

Is Ureteral Stenting Necessary After Uncomplicated Ureteroscopy Lithotripsy for Small Middle and Distal Ureteral Stones?

Siavash Falahatkar, Mohammad Salehi, Seyed Alaedin Asgari, Seyed Hossain Hossaini Sharifi, Marzieh Akbarpour, Felora Khaledi, Negin Khaki, Aliakbar Allahkhah

Urology Research Center, Guilan University of Medical Sciences, Rasht, I.R. Iran

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ABSTRACT

INTRODUCTION: Previous studies have suggested that routine stenting can be avoided following ureteroscopy. A prospective investigation was performed to determine the outcome of stent or no-stent placement after uncomplicated ureteroscopic lithotripsy for small (< 10 mm) middle and distal ureteral stones.

METHODS: Fifty six patients meeting inclusion criteria underwent uncomplicated ureteroscopic intracorporeal lithotripsy using a pneumatic device. No patient required ureteral dilation. Patients were randomly assigned to nonstented (n = 28) and stented (n = 28) treatment groups. The stent was removed after 2 days. Patients were followed for 2 weeks postoperatively.

RESULTS: There were no significant between-group differences in patient age, sex, stone size, or stone location. There were no significant between-group differences in mean operation time and postoperative pain. The group receiving the stent had a significantly longer mean hospital stay (2.14 days vs 1.25 days) ($P < .0001$). The stone-free rate was exactly the same at 96.4% for each group; the procedure was not successful for 1 patient in each group. There were no significant between-group differences in flank pain, fever, and hematuria. However, dysuria was significantly more common in the group receiving a stent ($P = .002$).

CONCLUSIONS: Patients who did not receive a stent after ureteroscopic intracorporeal lithotripsy had the same success rates as those who received a stent, while needing a shorter hospital stay and having less dysuria. These findings suggest that ureteral stent placement following uncomplicated ureteroscopy may be avoided, thereby reducing patient morbidity and surgical costs.

KEYWORDS: Ureteral stone; Ureteroscopy; Ureteral stent

CORRESPONDENCE: Siavash Falahatkar M.D., Guilan University of Medical Sciences, Urology Research Center, Razi Hospital, Sardare Jangal Street, Rasht, Guilan 41448, Iran (falahatkar_s@yahoo.com).

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INTRODUCTION

Many urologists consider ureteral stents the most useful tools in the urological armamentarium [1]. The routine placement of a ureteral catheter or stent following ureteroscopic stone removal is widely recommended [2]. The major benefit of stents is to prevent complications associated with ureteral obstruction as stone fragments pass down the ureter [3].

Indwelling stents are supposed to prevent pain, obstructive symptoms, and the need for secondary endoscopic procedures [4]. However, the results of a previous study showed that indwelling ureteral stents were associated with a variety of urinary tract symptoms that had significant negative impact on the patient's global health. Storage symptoms, hematuria, incontinence, and dysuria appeared to be major problems associated with the stents [5].

Controversy exists regarding the need for ureteral stent insertion after routine ureteroscopic stone surgery because of the possibility of complications [6]. The purpose of the present investigation was to assess the cost-effectiveness and morbidity of routine ureteral stenting after uncomplicated ureteroscopy for removal of small middle and distal ureteral calculi.

METHODS

Participants

Patients undergoing rigid ureteroscopy for middle and distal ureteral calculi between May 2007 and January 2008 were considered for the investigation. Stone location and size were assessed by intravenous urography (IVU) or plain x-ray of the kidneys, ureters, and bladder (KUB) and ultrasound.

Exclusion criteria were: (1) the stone was located in the upper ureter (above the superior border of the sacroiliac joint on plain abdominal x-ray); (2) the stone size was > 10 mm; (3) the patient had renal failure or a single kidney; (4) there was evidence of ureteral perforation at the end of the procedure; (5) there was a previous history of ureteral surgery or shock wave lithotripsy (SWL); (6) there was severe inflammation around the stone or a large amount of stone residue after the procedure; (7) there was concern of possible urinary tract infection.

A total of 56 patients met the inclusion criteria. These patients were randomly assigned to 2 groups. Group 1 (n = 28) had 19 males and 9 females with a mean age of 38.4 years (SD = 9.35; range, 20-56 years). Group 2 (n = 28) had 20 males and 8 females with a mean age of 37.1 years (SD = 9.77; range, 21-61 years). A description of the stone location and size for each group is contained in Table 1.

Ureteroscopy Procedure

All patients had a rigid ureteroscopy procedure. Patients received intravenous (IV) antibiotics (ceftriaxon and gentamicin) 30 minutes preoperatively. The procedure was done under epidural anesthesia, with the patient in the dorsal lithotomy position.

Ureteroscopy was performed with an 8.9 Fr rigid ureteroscope. A pneumatic lithotripter was used for stone fragmentation. One 0.038 inch guide wire was inserted into the ureter during ureteroscopy. The rigid ureteroscope was passed into the ureter over a working guide wire. Ureteroscopic access was successfully achieved in all cases without the need for ureteral orifice dilation.

Large stone fragments were extracted with a basket or grasper. Ureteroscopic inspection was done at the end of the procedure to rule out any residual calculi or complication.

Patients in group 1 received a 5 Fr stent. The stent was fixed to a 14 Fr or 16 Fr Foley catheter by leucoplast for drainage into a urine bag (ie, closed drainage). Patients in group 2 did not receive a stent.

After the operation, an IVU or CT scan was done if complications were suspected. IV antibiotics were continued for 12-18 hours after surgery and maintained orally with fluoroquinolone (Ofloxacin; Ranbaxy Laboratories, New Dehli, India) for 5 days postoperatively.

Postoperative Follow-up

Patients were assessed the day after surgery with a KUB x-ray. Patients in group 1 had the stent removed after 2 days. All patients received postoperative physician evaluation, renal ultrasonography, and KUB x-ray 2 weeks after the surgery.

Data Analysis

Operation time was calculated from the time the uretrocope was introduced into the urethra to the time of final removal of the endoscope.

Postoperative pain was defined by the need for and amount of parenteral or oral analgesics for 2 weeks.

Surgical success was defined as fragmented calculi smaller than the probe tip width and the absence of residual stones on a plain radiographic film or ultrasonography 2 weeks after the initial lithotripsy. For ureteral stricture this follow-up period is short, but for residual stones after transurethral lithotripsy this

Table 1. Patient Age, Stone Size, and Location; Probability of Significant Differences Between Treatment Groups (N = 56).

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Characteristic	Group With Stent (n = 28)		Group Without Stent (n = 28)		P
	Mean	SD	Mean	SD	
Age (years)	38.4	9.35	37.11	9.77	.72
Stone Size (mm)	7.82	1.39	7.93	1.21	.76
	n	% n	n	% n	
Stone Location					.78
Middle	9	32.2	10	35.7	
Lower	19	67.8	18	64.3	

follow-up is considered sufficient.

Other variables included length of hospital stay and complications (hematuria, dysuria, flank pain, and fever).

Data were analyzed by SPSS-10 software (SPSS, Inc, Chicago, IL) using the chi-square test for categorical variables and *t* test for continuous variables. Differences resulting in $P < .05$ were considered statistically significant.

RESULTS

A total of 56 consecutive patients underwent rigid ureteroscopy for middle and lower ureteral calculi; 28 patients underwent ureteral catheter placement postoperatively and 28 patients did not. There were no statistically significant between-group differences in mean patient age, sex, mean stone size, and stone location ($P > .05$) (see Table 1).

Mean operative time was 24.17 minutes and 22.53 minutes for group 1 and group 2, respectively. The difference was not statistically significant ($P = .234$).

The mean length of hospital stay was 2.14 days and 1.25 days for group 1 and group 2, respectively. Group 1 (receiving the stent) had a significantly longer hospital stay ($P < .0001$).

Postoperative pain requiring parenteral or oral analgesics was seen in 16 patients (57%) in group 1 and 11 patients (39%) in group 2. The difference was not statistically significant ($P = .181$), so the presence or absence of a stent did not significantly affect the need for analgesic administration.

The surgical success rate was equal at 96.4% for each group.

The procedure was not successful for 1 patient in each group.

Complications are shown in Table 2. Dysuria was seen in 24 patients (86%) and 13 patients (46%) in group 1 and group 2, respectively. Group 1 had a significantly higher rate of dysuria ($P = .002$). Other complications were not statistically different between groups ($P > .05$). No ureteral avulsion was seen in any patients. Three patients in group 1 and 2 patients in group 2 had mucosal injury.

DISCUSSION

There is controversy in the literature regarding whether or not some surgical approaches may protect the patient during or after ureteroscopy. Routine dilation of the ureteral orifice and intramural ureter is recommended for rigid as well as flexible ureteroscopy [4,7,8,9]. Stenting after ureteroscopy has been recommended to prevent the development of ureteral strictures [2,7,10]. One experimental study showed that when the ureter remained unstented after ureteral dilation, the risk

Table 2. Postoperative Complications; Probability of Significant Differences Between Treatment Groups (N = 56). doi: 10.3834/uij.1944-5784.2009.10.12t2

Complication	Group With Stent (n = 28)		Group Without Stent (n = 28)		P
	n	% n	n	% n	
Hematuria	7	25	3	11	.103
Dysuria	24	86	13	46	.002
Flank pain	16	57	11	39	.181
Fever	2	7	1	4	.553

of distal ureteral stricture should be considered [7]. The authors suggested that when routine ureteral dilation is proposed, the corresponding ureter should be stented. However, there are several reports suggesting that stent placement may be associated with significant symptoms which persist until the stent is removed [2,11,12]. Bregg and Riehle [12] found that 22 out of 50 patients (44%) experienced moderate to intolerable discomfort that was relieved by removal of the stent.

Ureteroscopy is now performed with small-caliber endoscopes and better intracorporeal lithotripsy devices such as the Holmium laser, so that most patients can be treated without ureteral dilation. As a result, the need for the postoperative stent remains questionable [13]. The present investigation was designed to compare the outcome for patients with or without a stent following ureteroscopy.

Byrne et al [14] reported 55 consecutive patients (60 renal units) randomized into either a stent or a no-stent group following ureteroscopy. Operative time was significantly longer for the group receiving a stent (55 minutes) than the group without a stent (43 minutes) ($P = .013$). Byrne et al also conducted a meta-analysis showing that mean operation time in other studies was consistently longer in groups with stents. Operation time is important to the patient's surgical outcome and a key cost driver.

In the present study, the mean operative time was not significantly different between the 2 groups (24.17 minutes and 22.53 minutes for patients with and without a stent, respectively). These results may be different from those previously reported in the literature because the present authors inserted the stent by ureteroscope immediately after the operation. Therefore, stent placement was not considered in the total operation time.

Netto et al [4] evaluated postoperative pain by the requirement for and amount of parenteral or oral analgesics. The presence or absence of a catheter did not significantly affect analgesic administration in their study. No prior studies found any significant difference in the proportion of participants who required analgesia after ureteroscopy with or without stents [14]. Similarly, the present study showed that the presence or absence of a stent did not significantly affect postoperative pain requiring parenteral or oral analgesics.

There was no statistically significant difference in the success rate between the 2 groups in the present study. Similarly, none of the previous trials reported a significant difference in the stone free rates of participants with or without a stent [14].

Several studies reported lower urinary tract symptoms at various times of follow-up [15,16,17]. These studies showed urinary frequency or urgency at a higher rate in participants with stents. There was also a higher rate of hematuria and dysuria in those with stents. The results of the present study were similar to prior reports in that dysuria was significantly more common in the group receiving the stent. However, other complications including hematuria were not statistically different between the 2 groups.

Data from the present study showed that patients who did not receive a stent after ureteroscopy for middle and distal ureteral stones < 1 cm in diameter had no intraoperative complications, fewer postoperative complications, and no difference in success rate when compared with patients receiving a stent. The no-stent procedure is also preferred because of a significantly shorter hospital stay and less expense. Therefore, it is suggested that stenting be limited to selective cases such as patients with a single kidney, urinary tract infection, complications during surgery, and large stones with large residual fragments.

Conflict of Interest: None declared

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