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Research Article

FORGOTTEN URETERAL STENTS IN A TERTIARY HOSPITAL AND THEIR ENDOUROLOGICAL MANAGEMENT

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ABSTRACT

Introduction: Ureteric stenting following removal of upper tract stones is almost universal in the management of stone disease. Its use however is fraught with risk forgotten stent with serious implications both to the patients and the treating urologist. This study evaluated the presentation and the management of patients with forgotten ureteral stents at our institution.

Methods: All patients with forgotten ureteral stents (patients who did not follow up for stent removal within 3 months of procedure) who were treated at our institution in between August 2015 to July 2016 were included.

Results: A total of 26 patients with forgotten ureteral stents were included in the study. The median indwelling time was 6 months. All stents were removed by endourologic techniques. In total, 31 stents were removed, 8 stents were removed by simple cystoscopy, 4 required SWL only, 14 stents were removed by ureteroscopy, and 5 stents required PCNL for stent removal. 25 stents required a combination therapy. A mean of 1.92 procedures were required per patient for stent removal and stone clearance.

Conclusions: Forgotten ureteral stents can be managed by endourological techniques. Proper education of patients about the importance of having their stent removed at the appropriate time reduces morbidity.

INTRODUCTION

Ureteric stenting is one of the most common urological procedures performed. The "perfect stent" which is characterized by easy insertion and removal, low incidence of irritation to urinary tract, no voiding symptoms, optimal upper tract drainage, resistance to infection and encrustation, and bio-degradability is yet to be found (1). The most common use of ureteric stents in current practice is after endourological procedures for urolithiasis. In addition stents are also used for a wide ranging of conditions like ureteric obstruction (intrinsic or extrinsic), after ureteral reconstruction, trauma etc. The use of stents is not without morbidity. Nearly 80% of patients report adverse stent related symptoms with common complaints being flank pain, hematuria, irritative voiding symptoms, and reduced work capacity (2). Ureteral stents are at times neglected within the urinary tract mostly due to poor compliance of the patient and surprisingly this condition is not uncommon seen in clinical practice. The morbidity of these retained stents is significant and includes loss of renal function and also mortality. Advancements in endourological techniques have now brought the management of these complex encrusted stents under endoscopy rather than open surgery. Various different techniques namely extracorporeal shock wave lithotripsy (SWL), cystolithotripsy (CLT) ureteroscopy with intracorporeal lithotripsy (URSL), percutaneous nephrolithotomy (PCNL) have all been used either alone or in combination to tackle this problem (3). Open surgery though uncommon still has its place for retrieval of these encrusted stents though their use is declining nowadays. We present our experience in managing these forgotten ureteral stents by endourological techniques and with significant encrustation in 26 patients.

MATERIALS AND METHODS

The study was conducted in the Institute of Urology, Rajiv Gandhi Government General Hospital and Madras Medical College, Chennai from August 2015 to July 2016 on the patients who failed to present for stent removal within 3 months of insertion of DJ stent. All the patients were informed about the study and a consent form was signed by them. 26 patients (22 men and four women) with forgotten ureteral stents, who presented at our department between August 2015 and July 2016, were treated. Information was obtained through a retrospective review of patients records. Successful management of stent removal includes removal of stent along with clearance of encrustations and stone fragments.

Preoperatively all patients were evaluated for stent encrustation and associated stone burden by plain-film radiography of KUB region and computed tomography with

or without intravenous contrast based on the renal parameters. Based on radiological and clinical parameters the treatment strategy was formulated. Before intervention, negative urine cultures were ensured with prior antibiotic therapy for patients with positive urine cultures. Antibiotic prophylaxis was given pre-operatively for all cases from 24 hours prior to procedure and continued for 48 hours in all patients.

Combined endourological procedures PCNL, Cystolithotripsy (CLT), retrograde ureteroscopy with intracorporeal lithotripsy (URSL) were performed in one session whenever possible. Retrograde ureteroscopy was performed using 8/9.8F and 6/7.5F semi rigid ureteroscope, under fluoroscopic guidance. Intracorporeal lithotripsy was performed with a pneumatic lithotripter. PCNL was carried-out using a rigid 24F nephroscope. Stent removal with cystoscopy under local anaesthesia was done with utmost care in patients with no visible encrustation on pre-operative imaging. The procedure was abandoned if the surgeon perceived any resistance or fluoroscopy showed no uncoiling of the renal end with gentle traction and the stent was removed by ureteroscopy under anaesthesia. For patients with encrustation and stone burden involving the lower coil, ureteric (body) or whole of the stent, initially, cystolithotripsy, retrograde ureteroscopy and intra corporeal lithotripsy 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 stents for injection of radio-contrast material to delineate the renal pelvis and the 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. The approach to the collecting system was through the lower calyx and middle posterior calyx and no patient required upper pole or supra costal access. A 24F nephrostomy tube was kept indwelling for 48 hours, in patients who required PCNL. Post operatively, plain-film radiography was done to confirm the stone free and stent free status.

RESULTS

26 patients (22 men and four women) presented with forgotten ureteral stents. 21 patients had stents placed unilaterally and 5 patients had bilateral stent placement. A total of 31 stents were removed in this study.

The mean patient age was 46.3 years (range 15-68 years) and the average indwelling time of the stent was 16.2 months within the maximum indwelling time being 7 years. 18 of the patients had their stents placed elsewhere. The indication for stent placement was following URSL in majority of patients (17 patients), 5 patients following PCNL, 3 patients following ESWL and one patient following open pyelolithotomy.

The clinical presentation of this patient population was highly variable. Half of the patients were asymptomatic and the rest were symptomatic varying from LUTS/loin pain in 6 patients, renal dysfunction in 7 patients and urosepsis in 4 patients. 4 patients with renal dysfunction required dialysis support pre-operatively and 2 patients ended with chronic renal failure requiring permanent dialysis support.

A total of 31 stents were removed in this study. The burden of encrustation was evaluated pre-operatively and the management strategy planned accordingly. 17 stents were found to have no or minimal encrustation. 2 stents were completely covered by encrustation from the renal to the vesical coil (Stentolith). Rest of the stents had variable encrustations at different locations.

The different procedures used for stent removal are mentioned in Table 1. The patients required multiple techniques at the same time for tackling the encrustations and some patients required multiple sittings for successful stent removal. ESWL was also used as a primary procedure for breaking encrustations within the kidney. A total number of 50 endourological procedures had to be performed for managing these patients. 20 out of 26 patients required multiple procedure for stent removal and 11 patients required more than one visit to the operating room. The mean number of procedures required was 1.92 per patient. The stent removal rate was 100% by endourological techniques and the stone clearance rate was 92.3% (24/26 patients).

Table 1 Procedures used for stent removal

Procedure	Number of stents
Cystoscopy under LA	8
ESWL	
As primary procedure	4
Post PCNL residual stone	2
Post URSL residual stone	2
Ureteroscopy	
Primary	14
2nd sitting	4
Post ESWL stent removal	3
During PCNL	5
PCNL	5

Table 2 Post operative complications

Complications	Incidence
Bleeding requiring transfusion	3 (11.5%)
Fever	12 (46.2%)
Urosepsis	3 (11.5%)
Renal Dysfunction (Post op)	2 (7.7%)
Readmission	4 (15.4%)

The number of patients with complications in the post op period was 30.8% (8 patients). The total number of complications requiring intervention was 20 (Table 2). One patient developed severe urosepsis requiring ventilatory support post operatively. The median overall hospital stay was 6 days (3 – 32 days) and the median post operative hospital stay was 3 days (1 – 21 days). The readmission rate was 15.4% (4 patients).

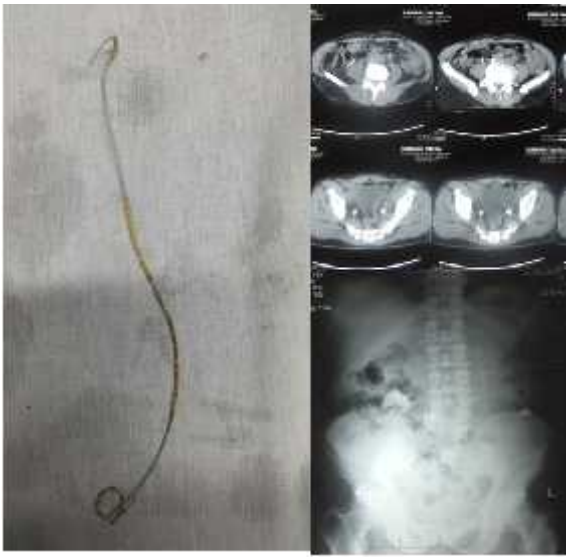

Figure 1 Encrusted stent radiology and after removal

DISCUSSION

Forgotten ureteral stents are observed in urologic practice because of poor compliance of the patient or failure of the physician to adequately counsel the patient. The morbidity and mortality, of these stents can be significant especially in older patients and those with co morbid illnesses. (4,5). In addition it leads to multiple other problems like recurrent urinary tract infection, hematuria, obstruction to urinary tract and silent renal failure (6). The deposition of encrusted material on retained ureteral stents can occur in both infected and sterile urine. The mechanism of encrustation in infected urine is a result of organic components in the urine crystallizing out onto the surface of biomaterial and becoming incorporated into a bacterial biofilm layer. Although the exact mechanism of encrustation in sterile urine is unclear, it appears to be dependent on the pH, ionic strength and biomaterial hydrophobic properties (7).

The degree of encrustation is dependent on the dwelling time. El faqih *et al*. found that encrustation increased from 9.2% at < 6 weeks to 47.5% at six to 12 weeks to 76.3% at > 12 weeks of dwelling time (8). Chronic recurrent stone formers, metabolic predisposition to stone disease, pregnancy are some factors that accelerate encrustation (9).

Endourologists face a number of challenges in dealing with patients with retained and encrusted stents. Most of these patients require multiple approaches because it may involve encrustations anywhere along the urinary tract along the length of the stent. In addition these patients may also require single or multiple endourological sessions also. Singh *et al*. described multiple accesses and approaches including open surgery to treat the retained stents (10). 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 (11). 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 (12). Using a combination of SWL, PCNL, CLT, ureteroscopy with intra corporeal lithotripsy, clearance rates ranging from 75 to 100% have been reported (13,14).

The site of encrustation, associated stone burden and the function of the affected kidney often dictate the method of access and treatment. Extracorporeal shock wave lithotripsy (SWL) is the initial treatment with stents with minimal encrustation. ESWL can be used both as a primary modality to break encrustations or to clear retained stone fragments after stent removal by ureteroscopy. Cystoscopy and stent removal under local anaesthesia is a less invasive approach to be used with extreme caution in patients with no or minimal encrustations. The possible pitfalls of this technique are stent breakage and also ureteral injury or ureteral avulsion due to excessive traction.

In our experience we have found that in patients with completely encrusted stents a stepwise approach to the stent from below upwards is usually effective in managing these patients. CLT followed by ureteroscopy is effective in clearing ureteric encrustations.

Although, endourological management of these stents achieves success in majority of the cases with minimal complications, the best treatment that remains is prevention of this complication. The treating physician should be very selective in placing the stents and they must be tracked very closely by documenting insertion and removal of the stents. All patients should be counselled 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 to as short as possible. Various authors have reported that indwelling time between 2-4 months is safe (15,16). For patients requiring stents beyond this period, they should be kept on prophylactic antibiotics and have their stents frequently changed.

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 removal stents (17). Coatings such as hydrophilic polymers, heparin, pentosan polysulfate, or oxalate -degrading enzymes have been used in an attempt to reduce encrustation (18-22). The use of bio-degradable compound of poly-L-lactic and glycolic acids which are designed to disintegrate can eliminate the problem of retention and encrustation of the stents in the near future (23).

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