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Is ureteral stent necessary for ureteroscopic treatment of distal ureteral stone ?

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Objective : *We conducted a prospective, randomized study to compare the outcomes of the ureteroscopic treatments of distal ureteral stone with and without ureteral stent.*

Materials and Methods : *A total of 49 patients undergoing ureteroscopy for distal ureteral stone were randomized to a stented group (N = 24) or a nonstented group (N = 25). Ureteroscopy was carried out with the 8/9.8 Fr Wolf semirigid ureteroscope and pneumatic lithotripsy was used in all cases. A 6 Fr open-ended ureteral stent was placed in the stented group for ureteral stenting. A ureteral stent was removed at 24-48 hours postoperatively. Patients were assessed for success rate, operative time, pre-and postoperative pain scores, postoperative fever, analgesics requirement, postoperative complication and hospital stay.*

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Results : *There was no statistically significant difference in the 2 groups regarding age, sex, stone size, stone location, perioperative pain, analgesic requirement or complication. However, in the stented group operative time and hospital stay were significantly longer than in the nonstented group (P<0.05). One patient in the nonstented group visited the emergency room for dysuria and bladder discomfort. The stone-free rate was 100 % in each group.*

Conclusions : *Routine ureteral stent placement after uncomplicated ureteroscopy for distal ureteral stone seems unnecessary. The nonstented group had either shorter operative time or hospital stay without increased complication rate.*

Keywords : *Ureteroscopy, Distal ureteric calculi, Ureteral stent.*

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ตรี หาญประเสริฐพงษ์, อภิรักษ์ สันติงามกุล. ความจำเป็นในการใส่สายระบายในท่อไตหลังจากทำการผ่าตัดส่องกล้องรักษานิ่วในท่อไตส่วนปลาย.จุฬาลงกรณ์เวชสาร 2548 ก.ย; 49(9): 499 – 507

ปัญหา/เหตุผลในการทำวิจัย : *การใส่สายระบายในท่อไตมีความจำเป็นหรือไม่หลังการผ่าตัดส่องกล้องรักษานิ่วในท่อไตส่วนปลาย*

วัตถุประสงค์ : *ศึกษาเปรียบเทียบผลการรักษาและภาวะแทรกซ้อนของการรักษานิ่วในท่อไตส่วนปลายโดยวิธีส่องกล้อง ระหว่างการใส่สายระบายและไม่ใส่สายระบาย*

วิธีการศึกษา : *ผู้ป่วยทั้งหมด 49 ราย ที่มารักษานิ่วในท่อไตส่วนปลายโดยวิธีส่องกล้อง แบ่งเป็น 2 กลุ่มคือ กลุ่มที่ 1 ใส่สายระบาย 24 ราย กลุ่มที่ 2 ไม่ใส่สายระบาย 25 ราย ผู้ป่วยทั้งหมดได้รับการส่องกล้องด้วย 8/9.8 Fr Wolf semirigid ureteroscope กระแทกนิ่วโดยใช้ pneumatic lithotripsy เศษนิ่วเอาออกจากท่อไตด้วย basket กลุ่มที่ 2 ได้รับการใส่สายระบายท่อไตแบบปลายเปิด ขนาด 6 Fr หลังการผ่าตัด 1-2 วัน จะเอาสายระบายออก ประเมินผลด้วย อัตราสำเร็จของการผ่าตัด เวลาในการผ่าตัด ความเจ็บปวดจากการผ่าตัด จำนวนยาแก้ปวดที่ใช้ ผลแทรกซ้อนของการผ่าตัดเวลาที่อยู่โรงพยาบาล*

ผลการวิจัย : *ไม่มีความแตกต่างของเพศ อายุ ขนาดนิ่ว ตำแหน่งของนิ่ว ความเจ็บปวดจากการผ่าตัด จำนวนยาแก้ปวดที่ใช้ ผลแทรกซ้อนของการผ่าตัด แต่ในกลุ่มที่ไม่ใส่สายระบายมีการลดลงของระยะเวลาในการผ่าตัด และเวลาที่อยู่โรงพยาบาลอย่างมีนัยสำคัญ ($P<0.05$) มีผู้ป่วย 1 ราย ในกลุ่มที่ไม่ใส่สายระบายต้องมาที่ห้องฉุกเฉิน จากอาการปัสสาวะแสบขัด ปวดบริเวณท้องน้อย ได้รับการรักษาด้วยยาและสามารถกลับบ้านได้ อัตราสำเร็จของการผ่าตัดทั้งสองกลุ่มเท่ากันคือ 100 %*

สรุปผลการวิจัย : *การใส่สายระบายท่อไตในผู้ป่วยที่ได้รับการรักษานิ่วในท่อไตส่วนล่างด้วยการส่องกล้อง ไม่มีความจำเป็นในทุกราย การพิจารณาใส่สายระบายอาจทำในผู้ป่วยที่มีการชอกช้ำหรือทะลุของท่อไต มีไตข้างเดียว มีไตวาย มีการติดเชื้อทางเดินปัสสาวะส่วนบน เป็นต้น การไม่ใส่สายระบายหลังการผ่าตัดในผู้ป่วยที่ไม่มีปัจจัยเสี่ยง ไม่ได้เพิ่มภาวะแทรกซ้อนให้แก่ผู้ป่วย และยังช่วยลดระยะเวลาการผ่าตัด และเวลาที่อยู่โรงพยาบาลอย่างมีนัยสำคัญ*

คำสำคัญ : *การผ่าตัดส่องกล้องทางท่อไต, นิ่วในท่อไตส่วนล่าง, สายระบายในท่อไต*

Ureteroscopy has been most strongly advocated for patients with distal ureteral stone, with stone-free rates greater than 90 % after a single treatment.[1-3] For many years, the routine placement of ureteral stents has been considered the standard of care after uncomplicated ureteroscopy for stone fragmentation. Recently, however, numerous studies have questioned the routine use of stents. There are numerous theoretic advantages to routine stenting. Ureteroscopy and stone manipulation may cause the development of ureteral edema, which can lead to ureteral obstruction. Placing a stent would ensure that the ipsilateral renal unit will not become obstructed during the perioperative period, which not only ensures preservation of renal function but eliminates the morbidity of flank pain associated with obstruction of the collecting system. Ureteric stents may also aid in the passage of stone fragments after ureteroscopy because of secondary passive dilation of the ureter. Stents may also promote ureteral healing and prevent stricture formation.[4-5]

Nevertheless, the placement of a ureteral stent is also associated with some morbidity. Major complications include stent fracture, ureteral erosion, encrustation. In addition, stents have been associated with irritative voiding symptoms, flank pain, suprapubic pain and urinary tract infection. Hematuria is another common complaint among stented patients.[6] During the latter haft of the 1990s, thanks to the much improved technique of ureteroscopic armamentarium, some urologists stared to question the need for routine stenting. Ureterscopy is now performed with small caliber endoscopes and lithotripsy devices, so that the majority of cases may be treated without ureteral dilation, making the procedure relatively atraumatic. As a result we questioned whether routine stent placement is required after uncomplicated ureterscopic lithotripsy. We determined whether stents may be eliminated after uncomplicated ureteroscopy for distal ureteral stones, which would eliminate stent related symptoms and morbidity, and improve patient satisfaction with ureterscopic lithotripsy. The incidence and severity of patients discomfort following ureteroscopy for stone removal without stenting have not been well documented. Stent placement may not be necessary when ureteroscopic procedure is uncomplicated. In the present study, we intensively compared the outcomes of the ureteroscopic treatment of distal ureteral stone with and without stent.

Purpose

We conducted a prospective, randomized controlled study to evaluate whether post-operative ureteral stent is necessary after ureteroscopy for distal ureteral stone.

Materials and Methods

This study was designed as a prospective, randomized controlled trial. From March 2004 to February 2005, 49 patients were scheduled for ureterscopic lithotripsy. The ureter was divided into two segments: proximal and distal, with the point of division being narrow part of the ureter over the iliac vessels. [7] The distal ureter was defined as below the iliac vessels on preoperative radiographic imaging. Preoperative imaging consisted of intravenous pyelogram or retrograde pyelogram with ultrasonography. Patients were excluded from study if they had stone larger than 20 mm, preoperative

clinical of urinary tract infection, a solitary functioning kidney, concomitant ureteral obstruction secondary to other causes such as stricture, failed ureteroscopic access to the stone, incomplete stone removal or residual stone greater than 2 mm, severe mucosal injury or perforation during operation. Patients were randomized preoperatively into a stented (24 cases) and a nonstented (25 cases) groups. The patients with intraoperative complication were excluded from the study. The operators included our staffs and senior residents.

The procedure was performed with the patient under either general or spinal anesthesia determined by the anesthesiologists and patients. A safety guidewire was inserted into the ureter by cystoscopy under fluoroscopic control. The ureteroscope was introduced into the ureteral orifice. Metal dilation of the distal ureter was performed when it could not pass ureteroscope via ureteral orifice. The 8/9.8 Fr Wolf semirigid ureteroscope was used in all cases. The ureteral stones were broken with the pneumatic lithotripsy probe. Basket retrieval of the fragments into the bladder. The residual stones were left if they were less than 2 mm. A 6 Fr open-ended ureteral stent and Foley catheter were placed in the stented group. The plain catheter was used to empty bladder and removed in the nonstented group. A ureteral stent was placed in the stented group for 24-48 hrs or until hematuria was resolved.

Intraoperative data includes stone size, side (right or left), number of stones, operative times. Pain symptom score questionnaires were completed by the patients before surgery and at 24 hours postoperatively (visual analog pain score 0 to 10). Assessment of stone-free status was done by plain film of the kidneys, ureters, and bladder (plain KUB) at 24 hours and postoperative day 14. Postoperative data includes fever (>37.8 ?C), number of intravenous narcotics (dose), number of urinary catheterization or Foley catheter insertion in postoperative periods of the nonstented group, hospital stays (day), number of visit to an emergency room.

The Chi-squre test was used for statistical analysis, with $P<0.05$ considered to indicate statistical significance.

Results

The gender, age, size, side of stone were similar in both groups. Mean patients age was 47.7 (ranged 20 to 75) for the stented group and 43.8 years (ranged 26 to 69) in the nonstented group. There were 14 and 15 men in the stented and nonstented group, respectively. The mean stone size (range) was 9.5 (4-16) mm in the stented group and 9.2 (5-20) mm in the nonstented group; the stented group had larger stone but not significant. Multiple ureteral stones were found in the patients in both groups, 2 cases in the stented group (10,14 mm and 4,5,7 mm) and 2 cases in the nonstented group (6, 10 mm and 3,4,7 mm). We compared the mean of the largest diameter of the stones in each group (Table 1). Two patients had been treated with double J stents before the operation, one in each group.

The operative time was calculated from the time to access the ureteric orifices until the stones were completely removed in the nonstented group or Foley catheters were placed in the stented group. The mean operative time (range) was 45.6 (20-80) min and 36.2 (15-60) min, in the stented group and the nonstented group, respectively. The operative time in

Table 1. Demographic data.

Characteristics	Stented gr.	Nonstented gr.	P
No. of patients	24	25	-
Male : Female	14:10	15:10	>0.05
Age (yr)	47.7 ± 13.5	43.8 ± 11.7	>0.05
Right/Left	14:10	11:14	>0.05
Stone diameter (mm)	9.5 ± 3.1	9.2 ± 3.0	>0.05
Nature of stone(n)			
Single	22	23	>0.05
Multiple	2	2	>0.05

the stented group was significantly longer (p=0.036).

Plain KUB on postoperative 24 hrs and day 14 were revealed 100% stone-free rate in both groups. One patient in the nonstented group developed acute urinary retention and had Foley catheterization for 24 hours.

The results of visual analog pain scores were summarized in Table 2. No difference of the pain scores was found from both groups. Nine patients (37.5 %) of the stented group and 13 patients (52 %) of the nonstented group did not required intravenous narcotic drugs. No difference of intravenous narcotic dosage was found during the postoperative period in both groups.

The mean hospital stay was 2.4 (1-4) days in the stented group and 1.3 (1-2) days the nonstented group (p<0.001). Two cases in the nonstented group developed one peak of fever (>37.8 ?C) but resolved after 24 hours, but none in the stented group. One case of the nonstented group came to emergency room from dysuria and suprapubic discomfort at the third day after operation and received the medical treatment, no admission was necessary.

Table 2. Overall results.

	Stented gr.	Nonstented gr.	P
Operative time (mins)	45.6 ± 16.7	36.2 ± 13.7	0.036
% stone-free rate	100%	100%	-
Pain score at preoperation (0-10)*	2.3 ± 2.2	1.7 ± 1.8	>0.05
Pain score at 24 hour postoperation (0-10)*	3.8 ± 1.5	4.4 ± 2.1	>0.05
No. intravenous narcotic (doses)	0.88 ± 1.0	0.88 ± 1.2	>0.05
Hospital stay (days)	2.4 ± 0.8	1.3 ± 0.5	<0.001

* No pain (0) to extreme pain (10)

Discussion

Several randomized studies have evaluated pain and voiding symptoms in patients who were either stented or not stented after uncomplicated ureteroscopy. Densted et al.[8] randomized 58 patients to either a stent or no-stent group following ureteroscopy. Stents were left indwelling for 7 days postoperatively. Patients were evaluated shortly before their stent removal, and these patients had significant more flank pain, abdominal pain, dysuria, and urinary frequency compared with those who had not been stented. Also, Borboroglu et al. reported [9] a multi-institutional randomized study that significantly demonstrated more postoperative flank pain, bladder pain, lower urinary tract symptoms, and overall pain in stented versus nonstented patients following ureteroscopy.

In contrast, Byrne et al.[10] reported that nonstented patients had more suprapubic discomfort compared with stented patients on the first postoperative day. This finding was reversed by postoperative day 6, however, with the stented patients developing significantly more suprapubic discomfort than their nonstented counterparts. Chen et al.[11] reported no difference in perioperative pain between the stented and nonstented groups. However, a significantly larger number of stented patients experienced irritative bladder symptoms (83.3 %) compared with non-stented patients (13.3 %). In the present study, we found no difference of postoperative pain score between the two groups.

Rane et al.[12]reported that 36 of 42 (85 %) of patients undergoing ureteroscopy for distal calculi without routine stent placement required neither postoperative analgesia nor oral analgesia. Three of 42 patients (7 %) required multiple intravenous narcotics, but all patients were discharged within 24 hours after the procedure. Denstedt et al.[8] reported a randomized trial that found no difference in the analgesic requirements between stented and nonstented patients, even though the stented patients reported significantly more pain on visual analog pain scale at 1-week postoperative follow up. In another randomized trial, Netto et al.[13] reported no significant difference in analgesic requirements between stented and nonstented patient groups. Chen et al.[11] also showed no difference of analgesic used between stented and nonstented patient groups. On the contrary, Borboroglu et al.[9] reported a decrease in narcotic use by nonstented patients in their randomized trial. We found that the doses of intravenous narcotic used in both groups were no statistical difference. Furthermore, regarding the amount of the narcotic use in both groups, we postulate that the problem of pain after ureteroscopy was minimal and insignificant.

One concern over no stent placement is whether the stone-free rate will decrease by the procedure. Denstedt et al[8], however, demonstrated a 100 % stone free-rate, regardless of whether patients were randomized into the stented or nonstented group after ureteroscopy. Therefore, stenting after ureteroscopy does not seem to improve the stone–free rate.

The development of a ureteral stricture is a well-established complication of ureteroscopic procedures. The incidence of such stricture has decreased significantly in recent years.[14] The advancement in many endourologic technologies, including miniaturization of endoscopes and flexible

ureteroscopes, is undoubtedly one of the causes contributed for the benefit of the patient. Some authors have suggested that stenting after ureteroscopy may decrease the incidence of postoperative ureteral stricture.[14-15] However, the claim has not been well demonstrated in any controlled trials in humans known to the authors. Denstedt et al.[8] examined the 58 patients in their randomized series with an ultrasound at 3-month of post-ureteroscopy follow up; no hydronephrosis or ureteral stricture was identified in either group. None of the patients in this series underwent balloon dilatation of the distal ureter. Similarly, in another randomized trial, Chen et al.[11] used 6-F rigid ureteroscope in all patients without balloon dilatation of the distal ureter. An ultrasound performed 4 weeks post ureterscopy did not reveal any evidence of ureteral stricture.

One of the reasons that favor urologists to choose to place a stent after uncomplicated ureteroscopy is a belief that it will reduce the incidence of emergency room visits and need for re-hospitalization. The randomized stenting or nonstenting trials provided the best opportunity to compare the hospital readmission rates. The results demonstrate that readmission to the hospital is approximately threefold higher among the nonstented patients. The overall readmission rate, however, remains low at only 4.3 %.[8-11]

Denstedt et al.[8] did not find a significant difference in operating time whether the patient was stented or not, with respective mean procedure times of 36 and 34 minutes. Netto et al.[13] did demonstrate, however, a significant difference between stented and nonstented patients, with mean operative times of 64 versus 45 minutes, respectively. Byrne et al.[10] reported that stenting increased the length of the procedure by a mean of 12 minutes. We can reduce the operative time by 9 minutes in the nonstent group. The ureteric and urethral catheterization increase the operative time. Most of the studies used the double J stent for ureteral stenting and the patients were discharged within 24 hours. However in our hospital, we used the 6 Fr open-ended stent to reduce the cost. Double J stents were used only under some specific conditions such as ureteral perforation or large amount of residue stones. Concerning the time of admission, we can reduce the hospital from 2.4 days to 1.3 days without the use of ureteral stents.

Conclusions

The evidence suggests that, regarding the uncomplicated ureteroscopy, ureteral stenting is not routinely required. Currently, there remain some absolute indications for stent placement after ureteroscopy such as ureteroscopy for stone extraction include a history of renal failure, a solitary kidney, a transplant kidney, and a significant perforation or injury to the ureter during the procedure. Otherwise, several relative indications are still controversial (significant ureteral edema, pregnancy, initial stone burden greater than 2 cm, a longstanding impacted stone, a high-grade preoperative obstruction, balloon dilatation of the distal ureter, recent history of urinary tract infection or sepsis, and any patient with imminent postoperative travel plans.

These indications for ureteral stenting may change the future, as new trials specifically challenge some of these older procedures, in addition to the novel techniques and instrumentation.

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