



E-ISSN: 2706-9575  
P-ISSN: 2706-9567  
IJARM 2021; 3(2): 278-282  
Received: 10-06-2021  
Accepted: 12-07-2021

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## Clinical outcomes of retained double j ureteral stents: Our institute experience

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DOI: <https://doi.org/10.22271/27069567.2021.v3.i2e.256>

### Abstract

**Background:** Ureteral stents were being used widely urology practice. The indications include post ureteral surgery and for managing obstruction due to intrinsic or extrinsic causes. If left untreated, these retained stents may lead to significant morbidity and mortality.

### Aims and Objectives

1. To analyse the various presentations of retained DJ stent.
2. To adapt different modalities of treatment for the management of retained DJ Stents.
3. To assess the complications and outcomes of retained DJ stents.

**Materials and Methods:** 32 patients presented to our out-patient department with retained DJ stent from October 2019 to September 2021. All patients with prior history of DJ stenting and indwelling time of more than one year included in the study.

**Results:** Our study group was 32, most common indication for stenting was post-surgery for stone disease. Among which 8 patients had encrustations in kidney, ureter and bladder. Cystolithotripsy with Percutaneous nephrolithotomy was done in 6 patients. 14 patients had indwelling time between 1-3 years.

**Conclusion:** Encrustation and stone formation in forgotten stents may lead to life threatening complications and pose a challenging management task for the treating surgeon. Combined endourologic techniques can achieve safe removal of forgotten stents. Satisfactory physician-patient communication is of paramount importance in maintaining compliance with treatment and follow-up, and decreasing the risk of adverse events with potentially litigious ramifications.

**Keywords:** ureteral stents, DJ stents, cystoscopy, PCNL, ESWL, CLT, URSL, X-ray KUB, indwelling time, encrustations, fragmentation

### Introduction

Ureteral stents were being used widely in urology practice. They are mainly indicated after any ureteral surgery and for managing ureteral obstruction due to intrinsic or extrinsic causes like stones, strictures, uretero-pelvic junction obstruction, retroperitoneal fibrosis, malignancies, and congenital anomalies. They are also placed after iatrogenic injuries to the ureter and before any complex abdominal procedure for identification and protection of the ureters.

Complications like stent encrustation, stent fragmentation, stone formation and recurrent urinary tract infection can occur. Retention of ureteral stents, often due to poor compliance of the patient is commonly seen. If left untreated, these retained stents result in significant morbidity and mortality<sup>[1, 2]</sup>.

Various methods of treatment combinations of extracorporeal shock wave lithotripsy (SWL), cystolithotripsy (CLT) retrograde ureteroscopy (URSL) with intracorporeal lithotripsy, percutaneous nephrolithotomy (PCNL) and open surgery have been used for retrieval of these encrusted stents.

### Aims and Objectives

- To analyse the various presentations of retained DJ stent.
- To adapt different modalities of treatment for the management of retained DJ Stents.
- To assess the complications and outcomes of retained DJ stents.

**Materials and Methods**

**Patient population**

We have studied 32 patients presented to our out-patient department with retained DJ stent from October 2019 to September 2021.

**Inclusion criteria**

All patients with prior history of DJ stenting and stent indwelling time of more than one year included in the study.

**Exclusion criteria:** Patients with silicon stents.

**Evaluation**

All the patients were evaluated for stent encrustation and associated stone burden by plain x-ray kidney, ureter and bladder (KUB), intravenous urogram and NCCT KUB [non contrast CT]. In patients with non-visualized kidneys on intravenous urogram, Tc<sup>99m</sup> diethylene triamine penta acetic acid [DTPA] renogram was done to estimate the renal function.

**Treatment**

Treatment decision was made on clinical and radiological findings. Before intervention, all patients had negative urine cultures and antibiotic prophylaxis was given for all patients. Combined endourological procedures such as cystolithotripsy [CLT], ureteroscopic lithotripsy [URSL], percutaneous nephrolithotomy [PCNL] with intracorporeal lithotripsy were performed. In stents with minimal encrustation on plain X-ray KUB, a gentle attempt was made for removal with the help of grasping forceps passed through the cystoscope under local anesthesia and fluoroscopic guidance. Retrograde ureteroscopy was performed using 6/7.5 and 8/9.8 Fr semi-rigid ureteroscope, under fluoroscopic guidance. Intracorporeal lithotripsy was

performed with a pneumatic lithotripter. PCNL was carried out using a rigid 20Fr nephroscope.

For patients with encrustation of stent, initially CLT or URSL was performed in the dorsal lithotomy position. Following this, a gentle attempt was made to retrieve the stent with the help of an ureteroscopic grasper. If the stent failed to uncoil, a ureteric catheter was placed adjacent to the encrusted stent for injection of radio-contrast material to delineate the renal pelvis and calyces. Then the patient was placed in the prone position and PCNL of the upper coil of the encrusted stent along with calculus was done.

Postoperatively, plain film radiography and ultrasound KUB was done to confirm the stone free status.

**Results**

A total of 32 patients presented to our out-patient department with retained DJ stent during the study period.

**Age**

Patients were in the age ranging from 12 years to 67 years.

**Sex**

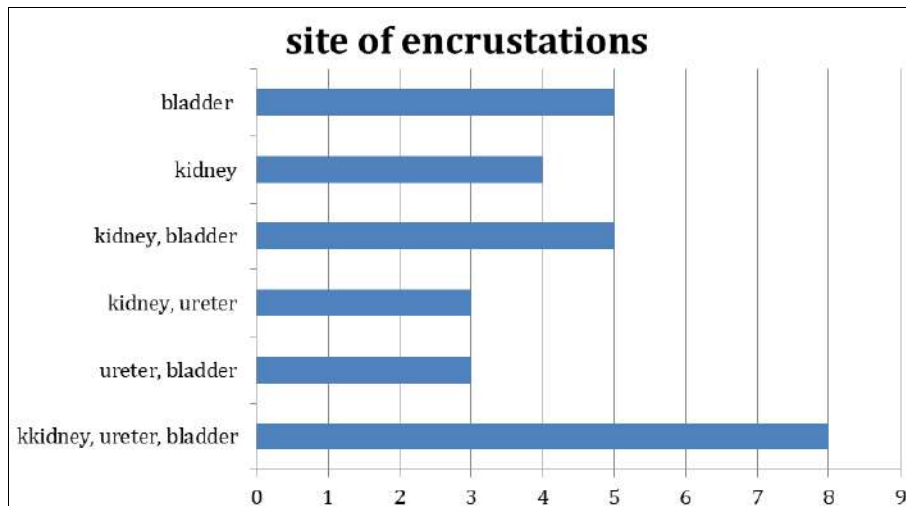
14 patients were female and 18 were male among 30 patients

**Table 1:** Sex of the patients

Male	18
Female	14
Total	30

**Site of encrustation**

X Ray KUB, intravenous urogram and non-contrast CT [NCCT] abdomen was done to detect the location of encrustations



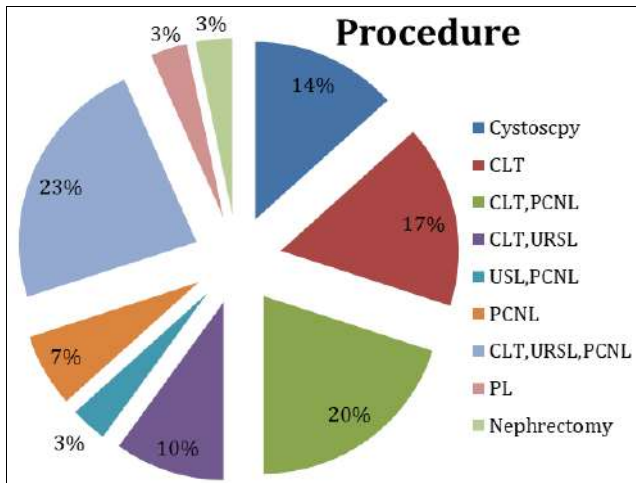
**Fig 1:** Site of encrustation

**Treatment**

Treatment decision was made on clinical findings and radiological findings. All patients had negative urine cultures and antibiotic prophylaxis before treatment.

**Table 2:** Treatment given

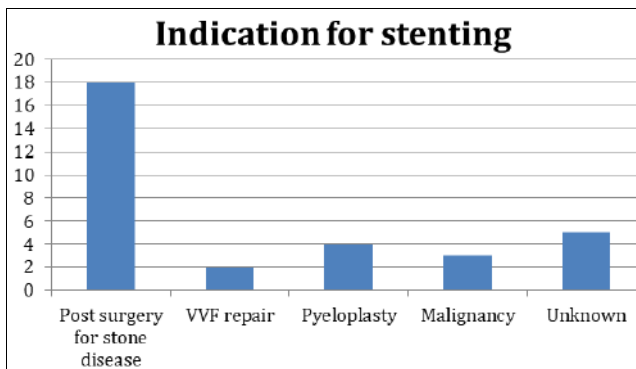
Procedure done	No. of patients
stent removal under LA with cystoscopy	4
CLT	5
CLT,PCNL	6
CLT,URSL	3
URSL,PCNL	3
PCNL	2
CLT,URSL,PCNL	7
Pyelolithotomy	1
Nephrectomy	1



**Fig 2:** Treatment given

**Table 3:** Indication for stenting

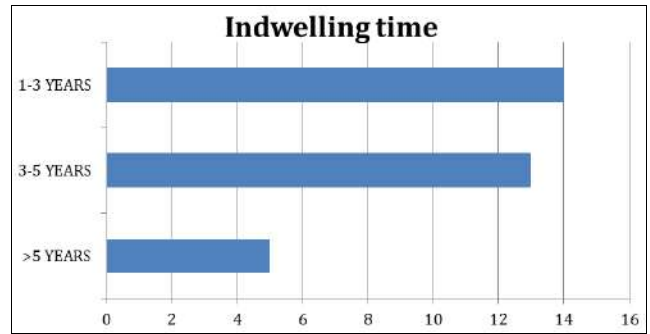
Indication	No. of patients
Post-surgery for stone disease	18
VVF repair	2
Pyeloplasty	4
Malignancy	3
Unknown	5



**Fig 3:** Indication for stenting

**Table 4:** Indwelling time

Indwelling time	No. of patients
1-3 years	14
3-5 years	13
>5 years	5

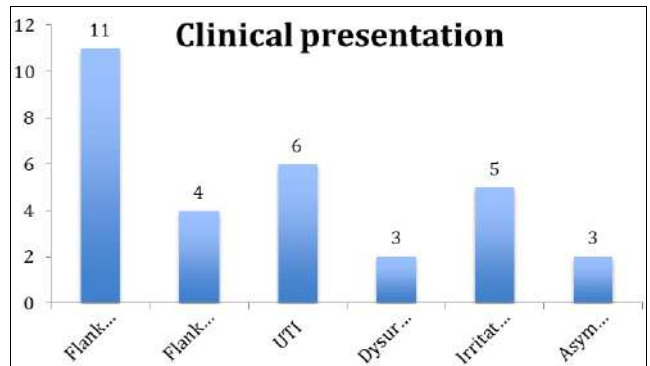


**Fig 4:** Indwelling time

Stent indwelling time in the study group ranged from 1 year to 8 years. The average duration being 3.4 years

**Table 5:** Symptoms at presentation

Symptom	Number
Flank pain	11
Flank pain + Hematuria	4
UTI	6
Dysuria + Hematuria	3
Irritative LUTS	5
Asymptomatic	3

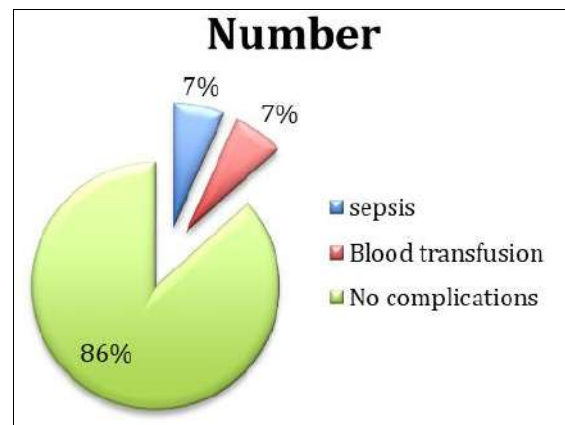


**Fig 5:** Clinical Presentation

Patients with retained DJ stents had varied clinical presentations with flank pain (50%) being the major symptom. Only 2 patients had no symptoms at presentation.

**Table 6:** Complications

Complication	Number
Sepsis	2
Blood loss requiring transfusion	2



**Fig 6:** Complications

Majority of the cases had no complications (86%).  
2 patients required blood transfusion in post op period.

### Discussion

Forgotten or retained ureteral stents in urologic practice were mostly due to poor compliance of the patient or failure of the urologist to adequately counsel the patient. These forgotten stents lead to significant morbidity and mortality, due to severe encrustation with high stone burden, knot formation, upward migration and fragmentation<sup>[1,2]</sup>.

Encrustation of forgotten stents associated with high stone burden is a major problem, due to complications like recurrent urinary tract infection, hematuria, obstruction and renal failure<sup>[3]</sup>.

In a study by Lam JS *et al.*, the average stent indwelling time was 10.7 months (range 3-28 months)<sup>[4]</sup>.

In another study by Aravantinos *et al.*, the average stent indwelling time was 24.1 months (range 6-85 months)<sup>[5]</sup>.

In our study, the average stent indwelling time was 3.4 years (range 1-9 years).

**Table 7:** Comparison of stent indwelling time with previous study

Study group	Stent indwelling time
Lam JS <i>et al.</i> <sup>[4]</sup>	10.7 months
Aravantinos <i>et al.</i> <sup>[5]</sup>	24.1 months
Present study	40.2 months

Fragmentation is also a major complication of the retained ureteric stents. Tensile strength, is lost due to hardening and degeneration of the stent polymers<sup>[6]</sup>. The risk of encrustation and fragmentation is dependent on the type of material of the stent. Silicone was found to be least prone to encrustation, followed by polyurethane, silitek, percuflax, and hydrogel coated polyurethane<sup>[7]</sup>. Fragmentation of polyurethane stents are four times as frequent as the silicone stents<sup>[8]</sup>.

Singh *et al.* described multiple accesses and approaches including open surgery to treat the retained stents<sup>[9]</sup>.

Borboroglu *et al.* also reported the endourological treatment of four patients with severely encrusted ureteral stents with a large stone burden. All patients required two to six endourological approaches [average 4.2] performed at one or multiple sessions, to achieve stone-free and stent-free status. These authors concluded that percutaneous nephrolithotomy and ureteroscopy are often necessary for treating a severely encrusted stent and associated stone burden<sup>[10]</sup>.

One stage removal of 12 encrusted retained ureteral stents has been reported by Bukkapatnam *et al.*, in ten patients. Of these, 11 were managed by ureteroscopy alone and in one patient, the stone was treated through a percutaneous approach. They concluded that, these stents can be removed in one sitting with minimal morbidity and short hospital stay<sup>[11]</sup>.

Using a combination of SWL, PCNL, CLT, ureteroscopy with intracorporeal lithotripsy, clearance rates ranging from 75 to 100% have been reported<sup>[12,13]</sup>.

Extracorporeal shock wave lithotripsy [ESWL] is the initial management of stents with minimal encrustation. However, in our study, no patient required ESWL because majority of them have extensive stone burden.

If there are no encrustations visible on imaging modalities, our initial approach is cystoscopic removal using a grasping forceps under local anesthesia with fluoroscopic guidance.

Gentle traction on the stent is applied, if patient complains of pain and if the stent does not uncoil, the procedure is abandoned.

Cystoscopic removal of minimally encrusted stent under local anesthesia, was done to 4 patients.

The next stage is CLT with the help of pneumatic lithotripter on stents with lower coil encrustations. This is followed by gentle pull under fluoroscopic guidance.

CLT alone was done to 5 patients and 16 patients needed CLT in addition to other procedures for complete stone clearance.

If the cystoscopic approach fails, and in patients with encrustation involving the ureteric portion of the stent, the next approach is under anesthesia, a safety guide wire is passed along the retained stent and ureteroscope is passed retrograde. Calcifications over the stent can be fragmented with a pneumatic lithotripter, while carefully advancing the ureteroscope into the renal pelvis. After all the encrustations and calcifications have been fragmented, the stent is gently removed with the help of grasping forceps passed through the ureteroscope. Following removal of the stent, it is mandatory to do a retrograde ureteropyelogram and check ureteroscopy to rule out a ureteric injury. If any signs of ureteric injury or contrast extravasation present, the patient should be re-stented. 13 patients needed URSL for encrustations in body portion of the stent.

For stents with large stone burden and those stents which fail to be retrieved by the above mentioned techniques, A 5 Fr ureteric catheter is placed adjacent to stent to enable the injection of radio contrast material into the renal pelvis and calyces as an aid to subsequent percutaneous access and the patient is placed in the prone position. Percutaneous access is established by a lower calyceal or middle calyceal puncture and the proximal coil of the stent along with the stone is fragmented. The stent is gently removed under fluoscopic guidance through the percutaneous nephrostomy tract.

Using the above mentioned approach, it was possible to remove all stents in 30 out of 32 patients, using the endourological approach alone. Open surgery was done in 2 cases. One patient needed pyelolithotomy and one patient needed nephrectomy for non-functioning kidney. Open surgery for stone clearance was done because of excessive stone burden.

Sepsis in the immediate post-operative period requiring broad spectrum antibiotics and intensive care management was given for 2 patients.

Although, endourological management of these stents achieves success in the majority of these cases with minimal complications, the best treatment that remains is prevention of this complication. The treating urologist should be very selective in placing the stents and they must be tracked very closely by documenting the insertion and removal of the stents. All patients should be counseled with respect to the complications of long term use and advised when their stent should be changed. As mentioned earlier, the degree of encrustation is dependent on the indwelling time, so, it is necessary to keep the indwelling time between 2-4 months is safe<sup>[14]</sup>.

It is also important to maintain a proper record of all stents inserted and keep a track of their due date of removal. Some authors have proposed a computerized tracking program for stent removal<sup>[15]</sup>. Coatings such as hydrophilic polymers, heparin, pentosan polysulfate, or oxalate-degrading enzymes

have been used in attempt to reduce encrustation <sup>[16]</sup>. The use of bio-degradable compound of poly-L-lactic acid and glycolic acids which are designed to disintegrate can eliminate the problem of retention and encrustation of the stents.

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