

Experience with Ureteral Stent Removal Using An self-extraction String in South Indian Patients - Single Institute Prospective Study

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Abstract

Background: The study aims to know the safety and effectiveness of a stent with a string attached after ureteroscopy (URS) for self-removal of the stent by the patient in our practice. **Subjects and Methods:** After Institutional Review Board approval, a chart review was performed concerning patients who underwent URS & received an indwelling stent with or without a string attached to the stent (55 vs. 65, respectively). Statistical analyses included chi-square and Student's t-tests. **Results:** The string group consisted of 55 patients, in which 32.7% of the patients were male. In the no-string group, 33.8% of the 65 patients were males. No significant difference in complication rates between both groups (P-value = 0.317). Stent duration (Indwell time) was significantly more in no string group (13.32 days) compared to the string group (6.28 days). In the string group, stent dislodgement has significant (P-value = 0.0183), can be easily overcome by patient education. Post-procedural pain was significant in no string group (P-value = 0.0233). **Conclusion:** The use of a stent with an Extraction string after URS appears safe and effective and offers several advantages without increasing stent-related urinary symptoms, complications, or postoperative morbidity.

Keywords: Ureteroscopy, Urolithiasis, Ureteric stent, Extraction –String, Stent removal, Pain

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Introduction

Ureteroscopy (URS) is a familiar procedure for removing urinary tract stones, evaluating kidney anatomy, or evaluating upper urinary tract tumors. After URS, stents placed in the ureter. The purpose of these stents is to maintain patency in the event of ureteric edema in response to instrumentation, to aid in the passage of small stones for a procedure, & to prevent stricture formation in case of ureteric trauma.^[1] Some studies suggest that patients have a lower risk of complications after URS when a stent is placed.^[2-4] These include patients with a history of renal failure, patients had a kidney transplant, patients of solitary kidney & in instances of significant trauma during the URS procedure. The AUA Guidelines list stenting after URS as optional except the setting of specific complications.^[5,6] Therefore, stent placement remains a common practice after a URS procedure. Stents are removed 3–7 days after URS. Stent removal normally involves a return to the clinic or hospital & the removal of the stent in a procedure or operating room using a cyst scope. Patients thus bear the burden of an additional cost & trip to

the hospital associated with their URS. The added procedure can be avoided by inserting a stent through a string attached so that the stent can be removed by the patient at home. Patients who are unable to remove the stent themselves, the stent can be removed without re-instrumentation of the bladder. It has been shown that adverse events & quality of life measurements are not affected by stents with attached strings.^[7] Furthermore, it has been shown that there is less likely to be an extended delay in stent removal, presumably due to the convenience of being able to self-remove the stent. Moreover, in rural centers, patients may live a long distance from the hospital, a string may increase the chance of the stent being removed at the appropriate time. Hence, avoiding this procedure could reduce discomfort for patients & URS-related costs. The purpose of the present study was to evaluate the safety & effectiveness of leaving a string attached to stents placed after URS. If determined to be effective and safe, the use of strings for self-removal has the potential to decrease costs & the necessity for a return to the clinic after stent placement.

Subjects and Methods

One hundred twenty consecutive patients undergoing URS (September 2019 to January 2020) for the stone disease were randomized to receive a ureteric stent with or without an extraction string.

This study was approved by Government Rajaji Hospital, Madurai Institutional Review Board. Consent was obtained from all patients after providing with verbal & written information about the study:

Inclusion criteria

Patients who had a double ureteral stent inserted after URS for unilateral stone disease.

Exclusion criteria

Coexisting noncalculous disease (e.g., malignant obstruction, renal insufficiency, or congenital anomaly of the urinary tract), solitary kidney, ureteral stricture, pregnancy, or complicated URS requiring long-term stent placement (>7 days). Patients who were taking an alpha-blocker or anticholinergic agent to treat lower urinary tract symptoms or who were taking analgesics for chronic pain were also excluded from ruling out any influence of the drugs on the symptom questionnaire results.

Results

A total of 120 patients were included in the study. In with string group 55 patients out of which 18 were male & 37 were female & in without string group 65 patients out of 22 were male & 43 were female. Mean age in string group was 48 years & in without string group was 51 years. Laterality showed no significance. Mean stone size was 14mm in with string group & 11mm in without string group. Stent duration was 6.28 days in with string group & 13.32 days in no string group, which has great importance patient's aspect. Patients with string are stent free by a maximum of 07 days, so there is a significant impact on patient probable in view of psychological stress-free & returning to work confidently.

Complications of the procedure are given in [Table 2].

In patients with a string group, 28 patients have encountered complications & without a string group, 39 patients have encountered complications, which was not statistically significantly different ($P = 0.317$). Stent dislodgement is seen in 5 patients with string & none without string with significant p-value (0.0183), which can be easily overcome by good patient education. Unable to remove stent in 2 patients in with string group & none in without string group, which is statistically not significant. Even though if it is significant, we can remove using cyst scope. The retained stent is seen in 3 patients in no-string groups. UTI & urinary retention does not show any difference in both groups. Post procedural pain was significantly

Table 1: Baseline characteristics of the study population.

Variable	String	No string
Number of patients	55	65
Male, n	18	22
Female, n	37	43
Mean age, Years	48	51
Mean BMI, Kg/m2	30	28.2
Left side, n	20	25
Right side, n	35	40
Stone location		
Kidney	15	15
Ureter	35	41
Combination	5	9
Mean stone size in mm	14	11
Previous Stone surgery	12	14
Stent Duration(days)	6.28	13.32

high in no string group ($P = 0.023$) because of the use of a cystoscope for stent removal.

Table 2: Complications associated with both procedures.

S.No.	Complication	String (n=55)	No string (n=65)	P-value
1	Stent Dislodgement	5 (2male, 3 female)	0	0.018
2	Unable to remove stent	2	0	0.208
3	Retained stent	0	3	0.249
4	UTI	4 (1 male, 2 female)	5 (2 male, 3female)	0.794
5	Post procedure pain	12	28	0.023
6	Urinary retention	5	3	0.467

Discussion

Prophylactic stent placement is one that may reduce the risk of ureteric obstruction, symptoms such as clot/fragment colic, & stricture formation following ureteric inflammation from ureteroscopic stone retrieval.^[8] Stent placement & subsequent cystoscopic removal resulted in higher procedural costs than when a stent was not used.^[9–13] For this reason, several studies have identified the use of a string for self-removal of stents after URS as a cost-saving measure.^[14] Cost savings & minimizing care are vital considerations in the altering health care environment & methods such as stents with self-removal strings may represent an opportunity to minimize the healthcare burden on patients undergoing URS. An advantage of stent extraction strings is that they reduce healthcare costs, & when used to remove stents at home, it reduces costs associated with patient travel & time taken off work.^[7] Barnes et al.^[7] estimated avoiding the need for a second hospital visit & cystoscopy for stent removal resulted in savings of £97000 in their study population. Bockholt et al.^[8] reported an estimated \$1300 (American dollars)/patient cost associated with cystoscopic stent removal, which would be avoided by patients performing home stent extraction using strings. Barnes et al.^[7] estimated a \$68–185 saving per patient on travel costs. Barnes et al. found no difference in mean pain scores between groups with & without strings.^[15]

In contrast, Loh-Doyle et al. reported variation in mean pain scores, with patients who used strings to remove their own stents, reporting the lowest mean pain scores.^[16] The use of intra-urethral lidocaine jelly during cystoscopic stent removal may have affected pain scores reported at removal, possibly falsely reducing pain scores.^[17] The mean pain scores for cystoscopic removal in the operating room (OR), suggesting that the use of extraction strings was well-tolerated at the time of stent removal. Stent dwell time was found to be significantly lower in patients removing their own stents via extraction strings, due to scheduling restraints in arranging appointments for stent removal. The use of extraction strings is advantageous with regard to stent dwell time as patients are able to remove them at home on the date required, with greater convenience. Also, it is well reported that indwelling stents negatively impact the quality of life & cause troublesome symptoms.^[18,19] Reduced stent dwell time reduces the duration of morbidity & positively impacts patient QoL.^[19]

The use of a stent with a string attached for self-removal at home after URS procedures would be safe compared with a traditional stent removed in a procedure room. This management strategy appears to be safe & effective, particularly in countries like India, where limited health resources are available.

Conclusion

The use of a stent with a string attached for self-removal after URS appears safe & effective for patients. Extraction strings with Ureteric stent offer several advantages without increasing stent-related urinary symptoms, complications, or postoperative morbidity. If patients are appropriately selected, this method can be used to decrease healthcare utilization & the related financial burden, which is more significant in resources poor countries like India.

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