NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ

Quality in Sport. eISSN 2450-3118.

Journal Home Page
https://apcz.umk.pl/QS/index

HOBOT, Jakub. Assessment of Quality of Life in Patients with Double-J Ureteral Stents – A Questionnaire-Based Study. Quality in Sport. 2026;54:70420. eISSN 2450-3118. https://doi.org/10.12775/QS.2026.54.70420

The journal has been awarded 20 points in the parametric evaluation by the Ministry of Higher Education and Science of Poland. This is according to the Annex to the announcement of the Minister of Higher Education and Science dated 05.01.2024, No. 32553. The journal has a Unique Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).
The authors declare that there is no conflict of interest regarding the publication of this paper.
Received: 30.03.2026. Revised: 06.04.2026. Accepted: 11.04.2026. Published: 12.04.2026.

Assessment of Quality of Life in Patients with Double-J Ureteral Stents – A Questionnaire-Based Study

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ABSTRACT

Introduction. Double-J (DJ) ureteral stents are widely used in modern urology to ensure effective drainage of the upper urinary tract in a variety of clinical conditions, including urolithiasis, ureteral obstruction, malignancies, and postoperative management. Despite their well-established clinical utility, the presence of a DJ stent is frequently associated with a range of adverse symptoms that may significantly impair patients' quality of life.

Aim. The aim of this study was to comprehensively evaluate the impact of DJ ureteral stents on the quality of life of patients treated at the Department of Urology, University Clinical Hospital in Opole, with particular emphasis on urinary symptoms, pain, daily functioning, and the effectiveness of symptomatic treatment.

Materials and methods. The study included 200 patients with indwelling DJ ureteral stents. Data were collected using a detailed proprietary questionnaire designed to assess demographic characteristics, clinical indications for stent placement, duration of stent indwelling, lower urinary tract symptoms, pain, quality of life, occupational and sexual functioning, and the use of symptomatic pharmacotherapy. Descriptive statistical methods were applied to analyze the collected data.

Results. Lower urinary tract symptoms were highly prevalent in the study population. The most frequently reported symptoms were nocturia (72%), urgency (68%), and a sensation of incomplete bladder emptying (61%). Pain was also common, with 55% of patients reporting lower abdominal pain and a substantial proportion experiencing lumbar discomfort. Overall, 74% of patients reported a deterioration in quality of life, with significant negative effects on sleep quality, work performance, and sexual activity. Symptomatic pharmacological treatment was used by 57% of patients, with alpha-blockers and anticholinergic agents being the most commonly prescribed. Among treated patients, 62% reported improvement in symptoms, although complete resolution was rarely achieved. Increased symptom severity was observed in patients with prolonged stent indwelling time.

Conclusions. DJ ureteral stents are associated with a high prevalence of urinary symptoms, pain, and functional impairment, leading to a substantial reduction in patients' quality of life. Although pharmacological treatment provides partial symptom relief, it is not fully effective in all patients. These findings highlight the importance of minimizing stent indwelling time, implementing individualized treatment strategies, and developing improved therapeutic approaches to reduce stent-related morbidity.

Keywords: ureteral stent; double-J stent; quality of life; health-related quality of life (HRQoL); lower urinary tract symptoms (LUTS); stent-related symptoms; urinary urgency; nocturia;

urology; urolithiasis; urinary tract obstruction; patient-reported outcomes; questionnaire-based study; stent discomfort; urinary frequency; pain; sexual dysfunction

Introduction

Double-J (DJ) ureteral stents are widely used in contemporary urology to ensure effective drainage of the upper urinary tract in a variety of clinical conditions, including urolithiasis, ureteral obstruction, malignancies, and postoperative management [4,20]. Despite their well-established clinical utility, the presence of a DJ stent is frequently associated with a range of adverse symptoms that may significantly impair patients' quality of life [2,5,19].

Their use is particularly important in situations requiring urgent decompression of the urinary system, prevention of hydronephrosis, and preservation of renal function. Additionally, DJ stents are commonly utilized as a supportive measure following endourological procedures, such as ureteroscopy, Ureterorenoscopic Lithotripsy (URSL), Retrograde Intrarenal Surgery (RIRS) or percutaneous nephrolithotomy (PCNL)[14,16].

Despite their high clinical effectiveness, the presence of a DJ stent is associated with numerous adverse effects. The most commonly reported include lower urinary tract symptoms (LUTS), such as urinary frequency, urgency, nocturia, a sensation of incomplete bladder emptying, dysuria, as well as pain and hematuria [5,8,18].

In recent years, increasing attention has been directed toward assessing patients' quality of life (QoL) as a crucial component of treatment outcomes. In the context of DJ stent placement, studies showed that up to 70–80% of patients experience a deterioration in quality of life, affecting physical, psychological, and social well-being [1,5,7,21].

An important clinical issue is the variability in symptom severity associated with DJ stents, which may depend on multiple factors, including the duration of stent indwelling, stent diameter, and individual patient sensitivity [6,17,22].

Various strategies have been implemented in clinical practice to reduce stent-related symptoms, including pharmacological treatment such as alpha-blockers, anticholinergic agents, and phosphodiesterase type 5 (PDE5) inhibitors; however, their effectiveness is not always satisfactory [6,9,11,23].

To objectively assess the impact of DJ stents on patients' quality of life, several validated tools have been developed, including symptom and QoL questionnaires such as the Ureteral Stent Symptom Questionnaire (USSQ) [3,10].

Aim

The aim of this study was to comprehensively assess the quality of life of patients with DJ ureteral stents treated at the Department of Urology, University Clinical Hospital in Opole. Study intended to provide a comprehensive, real-world evaluation of the burden associated with DJ ureteral stents in a Polish patient population, thereby contributing to improved clinical decision-making, optimization of treatment strategies, and enhancement of patient-centered care in urological practice.

Materials and Methods

The questionnaire was designed based on previously validated tools used in the assessment of stent-related symptoms and quality of life, including elements derived from the Ureteral Stent Symptom Questionnaire (USSQ) [3,10]. The study included 200 patients with DJ stents treated in Urology Department in University Hospital in Opole.

The questionnaire included:

- demographic data,
- indication for stent placement,
- duration of stent indwelling,
- urinary symptoms,
- impact on quality of life,
- occupational and sexual functioning,
- use of symptomatic treatment .

Descriptive statistics were used for data analysis.

Results:

The study group consisted of 200 patients with indwelling DJ ureteral stents, including 116 men (58%) and 84 women (42%). The predominance of male patients is consistent with the epidemiology of urolithiasis and other urological conditions requiring stent placement.

Table 1. Age distribution of the study group.

Age group (years)	Number of patients (n)	Percentage (%)
18–30	24	12%
31–50	56	28%

Age group (years)	Number of patients (n)	Percentage (%)
51–70	84	42%
>70	36	18%

The most common indication for DJ stent placement was ureteral stones, reported in 46% of cases. Other indications included renal calculi, combined renal and ureteral stones, benign ureteral obstruction, malignancies of the urinary tract, and external compression of the ureter by non-urological cancers. This diversity of indications highlights the broad clinical applicability of DJ stents in both acute and chronic urological conditions.

Table 2. Indications for DJ stent placement.

Indication	Number of patients (n)	Percentage (%)
Ureteral stones	92	46%
Renal stones	28	14%
Combined renal and ureteral stones	24	12%
Benign ureteral obstruction	22	11%
Malignancies of the urinary tract	18	9%
Extrinsic compression (non-urological cancers)	16	8%

In terms of place of residence, patients originated from both urban and rural areas, with a notable proportion residing in medium-sized cities. This distribution may reflect better access to specialized urological care in urban settings.

Regarding educational status, the majority of patients had secondary or higher education, suggesting a relatively high level of health awareness and engagement with medical care. Occupational status varied, including manual workers, office workers, retirees, unemployed individuals, and students. A substantial proportion of the study group consisted of retirees and pensioners, which is consistent with the predominance of older patients.

Table 3. Place of Residence of the Study Population

Category	Number of patients (n)
Rural area	54
Small city (<50,000)	42
Medium city (50,000–200,000)	68
Large city (>200,000)	36

Anthropometric data such as body weight and height were also collected, allowing for a general assessment of patients' physical condition. Additionally, daily fluid intake was evaluated; most patients reported consuming between 1 and 2 liters of fluids per day, while smaller groups reported lower or higher intake levels. Adequate hydration is a relevant factor influencing urinary symptoms and may play a role in symptom severity among patients with DJ stents.

Duration of DJ Stent Placement

Table 4. Duration of DJ stent indwelling.

Duration	Number of patients (n)	Percentage (%)
0–1 month	38	19%
1–3 months	72	36%
3–6 months	44	22%
6–9 months	20	10%
9–12 months	14	7%
>12 months	12	6%

The most common duration was 1–3 months (36%).

Table 5. Most frequently reported clinical symptoms.

Clinical symptom	Percentage (%)
Nocturia	72
Urgency	68
Lower abdominal pain	55

Urinary tract infection symptoms	44
Hematuria	38

Table 6. Impact of DJ stent placement on quality of life.

Outcome	Percentage (%)
Deterioration in quality of life	74
Sleep disturbance	63
Impact on work (moderate/severe)	63
Sick leave required	52

Table 7. Effect of DJ stent placement on sexual activity.

Outcome	Percentage (%)
Decreased sexual activity	49
Pain or discomfort during sexual activity	41

Table 8. Use of symptomatic pharmacological treatment.

Treatment status	Number of patients (n)	Percentage (%)
Treatment used	114	57%
No treatment	86	43%

Table 9. Overall effectiveness of symptomatic treatment among treated patients (n = 114).

Outcome	Number of patients (n)	Percentage (%)
Improvement	71	62%
No improvement	43	38%

Table 10. Types of medications used

Drug group	Patients (n)	Percentage (%)
Alpha-blockers	52	45.6%
Anticholinergics	28	24.6%
PDE5 inhibitors	14	12.3%
Herbal/supportive therapy	20	17.5%

Lower Urinary Tract Symptoms (LUTS)

A high prevalence of lower urinary tract symptoms (LUTS) was observed in the study group, confirming that these symptoms represent one of the most common and clinically significant consequences of DJ ureteral stent placement. The most frequently reported symptom was nocturia, affecting 72% of patients, followed by urinary urgency (68%) and a sensation of incomplete bladder emptying (61%). These findings are consistent with previous studies demonstrating that storage symptoms are predominant in patients with indwelling ureteral stents [1,5,8,18].

Other frequently reported symptoms included increased urinary frequency, dysuria, and symptoms suggestive of urinary tract infection , such as suprapubic discomfort and burning during micturition (44%). Hematuria was also observed in a substantial proportion of patients (38%). Similar symptom profiles have been widely reported in the literature, highlighting the predictable nature of stent-related urinary morbidity [2,5,19].

The pathophysiology of LUTS associated with DJ stents is complex and multifactorial. One of the key mechanisms involves mechanical irritation of the bladder trigone by the distal end of the stent, which leads to increased sensory stimulation and detrusor overactivity. Additionally, vesicoureteral reflux during voiding may contribute to urgency and frequency, while local inflammation further exacerbates symptom severity [5,6,19].

The presence of a foreign body within the urinary tract may also alter normal bladder function, leading to increased bladder sensitivity and reduced functional capacity. These mechanisms collectively explain the predominance of storage symptoms over voiding symptoms in patients with ureteral stents [5,18].

From a clinical perspective, LUTS were among the most bothersome symptoms reported by patients and had a substantial impact on daily functioning. Nocturia, in particular, contributed

significantly to sleep disturbances, which in turn affected overall well-being, daytime performance, and quality of life [1,7,21].

The severity of LUTS varied among patients and appeared to be influenced by several factors, including stent indwelling time, stent characteristics, and individual patient susceptibility. Patients with longer stent duration tended to report more persistent and severe symptoms, which is consistent with previous findings suggesting cumulative irritation and increased risk of complications over time [6,17,22].

Pharmacological management of LUTS in patients with DJ stents has been widely investigated. Alpha-blockers have been shown to improve urinary flow and reduce irritative symptoms, while anticholinergic agents are particularly effective in controlling urgency, frequency, and nocturia. Evidence from randomized trials and meta-analyses supports the use of these agents in reducing stent-related discomfort [9–13,23].

Despite available treatment options, LUTS remain a significant clinical problem in many patients. Recent research has therefore focused on improving stent design and developing novel therapeutic strategies aimed at minimizing bladder irritation and enhancing patient comfort [17,20,25].

Pain and Associated Symptoms

Pain-related complaints were highly prevalent among patients with indwelling DJ ureteral stents and constituted one of the most significant contributors to reduced quality of life. Lower abdominal (suprapubic) pain was reported by 55% of patients, while lumbar pain was present in 48% of cases. Additionally, 36% of patients experienced pain radiating to the groin on the side of the stent, which is characteristic of ureteral irritation [5,8,18].

The intensity and character of pain varied considerably among patients. Some individuals described mild, intermittent discomfort, whereas others reported persistent or severe pain requiring pharmacological intervention. Pain was often exacerbated during physical activity, micturition, or prolonged sitting, suggesting a mechanical and functional component associated with stent presence [5,6].

The underlying mechanisms of stent-related pain are multifactorial. One of the primary factors is irritation of the bladder trigone by the distal end of the stent, leading to suprapubic discomfort and urinary urgency. Additionally, vesicoureteral reflux during voiding may increase intrarenal pressure, contributing to flank pain. Ureteral spasms induced by the foreign body and local inflammatory responses may further intensify pain perception [5,6,19].

Other associated symptoms frequently reported by patients included:

- back pain and generalized discomfort in the lower urinary tract region [5,18],
- nausea and occasional vomiting, particularly in patients with more severe pain episodes [6],
- fever or subfebrile states in a minority of cases, potentially indicating urinary tract infection [2,8],
- fatigue and reduced overall physical well-being, often secondary to chronic discomfort and sleep disturbances [1,7,21].

Pain symptoms were often described as fluctuating over time but remained a persistent issue for many patients. Importantly, pain significantly interfered with daily activities, limiting mobility, reducing work capacity, and negatively affecting social and sexual functioning [7,21].

A noticeable trend was observed in relation to stent indwelling time, with patients having longer stent duration reporting more intense and persistent pain. This finding supports the hypothesis that prolonged exposure to a ureteral stent leads to cumulative irritation, biofilm formation, and increased symptom burden [6,17,22].

Overall, pain and associated symptoms represent a critical aspect of stent-related morbidity and should be carefully assessed and managed as part of a comprehensive, patient-centered approach to treatment. Current evidence suggests that both pharmacological management and technological improvements in stent design may contribute to symptom reduction, although optimal strategies are still being investigated [9–13,17,20,25].

Impact on Quality of Life

A deterioration in quality of life was reported by 74% of patients, indicating a substantial burden associated with DJ stent presence.

Sleep quality was negatively affected in 63% of patients, primarily due to nocturia and discomfort. Only a minority of patients reported no impact on sleep.

Occupational functioning was also significantly impaired:

- 29% of patients reported a severe impact on work performance,
- 34% reported a moderate impact,
- overall, 63% experienced at least a moderate reduction in work capacity.

Furthermore, 52% of patients required at least one day of sick leave due to stent-related symptoms.

Impact on Daily Activities and Sexual Function

The presence of a DJ stent negatively influenced daily activities and leisure time. Many patients reported limitations in hobbies and physical activity, ranging from mild to significant. Sexual activity was also affected:

- 49% of patients reported decreased frequency of sexual intercourse,
- 41% experienced pain or discomfort during sexual activity,
- some patients reported complete cessation of sexual activity due to symptoms.

Among male patients, additional issues such as erectile dysfunction or changes in ejaculation were reported, further contributing to reduced quality of life.

Duration of DJ Stent Indwelling and Its Impact on Symptom Severity

The duration of DJ stent indwelling varied among the studied patients and was identified as one of the key factors influencing the severity of stent-related symptoms. Analysis of the collected data demonstrated a clear relationship between prolonged stent presence and increased frequency as well as intensity of clinical complaints.

Relationship Between Stent Duration and Symptoms

Short-term stenting (0–3 months)

Patients with short-term stent placement (0–3 months; 55% of the study population) most frequently reported:

- mild to moderate lower urinary tract symptoms (LUTS),
- occasional urgency and frequency,
- intermittent discomfort in the suprapubic region.

In this group, symptoms were generally better tolerated and less likely to interfere significantly with daily activities. The incidence of complications such as infection or hematuria was lower compared to patients with longer indwelling times.

Intermediate duration (3–6 months)

Patients with stents maintained for 3–6 months (22%) exhibited:

- increased frequency of urgency and nocturia,
- more pronounced sensation of incomplete bladder emptying,
- higher prevalence of suprapubic and lumbar pain.

At this stage, symptoms became more persistent and began to significantly affect quality of life, including sleep disturbances and reduced work productivity.

Long-term stenting (>6 months)

Patients with prolonged stent indwelling (>6 months; 23% of patients) experienced the highest burden of symptoms, including:

- severe urgency and frequency,
- frequent nocturia leading to marked sleep disruption,
- persistent pain (lumbar, suprapubic, and radiating to the groin),
- higher incidence of hematuria,
- increased risk of urinary tract infections.

Additionally, long-term stenting was associated with:

- greater impact on occupational functioning,
- higher rates of sick leave,
- more pronounced reduction in physical and sexual activity.

Symptomatic Treatment

The effectiveness of symptomatic treatment in patients with DJ ureteral stents was evaluated in the subgroup of 114 patients (57%) who received pharmacological therapy . Overall, clinical improvement was reported by 71 patients (62%), while 43 patients (38%) did not experience significant relief. However, treatment outcomes varied depending on the pharmacological group used.

Alpha-blockers (α-blockers)

Alpha-blockers (e.g., tamsulosin) were the most frequently used medications, administered to 52 patients (45.6% of treated individuals). This group demonstrated the highest overall effectiveness.

Observed effects:

- significant reduction in urinary urgency and frequency,
- improvement in urinary flow,
- decreased sensation of incomplete bladder emptying,

- reduction of nocturia,
- reduction in stent-related flank pain.

Approximately **65–70% of patients** treated with alpha-blockers reported noticeable symptom improvement. Their effectiveness is primarily attributed to relaxation of smooth muscle in the ureter and bladder neck, leading to reduced intravesical pressure and reflux.

Anticholinergic agents (e.g., solifenacin)

Anticholinergic drugs were used in 28 patients (24.6%). These agents were particularly effective in patients with symptoms of bladder overactivity.

Observed effects:

- reduction in urgency and urge incontinence,
- decreased frequency of micturition,
- improvement in nocturia,
- better sleep quality.

Clinical improvement was reported in approximately **60–65% of patients** in this group. These drugs were especially beneficial in patients with predominant irritative symptoms.

Phosphodiesterase type 5 (PDE5) inhibitors

PDE5 inhibitors (e.g., tadalafil) were used in 14 patients (12.3%), primarily in male patients.

Observed effects:

- reduction in pelvic discomfort and pain,
- improvement in urinary symptoms,
- enhanced erectile function,
- overall improvement in quality of life.

Approximately **55–60% of patients** reported improvement. Although used less frequently, this group showed additional benefits in sexual function, which is an important aspect of patient well-being.

Herbal preparations and supportive therapy

Herbal and supportive treatments were used in 20 patients (17.5%).

Observed effects:

- mild reduction in urinary symptoms,
- subjective improvement in well-being,
- potential anti-inflammatory and diuretic effects.

The effectiveness in this group was lower, with improvement reported in approximately **40–50% of patients**. These therapies were mainly used as adjunctive treatment.

Table 11. Types of medications used and their main benefits.

Drug group	Patients (n)	Percentage (%)	Improvement (%)	Main benefits
Alpha-blockers	52	45.6%	65–70%	Reduction of LUTS and pain relief
Anticholinergics	28	24.6%	60–65%	Control of urgency and nocturia
PDE5 inhibitors	14	12.3%	55–60%	Reduction of pain and improved sexual function
Herbal/supportive therapy	20	17.5%	40–50%	Mild symptom relief

Discussion

The results of the present study demonstrate that the use of DJ ureteral stents is associated with a significant burden of symptoms and a substantial reduction in patients' quality of life. These findings are consistent with previously published data [1,2,5].

One of the most important observations in this study is the high prevalence of lower urinary tract symptoms (LUTS), particularly nocturia and urgency. These symptoms are well documented in the literature and are primarily attributed to mechanical irritation of the bladder mucosa by the distal end of the stent, as well as vesicoureteral reflux during micturition [5,8].

Pain was another prominent finding. The pathophysiology of stent-related pain is multifactorial and may include ureteral spasm, increased intrarenal pressure, and local inflammatory response [5,6].

A deterioration in overall quality of life was reported by the majority of patients, which is consistent with previous reports indicating that stent-related symptoms significantly affect daily functioning, sleep, and psychological well-being [1,7].

The impact on occupational functioning observed in this study is also supported by previous reports highlighting the socioeconomic consequences of stent-related morbidity [7].

An important contribution of this study is the analysis of the relationship between stent indwelling time and symptom severity. Patients with longer stent duration experienced more severe symptoms, which is consistent with previous findings suggesting chronic irritation and increased risk of complications over time [6,17].

The role of pharmacological treatment was also evaluated. Alpha-blockers were the most commonly used and most effective group, which is consistent with randomized trials and meta-analyses demonstrating their efficacy in reducing LUTS and pain [9–13].

Anticholinergic agents were particularly effective in controlling storage symptoms such as urgency and nocturia, which has also been confirmed in previous studies [6,11].

Despite these therapeutic options, a considerable proportion of patients did not experience significant improvement, indicating that current pharmacological strategies are not fully sufficient. This underscores the need for further research into more effective treatment modalities, including novel stent designs and drug-eluting stents [17,20,25].

Conclusions

The findings of this study clearly demonstrate that the presence of a DJ ureteral stent has a significant and multi-level impact on patients' quality of life. Although DJ stents remain an essential and often indispensable component of modern urological management, their use is

associated with a high prevalence of bothersome symptoms that affect both physical and psychosocial functioning [1,5,19].

Firstly, the study confirms that lower urinary tract symptoms (LUTS), particularly nocturia, urgency, and a sensation of incomplete bladder emptying, are among the most common and clinically relevant complications associated with DJ stents. These symptoms frequently coexist with pain, which further contributes to patient discomfort and reduced daily functioning [5,8,18].

Secondly, the results highlight that the negative impact of DJ stents extends beyond purely clinical symptoms. A substantial proportion of patients reported impaired sleep quality, reduced work productivity, and limitations in physical and sexual activity, which is consistent with previous studies emphasizing the broad quality-of-life burden associated with ureteral stents [1,7,21].

Thirdly, more than half of the patients required pharmacological treatment to alleviate stent-related symptoms. Alpha-blockers and anticholinergic agents were identified as the most commonly used and most effective therapeutic options. However, despite treatment, a significant proportion of patients continued to experience persistent symptoms, indicating that currently available pharmacological strategies are not fully sufficient [9–13,23].

Importantly, the duration of stent indwelling was identified as a major determinant of symptom severity. Patients with prolonged stent placement experienced more severe and persistent symptoms, as well as a higher risk of complications, which is in line with previous reports [6,17,22].

From a clinical perspective, these findings underscore the importance of minimizing stent indwelling time, implementing individualized treatment strategies, and improving patient education regarding expected symptoms and management options [6,17].

Finally, the study highlights the need for further research focused on improving the tolerability of DJ stents. Future directions may include the development of novel stent materials, drug-eluting stents, and optimized multimodal treatment approaches aimed at minimizing stent-related morbidity [17,20,24,25].

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