.9 days [1,4], there have been some reports showing the feasibility of outpatient ureteroscopy. Wills and Burns reported their experience with 176 ureteroscopies, 76.1% done as an outpatient procedure [12]; Boline and Belis reported 90% of 248 ureteroscopies as outpatient with only 3% requiring hospitalization [13]. The reported complications related to this procedure are: 1) intraoperative: mucosal abrasion, false passage, ureteral perforation, urine extravasation, ureteral avulsion, thermal injury, intussusception, equipment malfunction, difficult access; 2) early postoperative: infection, clot retention, steinstrasse, edema, urinary retention; and 3) late postoperative: vesicoureteral reflux, stricture and avascular ureteral necrosis [9]. Due to the limited number of bed in our hospital and to the increasing cost of medical care in our country, we have done all of our ureteroscopies as outpatient procedures. In this study, we evaluated 186 patients with ureteral calculi treated as outpatient ureteroscopy, comparing the effectiveness of four lithotriptors including alexandrite laser, electrohydraulic, ultrasonic and pneumatic lithotriptors. All of them have proved their efficacy alone or compared to any other devices [1,14-19] but as far as we know no reports have been done comparing four different stone fragmentation devices. Our purpose is to demonstrate that ureteroscopy can be carried out safely as an outpatient procedure and to compare in a randomized manner the efficacy of four different lithotriptors.

PATIENTS AND METHODS

One hundred eighty six patients from our hospital, 115 men and 71 women, 21 to 77 years old (mean age 42 years) with 186 ureteral calculi were randomized for rigid ureteroscopic treatment in an outpatient manner into four groups according to the type of calculi fragmentation device. Group 1: alexandrite laser (Dernier Laser Lithotriptor Impact 60mHz); group 2: ultrasonic (R. Wolf 2120 and 2167.001 Ultraschal/líthotríptor); group 3: electrohydraulic (R. Wolf 2137.01 Ríwolíth) and group 4: pneumatic (Swiss Lithoclast) lithotriptors. In all procedures, we used an 8.5 Fr semi rigid ureteroscope. Stone location and size were assessed by intravenous urogram, and plain abdominal X-ray. Upper stones were considered those above the superior border of the sacroiliac joint, distal stones were those below its inferior border and mid ureteral calculi were those within the borders of the sacroiliac joint. We analyzed distal and mid ureteral stones together and separate from those in the upper ureter. The procedures were performed by the authors under intravenous sedation or under regional anesthesia. Preoperative intravenous antibiotic were administered (cephalosporine or quinolone) and continued for seven days after discharge by oral intake. A ureteral guide wire was installed with cystoscopy and under fluoroscopic control in all patients. Intramural ureteral dilation was performed only for the upper ureteral calculi using a balloon dilator (Cook urological, Indiana U.S.A.) with a maximum inflation pressure of 25 P.S.I. Double-pigtail stent were placed according to the surgeon judgment [20]. Patients were discharged the same day of the procedure after total recuperation of anesthesia. A procedure was successful if the stone was fragmented into pieces smaller than two mm and did not require any other procedure. Those calculi pushed back into the kidney and those that couldn't be fragmented were considered as failures. The statistic analysis was performed using chi-square and the fisher exact test with p value < 0.05 considered significant.

RESULTS

We treated 186 ureteral calculi, 108 located at distal and mid ureter (58.1%) and 78 at the upper ureter (41.9%) (Table 1). The four groups were comparative with only significant statistical differences between upper and mid-distal ureteral calculi (p=0.009). The mean calculi diameter was 11 mm (range 4 to 34mm) with no statistical difference between the groups. The total success rate for was 91.6% for the distal and mid ureteral calculi and 76.9% for upper ureteral calculi. For distal and mid ureter the alexandrite laser obtained the higher success rate (100%), but no significant statistical difference was found between the four groups. For upper ureteral calculi the pneumatic device obtained the highest success rate (91.3%) and the electrohydraulic showed the lowest (56.5%) p=0.018 (Table 2). In sixty-one patients, a double-pigtail stent was placed (32.8%) and it was removed within one week under local anesthesia. Our overall, complication rate was 8.1% (15 patients), with only 1.6% of major events (Table 3). Of the 186 patients, only four (2.15%) required hospitalization. Two because of upper ureteral perforation, one related to electrohydraulic lithotripsy requiring a 24-hour hospitalization and a double-pigtail stent for three weeks with no further complications. The second patient suffered an ureteral perforation with the ultrasonic probe that required open ureterolithotomy, repair of the lesion and a double-pigtail stent that remained for four weeks. Both patients had upper ureteral stones. The third patient was hospitalized for 24 hours because of fever and bacteremia requiring intravenous antibiotics. The fourth patient was an elderly woman with ischemic heart disease hospitalized only for surveillance.

DISCUSSION

Earlier disadvantages of ureteroscopy were poor optics, large diameter instruments, difficult ureteral dilation, lack of adequate irrigation and the unavailability of instruments small enough for manipulative purposes. Keating reported their initial experience with rigid ureteroscopy treating 55 ureteral stones with an over-all success rate of 69%, 48% for upper stones and 84% for distal stones with an 18% complication rate [8]. Other authors' reports show similar results in their earlier experience. Fortunately, technological advances have led to increase the success rates and to decrease the complications related to this technique [21]. The dramatic development of technology in ureteroscopy including a variety of lithotriptors as well as a greater number of urologists performing this procedure, have made it a safe surgery with high success rates and low morbidity [24,25]. However, we found that in some centers ureteroscopy is still done as an inpatient procedure, with hospital stays between 2.9 and 4.9 days [1,4,27]. Our overall success rate is similar to previous literature [13-19], being 85.5%, 76.9% for upper and 91.6% for the mid and lower ureteral calculi. When comparing the success rates of the four lithotriptors in middle and lower ureter no statistical difference was found. In upper ureteral calculi pneumatic lithotriptor was the most effective with a success rate of 91.3% and the electrohydraulic device showed the lowest success rate (56.5%) with statistical significant difference. We report 15 complications (8.1%), also similar to the previously reported in the literature[26], the two major events were ureteral perforations due to ultrasonic and electrohydraulic lithotripsy in upper ureteral calculi. We made most of our ureteroscopies as an outpatient procedure, with only four patients (2.15%) requiring hospitalization, even lower to the previously reported in the literature and supporting that ureteroscopy can be safely done as an outpatient procedure [13].

CONCLUSIONS

Ureteral calculi can be managed safely in an outpatient manner, with the consequent reduction in hospital costs. Any patient who requires ureteroscopy, should be scheduled on an outpatient basis. Our data reveals that any of the four lithotriptors can be useful in the treatment of lower an mid ureteral calculi, but when treating an upper ureteral calculi we suggest to keep in mind the possibility of failure and ureteral damage with the electrohydraulic and ultrasonic devices.

Table 1

Location of stones in relation to treatment modality

Stone location	Group 1 Alexandrite laser	Group 2 Electrohydraulic	Group 3 Ultrasonic	Group 4 Pneumatic	Total
Distal and mid ureter	21	20	40	27	108 (58.1%)
Upper ureter	23	23	9	23	78 (41.9%)
Total	44	43	49	50	186 (100%)

Table 2

Success rate in relation to treatment modality

Stone location	Group 1 Alexandrite laser(%)	Group 2 Electrohydraulic (%)	Group 3 Ultrasonic (%)	Group 4 Pneumatic (%)	Total (%)
Distal and mid ureter	100%	85%	92%	88.9%	91.6%
Upper ureter	82.6%	56.5%	77.7%	91.3%	76.9%
Total	90.9%	69.7%	89.7%	90%	85.5%

Table 3

Intraoperative and immediate complications identified

Complication	No.
Intraoperative	5
Ureteral perforation	2
False passage	2
Mucosal abrassion	1
Postoperative	10
Infection/bateremia	3
Mucosal edema	7

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