Forgotten Ureteral Double-J Stents: Experience in a Tertiary Care Centre of Nepal

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Ureteric stent is used routinely and widely in urological procedures, especially the double-J (DJ) stent. However, it is necessary to replace or remove the stents within 2 weeks to 3 months. If forgotten, it can result in discomfort, infection, and encrustation of the surface and/or lumen of a stent. The current study aimed to examine the experience of managing patients with forgotten DJ stents (>3-month). This is a retrospective observational study among 27 patients with the indication of forgotten (>3-month) double J ureteral stents who underwent in the last 6 years from January 2017 to December 2022, in the department of Urology of B&B hospital, Lalitpur. It showed that the most common indications for the indwelling of a stent were PCNL, pyelolithotomy, and URS. Most of the patients had minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent. There were multiple responses regarding the presenting symptoms, with the majority having flank pain. Cystoscopy and DJ stent removal were the most commonly used endourological procedures.

Keywords: DJ stent, endourology procedures, forgotten Stents, Nepal.

Double-J (DJ) ureteral stent, which was first described by Zimskind et al, is a standard urological procedure that has been used routinely and widely since 1967. Ureteric stents following open or endoscopic ureteral surgery are used for retroperitoneal tumors or fibrosis, ureteral strictures, ureteropelvic junction obstructions, or the treatment of obstructing ureteral stones. Stents may also be inserted following iatrogenic injuries of the ureters or to protect and define the ureter in complex abdominal procedures in the preoperative

period.[1,2,3]

Ureteral stents are hollow tubes that drain the kidneys into the urinary bladder through the ureteric lumen, and there have been many advances in the ureteric stent design regarding the material, shape, and coating.[4] Even though DJ stents come with various benefits, their placement for a longer duration of time has severe consequences, including hematuria, stent occlusion, migration, fragmentation, encrustation, and stone formation. Most of the time, patients forget to come for the removal of the DJ stent despite written and verbal instructions, thereby resulting in the emergence of complications, which may be lethal in some cases.[5] Encrustations are most frequently noted in forgotten/retained DJ's, which remain indwelling for a long period and are an uneasy problem for the patient and treating urologist.[6,7]

There are no algorithmic approaches in urology guidelines for forgotten stents in both adults and children because of which poses a challenging issue for urologists. Several combinations of endourological methods have been reported in the literature for the removal of these stents. The type of procedure for removal of the stent depends upon various factors, like the extent and location of encrustation, whether the stent is broken, etc.[8] Although open surgery has been reported as a treatment modality, other minimally invasive procedures are followed like extracorporeal shockwave lithotripsy (ESWL), or internal lithotripsy with percutaneous nephrolithotomy (PCNL), cystolithotripsy (CLT), ureteroscopic lithotripsy (URL) have all been used either alone or in combination to tackle this problem.[9] Some recent modifications have been devised due to prevailing circumstances that ureteric catheter or improvised infant feeding tubes are also used as an alternative to the DJ stent.[10]

This retrospective study aimed to explore indications of indwelling stents and study the complications due to them and the management of forgotten DJ stents.

Materials and Methods

This is a retrospective observational study using a non-probability convenience method, which was conducted among all the patients with the indication of forgotten (>3-month) double J ureteral stents who underwent in the last 6 years (January 2017–December 2022) in the department of Urology of B&B hospital**,** Lalitpur. All the patients presenting to the urology outpatient department with polyurethane ureteral stents for more than three months, irrespective of gender, were included in the study. The patients with a ureteral stent in situ for a prolonged period, with regular change or with non-polyurethane ureteral stents, were excluded from the study. The patients included in this study were those referred from peripheral hospitals as well as those previously operated on at B&B Hospital. The total number of patients who

met the eligibility criteria of forgotten DJ stent (>3 months) and factors like duration of DJ stent indwelling, presenting complaints, and type of previous procedure was 27. The indwelling time of the stent was calculated from the time of insertion to removal. The preoperative evaluation consisted of a urinalysis, blood creatinine level, whole blood count, and urine culture with an antibiotic sensitivity test. A negative urine culture result was documented in all patients before endourological intervention. In patients with positive urine culture results, an intervention was performed after antibiotic treatment. All patients received antibiotic prophylaxis preoperatively. Kidney–ureter–bladder (KUB) radiography, urinary system ultrasonography (US), and/or non-contrast computerized tomography (NCCT) were performed in all patients to evaluate stone burdens and stent encrustation. Treatment decisions were based on clinical and radiological findings. The collected data were entered into an Excel sheet and cleaned as necessary. For the analysis of the data, SPSS version 16 was used. Frequency, percentage, mean, and standard deviation were calculated, and the required figures were added.

Results

A total of 27 patients with forgotten ureteral stents for more than three months were enrolled in the study. The mean age of the patients was 41.2±9.3 years, and the minimum and maximum ages were 31 and 59 years, respectively. The entire study population was male. The mean duration of the indwelling stent in situ was 38.3±34.2 months, and the minimum and maximum durations were 4 and 120 months, respectively.

Indications	**Number of cases (n)**	**Percentage (%)**
Anderson-Hynes pyeloplasty	2	7.5
PCNL	7	25.9
Pyelolithotomy	7	25.9
RIRS	4	14.8
URS	7	25.9
Total	27	100

Table 1: Indications of indwelling stents

As shown in **Table 1**, the most common indications for stenting were PCNL (25.9%), pyelolithotomy (25.9%), and URS (25.9%). The other indications were RIRS and Anderson-Hynes pyeloplasty.

As shown in **Table 2**, the age range of the study population was 31 to 59 years, and the duration range of the indwelling stent in situ was 4 to 120 months. In many patients, there were minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent.

As shown in **Table 3**, flank pain was the commonest presenting symptoms of the

Indication	Age (Years)	Sex	Indwelling time (Month)	Location of encrustation
Pyelolithotomy	45	Male	48	Circular encrustations completely encasing both of the pigtail portions of the indwelling ureteral stent.
URS	42	Male	18	Circular encrustation completely encasing the lower end of the pigtail portions of the indwelling ureteral stent.
URS	31	Male	30	Circular encrustation completely encasing the lower end of the pigtail portions of the indwelling ureteral stent.
Pyelolithotomy	59	Male	120	Diffuse and bulky encrustations completely encasing both the pigtail and ureteral portions of the indwelling ureteral stent.
PCNL	35	Male	36	Circular encrustation completely encasing the lower end of the pigtail portions, as well as linear encrustation of the ureteral aspects of the indwelling ureteral stent
PCNL	31	Male	60	Circular encrustation completely encasing the lower end of the pigtail portions, as well as linear encrustation of the ureteral aspects of the indwelling ureteral stent
Pyelolithotomy	45	Male	44	Circular encrustations completely encasing both of the pigtail portions of the indwelling ureteral stent.
RIRS	42	Male	8	Minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent
URS	31	Male	11	Minimal linear encrustations along either of the pigtail portions of the indwelling ureteral stent
Pyelolithotomy	59	Male	96	Diffuse and bulky encrustations completely encasing both the pigtail and ureteral portions of the indwelling ureteral stent.

Anderson-Hynes pyeloplasty	35	Male	24	Circular encrustation completely encasing the lower end of the pigtail portions of the indwelling ureteral stent.
URS	42	Male	7	Minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent
PCNL	45	Male	66	Circular encrustation completely encasing the lower end of the pigtail portions, as well as linear encrustation of the ureteral aspects of the indwelling ureteral stent
URS	42	Male	5	Circular encrustation completely encasing the lower end of the pigtail portions of the indwelling ureteral stent.
Pyelolithotomy	31	Male	108	Diffuse and bulky encrustations completely encasing both the pigtail and ureteral portions of the indwelling ureteral stent.
Anderson-Hynes pyeloplasty	59	Male	18	Circular encrustation completely encasing the lower end of the pigtail portions of the indwelling ureteral stent.
PCNL	35	Male	66	Circular encrustation completely encasing the lower end of the pigtail portions, as well as linear encrustation of the ureteral aspects of the indwelling ureteral stent
Pyelolithotomy	31	Male	84	Circular encrustation completely encasing the proximal end of the pigtail portions, as well as linear encrustation of the ureteral aspects of the indwelling ureteral stent
PCNL	45	Male	13	Circular encrustation completely encasing the proximal end of the pigtail portions of the indwelling ureteral stent.
PCNL	42	Male	15	Circular encrustation completely encasing the proximal end of the pigtail portions of the indwelling ureteral stent.

RIRS	31	Male	9	Minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent.
Pyelolithotomy	59	Male	72	Circular encrustation is completely proximal end of the pigtail portions of the indwelling ureteral stent.
RIRS	35	Male	36	Diffuse and bulky encrustations completely encasing both the pigtail and ureteral portions of the indwelling ureteral stent.
URS	42	Male	13	Minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent
RIRS	45	Male	7	Minimal linear encrustations along the lower end of the pigtail portions of the indwelling ureteral stent
PCNL	42	Male	17	Circular encrustations completely encasing both of the pigtail portions of the indwelling ureteral stent.

Table 2: Clinical characteristics of patients with forgotten DJ Stent

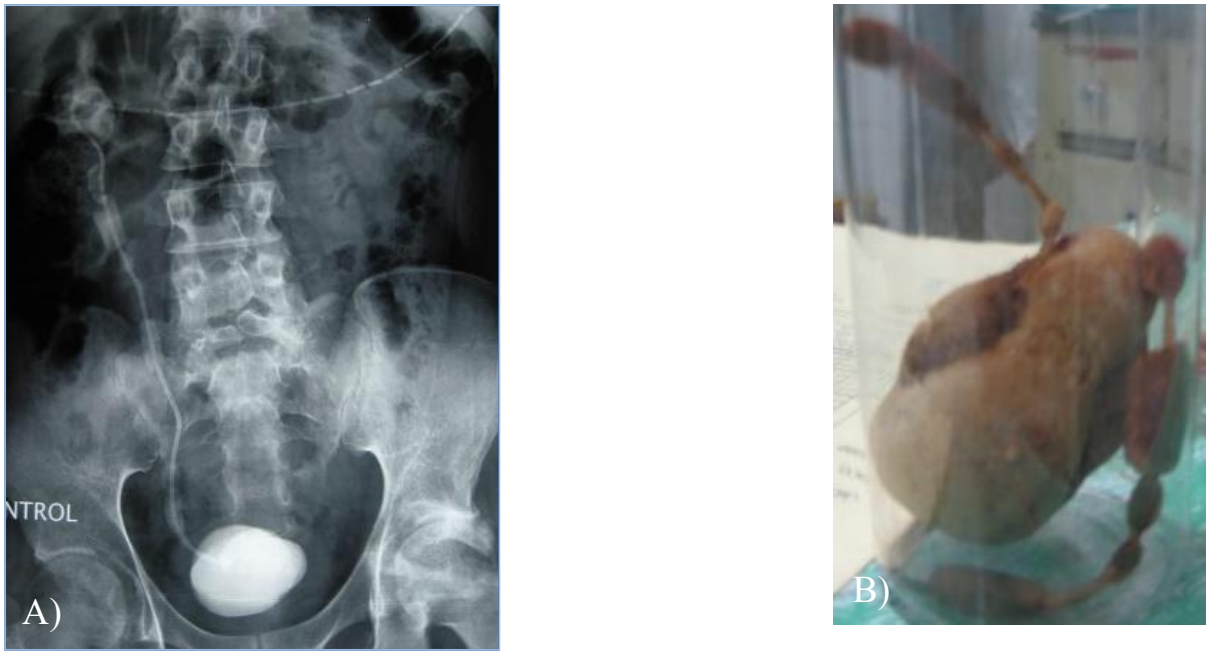

Figure 1: A) KUB radiograph view of associated stone burden and 5 yrs old encrusted fragmented DJ stent, B) bladder stone with encrusted DJ stent removed

Symptoms	Number (n)	Percentage (%)
Hematuria	14	51.9
Flank pain	17	63.0
Dysuria	3	11.1

Table 3: Presenting symptoms

study population and was followed by hematuria (51.9%) and dysuria (11.1%). The clinical findings and management are illustrated in **Figures 1, 2, and 3**.

As shown in **Table 4**, the stents were managed by various endourological techniques to remove the encrusted DJ stent. **Figure 1a** shows the Kidneys, Ureters, and Bladder (KUB) radiograph view of the associated stone burden. The most used procedure was cystoscopy and DJ stent removal, which were required in 8 (29.7%) patients, and cystolitholapexy and cystolitholapexy along with flexible URS with Holmium laser were performed among 4 (14.8%) patients, respectively. **Figure 1b** illustrates the bladder stone with encrusted DJ stent removed after surgery.

Among 27 cases, 10 (37%) were of grade I, and 3 (11.2%) were of grade IV in the FECal (Forgotten, Encrusted, and Calcified) ureteral stent grading system among the study population. A broken stent was also observed, indicating severe encrustation and structural compromise shown in **figure 3**.

Procedures	Number of cases (n)	Percentage (%)
Cystolitholapexy	4	14.8
Cystolitholapexy + flexible URS with Holmium Laser	4	14.8
Cystolitholapexy + PCNL	2	7.4
Cystoscopy + DJ removal	8	29.7
ESWL	2	7.4
ESWL + cystolitholapexy	1	3.7
ESWL + cystolitholapexy + PCNL + flexible URS with holmium laser	2	7.4
ESWL + PCNL	1	3.7
Open Cystolithotomy + flexible URS with Holmium Laser + PCNL	2	7.4
PCNL + antegrade URS Holmium laser	1	3.7
Total	27	100.0

Table 4: Procedures performed for the removal of the DJ stent

Figure 2: The removed stent from the patient

Figure 3: Fracture present in the stent

Discussion

In the study conducted by El-Kholy GEG et al among 239 patients, the mean age was 36.81±19.93 years, and the mean neglected stenting duration was 11.11±8.6 months.[11] In a similar study conducted by Hajjaj MA et al among 25 patients, the mean age of the patients was 38.44 years, and the age ranged from 22 to 58 years. There were 12 (48%) males and 13 (52%) females, and the mean duration of the indwelling stent in situ was 20.36 months, and the duration ranged from 13 months to 33 months.[12] In this study, out of 27 patients with forgotten ureteral stents for more than three months, the mean age of the patients was 41.2 ± 9.3 years, and the age ranged from 31 to 59 years, and all the patients were male. The mean duration of the indwelling stent in situ was 38.3 ± 34.2 months, and the minimum and maximum durations were 4 and 120 months, respectively.

In the study conducted by Patil et al among 30 patients, the most common indication for stenting was URS (46.67%), and other indications were PCNL, open pyeloplasty, ESWL, laparoscopic pyeloplasty, and ureteric reimplantation.[13] In a similar study conducted by Abdelaziz AY et al among 68 patients, the reasons for ureteral stent fixation were ESWL (44%), ureteroscopy (32%), PCNL (3%), and open surgeries (20%).[14] In this study, it was found that the most common indications for stenting were PCNL (25.9%), pyelolithotomy (25.9%), and URS (25.9%), and other indications were RIRS and Anderson-Hynes pyeloplasty.

In the study conducted by Shrestha NM

among 33 cases of forgotten D J stent, flank pain alone 10 (30.30%), and flank pain along with fever and positive urine culture 8 (24.24%), were the most common presenting symptoms.[15] In a similar study conducted by Mahmood K et al among 52 patients, pain was the most common adverse event (88.4%), followed by dysuria (63.4%), urinary tract infection (36.5%), hematuria (9.6%), and acute urinary retention (7.7%).[16] In this study, flank pain (51.9%) was the commonest presenting symptom of the study population and was followed by hematuria (63%) and dysuria (11.1%).

In the study conducted by Thapa BB et al, among 27 cases of forgotten DJ stent, the procedures conducted for forgotten DJ stent were cystoscopic removal, cystolithotripsy and PCNL, URSL and PCNL, URSL, cystolitholapaxy, cystolithotomy and pyelolithotomy, and simple nephrectomy, and the most used procedure was cystoscopic removal.[17] In a similar study conducted by Ali et al among 16 patients, the procedures conducted for forgotten DJ stent were Cystoscopy and stent removal, cystolithotripsy, cystolithotripsy and PCNL, ureteroscopy, and open pyelolithotomy.[18] In this study the most used procedure for removal of forgotten DJ stent was cystoscopy and DJ stent (29.7%) and other procedures conducted were cystolitholapexy, cystolitholapexy along with flexible URS with Holmium laser, cystolitholapexy and PCNL, ESWL, ESWL and cystolitholapexy, ESWL, cystolitholapexy, PCNL and flexible URS with holmium laser, ESWL and PCNL, Open Cystolithotomy, flexible URS with Holmium Laser and PCNL and PCNL and antegrade URS Holmium laser.

Conclusion

The study showed that the most common reason for indwelling of stent was PCNL, pyelolithotomy and URS and minimal linear encrustations along lower end of the pigtail portions of the indwelling ureteral stent were found among the patients with the indication of forgotten (> 3months) double J ureteral in department of Urology of B&B hospital**,** Lalitpur. Most of the patients presented with flank pain, and after required evaluation, cystoscopy and DJ stent removal were the most used endourological procedures among the study population.

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