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Can the complicated forgotten indwelling ureteric stents be lethal?

V. Singh, A. Srinivastava, R. Kapoor & A. Kumar
Department of Urology and Renal Transplantation, Sanjay Gandhi Post Graduate Institute of Medical Science, Lucknow, India

Abstract. *Introduction*: The forgotten ureteral stents remain a urological dilemma and complications related to it can be lethal for the patient. The management of such stents require lithotripsy and endourological techniques. *Materials and methods*: We retrospectively reviewed the records of 19 cases of forgotten stents managed between 1998 and 2003. The mean patient age was 32 ± l2 years, male to female ratio 17:2 and the mean duration of stents in urinary system was 24.2 months (7 months to l0 years). The stent were complicated in 14 patients and 5 patients had uncomplicated stents. The stents were severely calcified and encrusted in 6 patients, large stone formation seen at upper end of stent in 2 patients and at lower end of stents in 2 patients. The stents were spontaneously fragmented in 2 patients. The advanced renal failure secondary to hydroureteronephrosis because of severe encrustation and stone formation over the stent in solitary kidney was seen in 1 patient and 1 patient had upmigrated stent with infected hydronephrosis, but the duration of upmigration in this case was unknown. *Results:* The stents were removed by retrograde approach in all 5 uncomplicated cases. In 6 patients of severely calcified and encrusted stents, the retrograde stent removal could be done in 4 patients while stent got broken in proximal ureter in 2 cases when they were being removed. In these 2 cases the stents were removed by percutaneous nephrostomy. The percutaneous nephrolithotomy and stent removal was done in 2 patients who had large stone at the upper end of stent in renal pelvis. In 2 patients who had large stone formation at lower end, stones were fragmented by mechanical lithotripsy in one and by laser lithotripsy in another case and stents removed by retrograde approach. Two cases of spontaneous fragmented stents were managed by retrograde endoscopic approach. The patient of advanced renal failure refused treatment and died. The patient of infective hydronephrosis with upmigrated stent died because of complications related to operative intervention. *Conclusions:* The management of complicated forgotten ureteral stents need judicious use of endourological techniques and lithotripsy. The stent related complication can be directly lethal for the patient or indirectly can cause death because of complications related to operative intervention.

Key words: Complication, Forgotten, Lethal, Stents, Ureter

Introduction

The ureteral stents are the fundamental part in many of urological procedures [1]. They are inserted either in elective or imperative situations which should be removed within the safe time frame. Many a time the stents are forgotten either because of illiteracy or non-compliance of the patients. The standard practice in our institute is resident doctor makes the discharge summary of patients and tell for the stent removal to patients and their attendants. Many times, the residents keep on changing which creates a communication gap between patients and doctors. It has been observed that the resident doctors making the discharge summary of the patients and do not tell about the implications, if stents are left in the urinary systems.

The forgotten stents may get complicated by severe encrustations, large stone formation, recurrent urinary tract infections and hematuria [1–4]. The severe encrustation and stone formations may

cause obstructions and this may threaten the renal unit [2]. The forgotten steats itself may get complicated such as calcification, upward migration and fragmentation [1, 2, 5–9]. The complicated stents need management by endourological and some auxiliary techniques such as extracorporeal or intracorporeal, lithotripsy to make the patients stent free [1, 2, 8, 10, 11]. We present our experience of managing 19 cases of forgotten ureteral stents of whom 2 patients died either because of stent related complication or complication related to the operative intervention.

Materials and methods

We retrospectively reviewed the records of 19 cases of forgotten ureteric stents. The details reviewed included indications for initial stent placement, the duration of stent in urinary system, the presenting complaints, the laboratory and radiographic findings, management techniques and complications of intervention for stent removal. The details of stent material could not be elicited in every case. The mean patient age was 32 ± 12 bears (14–50 years) and the male to female ratio was 17:2. The mean duration of stents in the urinary system was 24.2 months (7 months to l0 years). The presenting complaints at the time of diagnosis is shown in, Table 1 and initial indications of ureteral stenting in Table 2. The stents were complicated were complicated in 14 patients and in 5 patients there was no any radiologic evidence of complication. All uncomplicated stents could be removed successively by retrograde stent removal. The complicated stents were managed by a combination of endourological and some auxiliary techniques (Table 3). One patient had advanced renal failure, refused the treatment and died. One more death occurred after complications related to endourological intervention. The case histories of two deaths in present study are summarized below.

Table 1. Presentations at the time of diagnosis of forgotten stents

S. No.	Presentations	Number of cases
1	Irritative voiding symptoms	7
2	Hematuria	5
3	Recurrent UTI	5
4	Stone formation	4
5	Loin pain	2
6	Renal failure	1
7	Infected hydronephrosis	1

Table 2. Initial indications of stenting

S. No.	Indications	Number of cases
1.	Ureteroscopy (URS)	7
2.	Percutaneous nephrolithotomy	6
3.	Open pyeloplasty	2
4.	Laparoscopic pyeloplasty	1
5.	Renal transplantation	1
7.	RGP and stenting for ESWL of renal stone	1
8.	Ureteric reimplantation	1

Case no. 1

A 35-year-old man presented with 2 months history of bilateral flank pain and fever with chill and rigors for 1 week. His serum creatinine was l.5 mg% and the urine culture and sensitivity showed *E. coli* sensitive to gentamycin. The ultrasound of the kidney, ureter and bladder showed left hydronephrosis with thin rim of renal, parenchyma with internal echos and a 4 cm stone in the pelvis. The right kidney was in normal size, shape and there was a stone of 1 cm size in the right midureter. The patient was managed initially by percutaneous nephrostomy of the left kidney which drained about 300 ml pus. The 24-h urine output and creatinine clearance from left kidney were 200 and 31 ml, respectively. The right ureteroscopic removal of midureteric stone and left nephrectomy were done in the same anesthesia. A JJ-stent was inserted in right renal unit following ureteroscopy. The patient was discharged with advice for stent removal after 2 weeks but the patient lost to follow-up. The patient presented after 10 years with nausea, weakness, hematuria, off and on fever and decreased urine output for 4 months. His serum creatinine and blood urea nitrogen were 9.2 and 112 mg%, respectively. The serum sodium and potassium were 138 and 6.0 meq/l, respectively and electrocardiogram showed the evidences of hyperkalemia. His X-ray KUB showed a calcified stent with severe encrustation and a large stone of 2 cm size at the upper end of stent (Figure 1). His ultrasound KUB

Table 3. The treatment modalities utilized in the treatment of complicated stents

S. No.	Stents with complication	Treatment modalities	Intraoperative complication	Management of intraoperative complication	Patient outcome
1	Severe encrustations and calcifications	Retrograde stent removal	None	–	Alive
2	Severe encrustations and calcifications	Retrograde stent removal	None	–	Alive
3	Severe encrustations and calcifications	Retrograde stent removal	None	–	Alive
4	Severe encrustations and calcifications	Retrograde stent removal	None	–	Alive
5	Severe encrustations and calcifications	Retrograde stent removal	Stent fragementation	Percutaneous stent removal	Alive
6	Severe encrustations and calcifications	Retrograde stent removal	Stent fragementation	Percutaneous stent removal	Alive
7	Large stone at upper end of stent	Percutaneous removal of stone and stent	None	–	Alive
8	Large stone at upper end of stent	Percutaneous removal of stone and stent	None	–	Alive
9	Large stone at lower end of stent	Mechanical cystolitho-tripsy and retrograde stent removal	None	–	Alive
10	Large stone at upper end of stent	Laser crystolithography and retrograde sternt re-moval	None	–	Alive
11	Spontaneuosly fragmen-ted stent	Retrograde stent removal by cystoscope	None	–	Alive
12	Spontaneuosly fragmen-ted stent	Retrograde stent removal by ureteroscope	None	–	Death
13	Upmigrated stent with infected hydronephrosis	Percutaneous nephrost-omy followed by antegrade stent removal	Fragmented stent in upper ureter	Antegrade removal of fragmented stent	Death[a]
14	Advanced renal failure	[b]	–	–	Death

[a] Death due to septicemia, disseminated intravascular coagulation and multiorgan failure
[b] Refused treatment and died of advanced renal failure.

showed right hydroureteronephrosis with thin rim of renal parenchyma with a stent in the right renal unit and a stone at the upper end of stent (Figure 2). After the initial management of hyperkalemia the patient was advised for urgent hemodialysis and subsequently for stent removal. The patient refused the hemodialysis and died after 2 days at home.

Case no. 2

A 36-months-old patient had a history of left percutaneous nephrolithotomy done for left staghorn stone one year back. A JJ-stent was inserted at the end of the procedure. The patient was discharged with advice for stent removal after 2 weeks but he lost to follow-up. The patient presented after 1 year with a history of left flank pain and fever for 1 week. His serum creatinine was 1.5 mg% and the X-ray KUB showed a upward migrated stent in the left rena1 (Figure 3).The patient was managed initially by percutaneous nephrostomy which drained about 300 ml of pus. The pus culture and sensitivity showed *E. coli* sensitive to amikacin and ciprofloxacin. The patient was treated for 1 week with antibiotics and repeat urine culture from left

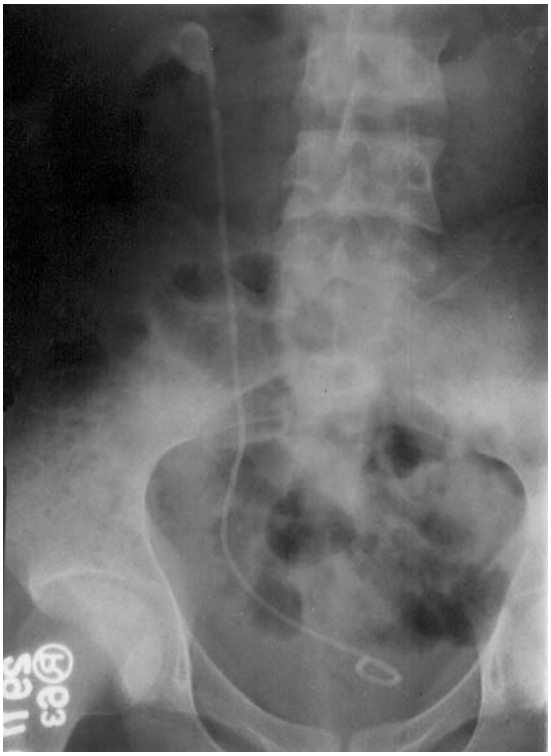

Figure 1. X-ray KUB showing ureteric stent in right renal unit with a large stone formation at the upper end of stent.

Figure 2. Ultrasound of the right kidney and ureter showing hydroureteronephrosis, encrusted stent and large stone at upper end of stent in renal pelvis.

percutaneous nephrostomy became sterile. The 24-h urine output and creatinine clearance from left nephrostomy were 1500 and 37 ml, respectively. The patient was managed by percutaneous removal of stent. The stent got broken in upper ureter intraoperatively but could be retrieved. The patient developed high grade fever, chills and rigors

Figure 3. X-ray KUB Kidney, ureter and bladder showing a upmigrated stent.

and hemodynamic unstability following the procedure. He was treated aggressively. He developed septicemic shock, disseminated intravascular coagulopathy and multiorgan failure within 12-h and died of sudden hypotension and cardiorespiratory failure.

Results

The irritative voiding symptoms were the commonest presentation (Table 1). The ureteroscopy for stone removal was the commonest indication for initial stent insertion (Table 2). The complicated stents were seen in 14 cases. All 5 uncomplicated stents could be removed successively by retrograde stent removal. The treatment modalities used in the management of complicated stents are shown in Table 3. The Case no. 1 refused treatment and died 2 days later at home because of advanced renal failure. The cause of death in Case no. 2 was realated to operative intervention, who developed septicemic shock, disseminated intravascular coagulopathy and multiorgan failure.

Discussion

The ureteric stents insertion is very common in modern day urologic practice but the forgotten stents remain a major concern [1, 5, 6, 8, 11]. Many a times, the stents are not removed because either the patients are not aware of the stent or just because of their non-compliance. The forgotten ureteric stents may get complicated and produce a wide range of urological symptoms and considerable morbidity to the patients [1–4, 8, 10, 12, 13]. The stents left in the kidney and the ureter for long time can produce persistent irritative symptoms, hematuria, recurrent urinary tract infections, stone formation, hydroureteronephrosis, urosepsis and septicemia [1–4, 7, 10, 12, 14].

These stents can be removed by retrograde or antegrade approach or a combination of these two [1–3, 5, 8, 10, 12,13]. However, an auxiliary procedures like extracorporeal or intracorporeal-lithotripsy and laser cystolithotripsy are required to make these patients stents and stones free [1, 2, 8–10]. In present study the treatment modalities utilized in the management of complicated stents are shown in Table 3.

The forgotten stents presents with a wide range of urological symptoms. In the present study, the irritative voiding symptoms were the commonest presentation (Table 1). The presentation in Case no.1 was renal failure, macroscopic hematuria and off and on fever. On careful history, he had a stent in solitary kidney for 10 years, which was inserted initially after ureteroscopy of mid-ureteric stone. In the initial discharge summary of the patient prepared by a resident doctor 10 years ago, the doctor had written for the stent removal after 2 weeks of initial procedure, but on careful questioning the patient was not aware of stent in his urinary system. It shows the communication gap between the resident doctor making discharge summary and the patient. After 10 years when the patient presented with advanced renal failure and hyperkalemia he was advised for urgent hemodialysis but he refused the treatment and died after 2 days at home. The refusal for the treatment for a serious and life threatening conditions are not uncommon in the poor nations like India. To best of our knowledge this is the only case of forgotten stent of 10 years duration in a solitary functioning kidney which led to stent encrustations, stone formation, hydroureteronephrosis leading to advanced renal failure and death of the patient. The forgotten stents producing hydronephrosis is reported [2–4, 8], but the hydroureteronephrosis leading to advanced renal failure and death of patient has not reported earlier.

The ureteric stents are inserted across the ureteroneocystostomy in renal transplantation to decrease the early ureteral complications like leakage and obstruction [13]. These stents are removed 4–12 weeks after transplantation [13]. In present study we had a patient of live related allograft renal transplantation with a forgotten stent of 1 year. He presented with intermittent hematuria and recurrent urinary tract infections. His X-ray KUB and the ultrasound of graft kidney showed a stent in the kidney with small stones in the pelvis and bladder. The stent was removed successfully by retrograde approach. To best of our knowledge, the forgotten stent in renal transplant recipient for 1 year has not been reported earlier.

El Faqih et al. [4] reported 3.7% incidence of stent migration, while Breau and Norman [12] reported 2% incidence of proximally migrated stent. The ureteroscopic stent removal is the most accepted modality for the management of these stent [12]. In present study the Case no. 2 was a case of upmigrated ureteric stent but the duration of upmigration was not known (Figure 3). He presented with infective hydronephrosis (Table 1). He was managed initially by percutaneous nephrostomy. The subsequent operative intervention for stent removal was done after 1 week when urine culture become sterile. The patient developed high grade fever, chills and rigors following the procedure and later septicemia, septicemic shock and hemodynamic unstability on the same post-operative day. The septicemia progressed rapidly to disseminated intravascular coagulopathy, multiorgan failure and he died within 12 h. The cause of septicemia in this patient may be closed pus pocket in kidney or infected stent. To best of our knowledge such lethal event has not been reported earlier.

The stent fragmentation can occur if stent is left for more than one year in the urinary system [1–6, 8]. The hostility of the urinary solution is responsible for the fragmentation of the stents [2, 4, 6]. The prevalence of stent fragmentation vary from 0.3 to10% [2, 4, 6, 8]. The presentation of these fragmented stent can be septic, irritative and hemorrhagic [2, 6]. These fragmented stents can be removed by a combined antegrade and retrograde

endoscopic approaches. In present study we had 2 patients of fragmented stent which was managed by only retrograde endoscopic approaches.

The JJ-stents are used in the extracorporeal-shock wave lithotripsy in solitary kidneys with large stone burden [15]. The stents should be removed at the end of the lithotripsy after complete clearance of stones. In present study we had one case of forgotten stent which was inserted initially for ESWL of 3.5 cm pelvic stone in solitary functioning kidney. The stones cleared completely after ESWL. The patient then lost to follow-up and the stent was detected 8 months later when the patient presented with recurrent urinary tract infections. The stent was removed by retrograde endoscopic approach.

The encrustation over the stents and large stone formations at the upper and lower ends of stone formations are the well-recognized complication if stent is left for long time in urinary systenjg [1–4, 8, 10, 11, 14]. The large stone burden at the upper end in the renal pelvis were managed by percutaneous nephrolithotomy and stent removal (Table 3). The large stones at the lower end of stent requires cystolithotripsy and retrograde stent removal (Table 3).

The forgotten ureteric stents remain a worldwide problem and recently the computerized tracking registry has been proposed to trace these patients to avoid this problem. In developing country like India, we have frequent problem of postal delay, illiteracy and non-compliance of the patients. The urologist should be very selective in putting the stents and patient counseling is required to avoid this urological dilemma.

Conclusion

The forgotten ureteric stents can produce considerable morbidity, which can be lethal for the patients. The proper patient counseling regarding the complications of stents, if left in the urinary system, is strongly needed to avoid this urological dilemma.

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Address for correspondence: Dr. Vishwajeet Singh, MCh Urology, Assistant Professor, Department of Urology, King George's Medical University, Lucknow, UP, India 226003
Phone: 0522-2256543; Fax: 0522-2256543
E-mail: vishwajeeturo@sify.com