Effects of Prophylactic Insertion of Double-J Stents to Decrease Episodes of Renal Colic in Patients with Recurrent Ureteral Stones

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ABSTRACT

Purpose: To evaluate the hypothesis that prophylactic insertion of Double-J stents after uncomplicated transurethral lithotripsy (TUL) can decrease the number of episodes of renal colic and their intensity in patients with recurrent ureteral stones (those with three or more episodes of stone formation).

Patients and Methods: During a prospective randomized clinical trial from May 1999 to January 2004, 195 patients with recurrent ureteral stones were included in our study; 94 had stents in place for 4 weeks, and 101 patients remained stentless (control group). A few patients in each group had residual stone disease. All patients were followed-up for a mean period of 24 months and questioned about the number and intensity of their episodes of renal colic, and were also evaluated for their rates of spontaneous stone passage.

Results: Spontaneous passage of stones was seen in 43 patients (45.7%; CI 95%, 35.7, 55.8) who underwent stenting, and 35 patients (34.7%; CI 95%, 25.4, 43.9) in the stentless group (P = 0.05). The number of episodes of renal colic was significantly lower in the stented group (P < 0.001).

Conclusion: Insertion of Double-J stents for 4 weeks after uncomplicated TUL in patients with recurrent ureteral stones significantly decreases the number of episodes of ureteral colic, although it does not decrease the rate of stone formation.

INTRODUCTION

URETERAL STENTS HAVE BEEN USED IN UROLOGY FOR OVER 25 YEARS, and are usually placed to relieve ureteral obstruction, to promote ureteral healing, or as prophylaxis of possible complications. 1, 2

Placement of a ureteral stent after ureteroscopy for stone extraction is routinely done to prevent stenosis or to decrease pain caused by mucosal edema. Stents promote ureteral healing because they promote alignment of the ureteral walls, reduce extravasation around the ureter thus reducing inflammation, and they act as a scaffold over which new epithelium can grow. 1, 2 However, symptoms such as hematuria, painful urination, or urinary frequency are still problematic. 1

It is well known that ureteral stones have a marked tendency to recur, with rates in some retrospective studies as high as 50% within 10 years of the first episode of stone disease. 4 It remains a challenge to determine which patients are most likely to stone recurrence. There is a vigorous debate about the best clinical pathway to take after a first stone episode; nevertheless, therapeutic measures must be taken to prevent further episodes.

Many randomized controlled clinical trials have demonstrated that not all patients require routine stenting after ureteroscopy, 5 so we designed a study to assess the prophylactic value of ureteral stenting for decreasing episodes of renal colic in patients with recurrent stone disease following uncomplicated transurethral lithotripsy (TUL). We followed-up all patients and compared the number of episodes of renal colic seen in patients with stents v those without stents.

PATIENTS AND METHODS

From May 1999 to January 2004, 205 patients with recurrent ureteral stones (those with three or more episodes of stone disease) who were candidates for TUL were included in our

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When the calculi or the ureteral orifice could not be accessed secondary to ureteral stricture (n = 4), a stent was inserted to prevent injury to the ureter during surgery (n = 2), or other interventions were needed (e.g., extracorporeal shockwave lithotripsy [n = 4]), these patients were excluded from the study. We ended up with a total of 195 patients enrolled in the study (a few patients in each study group had insignificant residual stone disease, less than 4 mm). After obtaining informed consent, patients were randomly divided into stented (94) and unstented (101) groups. A 7.5F rigid ureteroscope was used and the stones were fragmented with a pneumatic lithotripter, then a 4.8F Double-J stent (28 cm) was placed in the stented (94) group for 4 weeks post-procedure. Patients remained hospitalized for 2 days after the procedure.

A sensitivity analysis was performed and the results were consistent with the results of the data analysis. During a follow-up period of 24 months (range 6–60 months), the number of stones that passed spontaneously and the number and intensity of episodes of renal colic pain were assessed in the two study groups. The Student's t-test and Pearson's chi-square test were used for data analysis.

RESULTS

During the mean follow-up period of 24 months (range 6–60 months), 43 patients (45.7%; CI 95%, 35.7, 55.8) in the stented group and 35 patients (34.7%; CI 95%, 25.4, 43.9%) in the unstented group had spontaneous stone passage (P = 0.447). The mean ages of the patients with spontaneous stone passage were 39.2 years (range 15–76 years) and 43.1 years (range 13–80 years) in the stented and unstented groups, respectively.

The male:female ratio was 30:13 in the stented group and 24:11 in the unstented group. Mean stone size was 10.5 mm (range 4–15 mm) and 10.3 mm (range 4–12 mm) in the stented and unstented groups, respectively.

The sizes and sites of the stones are shown for both groups in Table 1. Among the patients who had spontaneous stone passage in the two groups, patient age, stone size and location, and the side affected were not statistically significantly different.

Episodes of ureteral colic pain were significantly higher in the unstented group compared with the stented group [total episodes = 87 (mean ± SE = 2.5 ± 0.2) vs. total episodes = 30 (mean ± SE = 0.7 ± 0.1), with a mean difference of 1.8 and (CI 95%; 1.4, 2.1) episodes per patient, on independent Student’s t-test (P < 0.001)].

DISCUSSION

Stents have been used for more than 25 years in the treatment of renal and ureteral stones. The stent is generally placed if there is accompanying ureteral injury, in patients with residual stone disease after ureteroscopic lithotripsy, and to prevent late complications (e.g., ureteral stricture).2 Stents may cause complications (e.g., hematuria, painful urination, urgency, flank pain, lower abdominal pain, bacteriuria, or infection), or they may migrate. These symptoms can last for up to 3 days after stent removal; however, some studies reported no differences between stented and unstented groups with regard to postoperative pain and complications.6,7

It was also believed that if the catheter was of the proper length and positioned correctly, the incidence of irritative bladder symptoms would be reduced. Risk factors for complications can be minimized with high-volume fluid intake, prompt evaluation of clinical complaints, and aggressive treatment of confirmed infections. The surgeon in charge is responsible for informing the patient of the indications, consequences, and

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unstented</th>
<th>Stented</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>Number of patients</td>
<td>101</td>
<td>94</td>
<td>—</td>
</tr>
<tr>
<td>Stone passage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number (%)</td>
<td>35 (34.7%)</td>
<td>43 (45.7%)</td>
<td>0.447&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>CI 95%</td>
<td>(25.4, 43.9)</td>
<td>(35.7, 55.8)</td>
<td></td>
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<tr>
<td>Side (left/right)</td>
<td>23 (65.1%)/12 (34.9%)</td>
<td>28 (65.7%)/15 (34.3%)</td>
<td>0.956&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gender (male/female)</td>
<td>24 (68.6%)/11 (31.4%)</td>
<td>30 (69.7%)/13 (30.3%)</td>
<td>0.909&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>43.1 (15.3)</td>
<td>39.2 (13.8)</td>
<td>0.221&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stone diameter (mm), mean (SD)</td>
<td>10.3 (2.3)</td>
<td>10.5 (2.9)</td>
<td>0.785&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stone size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 mm</td>
<td>0 (0%)</td>
<td>2 (4.7%)</td>
<td>0.223&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>5–10 mm</td>
<td>20 (57.1%)</td>
<td>18 (41.9%)</td>
<td></td>
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<tr>
<td>&gt;10 mm</td>
<td>15 (42.9%)</td>
<td>23 (53.5%)</td>
<td></td>
</tr>
<tr>
<td>Stone site</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Upper</td>
<td>19 (54.3%)</td>
<td>21 (48.8%)</td>
<td>0.891&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Middle</td>
<td>3 (8.6%)</td>
<td>4 (9.3%)</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>13 (37.1%)</td>
<td>18 (41.9%)</td>
<td></td>
</tr>
<tr>
<td>Number of episodes of renal colic, mean (SD)</td>
<td>2.5 (0.9)</td>
<td>0.7 (0.7)</td>
<td>&lt;0.001&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Chi-square test.
<sup>b</sup>Independent Student’s t-test.
complications attendant to stent placement. Failure to do so has dire management and potential medicolegal implications. Lower urinary tract symptoms such as irritative voiding are probably caused by irritation of the bladder floor, whereas upper urinary tract symptoms such as flank pain are thought to be secondary to vesico-ureteral reflux. Stents that are softer or those that have a tapered lumen and shorter tail have been shown to reduce these symptoms. Alkalization of the urine is also helpful.

Although randomized controlled clinical trials have demonstrated that not all patients require routine stenting after ureteroscopy, we sought to assess the prophylactic effect of ureteral stenting after uncomplicated TUL in patients with recurrent ureteral stones.

Studies of risk factors to help identify patients likely to have stone recurrence often yield disappointing results. In general, women tend to have recurrences less often than men, although this has not always been the case. Family history of renal stone disease is another risk factor in some, but not all, studies. Ljunghall and Danielson found high uric acid concentrations to be a risk factor. Others have previously demonstrated that first-time and recurrent stone formers have similar metabolic profiles; however, many studies did not include complete metabolic evaluation data for all patients, and researchers doing retrospective studies made their biochemical assessments several years after the first stone episode. There have been reports of Proteus infection in women (an organism that significantly increases infection rates in those with stone disease) and multiple stones as risk factors for recurrence, indicating that some studies did not clearly distinguish between the different types of stone disease. Some studies included patients receiving pharmacologic treatment to prevent recurrences, and this may have influenced the course of their disease. One recent study found no differences between patients with and without recurrence with regard to the prophylactic treatment they received.

Results of our study demonstrated that although symptoms such as hematuria may be more prevalent in the stented group, the number of episodes and intensity of renal colic pain in those with recurrent stones that formed at late follow-up were significantly lower in the stented than in the unstented group. Thus we believe that routine stenting should be performed after uncomplicated ureteroscopic lithotripsy only in patients with histories of recurrent ureteral stone disease.

CONCLUSION

Insertion of Double-J stents for 4 weeks after uncomplicated TUL in patients with recurrent ureteral stones significantly decreases the number of episodes of ureteral colic, although it does not decrease the rate of stone formation. We believe that routine stenting is useful after uncomplicated ureteroscopic lithotripsy only in patients with histories of recurrent ureteral stone disease.

REFERENCES


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ABBREVIATIONS USED

TUL = transurethral lithotripsy.