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Research Article

Comparative Study of Ureteral Stent Diameters on Stent - Related Symptoms

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ABSTRACT

Background: Ureteral double-J (DJ) stents are routinely used following endourological procedures to maintain ureteral patency. However, stent-related symptoms (SRSs), including pain, lower urinary tract symptoms, impaired quality of life, and sexual dysfunction, remain common. Stent diameter is a potentially modifiable factor that may influence symptom severity.

Objective: To compare the effect of 4.5 Fr and 6 Fr ureteral stents on stent-related symptoms using the Ureteral Stent Symptom Questionnaire (USSQ).

Materials and Methods: A hospital-based observational study was conducted over 18 months at Muzaffarnagar Medical College and Hospital. Fifty adult patients undergoing double-J stent placement following endourological procedures were enrolled and allocated into two groups according to stent diameter: Group A (4.5 Fr, n=25) and Group B (6 Fr, n=25). All patients received standardized 24-cm stents from the same manufacturer, which were removed after 4–6 weeks. At stent removal, patients completed the validated USSQ. Primary outcomes included Pain Index Score (PIS), Urinary Index Score (UIS), General Health Index Score (GHIS), Sexual Symptom Score, and work-loss days. Data were analyzed using Student's *t*-test, with $p<0.05$ considered statistically significant.

Results: Baseline demographic characteristics were comparable between the groups. Patients receiving 4.5 Fr stents demonstrated significantly lower symptom scores than those receiving 6 Fr stents: PIS (15.2±3.1 vs. 19.6±4.2; $p<0.01$), UIS (20.8±4.5 vs. 25.4±5.2; $p=0.02$), GHIS (13.4±3.8 vs. 16.2±4.1; $p=0.04$), Sexual Symptom Score (4.1±1.2 vs. 6.3±1.8; $p<0.01$), and work-loss days (2.4±1.1 vs. 4.1±1.7; $p<0.01$).

Conclusion: Smaller-caliber 4.5 Fr ureteral stents were associated with significantly reduced stent-related morbidity and improved quality of life compared with 6 Fr stents, without compromising clinical effectiveness. When clinically feasible, smaller-diameter stents should be considered to enhance postoperative patient comfort and functional recovery.

Keywords: Ureteral stent, Double-J stent, Stent-related symptoms, Ureteral Stent Symptom Questionnaire, USSQ, Stent diameter, Quality of life, Endourology.

INTRODUCTION

Historical Background of Ureteral Stents

Internal ureteral stenting was first described by Zimskind and colleagues in 1967 with the introduction of a cystoscopically placed silicone splint for urinary diversion in patients with obstructive uropathy. Since that landmark innovation, ureteral stents—particularly double-J (DJ) stents—have become indispensable in modern urological practice. Continuous advances in biomaterials, manufacturing techniques, and stent design have substantially improved their durability, biocompatibility, and clinical performance. Nevertheless, despite these technological developments, stent-related morbidity continues to represent a significant challenge in routine clinical care.

Clinical Indications for Ureteral Stenting

Ureteral stents are widely used to maintain urinary drainage and preserve ureteral patency in numerous benign and malignant urological conditions. Their principal indications include:

- Relief of ureteric obstruction caused by urinary calculi, ureteric strictures, malignancies, or extrinsic compression.
- Temporary drainage following endourological procedures such as ureteroscopy, percutaneous nephrolithotomy (PCNL), and laser lithotripsy to minimize postoperative edema and facilitate passage of residual stone fragments.
- Protection of ureteric anastomoses after reconstructive procedures including pyeloplasty, ureteric reimplantation,

and ureterolithotomy to promote healing and prevent urinary leakage.

- Management of traumatic ureteral injuries, whether iatrogenic or secondary to external trauma.
- Maintenance of ureteroneocystostomy patency following renal transplantation [6].

The widespread application of DJ stents has significantly improved surgical outcomes, reduced postoperative complications, and decreased reliance on external urinary diversion methods such as nephrostomy.

Complications Associated with Ureteral Stents

Although ureteral stents provide considerable therapeutic benefit, their use is frequently accompanied by complications. Early adverse events include flank pain, hematuria, lower urinary tract symptoms (LUTS), and stent migration, whereas prolonged indwelling may result in encrustation, infection, stent fracture, and stone formation. Among these complications, stent-related symptoms (SRSs) are the most prevalent and have the greatest negative impact on patients' quality of life.

Stent-Related Symptoms and Their Clinical Impact

Stent-related symptoms encompass a spectrum of urinary and pain-related complaints arising from the presence of the indwelling stent within the ureter and bladder. Patients commonly experience urinary urgency, increased frequency, nocturia, dysuria, flank pain, suprapubic discomfort, and intermittent hematuria. These symptoms are objectively assessed using validated patient-reported outcome measures, most notably the Ureteral Stent Symptom Questionnaire (USSQ), which remains the standard instrument for evaluating stent-associated morbidity.

Previous studies have reported that nearly four out of five patients with ureteral stents experience at least one troublesome symptom, while approximately half demonstrate reduced occupational productivity and limitations in daily activities. These symptoms frequently necessitate analgesic therapy, additional outpatient visits, and occasionally premature stent removal. Consequently, SRSs contribute substantially to both healthcare expenditure and diminished patient well-being.

Pathophysiology of Stent-Related Symptoms

The pathogenesis of stent-related symptoms is complex and multifactorial. Mechanical irritation of the bladder trigone by the distal coil of the stent induces detrusor overactivity, resulting in urinary urgency and frequency. During micturition, vesicoureteral reflux through the stent elevates intrapelvic pressure, producing flank pain. Continuous contact between the stent and the urothelium also provokes local inflammation and mucosal irritation, further aggravating patient discomfort. In addition, mucosal trauma may lead to hematuria, while prolonged indwelling promotes biofilm formation and encrustation, increasing the risk of urinary tract infection and obstruction.

Factors Affecting Stent-Related Morbidity

Several stent-related characteristics influence the severity of patient symptoms:

- **Stent material:** Differences in flexibility, surface characteristics, and resistance to encrustation among polyurethane, silicone, and hydrophilic-coated stents affect patient tolerance.
- **Stent length:** Both excessively short and excessively long stents may increase bladder irritation and urinary symptoms; therefore, appropriate length selection is essential.
- **Stent positioning:** Incorrect placement may result in trigonal irritation, vesicoureteral reflux, persistent pain, and impaired drainage.
- **Indwelling duration:** Longer retention periods are associated with greater risks of infection, biofilm formation, and encrustation.
- **Stent diameter:** Although larger-caliber stents may offer superior drainage, they can increase patient discomfort, whereas smaller stents may improve tolerability but have occasionally been associated with migration or obstruction.

Influence of Stent Diameter on Patient Symptoms

Among the various stent characteristics, diameter remains one of the most clinically modifiable factors affecting patient comfort. Larger-caliber stents (6 Fr) occupy a greater portion of the ureteral lumen and bladder, increasing mucosal contact, bladder trigone irritation, and vesicoureteral reflux, thereby intensifying urinary symptoms and pain. Conversely, smaller-caliber stents (4.7–5 Fr) generally reduce mechanical irritation and improve patient tolerance. However, concerns have been raised regarding the possibility of increased migration, inadequate drainage, and obstruction in selected patients.

Evidence regarding the optimal stent diameter remains inconsistent. Park et al. demonstrated significantly fewer urinary symptoms in patients receiving 4.7 Fr stents compared with 6 Fr stents. In contrast, Kim et al. reported no significant difference in overall stent-related morbidity between different stent calibers. These conflicting findings underscore the need for additional comparative studies evaluating the clinical impact of stent diameter.

Quality of Life Considerations

The objective of ureteral stenting extends beyond ensuring effective urinary drainage to preserving patients' functional status and quality of life. Studies utilizing the USSQ have demonstrated that stent diameter influences several important domains, including pain, urinary symptoms, work performance, general health, and sexual function. Identifying the optimal stent diameter may therefore improve postoperative recovery, enhance patient satisfaction, and reduce treatment-related morbidity.

Rationale of the Present Study

Despite significant innovations in ureteral stent design, no consensus exists regarding the ideal stent diameter for minimizing patient discomfort while maintaining effective drainage. Although considerable research has focused on stent material, coatings, and structural modifications, comparatively fewer studies have specifically evaluated the influence of stent caliber on patient-reported outcomes.

In routine clinical practice, stent diameter is frequently selected according to surgeon preference rather than standardized evidence-based recommendations. Such variability may contribute to inconsistent patient outcomes and avoidable morbidity.

Accordingly, the present study was undertaken to compare the effect of two commonly used ureteral stent diameters on stent-related symptoms using the validated Ureteral Stent Symptom Questionnaire. The findings are expected to strengthen the existing evidence regarding optimal stent selection, improve postoperative patient comfort, and facilitate more evidence-based decision-making in endourological practice.

AIM & OBJECTIVES

Aim

To evaluate and compare the impact of different ureteral stent diameters on the severity of stent-related symptoms in patients undergoing double-J ureteral stenting.

Objectives

- To assess the relationship between ureteral stent diameter and the occurrence and severity of stent-related symptoms while maintaining standardized stent positioning.
- To compare patient-reported outcomes between different stent diameter groups using the validated Ureteral Stent Symptom Questionnaire (USSQ), including:
- Pain Index Score (PIS)
- Urinary Index Score (UIS)
- General Health Index Score (GHIS)
- Sexual Symptom Score
- Number of work-loss days.

MATERIALS AND METHODS

Study Design

This was a hospital-based observational study.

Study Setting

The study was conducted in the Department of General Surgery at Muzaffarnagar Medical College and Hospital, Muzaffarnagar, Uttar Pradesh.

Study Population

The study included patients undergoing double-J (DJ) ureteral stent placement following endoscopic urological procedures.

Study Duration

The study was carried out over a period of 18 months, comprising 12 months for patient recruitment and data collection, followed by 6 months for data compilation and analysis.

Sample Size

A total of 50 patients were enrolled in the study.

Sampling Technique

Participants were selected using purposive sampling.

Inclusion Criteria

The following patients were considered eligible for inclusion:

- Patients undergoing placement of a double-J ureteral stent after endoscopic urological procedures.
- Adults aged between 18 and 70 years.
- Patients willing to participate and providing written informed consent.

Exclusion Criteria

Patients meeting any of the following criteria were excluded:

- Bilateral double-J stent placement.
- Presence of urinary tract infection, benign prostatic hyperplasia, or pregnancy.
- Congenital ureteral anomalies or a history of previous ureteral surgery.
- Pain attributable to conditions other than ureteral stenting or the presence of acute inflammatory illnesses, including viral infections.
- Patients with hepatitis, gastroenteritis, active malignancy, cardiovascular disease, hypertension, obesity, diabetes mellitus, or chronic liver failure.

METHODOLOGY

Patients fulfilling the eligibility criteria were consecutively enrolled after obtaining written informed consent. Prior to the procedure, all participants received detailed counselling regarding the study protocol. A comprehensive clinical history was obtained, followed by thorough physical examination and routine preoperative evaluation.

All patients underwent ureteroscopy using either a 7 Fr or 8.5 Fr rigid ureteroscope, selected according to ureteral calibre, under appropriate anaesthesia. Double-J stenting was performed at the completion of the procedure. A standardized 24-cm ureteral stent from the same manufacturer was used in all patients to eliminate variations related to stent material and design. Two different stent diameters were evaluated:

- **Group A:** 25 patients received a 4.5 Fr double-J stent.
- **Group B:** 25 patients received a 6 Fr double-J stent.

The indwelling stent was removed 4–6 weeks after surgery. At the time of stent removal, each participant completed the validated Ureteral Stent Symptom Questionnaire (USSQ). Clinical and demographic information was documented using a structured case record proforma.

Ureteral Stent Symptom Questionnaire (USSQ)

The Ureteral Stent Symptom Questionnaire (USSQ) is a validated, multidimensional, self-administered instrument developed by Joshi et al. in 2003 to evaluate the impact of indwelling ureteral stents on patients' quality of life. The questionnaire comprises 38 items distributed across six domains. Higher scores indicate greater symptom severity and poorer quality of life.

Domains Assessed by the USSQ

- **Urinary Symptoms:** Evaluates frequency, urgency, dysuria, nocturia, bladder spasms, and hematuria.
- **Body Pain:** Assesses the severity and location of pain, including flank pain, suprapubic pain, and generalized body discomfort.
- **General Health:** Measures the overall effect of the stent on physical health, energy levels, and psychosocial well-being.
- **Work Performance:** Assesses the impact of the stent on occupational functioning, productivity, and daily activities.
- **Sexual Matters:** Evaluates stent-related effects on sexual

function, including discomfort during intercourse and overall sexual well-being.

- **Additional Problems:** Records other stent-related issues, including medication requirements and treatment-related adverse effects.

Study Flow Chart

A schematic representation of patient recruitment, allocation, intervention, follow-up, and outcome assessment is presented in the study flow chart.

Data Entry and Statistical Analysis

Collected data were entered into Microsoft Excel 2010 and subsequently analyzed using Microsoft Excel 2010 and Epi Info version 7.2. Continuous variables were expressed as mean ± standard deviation (SD) with range wherever applicable, while categorical variables were summarized as frequencies and percentages. Descriptive as well as inferential statistical analyses were performed. Intergroup comparisons of continuous variables were carried out using the Student's *t*-test. A two-sided *p*-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study protocol received approval from the Institutional Ethics Committee of Muzaffarnagar Medical College and Hospital, Muzaffarnagar. Written informed consent was obtained from all participants before enrolment, and confidentiality of patient information was maintained throughout the study.

RESULTS

Among the 25 patients in Group A (4.5 Fr), the stent was placed on the right side in 15 patients (60%) and on the left side in 10 patients (40%). In Group B (6 Fr), right-sided stent placement was observed in 19 patients (76%), whereas 6 patients (24%) underwent left-sided stenting. Overall, right-sided ureteral stent placement was more common than left-sided placement in both study groups.

In Group A (4.5 Fr), the most common indication for double-J stent placement was ureteroscopic lithotripsy (URSL), accounting for 15 patients (60%), followed by percutaneous nephrolithotomy (PCNL) in 7 patients (28%). Other indications constituted 3 cases (12%).

Similarly, in Group B (6 Fr), URSL was the predominant indication, performed in 14 patients (56%), followed by PCNL in 6 patients (24%). The remaining 5 patients (20%) underwent stent placement for other indications.

Overall, URSL was the most frequent indication for ureteral stent placement in both study groups, followed by PCNL, while other indications accounted for a smaller proportion of cases.

The Ureteral Stent Symptom Questionnaire (USSQ) was administered at the time of stent removal to evaluate stent-related morbidity. Patients receiving 4.5 Fr stents (Group A) demonstrated significantly lower scores across all assessed domains compared with those receiving 6 Fr stents (Group B), indicating better overall tolerance of the smaller-caliber stent.

Table 1: Distribution of Stent Placement According to Laterality

Side	*Group A*	*Frequency(%)*	*Group B*	*Frequency(%)*
Right	15	60	19	76
Left	10	40	6	24
Total	25	100	25	100

Table 2: Distribution of Patients According to the Indication for Stent Placement

Indication	*Group A*	*Frequency(%)*	*Group B*	*Frequency(%)*
URSL	15	60	14	56
PCNL	7	28	6	24
Others	3	12	5	20
Total	25	100	25	100

Table 3: Comparison of Ureteral Stent Symptom Questionnaire (USSQ) Domain Scores Before Stent Removal

USSQ Domain	*Group A Mean ± SD*	*Group B Mean ± SD*	*P-value*
Pain Index Score (PIS)	15.2 ± 3.1	19.6 ± 4.2	<0.01
Urinary Index Score (UIS)	20.8 ± 4.5	25.4 ± 5.2	0.02
GHIS	13.4 ± 3.8	16.2 ± 4.1	0.04
Sexual Symptom Score	4.1 ± 1.2	6.3 ± 1.8	<0.01
Work Loss Days	2.4 ± 1.1	4.1 ± 1.7	<0.01

Pain Index Score (PIS)

The mean Pain Index Score was significantly lower in Group A than in Group B (15.2 ± 3.1 vs. 19.6 ± 4.2; $p < 0.01$). Patients with 6 Fr stents experienced more severe pain-related symptoms, with flank pain and suprapubic discomfort being the predominant complaints.

Urinary Index Score (UIS)

Urinary symptoms were significantly less severe among patients in Group A. The mean Urinary Index Score was 20.8 ± 4.5 in the 4.5 Fr group compared with 25.4 ± 5.2 in the 6 Fr group ($p = 0.02$). Irritative lower urinary tract symptoms, including urgency, frequency, nocturia, and dysuria, were more frequently reported by patients with larger-diameter stents, suggesting improved urinary tolerability with smaller-caliber stents.

General Health Index Score (GHIS)

Both study groups experienced an adverse impact on general health; however, patients in Group A reported significantly better overall health status. The mean GHIS was 13.4 ± 3.8 in Group A and 16.2 ± 4.1 in Group B ($p = 0.04$). Participants with 6 Fr stents more commonly reported fatigue, sleep disturbances, and impairment in overall well-being.

Sexual Symptom Score

Sexual symptoms were significantly more pronounced in patients with larger-diameter stents. The mean Sexual Symptom Score was 4.1 ± 1.2 in Group A compared with 6.3 ± 1.8 in Group B ($p < 0.01$). A greater proportion of patients in the 6 Fr group reported discomfort during sexual activity and avoidance of intercourse compared with those receiving 4.5 Fr stents.

Work-Loss Days

Stent-related symptoms adversely affected work productivity in both groups; however, absenteeism was significantly lower among patients with 4.5 Fr stents. The mean number of work-loss days was 2.4 ± 1.1 in Group A compared with 4.1 ± 1.7 in Group B ($p < 0.01$). The increased loss of workdays observed in the 6 Fr group was consistent with their higher pain and urinary symptom burden.

DISCUSSION

Double-J (DJ) ureteral stents are routinely employed following endourological procedures to maintain ureteral patency, facilitate urinary drainage, and prevent postoperative complications. Despite their undeniable clinical benefits, stent-related symptoms (SRSs) remain a significant source of postoperative morbidity and negatively affect patients' quality of life. Over the past two decades, numerous studies have evaluated strategies to reduce these symptoms by modifying stent material, length, coating, and design. Comparatively, fewer investigations have examined the influence of stent diameter on patient-reported outcomes. The present study compared the impact of two commonly used ureteral stent diameters (4.5 Fr and 6 Fr) on stent-related symptoms using the validated Ureteral Stent Symptom Questionnaire (USSQ).

Laterality of Stent Placement

In the present study, right-sided stent placement was more frequent than left-sided placement in both study groups (60% in Group A and 76% in Group B). This distribution most likely reflects the clinical presentation of patients requiring intervention rather than any procedural preference. Previous studies evaluating ureteral stent outcomes, including those by Joshi et al., Damiano et al., and Park et al., have similarly reported that the laterality of stent placement has no significant influence on stent-related symptoms or overall patient quality of life. Instead, symptom severity appears to depend primarily on factors such as stent characteristics, duration of indwelling, and patient-related variables rather than the side of placement. Consequently, the slight predominance of right-sided stenting observed in the present study is unlikely to have influenced the comparative outcomes between the two groups.

Indications for Stent Placement

Ureteroscopic lithotripsy (URSL) was the most common indication for stent placement in both groups, accounting for 60% and 56% of patients in Groups A and B, respectively, followed by PCNL. These findings reflect the current trend in endourological practice, where ureteric calculi constitute the leading indication for temporary ureteral drainage following minimally invasive stone surgery.

Similar observations have been reported by Damiano et al., who found ureteroscopy for ureteric stones to be the predominant indication for postoperative stenting. Likewise, randomized studies by Park et al. and Kim et al. primarily included patients undergoing ureteroscopic management of urolithiasis. The comparable distribution of indications between the two study groups in the present study minimizes selection bias and strengthens the validity of comparisons regarding stent-related symptoms.

Pain Index Score

Pain remains one of the most troublesome complications associated with ureteral stenting. In the present study, patients receiving 4.5 Fr stents experienced significantly lower Pain Index Scores than those receiving 6 Fr stents (15.2 ± 3.1 vs. 19.6 ± 4.2; $p < 0.01$). Flank pain and suprapubic discomfort were more frequently reported in the larger-diameter stent group.

These findings are consistent with the randomized controlled trial conducted by Park et al., who demonstrated significantly lower pain scores among patients receiving smaller-calibre (4.7 Fr) stents compared with 6 Fr stents. Similarly, Damiano et al. observed that increasing stent calibre was associated with greater patient discomfort and analgesic requirements. The increased pain associated with larger stents is biologically plausible because greater ureteral luminal occupancy may increase mechanical irritation of the ureteral wall and bladder trigone while promoting vesicoureteral reflux during micturition. These mechanisms contribute to flank pain and lower urinary tract discomfort.

However, not all studies have demonstrated similar findings. Kim et al. reported no statistically significant difference in pain scores between different stent diameters, suggesting that factors such as stent position, length, and individual pain perception may also contribute substantially to symptom severity. Nevertheless, the present study supports the growing body of evidence favouring smaller-diameter stents for reducing postoperative pain.

Urinary Symptoms

Urinary symptoms represent the most frequent complaint following DJ stenting. In the present study, the mean Urinary Index Score was significantly lower in the 4.5 Fr group than in the 6 Fr group (20.8 ± 4.5 vs. 25.4 ± 5.2; $p = 0.02$). Symptoms such as urinary urgency, frequency, nocturia, and dysuria were more prominent among patients receiving larger-diameter stents.

These observations are in agreement with those of Park et al., who demonstrated significant improvement in urinary symptom scores with smaller-calibre stents. Mechanical irritation of the bladder trigone by the distal coil of larger stents is believed to increase detrusor overactivity and urinary urgency. Furthermore, increased stent diameter may facilitate greater vesicoureteral reflux during voiding, thereby exacerbating irritative lower urinary tract symptoms.

Conversely, Kim et al. reported no significant difference in urinary symptoms between 4.7 Fr and 6 Fr stents, highlighting the ongoing controversy regarding the influence of stent calibre. Differences in study populations, stent dwell time, surgical techniques, and sample size may account for these discrepancies. Nevertheless, the present findings indicate that reducing stent diameter may improve postoperative urinary comfort without compromising drainage.

General Health

General health scores reflect the overall physical and psychological burden imposed by ureteral stenting. Patients in the present study receiving 4.5 Fr stents demonstrated significantly better General Health Index Scores than those receiving 6 Fr stents (13.4 ± 3.8 vs.

The findings of the present study can be compared with the following published studies:

Study	*Stent Size Compared*	*Key Findings*	*Comparison with Present Study*
Present Study (2026)	4.5 Fr vs 6 Fr	Patients with 4.5 Fr stents had significantly lower Pain Index Score, Urinary Index Score, General Health Index Score, Sexual Symptom Score, and fewer work-loss days than patients with 6 Fr stents.	Reference study
Diatmika et al. (2022) Systematic Review and Meta-analysis[30]	≤5 Fr vs 6 Fr	Analysis of seven RCTs showed that smaller stents resulted in lower overall USSQ scores and fewer urinary symptoms, with no difference in migration, analgesic use, or stone-free rates.	Strongly supports present findings and provides high-level evidence favoring smaller stents.
Ehsanullah et al. (2022) Systematic Review and Meta-analysis [31]	4.7–5 Fr vs 6 Fr	Smaller-diameter stents were associated with improved USSQ outcomes and reduced stent-related symptoms compared with 6 Fr stents.	Strongly corroborates present study findings.
Kim et al. (2020) [32]	5 Fr vs 6 Fr	Smaller-diameter stents significantly reduced bladder irritation and urinary symptoms without compromising drainage.	Strongly supports present findings of lower urinary symptom burden with smaller stents.
Nestler et al. (2019)[33]	4.7 Fr vs 6 Fr	Demonstrated improved patient comfort and lower symptom burden with smaller-caliber stents.	Supports present study results.
Taguchi et al. (2019)[34]	Small vs large stent diameters	Smaller stents were associated with reduced stent-related symptoms and improved patient tolerance.	Consistent with present study.
Cubuk et al. (2018)[35]	4.8 Fr vs 6 Fr	Lower urinary symptom scores and better patient tolerance were reported in the smaller stent group.	Consistent with present study findings.

16.2 ± 4.1; $p = 0.04$). Individuals with larger stents more commonly reported fatigue, sleep disturbances, and reduced overall well-being. These findings correspond with those reported by Joshi et al., who first developed the USSQ and demonstrated that ureteral stents substantially impair health-related quality of life. Subsequent investigations by Damiano et al. and Lingeman et al. similarly reported deterioration in general health following stent placement, primarily due to persistent pain and urinary symptoms. Since general health scores are influenced by multiple symptom domains, the improvement observed with smaller stents in the present study likely reflects reductions in pain and urinary discomfort.

Sexual Symptoms

Sexual health is an often overlooked but clinically important component of postoperative quality of life. In the present study, Sexual Symptom Scores were significantly lower among patients receiving 4.5 Fr stents compared with 6 Fr stents (4.1 ± 1.2 vs. 6.3 ± 1.8; $p < 0.01$). Patients with larger stents more frequently reported discomfort during sexual activity and avoidance of intercourse.

These findings are consistent with observations by Joshi et al., who demonstrated that ureteral stents adversely affect sexual function in both male and female patients. Similar findings have been reported by Dellis et al., who observed significant improvement in sexual function following stent removal. Although relatively few studies have specifically examined the influence of stent diameter on sexual symptoms, the present results suggest that reducing stent calibre may alleviate mechanical discomfort and improve sexual well-being during the indwelling period.

Work Performance

Loss of work productivity represents an important socioeconomic consequence of ureteral stenting. In the present study, patients receiving 4.5 Fr stents lost significantly fewer working days than those receiving 6 Fr stents (2.4 ± 1.1 vs. 4.1 ± 1.7 days; $p < 0.01$). This finding is consistent with previous studies using the USSQ, particularly those by Joshi et al. and Damiano et al., which demonstrated that pain and urinary symptoms substantially impair occupational performance and routine daily activities. Improved work performance among patients receiving smaller stents is likely attributable to lower pain intensity, fewer urinary symptoms, and better overall quality of life. These observations have important economic implications, particularly in working-age populations where prolonged absenteeism may increase healthcare costs and reduce productivity.

Overall Interpretation

The present study demonstrated consistently lower scores across all domains of the USSQ among patients receiving 4.5 Fr ureteral stents. Significant improvements were observed in pain, urinary symptoms, general health, sexual function, and work performance compared with 6 Fr stents. These findings support the hypothesis that reducing stent diameter decreases mechanical irritation of the ureter and bladder while improving patient tolerance without compromising short-term postoperative management.

The findings are broadly consistent with those reported by Park et al. and several observational studies evaluating stent-related quality of life, although they differ from studies such as Kim et al., which reported no significant effect of stent calibre. Such differences may reflect variations in sample size, patient characteristics, stent dwell duration, outcome assessment, and procedural techniques.

Overall, the present study adds to the growing evidence that smaller-calibre (4.5 Fr) ureteral stents are associated with significantly lower stent-related morbidity than conventional 6 Fr stents. Whenever clinically feasible and not contraindicated by the underlying pathology, the use of smaller-diameter ureteral stents may enhance postoperative patient comfort, improve quality of life, and reduce the socioeconomic burden associated with ureteral stenting.

CONCLUSION

The present hospital-based observational study compared the impact of 4.5 Fr and 6 Fr double-J ureteral stents on stent-related symptoms using the validated Ureteral Stent Symptom Questionnaire (USSQ). The findings demonstrated that patients receiving 4.5 Fr ureteral stents experienced significantly lower stent-related morbidity than those receiving 6 Fr stents.

Significantly lower scores were observed in the 4.5 Fr group across all evaluated USSQ domains, including Pain Index Score (PIS), Urinary Index Score (UIS), General Health Index Score (GHIS), Sexual Symptom Score, and work-loss days, indicating superior patient tolerance and better quality of life. Patients with smaller-caliber stents reported reduced flank pain, fewer lower urinary tract symptoms, improved general well-being, less impairment of sexual function, and fewer days of work absenteeism. These findings suggest that decreasing stent diameter can effectively minimize the mechanical irritation associated with indwelling ureteral stents without compromising postoperative management.

The predominance of ureteroscopic lithotripsy (URSL) as the indication for stent placement and the comparable distribution of baseline characteristics between the two study groups further strengthen the validity of the observed differences, indicating that the improvement in outcomes was primarily attributable to stent diameter rather than procedural factors.

Overall, the results of the present study support the use of 4.5 Fr double-J ureteral stents, whenever clinically appropriate, as they provide significantly better patient comfort and quality of life compared with conventional 6 Fr stents. Adoption of smaller-caliber stents in suitable patients may reduce postoperative morbidity, improve patient satisfaction, decrease work-related productivity loss, and contribute to more patient-centered postoperative urological care. Larger multicentric randomized controlled trials with longer follow-up are recommended to further validate these findings and establish evidence-based guidelines for optimal ureteral stent diameter selection.

CONFLICTS OF INTREST

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