

Use of conventional DJ stent and single loop stent with string after ureterorenoscopic lithotripsy: Can we use? Can it be effective?

Sonu Sharma, Vilas Sabale, Abhirudra Mulay, Sunil Mhaske, Vikram Satav, Surya Nihar
Department of Urology, Renal Transplant and Robotics, Dr D Y Patil Medical College, Pune, Maharashtra, India

Abstract

Context: Use of conventional double j stent with string and single loop stent with string after ureterorenoscopy.

Aim: The aim of this study was to compare the use of both types of stents using the Ureteral Symptom Score Questionnaire (USSQ) and assess proximal migration.

Settings and Design: This was a single institute study.

Subjects and Methods: A total of 96 female patients with unilateral ureteric stones were enrolled. Patients underwent ureterorenoscopic lithotripsy, conventional double J (DJ) stent with string and single loop stent with string was placed. Before stent removal at 7–10 days, they were evaluated with X-ray kidney ureter bladder for proximal migration and USSQ for stent-related complaints.

Statistical Analysis Used: Data were analyzed using Chi-square and Student's *t*-test.

Results: In our study, Group A (DJ loop with string) had 51 patients and Group B (single J loop with string) had 47 patients. The mean stone size in group A was 10.06 mm and Group B was 9.7 mm. Both groups had one case each of early stent expulsion and none had proximal migration of the stent. Group A had two cases of urinary tract infection and Group B had one case which resolved on antibiotics. Evaluating the USSQ questionnaire in both groups, urinary symptoms such as urgency ($P = 0.03$), dysuria ($P = 0.02$), interference with life ($P = 0.01$), and quality impact overall ($P = 0.016$) were statistically significant. Evaluating pain, sleep disturbance ($P = 0.04$), pain at voiding ($P = 0.03$), and flank pain during voiding ($P = 0.018$) was statistically significant. In general health, difficulty with heavyweight physical activity ($P = 0.02$), feeling calm ($P = 0.16$), social life enjoyment ($P = 0.26$), and need for extra help ($P = 0.008$) was significant. In sexual matters, 13 (28%) patients in Group B had no active sex (conscious) and 6 (12%) patients had stopped intercourse due to stent-related symptoms, whereas in Group A, it was 10 (20%) and 2 (4%) patients, respectively.

Conclusions: The use of a single J stent with string is an effective method, has lesser complication, and is easier to remove.

Keywords: Double J stent, single loop, string, ureterorenoscopy

Address for correspondence: Dr. Sonu Sharma, Department of Urology, Renal Transplant and Robotics, Dr D Y Patil Medical College, Pimpri, Pune - 411 018, Maharashtra, India.
E-mail: sharmasonubt@yahoo.com

Received: 17.08.2020, **Accepted:** 11.02.2021, **Published:** 02.09.2021

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/UA.UA_113_20

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How to cite this article: Sharma S, Sabale V, Mulay A, Mhaske S, Satav V, Nihar S. Use of conventional DJ stent and single loop stent with string after ureterorenoscopic lithotripsy: Can we use? Can it be effective? *Urol Ann* 2021;13:362-6.

INTRODUCTION

Ureteroscopy (URS) is one of the most common interventions done for removing urinary tract stones, evaluating pelvicalyceal anatomy, and upper urinary tract malignancy. Stents are commonly placed in the ureter after the intervention. The sole work of stent is to maintain patency if there is a development of ureteric edema in response to instrumentation, to help in the passage of small stones remaining after a procedure, and to prevent stricture formation in case of ureteric injury.^[1] Removing a ureteral stent using an extraction string was first described by Siegel *et al.* in 1986 as a simple method to avoid general anesthesia and unnecessary urethral instrumentation for pediatric patients.^[2]

The American Urological Association Guidelines lists double J (DJ) stenting after URS as optional except in cases of specific complications. Hence, placement of DJ remains a common practice after a URS procedure.^[3,4] For removal of the stent, patients need to visit the hospital and undergo removal by use of cystoscope, which can be averted by using stents with strings attached to them. The patient can be counseled about self-removal of the stent with the help of string and those who are unable to remove can visit the hospital. This could decrease a procedure as well as decrease hospital costs.^[5]

Most of the studies show the use of conventional DJ stent with string and none with the use of a single loop with string.

This study is undertaken to compare stent-related complication using a single loop stent with string and DJ stent with string in female patients after retrograde technique for ureteric stones using Ureteral Symptom Score Questionnaire (USSQ).

SUBJECTS AND METHODS

This comparative study was performed in the Department of Urology in Dr. D Y Patil Medical College, Pune in the year 2018. Institutional Ethical Committee approval was obtained before the commencement of the study. A total of 96 female patients were enrolled in two groups.

Group A conventional DJ stent with string, Group B with Single J with string [Figure 1]. Patients with unilateral ureteric stones were included into the study. Patients with bilateral ureteric stones and patients unfit for surgery, mentally or physically challenged, trauma to the ureter, and males were excluded. A written and informed consent was

obtained from the patient after explaining the merits and demerits of all the techniques. All the patients to be operated were given appropriate anesthesia before the procedure.

All stents were inserted through a retrograde approach under cystoscopic guidance after ureterorenoscopic lithotripsy [Figure 2]. Stent lengths were determined based on patient height. The lower coil of the loop was cut (3 cm) and the string was tied to the cut end for the single loop group. The stent string was prolene 7-0 which was manipulated to leave a new air knot 1 cm from the stent end, the distal end of the string (15 cm) was left protruding from the urethral meatus without securing it to the skin.

All patients were discharged 2 days following the operation with prescriptions for prophylactic antibiotics for 1 week and nonsteroidal anti-inflammatory drugs for 3 days. No alpha-blockers and anticholinergics were given until unbearable symptoms appeared affected quality of life.

The stent was removed between 7 and 10 days after the procedure and evaluated for postprocedure events.

If the length of the string is found to be reducing, the patient was called for the removal of the stent.

The pain was evaluated by USSQ^[6] in both groups and proximal migration by X-ray [Figure 3] kidney ureter bladder.

Patients were explained about stent *in situ* with string and how to remove it on her own or under supervision in the out-patient department.

Data were analyzed using Chi-square and Student's *t*-test.

RESULTS

In our study, Group A (DJ loop with string) had 51 patients and Group B (single J loop with string) had 47 patients. The mean age for Group A was 46.2 years and Group B was 44.7 years. The mean stone size in Group A was 10.06 mm and Group B was 9.7 mm.

Groups A and B had one case each of early stent expulsion and none had proximal migration of the stent. Group A had two cases of urinary tract infection and Group B had one case which resolved on antibiotics [Table 1].

Evaluating the USSQ questionnaire in both groups, with regard to pain, sleep disturbance ($P = 0.04$), pain at voiding ($P = 0.03$), and flank pain during voiding ($P = 0.018$) was statistically significant. In general health patient, difficulty with heavy weight physical

activity ($P = 0.02$) [Table 2], urinary symptoms like urgency ($P = 0.03$), dysuria ($P = 0.02$), interference with life ($P = 0.01$), and quality impact overall ($P = 0.016$) was statistically significant between the two groups [Table 3].

Feeling calm ($P = 0.16$), social life enjoyment ($P = 0.26$), and need for extra help ($P = 0.008$) were significant between both groups [Table 4]. In sexual matters, 13 patients (28%) in a single loop with string group had no active sex (conscious of the stent) and 6 patients (12%) had stopped intercourse due to stent-related symptoms, whereas in DJ with string group, 10 patients (20%) had no

active sex life and 2 patients (4%) had stopped intercourse due to stent-related symptoms [Table 5].

DISCUSSION

Bockhalt *et al.* in their 6-week follow-up period, 34.3% of all patients had postprocedural stent events (PRE), including 37.2% and 33.3% of patients with and without extraction string, respectively ($P = 0.64$). PREs occurred equally in men with or without an extraction string (27.8 vs. 32.4%; $P = 0.71$), as well as women with and without an extraction string (44.0 vs. 34.3%; $P = 0.39$). In addition, the use of an extraction string resulted in an equivalent number of PREs between men and women ($P = 0.28$). Two women (4.7%) reported removing their stent prematurely on postoperative days 2 and 6, although neither episode resulted in an unscheduled appointment or need for the stent to be replaced. All patients, other than one man (2.3%) who refused to remove his own stent, removed their stent at home, with no patient having a retained stent

Table 1: General Characteristics

Variable	Group A	Group B
Number of patients (n)	51	47
Mean age (years)	46.2	44.7
Mean stone size (mm)	10.06	9.7
Early stent expulsion	1	1
Proximal migration	0	0
Urinary tract infection	2	1

Table 2: Ureteral symptom score questionnaire - pain

Variable	Single J with string	SD	Double J with string	SD	P
Location of pain	1.04	0.72	1.28	0.83	0.07
VAS	3.86	1.32	4.32	1.39	0.053
Pain with physical activity	2.36	0.87	2.64	0.87	0.07
Sleep disturbance	1.43	0.74	1.7	0.78	0.04
Pain at voiding	1.17	0.56	1.58	0.83	0.03
Flank pain at voiding	1.04	0.75	1.68	0.95	0.018
Analgesic frequency	1.5	0.54	1.84	0.71	0.052
Overall bother	1.69	0.81	2.04	0.78	0.02
Overall score	14.13	2.59	17.08	3.5	0.01

VAS: Visual analog scale, SD: Standard deviation

Table 3: Ureteral symptom score questionnaire - urinary symptoms

Variable	Single J with string	SD	Double J with string	SD	P
Frequency of water intake	2.82	0.82	2.72	0.83	0.26
Nocturia	1.89	0.90	2.24	0.95	0.035
Urgency	1.45	0.80	1.8	0.96	0.03
Urge incontinence	0.93	0.82	0.84	0.71	0.26
No urge incontinence	0.89	0.82	0.9	0.81	0.47
Sensation of urine residue	1.63	0.74	1.84	0.88	0.10
Dysuria	1.69	0.70	1.96	0.83	0.02
Hematuria frequency	1.34	0.64	1.32	0.81	0.43
Hematuria amount	1.06	0.77	1.04	0.80	0.42
Interference in life	1.89	0.92	2.46	0.88	0.01
QOL impact overall	2.82	1.16	3.3	0.99	0.016
Overall score	18.56	3.86	20.42	4.2	0.08

QOL: Quality of life, SD: Standard deviation

Table 4: Ureteral symptom score questionnaire general health

Variable	Single J with string	SD	Double J with string	SD	P
Difficulty with light physical activity	1.79	0.77	1.96	0.69	0.07
Difficulty with heavy physical activity	2.15	0.98	2.48	0.86	0.02
Feeling tired	1.34	0.99	1.7	0.78	0.03
Feeling calm	3.08	0.85	2.86	0.94	0.16
Social life enjoyment	2.86	1.1	3	0.92	0.26
Need extra help	0.69	0.81	1.1	0.81	0.008

SD: Standard deviation

Table 5: Ureteral symptom score questionnaire sexual matters

Variable	Single J with string (n=47), n (%)	Double J with string (n=51), n (%)
No active sexual life (due to other reasons)	24 (52.1)	29 (58)
No active sex life (conscious of stent)	13 (28)	10 (20)
Hesitant/refused to answer	4 (8.7)	9 (18)
Stopped intercourse due to stent-related symptoms	6 (12)	2 (4)



Figure 1: Cut end of the stent with string

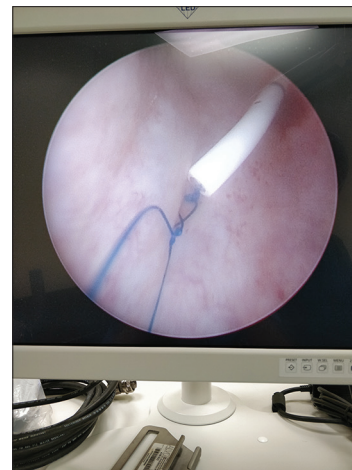


Figure 2: Cystoscopy image

at follow-up based on routine postoperative imaging (CT, plain film, or renal ultrasonography).^[7]

Barnes *et al.* conducted a randomized study in 68 patients: 33 with stent string and 35 with no string. Surveys were returned by 42 of the 68 patients randomized (62%). There was no difference in “urinary symptoms,” “pain,” “general health,” or “work performance” between the groups on either POD 1, 6, or 6 weeks after stent removal. The mean pain score was 2.5 in those with a stent string and 3.1 in those with no string undergoing cystoscopy ($P = 0.45$). Of the 33 patients with a stent string, 5 (15%) inadvertently removed their stent before POD 7 (one male, four females) at 0–4 days postoperatively, none of which required replacement. In all, 32/33 patients (97%) with a stent string were able to remove their stent at home without difficulty, while one male patient with a stent string presented to the clinic for help with removal secondary to anxiety. There were no incidents of proximal stent migration requiring URS for stent removal.^[5]

Kim *et al.* evaluated 89 patients, DJ stent with string and DJ stent without a string in cases of ureteric stones which included males and females where USSQ was used and was completed by 86 patients and 3 had inadvertent stent removal before the visit. Significant differences were observed between the groups for separate questions on “dysuria” and “difficulties with heavy physical activity” (2.96 vs. 2.36, $P = 0.03$, and 2.77 vs. 2.18, $P = 0.04$, respectively). All patients who completed the USSQ, except one in the

string group, answered “no active sexual life.” Among them, 22 patients checked “stopped sexual intercourse after insertion of stent,” which was “due to a stent-related problem” in 17 patients and was significantly higher than that in the no string group (77% vs. 44.4%, $P = 0.03$). Male patients in the string and no string groups showed significant higher urinary symptom scores (33.14 vs. 25.87, $P = 0.006$, and 29.69 vs. 26.26, $P = 0.012$). No differences were found between the two sex subgroups in the other domains of pain, general health, or work performance. The mean pain score was 2.94 in those with string stents and 4.23 in those with no string stents who underwent the flexible cystoscopic removal procedure ($P = 0.005$). No patient suffered from a febrile urinary tract infection requiring additional antibiotic treatment or a therapeutic procedure.^[8]

Oliver *et al.* did a systematic review in 2018 on ureteric stents on extraction string and summary of complications is tabulated in [Table 6]. Most of the studies had no difference in pain and urinary scores.^[9]

Doerch *et al.* in 2018 did a study to examine the safety and effectiveness of the use of a stent with a string attached after URS. Complications, like urinary retention or obstruction and stent migration, were rare in both groups. The patient’s ability to self-remove stents was adequate. In the string group, two were unable to remove their stents, due to fear of removing their stents, and required a return to the office for stent removal. Three patients removed their stents too early. Two

Table 6: Comparative studies

	Overall number of events		Stent dislodgements		Pain scores	Urinary symptoms
	Strings	No strings	Strings	No strings		
Pryor	-	-	-	-	No difference	No difference
Bockhalt	16	46	2/43	-		
York	-	-	-	-	Low (strings)	
Kuehaus	-	-	-	-	No difference	
Barnes	13	14	5/33	-	No difference	No difference
Althaus	13	0	13/98	0		
Loh-Doyle	-	-	-	-	No difference	
Kim	-	0	3/58	0		
Total, n (%)	32 (7.5)	60 (8)	20/232 (9.9)	0		

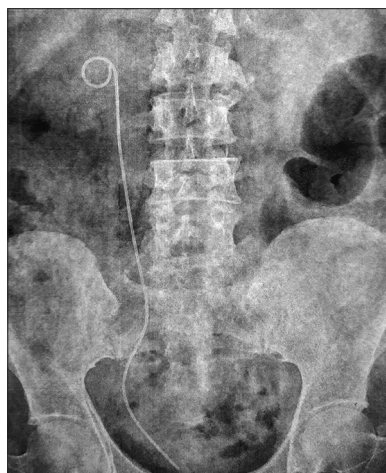


Figure 3: Postoperative X-ray kidney ureter bladder

patients presented with flank pain to the emergency department managed by stent removal and symptomatic treatment.^[10]

CONCLUSIONS

This study concludes that a single loop stent with string can be equally effective as to conventional DJ stent with string with lesser complications, easy removal, and avoidance of procedure. Most studies done are using conventional DJ stent with string and conventional DJ without strings, however we could not come across any study with a single loop with string. Randomized control trials are needed to conclude the precise effectiveness and further use of single loop DJ stent with string. It leaves us with a thought that can we think of using it? Will it be helpful?

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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