

## Evaluation of Lower Urinary Tract Symptoms Due to Indwelling Ureteral Stents

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### ABSTRACT

Indwelling ureteral stents are associated with a variety of lower urinary tract symptoms. We evaluated the lower urinary tract symptoms associated with the ureteral stents in patients with temporary ureteral stents following ureteroscopic lithotripsy. The patients were given questionnaires for evaluation of lower urinary tract symptoms after 2 weeks of stent insertion and then again after 2 weeks of stent removal. The scores of lower urinary tract symptoms with and without stents were compared using statistical tools. Seventy-eight patients completed the study. Eighty-six percent of the patients had frequency and 71% had nocturia with indwelling ureteral stents. Similarly, 92% had dysuria, 90% had urgency and 91% had feeling of incomplete voiding. Analysis of the symptom scores before and after removal of the stents revealed a statistically significant difference with respect to frequency, nocturia, dysuria, urgency and feeling of incomplete voiding. The difference in rate of incontinence was not statistically significant before and after removal of stents. We concluded that insertion of ureteral stent causes significant lower urinary tract symptoms in most of the patients and the symptoms improve after removal of the stents.

**Keywords:** Evaluation, Lower urinary tract symptoms, Ureteral stent

### INTRODUCTION

Ureteral stents have become a fundamental tool in today's urologic armamentarium and are employed for a number of indications including relief of obstruction, as a prophylaxis against obstruction or ureteral injury, and use as a ureteral splint.<sup>1</sup> Since its first use by Finney in 1978, the indication and use of ureteral stents have continued to expand.<sup>2</sup> Unfortunately, indwelling ureteral stents are associated with varying degrees of lower urinary tract symptoms (LUTS), discomfort and complications.<sup>3-6</sup> Besides subjective evaluation of these symptoms, objective assessment tools are important to quantify their intensity and allow for comparisons between different points during the course of treatment. The international prostate symptom score (IPSS), International Continence Society (ICS) male questionnaire, ICS quality of life (QOL) questionnaire and Bristol Female Lower Urinary Tract Symptoms (BFLUTS) questionnaire are validated instruments used for the assessment of lower urinary tract symptoms along with their impact on quality of life.<sup>7,8,9</sup> However, these tools are not specific for stent related symptoms. In 2003, Joshi et al developed and validated Ureteral Stent Symptom Questionnaire (USSQ)

to specifically address the evaluation of symptoms related to ureteral stent and its impact on QOL of patients.<sup>10</sup> USSQ is a self administered comprehensive psychometrically valid and multidimensional measure to evaluate health related quality of life in patients with ureteral stents. Since its publication in 2003, the USSQ has undergone cross-cultural and linguistic validation in different languages like Spanish, Korean, Italian, French etc.<sup>11-14</sup> It has been used as a primary outcome measure in many studies on ureteric stents and remains a reliable and valid intervention specific measure for research application.<sup>15</sup> It consists of 6 domains covering urinary symptoms, pain, general health, work performance, sexual matters and additional problems. In this study, we evaluated the lower urinary tract symptoms in patients with ureteral stents. To evaluate the symptoms due to stents, it is necessary to compare the symptoms during stent with symptoms before stenting. However, the patients who need stents will be having symptoms of the disease (ureteric stone in our case) which tends to mimic the stent symptoms itself, making the comparison difficult. Hence, we compared symptoms of the patients during the stent period with symptoms after stent has been removed.

**MATERIALS AND METHODS**

Patients with ureteric stone scheduled for ureteroscopic lithotripsy in Nepal Medical College Teaching Hospital were included in the study. Over a period of one year, from May 2013 to April 2014, a total of 78 patients fulfilled the inclusion criteria and enrolled in the study. The inclusion criteria were patients with unilateral ureteric stone who underwent semi rigid ureterorenoscopy (URS) and pneumatic lithotripsy with double J (DJ) stent insertion for 2 weeks. Exclusion criteria were patients with bilateral DJ stents, patients in whom DJ stent were kept for less than or more than 2 weeks and patients with residual stones. Patients with other lower urinary tract diseases besides ureteric stone, including urinary tract infection were also excluded from the study. All patients had negative urine culture before the procedure. Under spinal anesthesia, semi rigid ureteroscopy was done with 7 Fr URS (KarlStorz) and stone was fragmented using pneumatic lithotripter(Nidhi). A 6 Fr, 26 cm stent made of same material (Polyurethane by BioRad) was inserted in all patients. Stent position was verified both fluoroscopically and endoscopically at the end of the surgery. Correct positioning of stent was reconfirmed with plain radiography of abdomen on the 3<sup>rd</sup> post-operative day and stone free status was also confirmed. Patients were given postoperative analgesic Aceclofenac 100mg twice daily for 3 days. Patients were called at 2 weeks and their lower urinary tract symptoms were evaluated using USSQ, followed by DJ stent removal. They were reevaluated after 2 weeks of DJ stent removal using USSQ again. Questionnaires were filled

up by telephone call for those patients who could not attend hospital at specified date of follow up. The stent specific symptom questionnaire consisted of questions that assessed lower urinary tract symptoms including daytime frequency, nocturia, dysuria, urgency, feeling of incomplete evacuation and incontinence. The answers were based on a five-point rating scale and the scoring system consisted of simple sum of the points in each section with higher score indicating worse outcomes. Analysis of data was done by Statistical Package for the Social Sciences (SPSS) version 18 and *p*-value <0.05 was considered statistically significant.

**RESULT**

Over a period of 12 months, 78 patients fulfilled the inclusion criteria and completed the questionnaires. Mean age of the patients was 36 with range 16-71 years. And male:female ratio was 1.4:1. Mean stone size was 9.2mm. Among the 78 patients, 31 had proximal ureteric stones and 47 had distal ureteric stones. 45 stones were on right side while 33 stones were on left side. Comparison of scores of individual stent related symptoms between week 2 (before stent removal) and week 4 (after stent removal) is shown in Table 1.

The mean age of the patients participating in this study was 36.01±16.88 with a range of 2 to 82 years. Two hundred and fourteen (56.9%) of the participants were male and 162 (43.1%) were female. Most of the patients were from Lalitpur district where this dental hospital is located (Table 1).

**Table 1:** Comparison of number of patients with scores of individual stent related symptoms between before stent removal (week 2) and after stent removal (week 4)

	<b>Before stent removal (week 2)/ after stent removal (week 4)</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Frequency</b>	11/33 ≥Every 4 hr	14/19 Every 3 hr	14/15 Every 2 hr	17/6 Hourly	22/5 Several/hour
<b>Nocturia</b>	23/32 None	31/29 1 time	16/12 2 times	6/4 3 times	2/1 ≥ 4 times
	<b>Never</b> <b>( 1)</b>	<b>Rarely</b> <b>(&lt;1/3rd of time) (2)</b>	<b>Sometimes</b> <b>(1/3rd -2/3rd of time) (3)</b>	<b>Most of time</b> <b>(&gt;2/3rd of time) (4)</b>	<b>All the time</b> <b>(5)</b>
<b>Dysuria</b>	6/35	9/26	18/12	36/5	9/0
<b>Urgency</b>	8/24	9/31	12/15	33/6	16/2
<b>Feeling of Incomplete Evacuation</b>	7/52	8/17	13/9	16/0	34/0
<b>Incontinence</b>	52/56	21/18	5/4	0/0	0/0

Analysis of urinary symptoms before and after stent removal revealed a statistically significant difference with respect to day time frequency, nocturia, dysuria, urgency, and feeling of incomplete evacuation as shown in Table 2.

**Table 1:** Frequency and percentage distribution of stent related symptoms at week 2 and week 4

	Week 2	Week 4	p value
Day Frequency	67(86%)	45(58%)	
Night Frequency	55(71%)	46(59%)	0.002
Dysuria	72(92%)	43(55%)	<0.001
Urgency	70(90%)	54(69%)	<0.001
Feeling of Incomplete Evacuation	71(91%)	26(33%)	<0.001
Incontinence	26(33%)	22(28%)	0.49

The rate of incontinence was not statistically significantly different between before and after removal of the stent. Eighty-six percent of patients complained of urinary frequency at least every 3 hours (score of >1) and 71% complained of nocturia at 2 weeks of stenting, while only 58% of the patients complained of urinary frequency and 59% complained of nocturia 2 weeks after removal of stent. Almost all patients with stent had dysuria (except 6) and urgency (except 8) at 2 weeks. However, only 55% had dysuria and 69% had urgency 2 weeks after removal of the stent. Ninety-one percent of patients had feeling of incomplete voiding with stents, while the symptom was persistent in only 33% after removal of stent. The difference in the rate of these symptoms before and after stent removal was statistically significant as shown in the Table 2. Although the rate of incontinence was less after stent removal, the difference was not statistically significant (p=0.49). Similarly, comparison of mean score of urinary symptoms with stent and without stent revealed statistically significant difference with regards to day time frequency, nocturia, dysuria, urgency, and feeling of incomplete voiding, while there was no statistically significant difference with regards to incontinence as shown in Table 3.

**Table 3:** Mean scores of stent related symptoms at week 2 and week 4

	Week 2	Week 4	p value
Day Frequency	3.32	2.13	<0.001
Night Frequency	2.14	1.91	0.012
Dysuria	3.42	1.78	<0.001
Urgency	3.54	2.14	<0.001
Feeling of Incomplete Evacuation	3.79	1.45	<0.001
Incontinence	1.40	1.33	0.254

## DISCUSSION

Indwelling ureteral stents are associated with a range of urinary tract symptoms affecting the general health of patients and their use, results in a reduced quality of life in upto 80% of patients.<sup>16</sup> Despite these symptoms, ureteral stents are thought to be overused in contemporary urological practice. In a worldwide survey among practicing urologists, Auge *et al* found that two thirds of the urologists who perform ureteroscopic stone surgery would place a stent more than 50% of the time and 13% would always place a post-operative stent.<sup>17</sup> The underlying pathophysiology associated with the urinary symptoms due to ureteric stents remains unknown. The etiology is partly due to the high urinary bladder pressure transmitted to the renal pelvis during voiding and partly due to the trigonal irritation by the intravesical part of the stent. Several factors have been investigated for their effects on the symptoms including the stent length, diameter, softness, material and position of the stent loop.<sup>18-21</sup> In addition, the stent related symptoms could be related to lower ureteral spasm or local trigone sensitivity.<sup>22</sup> Nab G and colleagues published a systematic review and meta-analysis of studies evaluating the outcomes of stenting after uncomplicated ureteroscopy in the British Medical Journal in 2007.<sup>23</sup> This study included 9 randomized controlled trials with 831 participants and the results revealed that the incidence of LUTS such as dysuria, urgency and frequency was significantly higher in patients with stents. Comparison of stent related symptoms between patients with and without symptoms can be misleading because stent symptoms tolerability varies with individuals. In this study we attempted to compare the stent related symptoms in the same individual during the stent in situ period with symptoms after 2 weeks of stent removal. We expected that 2 weeks after stent removal, the symptoms related to the stent would have been completely resolved and the remaining symptoms would be representative of baseline symptoms. Joshi *et al* prospectively assessed the prevalence and bother of various urinary tract symptoms caused by indwelling ureteral stents using validated questionnaires (IPSS, ICS male questionnaire, QOL questionnaire and the BFLUTS).<sup>24</sup> The same authors later developed and validated a questionnaire to specifically address the symptoms of ureteral stents, termed as USSQ, which consist of 38 items examining 6 domains.<sup>25</sup> Using this USSQ, they found that 78% of the patients with stents reported bothersome urinary symptoms and more than 80% of the patients experienced stent related pain affecting daily activities.<sup>16</sup> The purpose of our study was also to evaluate the extent of the urinary symptoms due to ureteric stent. Our results concluded that most of the patients with ureteric stents suffer from bothersome urinary symptoms which are attributable

to the presence of stents and these symptoms except incontinence improved significantly after stent removal. Understanding the extent of these symptoms would help a urologist to take better decision about whether to leave a ureteric stent or not at the end of ureteroscopic procedure and avoid the stent whenever possible.

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