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Original Article

Forgotten Double-J Stent: Evaluation and Management in a Tertiary Hospital in the North East India

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Abstract

The objectives of this study were to evaluate the clinical profile, the management and complications of the 16 cases of forgotten double-J stent. Cases with more than 6 months duration of the stent without prolonged stenting indication were included. The following parameters (such as age, sex, literacy, socioeconomic status, stenting indication, duration of the indwelling stent, presenting complaints, various treatments given, and their management and eventual outcome) were recorded and analyzed. The mean age was 59.12 ± 9.8 years (34–70). Most commonly found in females 9 (56.25%). Most of the patients 11 (68.75%) were illiterate and common in the lower socioeconomic class group 10 (62.50%). The mean age of the stent indwelling time was 1.73 ± 0.9 (0.11–3.4) years. The most common reason for stenting was ureteroscopic lithotripsy 7 (43.75%) cases. The most common presenting complaint was flank pain with lower urinary tract symptoms in 9 (56.25%) patients, recurrent urinary tract infections in 2 (12.5%) patients, and 4 (25%) cases were asymptomatic. Severe stent encrustation with stone formation was seen in ten cases, urinary obstruction in two cases, stent migration in one case, and stent fragmentation was seen in two cases. Cystoscopy with stent removal was done in four patients, cystolithotripsy (CLT) four patients, three patients underwent initially CLT followed by PCNL. Two fragmented stents were retrieved by ureteroscopy and one patient underwent open pyelolithotomy.

Key words: Forgotten double-J stent, North East India, Cystolithotripsy, Percutaneous Nephrolithotomy

INTRODUCTION

Since 1967, ureteric stent has been using routinely and widely in urological procedures. They are mainly used after any elective ureteric surgery of ureteric obstruction due to intrinsic or extrinsic causes such as stones, strictures, ureteropelvic junction obstruction, retroperitoneal fibrosis, malignancies, and congenital anomalies.[1]

It is usually safe and well-tolerated; however, it is associated with complications which can be mild to severe complications such as encrustation, urinary tract obstructions, and renal failure. The most common factors responsible for the encrustation include the stent indwelling time, urinary tract infection (UTI), and history of concomitant stone disease.[2]

The removal of encrusted stents is one of the most complicated endourological procedures as the loss of tensile strength due to neglected may lead to its breakage and fragmentation. The various methods of treatment such as shock wave lithotripsy (SWL), cystolithotripsy (CLT), ureteroscopic lithotripsy (URSL), percutaneous nephrolithotomy (PCNL), and open surgery methods have been used for the treatment of encrusted stents.[3]

MATERIALS AND METHODS

This was a prospective study conducted at the Regional Institute of Medical Science Imphal Manipur India. All the patients with an age of more than 18 irrespective of sex, who came to the urology outpatient department/causality with forgotten double-J (DJ) stent from September 2019 to 31 August 2021 were included. The inclusion criteria were cases with more than 6 months duration of the stent without prolonged stenting indication.

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Written informed consent was obtained from all the patients. The study was conducted after getting clearance from the Ethical Board Committee of our institute.

The education and socioeconomic status of the patients were calculated by the modified Kuppuswamy scale. The education status ranged from score 1 to score 7. The patients were classified under Class 1 – upper, Class 2 – upper middle, Class 3 – lower-middle, Class 4 – upper-lower, and Class 5 – lower according to socioeconomic status.

After getting admitted to the ward, all the patients were evaluated with all basic routine preoperative investigations. The demography, educational/socioeconomic status, the indication of stenting, duration of stenting, presenting complaint was recorded as per the Performa of the study. Ultrasound abdomen and pelvis, Plain X-ray kidney, ureter, and bladder (KUB), non-contrast computed tomography (NCCT KUB/CT Urogram) were done to evaluate for stent-related complications. The treatment decision was taken from the clinical and radiological findings.

The patients with minimal encrustation were planned for cystoscopy and gentle traction was used for stent removal under C arm guidance. The procedure was abandoned if found resistance during retrograde extraction. The patients with severe encrustation and stone formation on lower coil only were managed by cystoscopic lithotripsy (CLT) using pneumatic lithotripter. The patients with failed retrograde extraction and large stones in the upper coil were managed by percutaneous lithotripsy (PCNL). Rarely pyelolithotomy and ureterolithotomy were required in some cases. Finally, we also evaluated the correlation of stent duration with the complications and need for multiple procedures. Re-stenting was done in patients with complicated encrustation. All the findings were recorded as per the Performa of our study.

Statistical Analysis

Descriptive analysis was done for various clinical parameters. All data were expressed as a percentage, mean ± standard deviation. To test the correlation of stent duration with the complications and need for multiple procedures, the independent *t*-test was used. A $P < 0.05$ was considered significant.

RESULTS

A total of 16 patients were included in our study. The mean age of the patient was 59.12 ± 9.8 years with a range of 34–70 years. Out of sixteen patients, 7 (56.25%) patients were males and 9 (56.25%) patients were female. Most of the patients 11 (68.75%) were illiterate and belongs to the lower socioeconomic class group 10 (62.50%). Right side 9 (56.25%) was more commonly involved [Table 1].

The mean age of the stent indwelling time was 1.73 ± 0.9 years, and the maximum stent duration was for 3.4 years (0.11–3.4). The reason for stenting was post URSL in 7 (43.75%) cases, pre-stented ESWL in 3 (18.75%) cases, post PCNL in 2 (12.50%) cases, post open pyelolithotomy in 2 (12.5%) cases, one patient was emergency stenting for pyonephrosis, and one case was in a pregnant lady during the antenatal period at 32-week amenorrhea for severe hydronephrosis [Table 2].

The most common presenting complaint was flank pain with lower urinary tract symptoms (LUTS) in 9(56.25%)

Table 1: Patient demographics

Patient demographics	Number of patients (*n*=16)
(Mean age±SD*)	59.12±9.8
IQR*	53.50–65.50
Age (years)	
<60	5 (31.25%)
≥60	11 (68.75%)
Sex	
Male	7 (43.75%)
Female	9 (56.25%)
Educational status	
Illiteracy	11 (68.75%)
Educated	5 (31.25%)
Socioeconomic status	
Upper	0
Upper middle 2	1 (6.25%)
Lower middle 3	1 (6.25%)
Upper lower 4	4 (25%)
Lower 6	10 (62.50%)
Site of involvement	
Right	9 (56.25%)
Left	7 (43.75%)

SD: Standard deviation, IQR: Inter quartile Range

Table 2: Indication of stenting

Indication of stenting	Number of patients (*n*=16)
*ESWL	
*PCNL	3 (18.75%)
*URSL	2 (12.50%)
Emergency stenting for	7 (43.75%)
Pyonephrosis	1 (6.25%)
Open surgery	2 (12.5%)
Pregnancy	1 (6.25%)
Duration of stenting (years)	
Range	0.11–3.4
Mean±SD*	1.73 ± 0.9
*IQR	1.100–2.550
Presenting complaints	
LUTS*+flank pain	9 (56.25%)
Flank pain and fever	1 (6.25%)
Recurrent UTI*	2 (12.5%)
Asymptomatic	4 (25%)

ESWL: Extracorporeal shockwave lithotripsy, PCNL: Percutaneous nephrolithotomy URSL: Uretoscopic lithotripsy, UTI: Urinary tract infection, LUTS: Lower urinary tract infection, SD: Standard deviation, IQR: Inter quartile Range

patients, recurrent UTI in 2(12.5%) patients, and 4(25%) cases were asymptomatic [Table 3].

Case Presentations

A 60-year-old female patient presented with right flank pain and severe dysuria. She underwent right-side DJ stenting following URSL 2.3 years back. The patient did not come for follow-up because of some familial issues and then forgotten. USG KUB was showing a stent with large calculus at the lower ends of the DJ stent. The patient underwent CLT with pneumatic lithotripter and stent removal was done [Figure 1a-c].

Another patient 52-year female, with a history of left-forgotten DJ stent post URSL for 3 years, was admitted with obstructive uropathy with a deranged kidney function test. X-ray KUB shows encrusted stent with the stone formation on both ends of the stent. The patient underwent CLT followed by PCNL under regional anesthesia [Figure 2a and b].

Urinary obstruction was seen in two cases and one of the patients had elevated serum creatinine. Stent migration was present in one case, stent fragmentation in two cases [Figure 3a and b], and severe stent encrustation with stone formation was seen in ten cases [Table 4].

Table 3: Preoperative diagnosis

Preoperative diagnosis	Number of patients (*n*=16)
Bladder stone+FS*	4 (25%)
Stone on both ends+FS*	3 (18.75%)
Ureteric calculi+moderate HDN*+FS*	1 (6.25%)
Stent migration	1 (6.25%)
Stent fragmentation	2 (12.5%)
Pyonephrosis+ureteric calculi+AKI*+ FS*	1 (6.25%)
Asymptomatic with minimal+FS*	4 (25%)

FS: Forgotten stent, HDN: Hydronephrosis, AKI: Acute kidney injury

Cystoscopy with stent removal was done in four patients, four patients underwent CLT with stent removal, three patients with stone on both ends of the forgotten stent underwent initially CLT followed by PCNL, and the stent was removed. Two patients with ureteric obstruction with stone were managed by URSL. Two fragmented stents were retrieved by URS and one patient with a large stone in the pelvis with forgotten stent was managed by open pyelolithotomy [Table 4].

Re-stenting was done in all patients with complicated encrustation with stone formation.

DISCUSSION

Different studies have defined forgotten DJ stent differently, as there is no appropriate definition. Monga *et al.*[3] and Tang *et al.*[4] defined forgotten DJ stents as those used for anticipated extraction.[5] Lin *et al.*[6] classified forgotten DJ stent into 3-month, 6-month,

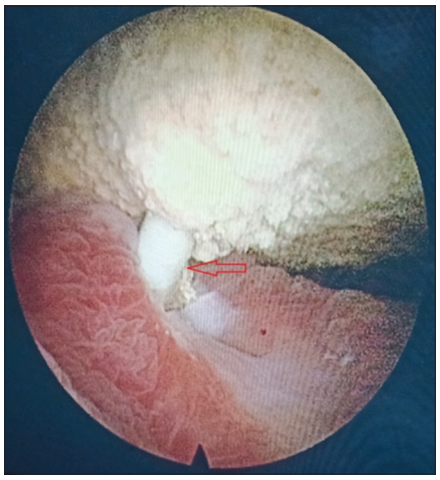

Figure 1b: Cystoscopy showing bladder stone with forgotten double-J stent *in situ*

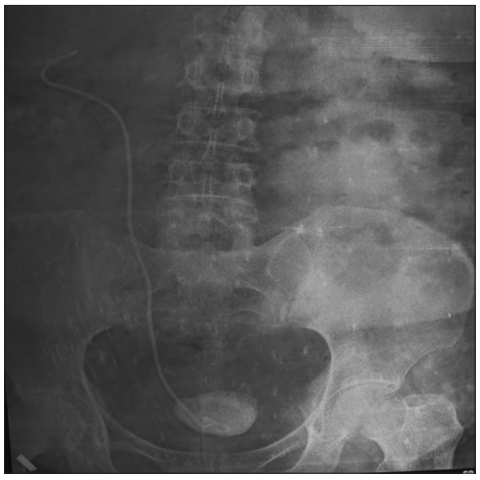

Figure 1a: X-ray ray kidney, ureter, and bladder showing right Forgotten double-J stent with bladder stone

Figure 1c: Post cystolithotripsy with stone fragments and forgotten double-J stent

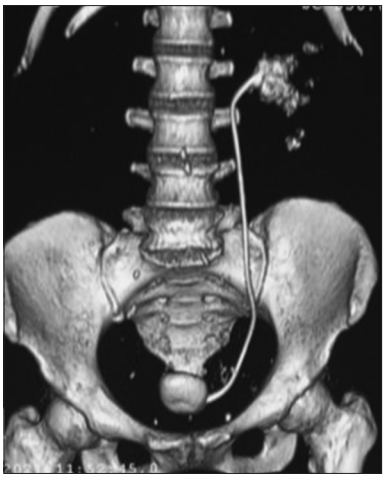

Figure 2a: X-ray kidney, ureter, and bladder showing Left forgotten double-J stent with the stone formation on both ends of the stent

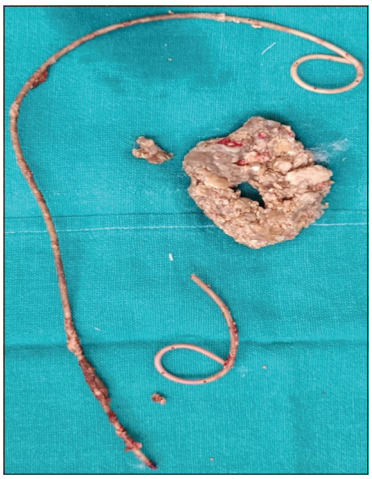

Figure 2b: Encrusted stent with stone after the operation with the fragmentation of upper coil of double-J stent

Figure 3a: X-ray kidney, ureter, and bladder showing right fragmented upper stent with left stent

Figure 3b: Axial computerized tomography showing right fragmented stent in the pelvis with left stent *in situ*

and 12-month groups based on their maximal stent life (MSL). In our study, we defined forgotten DJ stents as an indwelling time of more than 6 months.

As the use of DJ stenting is a routine urological surgical practice in endourology and forgotten ureteric stents can be present because of the failure of the physician to adequately counsel the patient or because of poor patient compliance. We evaluated the education and socioeconomic status of the patients in these patients and found forgotten DJ stent was more common in the illiterate 11 (68.75%) and low socioeconomic groups 10 (62.5%) of patients. This can be one of the patient-related reasons for the forgotten stent in our study.

The forgotten DJ stent has a variable presentation, which includes irritative voiding symptoms, flank pain, hematuria, fever, stent fragmentation, and migration. In our study, we found LUTS and flank pain 9 (56.25%) were the most common symptoms which bring the patient to the hospital. Agarwal *et al.*[7] also found LUTS was the most common symptom followed by hematuria and flank pain in their study. Damiano *et al.*[8] observed flank pain in 25.3%, irritative bladder symptoms in 18.8%, hematuria in 18.1%, and fever in 12.3%, of the patients.

Table 4: Procedures

Nature of procedures	Number of patients (*n*=16)
Cystoscopy+stent removal	4 (25%)
CLT*+stent removal	4 (25%)
CLT*+PCNL*+stent removal	3 (18.75%)
*URS+stent removal	2 (12.5%)
*URSL+stent removal	2 (12.5%)
Open Pyelolithotomy+stent removal	1 (6.25%)

CLT: Cystolithotripsy, PCNL: Percutaneous nephrolithotomy, URS: Ureteroscopy, URSL: Uretoscopic lithotripsy

The etiology of encrustation and stone formation on a stent is multi-factorial, and it includes long indwelling time, urinary stone disease, pregnancy, metabolic, and congenital abnormalities.[9] the mean stent indwelling duration was 1.73 ± 0.9 years, and the maximum stent duration was for 3.4 years. The maximum duration of indwelling stent till recorded is 23 years.[10] The most common indication for stenting in our study group was stenting post-URSL 7(43.75%) for ureteric stone. The reason for increased incidence may be because of doing the URSL procedure in females on minor operation theatre (OT) day and we used to have a high patient load and very little time for proper counselling of the patients regarding placement of the stent and associated complications.

Stent-related complications such as encrustation, fragmentation, and obstructions were usually found in asymptomatic patients.[11] In our study, stent fragmentation was found in two patients, one was found preoperatively, and another was fragmented intraoperatively during retrograde stent removal. Both cases were removed by a semi-rigid ureteroscope.

The patients of a forgotten DJ stent should be managed with investigations including routine blood, urine culture, KUB film, ultrasonography of the KUB region. We conducted NCCT KUB to look for severity of encrustation and stone formation and CT urography was done in patients with a high stone burden to look for the functional status of the kidney. Imaging plays an important role in evaluating the patient and determining appropriate surgical management of the encrusted and retained stent. Very rarely nephrectomy is required in a poorly functioning kidney with significant stone burden, rather than going for multiple procedures to clear the stones.[12]

The management of the forgotten DJ stents depends on multiple factors such as the site of encrustation, the size of the stone burden, and the function of the affected kidney. The management often requires multiple endourological approaches and/or open surgeries. As there is no definitive algorithm, some investigators have reported high success rates in managing calcified stents using endourologic techniques in a single anesthetic setting.[13] However to render the patient stent and stone-free completely, usually multiple treatment sessions are required.[14]

If no encrustation is visible on plain radiography, removal of the stent in a retrograde fashion should be attempted gently and if there is any resistance while attempting to remove, one should stop immediately to prevent stent fragmentation and ureteric injury. In patients with severe encrustations and stone, different treatment modalities were used such as CLT, URSL, PCNL, and open pyelolithotomy depending on the location and burden of the stone. The calcification along the ureter can be managed with retrograde ureteroscopy following guide wire insertion and laser lithotripsy. In our cases, the encrustations and stone were free from the ureteric wall, so we could easily negotiate the ureteroscope and broke the stone with a holmium laser. If the encrustations involve the stent circumferentially and extensive edema is present, the surgeons should be very cautious while pulling or pushing manoeuvres, as it may perforate or avulse the ureter. PCNL is the preferred approach in proximal larger stent encrustation/stone and a case of simultaneous large proximal and distal stones, PCNL in the Galdakao-Valdivia supine position had been a preferred choice as it can address both the encrustations simultaneously.[15,16] ESWL can be an option in cases of proximal encrustation and lower stone burden, but as monotherapy may not be appropriate or recommended. In our study, we have not used ESWL in any of our cases as the stone burden was very high.

The indwelling time was found to affect the infection, as more the indwelling time; there is more liability to have complications. We also found a significant correlation between the duration of stent indwelling time and complications like encrustations/stone and the requirement of multiple procedures for complete clearance of the stone ($P = 0.017$) [Table 5]. In our study, all the patients were discharged within due course of time with no mortality and the outcome was satisfactory.

Management of forgotten DJS is time-consuming, difficult, complicated, risky, and costly. Therefore; financial burden, increased labor loss, and impaired quality of life brought by the application of these modalities must not be forgotten.

So how to avoid a catastrophe like a forgotten stent remains still elusive! The underprivileged sections of the society and

Table 5: Correlation between stent duration and complications/requirement of multiple procedures

	Complications		*P*-value	Test performed
	No	Yes		
Age				
Sample size	8	8	0.082	*t*-test; 1.873
Mean±SD*	54.88±11.59	63.38±5.5		
Median	57.5	64		
Min-Max	34-69	52-70		
Inter quartile Range	47–63.500	61.500–67		
Duration of stenting (years)			0.017	*t*-test; 2.698
Sample size	8	8		
Mean±SD*	1.21±0.63	2.24±0.87		
Median	1.2	2.4		
Min-Max	0.11–2.3	1.2–3.4		
IQR*	0.950–1.500	1.350–2.900		

SD: Standard deviation, IQR: Inter quartile Range

the people belonging to low socioeconomic status were most commonly involved and these sections of society should be our priority.[17] In this group of patients, it is the responsibility of the treating urologist to adequately counsel the patient or the patient party. Patient compliance is equally important to decrease this complication. Maintaining a simple stent registry can achieve removal of DJ stent at the due date and prevent this complication.[18] To overcome the retained/forgotten stent problem, several strategies have been developed such as a ureteric stent card registry, e-mail reminder, and a letter of reminder based on billing information.[5,19] however, a long-term prospective trial is still needed for their efficacy.

This is the only institute where urology facility is available in this region. This study is done for the 1st time in the whole northeast region India. Most people of this region especially in Manipur region lives in rural area, have low socioeconomic status and far from adequate primary health service. Further studies are needed in future to know the actual incidence as our sample size was very small, and finally, stone analysis was not performed to study the types of stone encrustation.[20]

CONCLUSION

The forgotten DJ stent is associated with significant morbidity and complications. Usually, the lower socioeconomic class and old age groups were predominantly affected, so Ignorance and lack of proper understanding by the patient were the most common reasons in our study groups. By maintaining a simple stent registry after the procedure can achieve removal of DJ stent on time and prevent its complications.

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