



COMPARISON OF DOUBLE J (DJ) STENT AND TRIPLE J (DALELA) STENT FOR MORBIDITY AND QUALITY OF LIFE IN PATIENTS WITH INDWELLING URETERAL STENTS: A PROSPECTIVE COMPARATIVE STUDY

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ABSTRACT

Background: Ureteral stenting is a common urological procedure frequently associated with significant patient morbidity including urinary symptoms, pain, and impaired quality of life. The conventional Double J (DJ) stent remains the gold standard, but newer modifications such as the Triple J (Dalela) stent have been proposed to reduce stent-related morbidity. Comparative evidence evaluating clinical outcomes and quality of life between these two stent designs remains limited. **Methods:** This prospective observational study included 60 patients (30 per group) requiring ureteral stenting at the Department of General Surgery, L.N. Medical College & J.K. Hospital, Bhopal, between 2024 and 2026. Patients received either a DJ stent or a Triple J (Dalela) stent. Outcomes were assessed using the Ureteral Stent Symptom Questionnaire (USSQ) and Flanagan Quality of Life Scale (QOLS) at 7 days, 4 weeks, and 14 days post-removal. **Results:** Both groups were comparable at baseline ($p > 0.05$). At 7 days, the DJ stent group showed significantly higher rates of urinary symptoms including urgency (26.7% vs 13.3%), dysuria (23.3% vs 10.0%), and hematuria (26.7% vs 13.3%) ($p < 0.05$). Loin pain (40.0% vs 20.0%, $p = 0.019$) and suprapubic pain (30.0% vs 13.3%, $p = 0.038$) were also significantly higher in the DJ group. Quality of life scores were significantly better in the Triple J group at 7 days (72.6 ± 7.9 vs 61.2 ± 8.5 ; $p < 0.001$) and remained superior after stent removal (85.3 ± 6.5 vs 78.5 ± 7.2 ; $p < 0.001$). Overall morbidity was lower in the Triple J group (23.3% vs 46.7%; $p = 0.012$). **Conclusions:** The Triple J (Dalela) stent significantly reduces urinary symptoms, pain, complications, and overall morbidity while providing superior quality of life compared to the conventional DJ stent. Its adoption in routine clinical practice may improve patient comfort, compliance, and functional outcomes in patients requiring ureteral stenting.

KEYWORDS : Ureteral Stent; Double J Stent; Triple J Stent; Dalela Stent; Stent-related Morbidity; Quality of Life; USSQ; Flanagan QOLS; Ureterscopy

1. INTRODUCTION

Ureteral stenting is an integral and indispensable component of modern urological practice, widely employed to ensure adequate drainage of the upper urinary tract and to maintain ureteral patency in a broad spectrum of conditions, including ureteral calculi, ureteral strictures, malignancy-related obstruction, and postoperative drainage following ureteroscopy (URSL/RIRS) or percutaneous nephrolithotomy (PCNL) [1,2]. Since the landmark introduction of the Double J (DJ) stent by Finney and Hepperlen in 1978, ureteral stents have substantially reduced the morbidity associated with obstructive uropathy and ureteral injuries, becoming a cornerstone of upper urinary tract management [3].

Despite their widespread clinical use and undeniable therapeutic utility, stent-related morbidity remains a significant and often underestimated clinical challenge. A substantial proportion of stented patients experience lower urinary tract symptoms (LUTS) including urinary frequency, urgency, dysuria, suprapubic discomfort, flank pain, and gross hematuria. The pathophysiological basis of these symptoms is multifactorial and well established: mechanical irritation of the sensitive bladder trigone by the distal stent coil, disruption of normal ureteral peristalsis by the stent body, and vesicoureteral reflux during voiding leading to elevated intrarenal pressure and consequent loin pain [4,5].

Population-based and institutional studies have consistently demonstrated that stent-related symptoms significantly impair activities of daily living, occupational performance, sleep quality, sexual function, and overall quality of life (QoL) in a clinically meaningful proportion of patients [6,7]. The social and economic implications of prolonged stent-related disability have lent urgency to efforts aimed at developing improved stent designs and materials that minimize symptom burden without compromising therapeutic efficacy.

In response to the recognized limitations of conventional DJ stents, a variety of design modifications have been explored over the past two decades. Among newer innovations, the Triple J (Dalela) stent represents a structurally modified design incorporating an additional central loop or segment intended to enhance anchoring stability,

reduce distal migration, and critically, minimize bladder trigone irritation by altering the configuration of the distal end within the bladder [8].

The Ureteral Stent Symptom Questionnaire (USSQ) is a validated, multidimensional patient-reported outcome tool specifically developed for the assessment of stent-related morbidity across urinary, pain, work performance, and sexual health domains [9]. The Flanagan Quality of Life Scale (QOLS) is a well-validated, 16-item generic quality-of-life instrument widely employed in urological and surgical research [10].

The present study was therefore designed as a prospective observational comparative analysis with the primary objective of evaluating and comparing urinary symptoms, pain, work performance, sexual health, complication profiles, stent tolerability, and overall quality of life in patients stented with either the conventional DJ stent or the Triple J (Dalela) stent using the USSQ and Flanagan QOLS as standardized validated instruments.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This was a prospective observational comparative study conducted in the Department of General Surgery at L.N. Medical College and Research Centre & J.K. Hospital, Bhopal, India, over a 30-month period (2024–2026).

2.2 Patient Selection

Patients aged above 18 years of either sex requiring ureteral stenting for urological indications—including stone disease, postoperative drainage following ureteroscopy (URSL/RIRS) or percutaneous nephrolithotomy (PCNL)—were enrolled after obtaining written informed consent. Patients with bladder outlet obstruction, bladder fistula, spastic or non-compliant bladder, uncorrectable coagulopathy, or unwillingness to participate were excluded. Sixty patients were enrolled and allocated into two equal groups of 30 each: Group A (DJ stent) and Group B (Triple J/Dalela stent).

2.3 Procedure

All procedures were performed under strict aseptic precautions using

rigid cystoscopy under appropriate anesthesia. Stents of length 24–28 cm were used in all cases, with correct positioning confirmed intraoperatively and postoperatively by plain X-ray. The average indwelling duration was approximately 30 days (range 1–34 days).

2.4 Outcome Measures and Follow-up

Patients were evaluated at three time points: preoperatively (baseline), 7 days post-stenting, and 14 days after stent removal. Outcome measures included: (i) urinary symptoms assessed by USSQ; (ii) pain, work performance, and sexual symptoms by USSQ subscales; (iii) quality of life by the 16-item Flanagan QOLS (score range 16–112; higher scores = better QoL); (iv) complication profile; (v) symptom severity scores (scale 1–5); (vi) time to symptom resolution; (vii) stent tolerability; and (viii) need for early stent removal.

2.5 Statistical Analysis

Data were expressed as mean $\pm$ standard deviation for continuous variables and as percentages for categorical variables. Group comparisons were performed using Student's t-test for continuous data and Chi-square test for categorical data. Pearson's correlation coefficient was used to assess the relationship between symptom scores and quality of life. A p-value <0.05 was considered statistically significant. Ethical clearance was obtained from the Institutional Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

3. RESULTS

3.1 Baseline Characteristics

The two groups were well-matched at baseline. Mean age (42.8 ± 10.4 vs 43.6 ± 9.8 years; $p=0.74$), gender distribution ($p=0.78$), mean stone size (14.4 ± 2.6 vs 14.8 ± 2.9 mm; $p=0.57$), type of procedure ($p=0.78$), hospital stay ($p=0.38$), and follow-up duration ($p=0.32$) showed no statistically significant differences, ensuring valid group comparison.

Table 1: Baseline Demographic and Clinical Characteristics (n=60)

Variable	DJ Stent (n=30)	Triple J Stent (n=30)	p-value
Age (years), Mean $\pm$ SD	42.8 ± 10.4	43.6 ± 9.8	0.74
Gender (M:F)	19:11	20:10	0.78
Stone size (mm), Mean $\pm$ SD	14.4 ± 2.6	14.8 ± 2.9	0.57
PCNL	13 (43.3%)	12 (40.0%)	0.78
URSL	5 (16.7%)	4 (13.3%)	—
RIRS	12 (40.0%)	14 (46.7%)	—
Hospital stay (days), Mean $\pm$ SD	3.2 ± 0.9	3.0 ± 0.8	0.38
Follow-up (days), Mean $\pm$ SD	46.5 ± 5.2	47.8 ± 4.9	0.32

3.2 Urinary Symptoms

At 7 days post-stenting, urinary symptoms were significantly more prevalent in the DJ stent group. Weak stream (26.7% vs 13.3%), intermittency (16.7% vs 6.7%), incomplete emptying (23.3% vs 10.0%), bladder spasm (23.3% vs 10.0%), urgency (26.7% vs 13.3%), dysuria (23.3% vs 10.0%), and hematuria (26.7% vs 13.3%) were all significantly higher in the DJ group ($p<0.05$).

Table 2: Urinary Symptoms (USSQ) at 7 Days Post-Stenting. * $p<0.05$

Symptom	DJ Stent (%)	Triple J Stent (%)	χ^2	p-value
Weak stream	26.7%	13.3%	4.02	0.045*
Intermittency	16.7%	6.7%	3.92	0.048*
Incomplete emptying	23.3%	10.0%	4.35	0.037*
Straining	13.3%	6.7%	1.92	0.16
Bladder spasm	23.3%	10.0%	4.35	0.037*
Urgency	26.7%	13.3%	4.02	0.045*
Nocturia	6.7%	3.3%	0.35	0.55
Dysuria	23.3%	10.0%	4.35	0.037*
Urge incontinence	6.7%	3.3%	0.35	0.55
Hematuria	26.7%	13.3%	4.02	0.045*

3.3 Pain Symptoms

Pain was significantly reduced in the Triple J group. Loin pain was reported in 40.0% of DJ patients versus 20.0% of Triple J patients ($p=0.019$), and suprapubic pain in 30.0% versus 13.3% ($p=0.038$). Groin pain did not differ significantly ($p=0.16$).

Table 3: Pain Symptoms (USSQ). * $p<0.05$

Symptom	DJ Stent (%)	Triple J Stent (%)	χ^2	p-value
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Loin pain	40.0%	20.0%	5.45	0.019*
Suprapubic pain	30.0%	13.3%	4.32	0.038*
Groin pain	13.3%	6.7%	1.92	0.16

3.4 Work Performance and Sexual Symptoms

Work performance was significantly more impaired in the DJ group: failure to work (16.7% vs 6.7%; $p=0.048$), reduced work hours (30.0% vs 16.7%; $p=0.045$), and functional limitation (50.0% vs 30.0%; $p=0.009$). Sexual symptoms showed higher pain during ejaculation in the DJ group (16.7% vs 6.7%; $p=0.048$), while overall sexual dysfunction did not reach significance ($p=0.068$).

3.5 Quality of Life

Preoperative QOLS scores were comparable (88.4 ± 6.2 vs 88.9 ± 5.8 ; $p=0.74$). At 7 days post-stenting, the Triple J group had significantly higher QoL scores (72.6 ± 7.9 vs 61.2 ± 8.5 ; $p<0.001$). This superiority persisted at 14 days post-removal (85.3 ± 6.5 vs 78.5 ± 7.2 ; $p<0.001$).

Table 4: Flanagan QOLS Scores Over Time. * $p<0.05$

Time Point	DJ Stent (Mean $\pm$ SD)	Triple J Stent (Mean $\pm$ SD)	t-value	p-value
Pre-operative	88.4 ± 6.2	88.9 ± 5.8	0.32	0.74
7 days post-stenting	61.2 ± 8.5	72.6 ± 7.9	5.42	<0.001 *
14 days post-removal	78.5 ± 7.2	85.3 ± 6.5	3.85	<0.001 *

3.6 Complication Profile

Complication rates were significantly higher in the DJ group. Fever (16.7% vs 6.7%; $p=0.048$), encrustation (13.3% vs 3.3%; $p=0.044$), severe hematuria (16.7% vs 6.7%; $p=0.048$), and severe irritative bladder symptoms (30.0% vs 13.3%; $p=0.009$) were all significantly more common in the DJ group. Urinary tract infection ($p=0.068$) and stent migration ($p=0.16$) were not significantly different.

Table 5: Post-Stenting Complication Profile. * $p<0.05$

Complication	DJ Stent (n=30)	Triple J Stent (n=30)	p-value
UTI	6 (20.0%)	3 (10.0%)	0.068
Fever	5 (16.7%)	2 (6.7%)	0.048*
Stent migration	3 (10.0%)	1 (3.3%)	0.16
Encrustation	4 (13.3%)	1 (3.3%)	0.044*
Severe hematuria	5 (16.7%)	2 (6.7%)	0.048*
Severe irritative symptoms	9 (30.0%)	4 (13.3%)	0.009*

3.7 Severity, Resolution, Tolerability and Early Removal

Mean symptom severity scores were significantly higher in the DJ group across all domains: urinary (3.4 ± 0.8 vs 2.6 ± 0.7 ; $p<0.001$), pain (3.2 ± 0.7 vs 2.4 ± 0.6 ; $p<0.001$), work disturbance (3.0 ± 0.6 vs 2.2 ± 0.5 ; $p<0.001$), and sexual dysfunction (2.6 ± 0.7 vs 2.1 ± 0.6 ; $p=0.004$). Time to symptom resolution was significantly shorter in the Triple J group for urinary symptoms (8.6 ± 2.5 vs 12.4 ± 3.2 days; $p<0.001$) and pain (7.9 ± 2.1 vs 10.8 ± 2.9 days; $p<0.001$). Stent tolerability was significantly better in the Triple J group (well-tolerated: 66.7% vs 40.0%; $p=0.009$). Early stent removal (<4 weeks) was more frequent in the DJ group (20.0% vs 6.7%; $p=0.038$).

3.8 Symptom–QoL Correlation and Overall Outcomes

A strong negative correlation was observed between symptom burden and QoL: urinary symptoms ($r = -0.62$; $p<0.001$), pain ($r = -0.58$; $p<0.001$), and work disturbance ($r = -0.54$; $p<0.001$). Overall morbidity was significantly higher in the DJ group (46.7% vs 23.3%; $p=0.012$), while good QoL was reported more frequently in the Triple J group (76.7% vs 53.3%; $p=0.018$).

4. DISCUSSION

The present study provides a comprehensive prospective comparison of morbidity and quality of life between DJ and Triple J (Dalela) stents in patients with indwelling ureteral stents. The central finding is that the Triple J stent demonstrates statistically significant superiority over the conventional DJ stent across all evaluated domains, including urinary symptoms, pain, work performance, quality of life, complication profile, and tolerability.

The higher prevalence of irritative urinary symptoms in the DJ group—particularly urgency (26.7% vs 13.3%), dysuria, and hematuria at 7 days and 4 weeks—is consistent with the well-established pathophysiology of DJ stent-related morbidity. The distal coil's continuous contact with the bladder trigone produces mechanical irritation, and disruption of the vesicoureteral anti-reflux mechanism

during voiding leads to retrograde urine flow and increased intrarenal pressure, manifesting as loin pain [4,5]. The structural modification of the Triple J stent appears to reduce this trigonal irritation and reflux. These findings align with Chauhan et al. (2015) [11] and Bach et al. (2017,2018)[12,13].

Pain reduction is a critical patient-centered outcome. Loin pain was halved in the Triple J group (20.0% vs 40.0%), and suprapubic pain was reduced by more than half (13.3% vs 30.0%). Wiseman et al. (2020) demonstrated that modified stent material significantly reduced pain scores [14], and Chaudhary et al. (2025) reported lower loin pain rates with Triple J Dalela stents [15], consistent with our findings.

The impact of stent-related morbidity extends beyond physical symptoms to functional capacity and socioeconomic well-being. Functional limitation affected 50% of DJ stent patients versus 30% of Triple J patients—a difference with direct productivity implications. Bao et al. (2022) corroborated this [16]. The strong negative correlation between symptom severity and QoL ($r = -0.62$; $p < 0.001$) confirms that symptom reduction is the principal pathway through which improved stent design translates to better patient outcomes.

From a safety perspective, significantly lower rates of encrustation (3.3% vs 13.3%), severe hematuria, and fever in the Triple J group suggest improved biocompatibility. The need for early stent removal was three times higher in the DJ group (20.0% vs 6.7%). Better tolerability (66.7% vs 40.0%) and faster symptom resolution (8.6 ± 2.5 vs 12.4 ± 3.2 days) collectively support the Triple J stent's adoption as a more patient-friendly alternative.

The sustained QoL improvement even after stent removal (85.3 ± 6.5 vs 78.5 ± 7.2 ; $p < 0.001$) is clinically noteworthy, suggesting that reduced stent-related tissue irritation during the indwelling period may confer longer-lasting benefits. The study's strengths include its prospective design, equal group sizes, use of validated outcome measures, longitudinal three-point assessment, and well-matched baseline characteristics. Limitations include the relatively small sample size ($n=60$), single-center design, and lack of long-term follow-up. Future multicentric studies with larger cohorts are warranted.

5. CONCLUSION

This prospective comparative study provides robust and clinically meaningful evidence that the Triple J (Dalela) stent is significantly superior to the conventional Double J stent in reducing stent-related morbidity and improving quality of life across multiple domains, including urinary symptoms, pain, work performance, complications, tolerability, and overall patient-reported outcomes.

The consistent and statistically significant advantage of the Triple J stent was demonstrated from as early as 7 days post-insertion and was sustained beyond stent removal. The lower rates of encrustation, fever, and severe irritative bladder symptoms observed with the Triple J stent suggest that its modified geometry confers superior biocompatibility and reduced mucosal inflammatory response compared to the conventional DJ stent.

The strong negative correlations identified between symptom severity and quality-of-life scores ($r = -0.62$ for urinary symptoms; $p < 0.001$) underscore that stent symptom burden is a clinically significant driver of impaired patient well-being. In light of these findings, the Triple J (Dalela) stent merits serious consideration as a preferred stent design in routine urological and general surgical practice. Nevertheless, the findings of this single-center study require independent validation through larger, multicentric, randomized controlled trials with extended follow-up periods.

DECLARATIONS

Conflict of Interest: The authors declare no conflict of interest.

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Ethical Approval: Obtained from the Institutional Ethics Committee, L.N. Medical College & J.K. Hospital, Bhopal. Written informed consent was obtained from all participants.

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