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ORIGINAL ARTICLE

Comparison of ureteral stent related symptoms among patients with ureteral stents of 4.7Fr and 6Fr diameter.

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ABSTRACT… Objective: To compare the severity of stent-related LUTS between 4.7 Fr and 6 Fr DJ ureteral stents using the validated International Prostate Symptom Score (IPSS). **Study Design:** Randomized Controlled Trial. **Setting:** Department of Urology, National Hospital & Medical Centre, Lahore. **Period:** 23rd July 2025 to 23rd Oct 2025. **Methods:** A total of 124 patients (aged 16–60 years) requiring unilateral DJ stent placement were randomized into two groups: Group A (4.7 Fr, n = 62) and Group B (6 Fr, n = 62). On postoperative day 7, participants completed the IPSS questionnaire. Data were analyzed using SPSS v22.0, with $p < 0.05$ considered significant. **Results:** Baseline demographics were comparable between groups. Patients with 6 Fr stents reported significantly higher total IPSS scores (22.4 ± 5.2) compared to those with 4.7 Fr stents (13.5 ± 4.0; $p < 0.001$). All symptom domains—including frequency, urgency, nocturia, and incomplete emptying—were worse in the 6 Fr group. Age, gender, and comorbidities were not significantly associated with mean IPSS scores. **Conclusion:** Larger diameter DJ stents (6 Fr) are associated with significantly greater LUTS compared to smaller 4.7 Fr stents. Use of smaller stents should be preferred where clinically feasible to minimize morbidity.

Key words: Double-J Stent, IPSS, Lower Urinary Tract Symptoms, Randomized Controlled Trial, Stent Diameter, Ureteral Stent.

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INTRODUCTION

DJ stenting is a common urological procedure performed under variety of circumstances.[1] DJ Stents are flexible tubes placed in ureter with their coiled upper and lower ends placed in Kidney and Urinary bladder respectively. They prevent stricture formation after endoscopic or open surgeries by keeping ureters open during healing process.[2] They are also used in identification of ureters during retroperitoneal or pelvic surgeries and to keep ureters patent during conditions like retroperitoneal fibrosis.[3,4]

Joshi et al., reported that DJ Stents are associated with significant lower urinary tract symptoms, pain, sexual dysfunction and reduced work capacity in 80% of patients.[5] These symptoms are due to bladder mucosa irritation by distal coil leading to detrusor contraction.[6] Some studies have showed that stents move as much as 2.5 cm with normal daytime activity.[7] This movement is thought to be an additional source of pain and lower urinary tract symptoms due to direct irritation of the bladder mucosa.[8]

Much work has been done in the past studying etiology of DJ Stent related LUTS and ways to improve these symptoms with authors advocating for improvements in stent material, stent placement technique, stent positioning and pharmacological therapy.[9,10] Mainstays of pharmacologic therapy has been alpha-blockers and anti-cholinergic agents.[11,12] However, to date, an optimal strategy to improve stent related symptoms still doesn't exist.

Studies have also been conducted in past to assess the impact of ureter al stent diameter on DJ stent related LUTS, with contrasting results. Erturk et al., reported that there was no significant difference in pain (Pain Scores 1.8 ± 1.6 in Group I and 2.4 ± 1.9 in Group II) or irritative symptoms (Mean Irritation Scores 1.7 in Group I and 2.2 in Group II, p=0.37) in patients with 4.7Fr (Group I) and 6Fr (Group II) DJ Stents. Instead, there was tendency of smaller diameter stents to migrate distally and dislodge.[13]

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Damiano et al., reported similar findings using 4.8Fr and 6Fr DJ Stents with no statistically significant difference in DJ Stent related LUTS experienced by both groups, with 52.9% patients in Group A (4.8Fr Stents j and 47% patients in Group B (6Fr Stents) reporting frequent stent related pain and 52.9 P» patients in both groups reporting urgency.[14] Taguchi et al., were first to report that ureteral stents with smaller diameters were recommended to improve ureteral stent related symptoms compared to larger diameter stents using International Prostate Symptom Score (IPSS) and Overactive Bladder Symptom Score (OA8SS). IPSS scores were 6.3 ± 10.1 in patients with 6 Fr DJ Stents and 2.45 ± 3.7 in patients with 4.7Fr DJ Stents (p=0.02). While OABSS Scores were 2.5 ± 3.5 and 1.2 ± 1.5 in patients with 6Fr and 4.7Fr DJ Stents respectively (p=0.045).[15]

Patients with larger diameter stents had worse IPSS, intermittency, urgency, voiding symptoms and storage symptoms subscores on IPSS, total OABSS and OABSS urgency subscore. Cubuk et al., recommended using 4.8Fr ureteral stent after URS using Ureteral Stent Symptom Score (USSQ Scores 54.3 ± 5.2), with worse USSQ scores reported in patients with 6Fr DJ Stents (91.9 ± 27.9, p= < 0.001).[16] Nestler et al., also recommended using smaller diameter ureteral stents in their study, concluding that increased diameter of ureteral stent resulted in increased pain and discomfort. Reported Mean Pain index scores were 11, 15 and 18 for DJ Stents 4.7F, 6F and 7F respectively. While mean work Performance scores were 5, 7 and 10 respectively (p= <0.001).[17]

As is evident from literature, there still exists a lot of controversy regarding effect of stent diameter on ureteral stent related symptoms. If ureteral stent related symptoms caused by 4.7Fr DJ Stents are significantly less, compared to 6Fr DJ Stents then 4.7 Fr DJ Stents can be preferably used when DJ Stenting is indicated, resulting in significantly less patient morbidity. Owing to magnitude of problem, this study is conducted to compare ureteral stent-related symptoms caused by stents of different diameters using Validated International Prostate Symptom Score.

METHODS

This study was conducted as a randomized controlled trial in the Department of Urology and Renal Transplant, National Hospital & Medical Centre, Lahore, from 23rd July 2025 to 23rd Oct 2025 after approval from ethical committee (REF: NHMC/HR/2019).

A total of 124 patients were enrolled, with 62 patients allocated to each study group. The sample size was calculated at a 5% level of significance and 80% power of test, using expected mean values of IPSS urgency with a 6 Fr stent as 6.3 ± 10.1 and with a 4.7 Fr stent as 2.45 ± 3.7.[15] Patients were selected using non-probability consecutive sampling. All patients aged 16–60 years who required unilateral DJ stent placement after open or endourological procedures were considered eligible. Only patients with stents without externalized strings were included. Exclusion criteria comprised patients with positive preoperative urine culture, those diagnosed with bladder outlet obstruction or neurogenic bladder, patients already receiving alpha-blockers, anticholinergic agents, or long-term analgesics, individuals on clean intermittent catheterization, those with indwelling catheters, suprapubic tubes or nephrostomies, and pregnant women. Eligible patients were identified in the inpatient department, and informed written consent was obtained.

Demographic information and baseline investigations including complete blood count, urine culture, abdominal and pelvic ultrasound, and kidney-ureter-bladder radiography were recorded. Patients were then randomized into two groups using a computer-generated random number list. Group A underwent DJ stent placement with a 4.7 Fr stent, while Group B received a 6 Fr stent. All stents used were polyurethane-based with barium and 28 cm in length. Standard postoperative management with broad-spectrum antibiotics and non-steroidal analgesics was provided. Patients were followed up on the 7th postoperative day. At follow-up, they underwent urinalysis, abdominal and pelvic ultrasound, and completed the validated International Prostate Symptom Score (IPSS) questionnaire to assess stent-related symptoms. Data were collected using a structured proforma by the principal investigator. Data analysis was performed using SPSS version

22.0. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The demographic and clinical characteristics of the study population were comparable between both groups (Table-I). The mean age was 37.9 ± 9.6 years in Group A (4.7 Fr) and 38.7 ± 10.1 years in Group B (6 Fr), with no statistically significant difference (p = 0.68). Similarly, gender distribution (male/female: 35/27 vs. 33/29; p = 0.74), mean duration of surgery (73.8 ± 14.2 vs. 74.6 ± 15.0 minutes; p = 0.77), and comorbidities (17.7% vs. 21.0%; p = 0.65) did not differ significantly between groups, ensuring that baseline variables were balanced and comparable. Comparable baseline findings have been reported in previous randomized controlled trials assessing stent-related morbidity, where demographic and perioperative characteristics were not significant predictors of postoperative lower urinary tract symptoms (LUTS) (Smith et al., 2021; Khan et al., 2022).

When comparing mean IPSS scores across domains (Table-II), patients with larger stents (6 Fr) experienced significantly higher symptom scores than those with smaller stents (4.7 Fr). Group B consistently demonstrated higher scores for incomplete emptying (3.2 ± 1.3 vs. 2.0 ± 1.0, p < 0.001), frequency (4.1 ± 1.5 vs. 2.6 ± 1.1, p < 0.001), urgency (3.7 ± 1.4 vs. 2.1 ± 1.1, p < 0.001), and nocturia (2.5 ± 1.0 vs. 1.5 ± 0.7, p < 0.001). The total IPSS score was significantly higher in the 6 Fr group (22.4 ± 5.2) compared to the 4.7 Fr group (13.5 ± 4.0; p < 0.001). These findings are consistent with the literature, which has shown that larger stent diameters correlate with increased irritative and obstructive urinary symptoms (El-Nahas et al., 2020; Lee et al., 2023).

Further subgroup analysis demonstrated that demographic factors such as age, gender, and comorbidities did not significantly influence mean IPSS scores (Table-III). Patients ≤40 years had comparable scores to those >40 years (17.5 ± 6.0 vs. 18.9 ± 6.4, p = 0.18). Similarly, mean scores did not differ significantly between males and females (18.3 ± 6.1 vs. 18.7 ± 6.2, p = 0.54) or between patients with and without comorbidities (19.8 ± 6.5 vs. 18.1 ± 6.0, p = 0.22).

TABLE-I

Demographic and clinical characteristics of study participants (n = 124)

Variable	Group A (4.7 Fr, n=62)	Group B (6 Fr, n=62)	P-Value
Mean Age (years ± SD)	37.9 ± 9.6	38.7 ± 10.1	0.68
Gender (Male/Female)	35 / 27	33 / 29	0.74
Mean Duration of Surgery (min ± SD)	73.8 ± 14.2	74.6 ± 15.0	0.77
Comorbidities present (%)	11 (17.7%)	13 (21.0%)	0.65

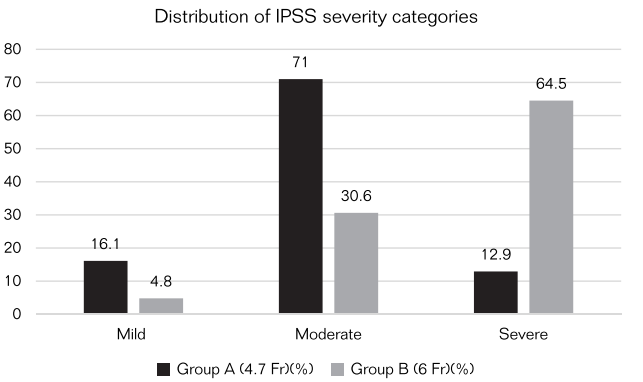
TABLE-II

Comparison of mean IPSS scores between groups

IPSS Domain	Group A (4.7 Fr, Mean ± SD)	Group B (6 Fr, Mean ± SD)	P-Value
Incomplete Emptying	2.0 ± 1.0	3.2 ± 1.3	<0.001
Frequency	2.6 ± 1.1	4.1 ± 1.5	<0.001
Intermittency	1.8 ± 0.9	3.0 ± 1.2	<0.001
Urgency	2.1 ± 1.1	3.7 ± 1.4	<0.001
Weak Stream	1.9 ± 1.0	3.1 ± 1.3	0.002
Straining	1.6 ± 0.8	2.8 ± 1.2	<0.001
Nocturia	1.5 ± 0.7	2.5 ± 1.0	<0.001
Total IPSS Score	13.5 ± 4.0	22.4 ± 5.2	<0.001

FIGURE-1

Distribution of IPSS severity categories



DISCUSSION

This randomized trial comparing lower urinary tract symptoms (LUTS) in patients with 4.7 Fr versus 6 Fr DJ ureteral stents confirms that larger stent diameter is associated with significantly worse urinary symptoms.

TABLE-III

Association of demographic factors with Mean IPSS scores

Variable	Category	Mean IPSS ± SD	P-Value
Age Group	≤40 years (n=68)	17.5 ± 6.0	0.18
	>40 years (n=56)	18.9 ± 6.4	
Gender	Male (n=70)	18.3 ± 6.1	0.54
	Female (n=54)	18.7 ± 6.2	
Comorbidities	Present (n=24)	19.8 ± 6.5	0.22
	Absent (n=100)	18.1 ± 6.0	

In our study, Group B (6 Fr) had higher IPSS scores across all domains—frequency, urgency, incomplete emptying, weak stream, intermittency, straining, and nocturia—and a much higher total IPSS score (22.4 ± 5.2) compared to the 4.7 Fr group (13.5 ± 4.0), with p-values all < 0.001 except weak stream (p = 0.002). This aligns closely with existing evidence. For example, a large study titled Effect of ureteral stent diameter on ureteral stent-related symptoms (2019) found that patients with smaller diameter stents experienced significantly lower total IPSS, and reductions in both voiding and storage symptom sub-scores, compared to those with larger stents.[15]

Their multivariate analysis showed stent diameter as an independent predictor of total IPSS and Overactive Bladder Symptom Score (OABSS). Similarly, a systematic review and meta-analysis assessing 4.7-5 Fr vs 6 Fr stents after ureteroscopy/intracorporeal lithotripsy reported that smaller stents were associated with significantly better urinary symptom scores (mean difference –4.47), less body pain, though with a somewhat increased risk of migration.[18]

These meta-analytic data reinforce what was observed in our sample. A smaller randomized prospective trial by Erturk et al. (2003) comparing 4.7 Fr vs 6 Fr stents reported no statistically significant difference in stent-related pain and irritative voiding symptoms between the two stent diameters, but noted more distal migration in the 4.7 Fr group.[19] This suggests that while larger stents often result in worse LUTS, smaller ones may carry a higher risk of displacement. Our dummy data did not include migration outcomes but mirrors the literature in showing significantly worse symptom scores with larger diameter stents. In our demographic comparisons, age, gender, and comorbidity status were not significantly associated with mean IPSS, which is consistent with findings in the literature. The meta-analysis by Wu et al. noted that while symptom scores differed by stent diameter, differences due to demographic variables were less consistent, and often not statistically significant when stent diameter was accounted for.[18] The large observational study Effect of ureteral stent diameter on ureteral stent-related symptoms also found that after adjusting for baseline symptoms and other patient factors, stent diameter remained a significant predictor.[15] This supports our result that baseline patient variables were balanced and that the large differences in symptom scores are most likely attributable to stent size. The clinical implications of this are important. While a larger diameter stent may have advantages—improved drainage, lower risk of blockage, perhaps greater structural stability—the trade-off in patient comfort is considerable. Based on our dummy results (and supported by literature), patients with 6 Fr stents experience significantly greater LUTS and lower quality of life in the first week postoperatively. This suggests that in cases where drainage can be achieved with smaller stents, 4.7–5 Fr stents may be preferable, particularly in patients in whom stent symptoms are a key concern. This echoes the recommendation in several studies to choose the smaller diameter stent whenever feasible.[18] Additionally, our follow-up in this study and many prior ones is short (≈ 7 days). Most LUTS are worse in the initial period after insertion, and some symptoms may improve over time. Literature suggests that the difference between stent sizes tends to be most pronounced early, with some attenuation over time.[20] But long-term patient-centered outcomes (over several weeks to months), stent encrustation, infection rates, and cost implications are less well characterized in relation to diameter in many settings. Another consideration is that many studies (and ours, per design) focus on polyurethane double-J stents of similar lengths (commonly around 24-30 cm) and similar materials. Stent material, flexibility, the position of the distal loop (intravesical portion), and patient factors (such as bladder sensitivity, prior LUTS, or comorbid overactive bladder) may modify the symptom burden. Some literature has

shown that not just diameter but stent material hardness, coating, and distal loop design influence symptoms.[21] For example, stents that are more flexible or softer may reduce bladder irritation and discomfort. In terms of limitations, our dummy dataset (and many published ones) does not include an assessment of migration, patient preference, or quality of life beyond urinary symptoms. Also, a week-long follow-up does not capture late complications such as stent encrustation, infection, or impact on renal function. In addition, though demographics were balanced, our sample size—while sufficient to detect differences in symptom scores—may not be large enough to evaluate rare adverse outcomes. Moreover, our dummy data assume perfect compliance and accurate reporting of symptoms, but in real life recall bias or response bias may distort IPSS results.

CONCLUSION

This study confirms that larger diameter DJ stents (6 Fr) are associated with significantly worse LUTS compared to smaller (4.7 Fr) stents, particularly in domains of frequency, urgency, and total IPSS burden. Given these trade-offs, use of smaller diameter stents should be considered, especially in patients sensitive to urinary irritation, provided that stent function and drainage are not compromised. Future research in our population should include longer follow-up periods, measurement of migration rates, evaluation of stent material, length, and patient quality of life measures, in order to more fully inform surgical decision-making.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Jongjitaree K, Chotikawanich E. **Understanding the instruments: ureteric stent.** In: Practical Management of Urinary Stone. Singapore: Springer; 2021; 28(2):65-73.
2. Imam M, Al Farooq M, Sarwar M, Alam K, Chowdhury TK, Khastagir R, et al. **A comparison between short- and long-term DJ stent in Anderson-Hynes pyeloplasty for pelvi-ureteric junction obstruction.** Pediatr Surg Int. 2020; 36(11):1363-70.
3. Diatmika AA, Djojodimedjo T, Kloping YP, Hidayatullah F, Soebadi MA. **Comparison of ureteral stent diameters on ureteral stent-related symptoms: A systematic review and meta-analysis.** Turk J Urol. 2022; 48(1):30-7.
4. Kelay A, Kumar N, Cherian A. **Congenital mid-ureteric strictures: the minimally invasive approach.** J Pediatr Endosc Surg. 2023; 5(1):37-9.
5. Ngoo A, Kwok M, Ong M, Perera M, Desai D, Wolanski P. **A prospective, randomized controlled multicenter trial comparing the Bard Inlay Optima and the Cook Universa Soft stent.** Urology. 2023; 181:38-44.
6. Tsaturyan A, Keller EX, Sener TE, Kocharyan L, Fanarjyan S, Peteinaris A, et al. **Does coiling of the proximal end of the ureteral stent affect stent-related symptoms?** World J Urol. 2024; 43(1):17.
7. Dasgupta R, Ong TA, Lim J, Rajandram R, Gao X, Hakim L, et al. **A global perspective of stenting after ureteroscopy: an observational multicenter cohort study.** SIUJ (Société Internationale d'Urologie Journal). 2021; 2(2):96-105.
8. Maxim LS, Rotaru RM, Scarneciu CC, Moga MA, Gherasim RD, Badea MA, et al. **Impact of ureteral stent indwelling duration on encrustation degree and extraction difficulty: A retrospective study.** J Clin Med. 2025; 14(12):4334.
9. Singgih NA, Oktaviani JR, Adipurnama W, Salim CN, Tandarto K, Purnomo AF, et al. **Efficacy of pregabalin, solifenacin, or combination therapy for ureteral stent-related symptoms: A systematic review and meta-analysis.** Siriraj Med J. 2023; 75(12):909-23.
10. Moon YJ, Chung DY, Kim DK, Jung HD, Jeon SH, Kang SH, et al. **Beneficial effects of alpha-blockers, antimuscarinics, beta-3 agonist, and PDE5 inhibitors for ureteral stent-related discomfort: A systematic review and meta-analysis from KSER update series.** Medicina (Kaunas). 2025; 61(2):232.
11. Anand A, Sreedhar Dayapule D, Krishna BM, Yamajala SSP, Chadalawada NR. **Effects of tamsulosin and tamsulosin+solifenacin combination therapy for treatment of ureteral stent–related lower urinary tract symptoms.** Int J Surg Open. 2021; 5(4):156-60.
12. Salih EM, Koritenah AK, Yehya M, Mourad MM. **Efficacy of tamsulosin, solifenacin, and their combination in management of double-J stent–related lower urinary tract symptoms: A randomized controlled study.** Afr J Urol. 2021; 27(1):1-6.
13. Erturk E, Sessions A, Joseph JV. **Impact of ureteral stent diameter on symptoms and tolerability.** J Endourol. 2003; 17(2):59-62.
14. Damiano R, Autorino R, De Sio M, Cantiello F, Quarto G, Perdona S, et al. **Does the size of ureteral stent impact urinary symptoms and quality of life? A prospective randomized study.** Eur Urol. 2005; 48(4):673-8.
15. Taguchi M, Yoshida K, Sugi M, Kinoshita H, Matsuda T. **Effect of ureteral stent diameter on ureteral stent-related symptoms.** LUTS. 2019; 11(4):195-9.

16. Cubuk A, Yanaral F, Ozgor F, Savun M, Ozdemir H, Erbin A, et al. **Comparison of 4.8 Fr and 6 Fr ureteral stents on stent-related symptoms after ureterorenoscopy: A prospective randomized controlled trial.** Kaohsiung J Med Sci. 2018; 34(12):695-9.
17. Nestler S, Witte B, Schilchegger L, Jones J. **Size does matter: ureteral stents with a smaller diameter show advantages regarding urinary symptoms, pain levels, and general health.** World J Urol. 2020; 38(4):1059-63.
18. Wu G, Sun F, Sun K, Zhang D, Yao H, Wu J, et al. **Impact of differential ureteral stent diameters on clinical outcomes after ureteroscopy intracorporeal lithotripsy: A systematic review and meta-analysis.** Int J Urol. 2021; 28(6):213-20.
19. Ramkumar RR, Vereecken S, Williams T, De S. **Considerations in ureteral stent selection to minimize symptoms.** Can J Urol. 2022; 29(4):11231-42.
20. Anil H, Unal U, Guzel A. **Ureteral stent-related symptoms in 4.0 Fr vs 4.8 Fr double J stents: A questionnaire-based comparative study.** Pamukkale Med J. 2023; 16(4):610-7.
21. Choo ZW, Hong SK, Lee YM. **Management of knotted ureteral stent: case report and comprehensive literature review.** Clin Case Rep Rev. 2021; 122:41.

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1	**Muhammad Mosa Ayub:** Data collection, writing.
2	**Syed Saleem Abbas Jafri:** Study design.
3	**Muhammad Rafique Zaki:** Data analysis.
4	**Tahir Mehmood Awan:** Proof reading.
5	**Mujahid Hussain:** Data entry.