

# Complications Of Forgotten Ureteric Stents - Our Experience In A South Indian Tertiary Urology Centre

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## Abstract

**Background:** Use of ureteric stents is accepted standard practice in the management of ureteric obstruction. Forgotten ureteric stents results in significant morbidity and financial loss to the patients. The aim of our study is to evaluate the incidence of various complications in these cases and different techniques adopted in their management. We also studied other factors such as duration of stent insitu, literacy level of the patient and socioeconomic status.

**Methods:** Thirty eight patients presented with forgotten ureteric stents to urology department between August 2009 and January 2012 was included in the study.

**Results:** Mean age of patients was 41.3 years. Seventy nine percent of patients have the stent for less than 5 years. Seventy four percent of patients in the cohort were uneducated and 82% were from poor socioeconomic background. Ninety percent of cases were unilateral cases. Most common indications for stent placement were following percutaneous nephrolithotomy and ureteroscopic lithotripsy for stone disease. Forty seven percent of patients were presented with dysuria and urinary frequency. Seventy four percent of patients were presented with normal creatinine levels. Thirty nine percent of patients were found to have encrustations at more than one site. Majority of stones were composed of calcium oxalate and calcium phosphate.

**Conclusion:** This study emphasises the importance of regular follow up, maintenance of stent register, patient education and prompt removal of stent to avoid potential complications.

## INTRODUCTION

Ureteric stents are widely used in urological practice following ureteric surgery and in the management of intrinsic and extrinsic causes of ureteric obstruction and following iatrogenic injuries. A forgotten double J ureteral stent results in various complications like hematuria, stent occlusion, migration, fragmentation, encrustations, stone formation and severe complications like recurrent urinary tract infections, urinary tract obstruction, and renal failure.

## MATERIAL AND METHODS

A total of 38 patients were presented with forgotten ureteral stents to urology department, Sri Venkateswara Institute of Medical Sciences (SVIMS) between August 2009 and January 2012. Thirty patients were referred from outside hospitals, and eight patients were SVIMS institute cases. All patients' data was collected and analyzed retrospectively for duration of double J (DJ) Stent, presenting complaints, types

of previous procedure and current procedure. Renal function tests, urine microscopy and culture & sensitivity were done in all patients. All patients were subjected to ultrasound KUB (Kidney Ureter and Bladder) and X- Ray KUB (Kidney Ureter and Bladder). In addition, selected number of cases are subjected to CT scan KUB (Kidney Ureter and Bladder) (4 patients), intravenous pyelogram (6 patients) to evaluate stent encrustations.

Encrustations were categorized as those confined to the upper coil of the stent, lower coil, ureter (stent body), and whole stent. In cases with infected hydronephrosis, percutaneous nephrostomy is placed preoperatively to decompress the system and the procedure was carried under antibiotic coverage based on culture reports.

Stent removal was done under local anesthesia in uncomplicated cases like those with minimal encrustations, normal renal function and short duration stents. Fluoroscopy

was used to assess proximal uncurling of the stent.

If resistance was encountered, procedure was abandoned and ancillary procedures like ureteroscopy or percutaneous methods were done under anesthesia. For patients with encrustations and stone burden involving stent body (ureter), retrograde ureteroscopy and intracorporeal lithotripsy was done using 8/9.8Fr and 6/7.8Fr semi rigid ureteroscope under the fluoroscopy guidance using pneumatic lithotripter. Ureteroscope was advanced besides the stent, and gentle attempt was made to remove the stent after breaking encrustations with the help of ureteroscopic grasper.

If the stent fails to uncoil, retrograde pyelography was done by passing ureteric catheter adjacent to the stent. Then, percutaneous nephrolithotomy was done after shifting the patient to prone position.

If encrustations involved the upper coil of the stent, percutaneous nephrolithotomy is done using 24 Fr rigid nephroscope approach through middle or lower calyx. For encrustation at lower coil of the stent, fragmentation was performed using transurethral cystolithotripsy and extraction with grasper. New double J (DJ) Stent was placed in to manipulated ureter and after 3 weeks without fail, new double J (DJ) stent was removed. No significant intra operative complications were noticed.

All patients were subjected to stone analysis and post procedure X-Ray KUB (Kidney, ureter and bladder) to assess the stone free status.

## RESULTS

Out of 38 cases, 30 cases were referred from outside, while 8 cases were stented in our institute and lost to follow up even after informing them and contacted them on the set due date.

**Table 1**

Patients age distribution

Age	No. of patients
10 to 20 years	1
21 to 30 years	3
31 to 40 years	4
40 to 50 years	22
51 to 60 years	7
>60 years	1

Patient's age distribution range was 10 to 65 years. Mean age of patient was 41.3 years. Majority (more than ~58%) of our patients were in 40 to 50 years range. There were 18 males and 20 females in this cohort. The mean hospital stay was 3.5 days.

**Table 2**

Stent duration

Duration of stent	No. of patients
Duration of stent < 1 year	18
1 <= Duration of stent < 5 years	12
5 <= Duration of stent < 10 years	5
Duration of stent >= 10 years	3

Table 2 illustrates the distribution of stent duration in this patient cohort. Mean duration of stent retention was 2.42 years [5 months to 12 years].

Thirty out of thirty eight patients had their stent for less than 5 years. Majority of the patients (74%) were uneducated and rest of the cohort received at least basic education. In addition, most of these patients (82%) were from poor socioeconomic group. 74% of the patients were not aware of stent in place.

**Table 3**

Laterality

Laterality	No. of patients
Unilateral retained stent cases	34
Bilateral Cases	4

Ninety percent of cases (34 cases) in the cohort were unilateral and 10% of cases (4 cases) were bilateral retained stents.

In 28 of the 38 patients, stent was placed due to obstruction caused by stone disease.

**Table 4**

Indications for stent placement

Indications	No. of patients
Percutaneous nephrolithotomy	16
Ureteroscopic lithotripsy	10
Open pyeloplasty	6
Ureteric reimplantation	2
Extracorporeal shock wave lithotripsy	2
Malignancy (Carcinoma cervix)	2

Table 4 shows various indications for stent placement. Most common indications for stent placement were following percutaneous nephrolithotomy and ureteroscopic lithotripsy for stone diseases.

**Table 5**

Clinical presentation

Clinical presentation	No. of patients
Dysuria and urinary frequency	18
Loin pain	10
Haematuria	6
Recurrent Urinary tract infections	4

47% of patients were presented with dysuria and urinary frequency.

74% of the patients were presented with normal creatinine levels (< 1.5) and rest of patients was presented with elevated creatinine levels [>1.5]. Preoperative Percutaneous nephrostomy placement is done for 4 cases of infected hydronephrosis.

There were 12 patients with site of encrustation in bladder; 10 patients with site of encrustation in ureter; 6 patients with site of encrustation in kidney and 14 patients with more than one site.

**Table 6**

Site of encrustations

Site of encrustations	No. of patients
Kidney	6
Ureter	10
Bladder	12
More than one site	14

Table 6 illustrates the distribution of site of encrustations.

Encrustations were cystoscopically removed in 8 cases with the help of grasper.

Encrustations involving upper coil and stent body were removed using percutaneous nephrolithotomy in 9 cases and ureteroscopic lithotripsy in 15 cases. Transurethral cystolithotripsy was done in 12 patients with encrustation involving lower coil of stent. Extraction by open method under C-arm guidance was used in two cases where stent was extruded outside ureter into right iliac fossa.

Staged procedure was required in 3 patients due to breakage of stent at time of removal. Most of removed stents were

made of poly urethane.

**Table 7**

Stone composition

Stone composition	No. of patients
Calcium oxalate	24
Calcium phosphate	10
Infection stones	4

Stone analysis revealed calcium oxalate monohydrate in 24 patients, calcium phosphate in 10 patients, and struvite in 4 patients.

Sixty eight percent of patients were rendered stone-free and thirty two percent had clinically insignificant residual stones (4 mm or less).

## DISCUSSION

An ideal ureteral stent should be biocompatible, radiopaque and cost-effective. It should relieve intra/extra ureteral obstruction, resist encrustations and resist infection. Ideal double J ureteral stents are not available for this purpose. Complete stent encrustation is a serious complication of prolonged forgotten ureteral stent and it often needs prompt management. Exact cause of encrustation is not known. However, the associated risk factors include urinary tract infections, metabolic disorders, previous history of stone disease, malignancy, congenital anomalies of urinary tract, pregnancy and duration of stent insitu [2, 4, 5, 24, 25, 26].

Urease produced by bacteria, hydrolyses urea to produce ammonia in the urine resulting in elevated urinary pH and magnesium and calcium salts precipitation as struvite and hydroxyapatite onto the stent surface [13, 24, 36].

Incidence of complication increases with duration of stent placement. Various authors reported safe indwelling time of 2 to 4 months, beyond which stent exchange should be done under antibiotic prophylaxis [8, 27, 28, 29, 30, 35].

The management of ureteral stents with encrustation depends on site of encrustation, the size of stone burden and the function of affected kidney. Several approaches like extracorporeal shockwave lithotripsy, ureteroscopic lithotripsy, percutaneous nephrolithotomy, and open procedures are used depending on necessity and severity of encrustations [3, 27, 29, 32, 35].

Extracorporeal shockwave lithotripsy can be used as non-invasive first line treatment for small stones localised to kidney and encrustations involving upper coil and ureter [18,

19, 28,29].

Ureterscopy using pneumatic or ultrasonic lithotripsy or laser lithotripsy can be used as first option for encrustations involving ureter and for extracorporeal shockwave lithotripsy failure cases. Another minimally invasive option is flexible ureterscopy using holmium laser lithotripsy [7,8,3,13]. Encrustations involving lower coil are managed by cystolithotripsy, cystolithopaxy [2,18,24]. When these techniques are unsuccessful or there is a large stone burden, percutaneous nephrolithotomy or open pyelolithotomy are often required.

Complications include migration, perforation of urinary tract, adjacent organ penetration, stent malposition, urinary tract infections, ureteral erosion or fistula formation, encrustations, stone formation, and fractured stent [25]. Endourological management of retained double J stents is successful in majority of patients. Prevention of the complications involves proper counseling about date of removal or change of stents and selective placement of stents with proper documentation and maintenance of stent register [35].

Ather et al. (2000) reported a significantly lower incidence of retained ureteral stents from 12.5% to 1.2% in 1 year period by the use of a computer tracker [1].

El-Faqih et al. (1991) reported encrustation rate of 9.2% when the ureteral stent was removed within 6 weeks and 76 percent for cases retained for more than 12 weeks. They concluded that multimodal endourological procedures were the cornerstone of therapy for heavily encrusted stents and also stressed need for maintaining computerized stent register [5].

Kawahara et al. (2012) reported encrustation rates of 26.8% in < 6 weeks, 56.9% at 6 to 12 weeks and 75.9% > 12 weeks of retained double J stents. They concluded that ureteral stent encrustation was related to the time insitu. Heavily encrusted ureteral stents necessitated additional procedures for removal. The exact interval for removal of an indwelling ureteral stent to avoid additional procedures for removal is difficult to determine [6].

Singh et al. (2001) explained multiple accesses and approaches to treat forgotten ureteral stents [7].

Mohan-Pillai et al. (1999) reported 4 patients with encrusted retained stents were rendered stone free with retrograde ureterscopy or a combination of percutaneous and

ureterscopic procedures following an average of 2.5 procedures. They concluded that timely endourologic intervention can result in early recovery of renal function [8].

Borboroglu et al. (2000) also reported four patients with severely encrusted ureteral stents and large stone burden can be managed by endourological methods requiring two to six endourological approaches (average 4.2) in single or multiple sessions. They concluded that successful management of a retained encrusted stent with large stone burden requires combined endourological approaches like percutaneous nephrolithotomy and ureterscopy [2].

Schulze et al. (1985) described severe encrustations and stone formation on indwelling ureteral stents in two patients with a history of stones and suggested a strong correlation between chronic stone formation and encrustation of the stents, rather than from bacteriuria. They concluded that Long-term antibiotic suppression, more frequent follow up with abdominal X-Ray, and shorter periods of internal stenting are suggested for patients with a lithogenic history [4].

Bukkapatnam et al. (2003) reported 1-step removal of encrusted retained ureteral stents in 12 patients. Out of which, eleven were managed by ureterscopy alone and one patient by percutaneous approach. They concluded that, stents can be removed at single step with minimal morbidity and short hospital stay. Using a combination of shock wave lithotripsy, percutaneous nephrolithotomy, cystolithotripsy, ureterscopy with intra corporeal lithotripsy, clearance rates of 75 to 100% have been reported [3].

Rabani et al. (2012) mentioned endourological management of retained stents lead to success in majority of cases with minimal complications; the best strategy would be prevention of this complication [9].

Lynch et al. (2007) described an electronic stent extraction reminder facility to prevent forgotten stents [10].

Sancaktutar et al. (2012) presented results of a computer-based tracking system for ureteral stents by automatically sending reminders via short message service to both the urologist's and the patient's mobile phones [11].

Chew et al. (2013) even described a novel biodegradable ureteral stent in a porcine model [12].

To avoid these complications, different materials and

coatings have been designed in manufacture of double J ureteral stents. Amongst the different types of materials used in the manufacture of the double J stents, silicone double J stents have been found to be associated with a significantly less incidence of encrustation than polyurethane stents. Polyurethane stents have four times risk of fragmentation than silicone stents [15].

Coatings such as hydrophilic polymers, heparin, pentosan polysulfate, or enzymes degrading oxalates have been used in an attempt to minimise encrustations. The use of biodegradable compound of glycolic acids and poly L lactic acids which are designed to disintegrate which can eliminate the problem of retention and encrustation of the stents in the near future [15].

In our study, we noticed that retained double J ureteral stents caused significant morbidity to the patients such as hematuria, flank pain, dysuria, and recurrent urinary tract infections. About 60% of the patients were not properly counseled regarding the placement of the stent and need for stent removal in due course of time. In our study, encrustations are seen in more than one site in majority of cases.

In our study, 68% of patients were rendered stone-free and 32% had clinically insignificant residual stones (4 mm or less).

Our study results further reinforces the importance of maintaining a good stent register, educating patients and computer based reminder system for prompt stent removal.

#### Conclusion:

Forgotten ureteric stents are source of severe morbidity and financial burden to the patient. Encrustation is one of most frequent and difficult to manage complication of ureteral stents. Accurately determining the location and the degree of encrustation is an important in the preoperative period. Most of encrusted and retained ureteral stents can be removed by endoscopic techniques which are minimally invasive.

Open surgery is an option in case of failed endourological techniques or large stone burden. However, prevention of this complication by proper education of patient is most preferred approach. Factors like education level of the patients and counseling of the patient before and after procedure regarding the stent placement and its removal plays a vital role in avoiding the retained stent and resultant morbidity to the patient. Maintenance of stent register

avoids majority of these problems.

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