Stone Formation and Fragmentation in Forgotten Ureteral Double J Stent

Unutulmuş Üreteral Double J Stentlerde Taş Oluşumu ve Fragmantasyonu

Unutulmuş Üreteral Double J Stent / Forgotten Ureteral Double J Stent

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Özet

Giriş: Günlük üroloji pratiğinde üreteral stentler endoürolojik ve açık vakalarda önemli rol oynamaktadır. Ancak stentler migrasyon, enfeksiyon, fragmantasyon, taş oluşumu ve enkrustasyon gibi ciddi komplikasyonlara sebep olabilmektedir. Amaç: Bu makalede, unutulmuş üreteral stentli hastaların tedavisindeki kombine endoürolojik yaklaşımlarımızı sunmayı ve güncel literatürü kısaca gözden geçirmeyi amaçladık. Olgu: Daha önce dış merkezlerde tedavi olan ve unutulmuş üreteral stenti olan iki hasta endoürolojik yaklaşım ile tedavi edildi. Ortalama stent kalma süreleri 18 ve 36 ay idi. Kombine endoürolojik yaklaşım sonrasında her iki hastanın stent ve taşları tamamen temizlendi. Sonuç: Minimal morbidite ve kısa hastanede kalış süresi ile endoürolojik yaklaşım, stent ve taş tedavisi için etkin bir yöntemdir. Ancak terapötik strateji, elde mevcut teknoloji ile belirlenmelidir. En iyi yaklaşım, hastayı bilgilendirerek bu gibi durumların oluşmasını engellemektir. Ürologlar, üreteral stentlerin önemini hastalarına mutlaka anlatmalıdır.

Anahtar Kelimeler

Unutulmuş Üreteral Stent; Enkrustasyon; Taş; Endoüroloji

Abstract

Aim: Nowadays, ureteral stents play an essential role in various endourological and open surgical procedures and common procedures performed in daily urological practice. However, stents can cause significant complications such as migration, infection, fragmentation, stone formation and encrustation, especially when forgotten for a long period. Objectives: We present our experience in endoscopic management of forgotten ureteral stents with a brief review of current literature. Case presentation: A total of 2 patients with forgotten ureteral stents were treated with endourological approaches in our department. Indwelling durations were 18 months and 36 months. After treatment both patients were stone and stent free. Conclusion: An endourological approach is effective for stent and stone removal after a single anesthesia session with minimal morbidity and short hospital stay. However, therapeutic strategy is also determined by the technology available. The best treatment would be the prevention of this complication by providing detailed patient education.

Keywords

Forgotten Ureteral Stents; Encrustation; Lithiasis; Endourology

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Introduction

Endoscopic stent placement was first reported by Zimskind in 1967 to relieve ureteral obstruction [1]. Nowadays, ureteral stents play an essential role in various endourological and open surgical procedures and common procedures performed in daily urological practice.

However, stents can cause significant complications such as migration, infection, fragmentation, stone formation and encrustation, especially when forgotten for a long time [2-4]. Because of these problems, technological innovations and improvements have been developed in stent design and material but to date, no ideal stent material has been described [5].

Several procedures can be used for the retrieval of encrusted stents and depending on the site and degree of encrustation, a single or multimodal approach may be necessary. These procedures include extracorporeal shock wave lithotripsy (SWL), cystolithotripsy, retrograde ureteroscopy with intracorporeal lithotripsy, percutaneous nephrolitotomy (PCNL) and open surgery [2,3,6].

We present our experience in endoscopic management of forgotten ureteral stents with a brief review of current literature.

Case Report

Case 1

A 71-year-old female had a right ureteral stent placed to relieve an obstruction due to proximal ureteral calculi 18 months prior to presentation. Three sessions of SWL were applied to the patient and the renal calculus was disintegrated. The patient did not return for stent removal because of poor compliance. Nine months later, she presented with a 1-month history of right lumbar pain, lower urinary tract symptoms and hematuria. Physical examination, serum creatinine levels and white blood cell count were normal. Preoperative positive urine culture was treated with culture specific antibiotics and assessed as a negative urine culture before intervention. The patient was evaluated for stent encrustation and associated stone burden by kidney-ureter-bladder (KUB) radiography, intravenous urogram and non-contrast enhanced stone protocol computerized tomography (CT). The radiological findings demonstrated proximal curl encrustations of 17 mm with a renal calculus attached to the calcifications. It also showed a 33 mm severe encrustation at the distal part of the ureteral stent in the bladder (Figure 1). Combined endourological procedures were performed in a single session including cystolithotripsy, retrograde ureteroscopy and PCNL. At first, under general anesthesia, cystolithotripsy with a pneumatic lithotripter was performed in the dorsal lithotomy position for the lower coil encrustation. Then, a safety guidewire was passed along the retained stent and ureteroscopy was applied using an 8/9.8F semi rigid ureteroscope, under fluoroscopic guidance. There was no encrustation at the ureteric part of the stent and the stent was gently removed with grasping forceps under fluoroscopic guidance but the stent failed to uncoil. A 5 Fr open ended ureteric catheter was placed near to the encrusted stent to facilitate the injection of contrast material into the renal pelvis and calyces. After catheter insertion, the patient was placed in the prone position, and percutaneous access was achieved at the lower posterior calyx under C-arm fluoroscopy guidance using an 18-gauge needle and a guidewire. Amplatz dilators were used for tract dilatation up to 12F–30F. The removal of stone fragmentation was accomplished using a pneumatic lithotripter (Lithoclast; EMS, Nyon, Switzerland) and retrieval graspers through a rigid nephroscope (26F, Karl Storz®). The stent was gently removed under fluoroscopic guidance through the percutaneous nephrostomy tract with an antegrade approach. An 18Fr re-entry nephrostomy tube was kept indwelling for 48 hours. KUB radiography was performed to confirm the stone-free and stent-free status postoperatively. The patient was discharged the next day.

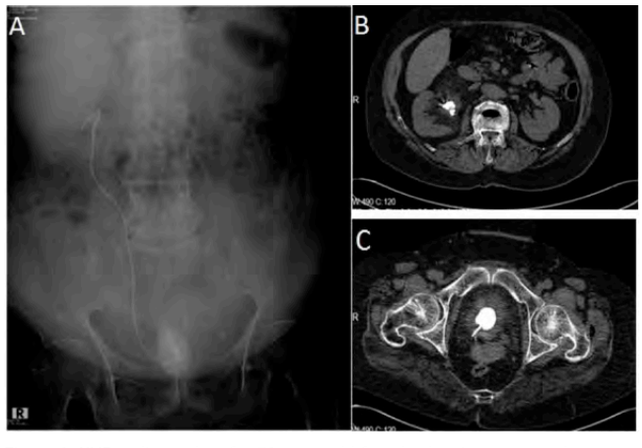


Figure 1. KUB radiography of a 71 years old female showing encrusted stent on the right side with calculus formation mainly at the lower parts(A), Encrusted part of retrieved stent in kidney(B), Retrieved stent showing extensive encrustation and stone formation especially in bladder(C).

Case 2

A 36-year-old male had previously undergone an open ureterolithotomy to treat left distal ureteral calculi. A double J-stent had been inserted at that time to provide postoperative drainage. The patient never returned for follow-up or removal of the ureteral stent. Three years later, the patient presented with a 3-month history of left lumbar pain, lower urinary tract symptoms and hematuria. Physical examination and routine biochemical parameters were normal and urinalysis revealed urinary tract infection and microscopic hematuria. Preoperative positive urine culture was treated with culture specific antibiotics. KUB showed that the ureteral stent was fragmented and the proximal part had migrated from the ureter to the kidney. The middle and distal part of the stent had migrated to the distal ureter, bladder and proximal urethra (Figure 2). The right kidney was normal in the intravenous urogram but the left kidney showed delayed excretion of contrast and hydronephrosis. To estimate the renal function a Tc99m diethylene triamine

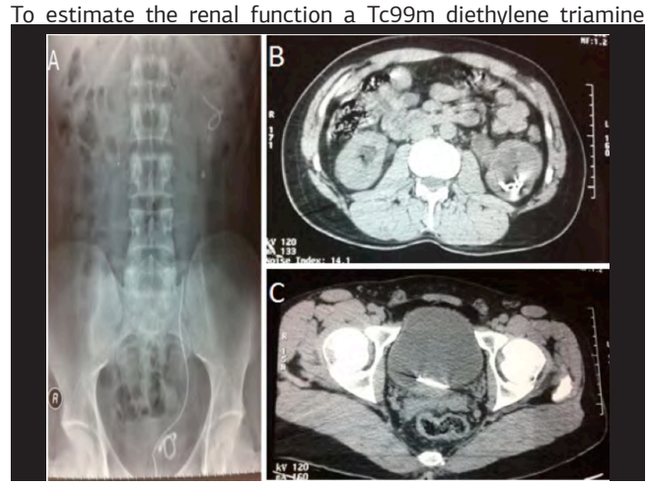


Figure 2. Spontaneous fragmentation of double-J stent that was forgotten 36 months(A), nonencrusted part of double-J stent in kidney (PCNL was performed in this part of stent)(B), minimal encrusted part of double-J stent in bladder(C).

penta acetic-acid renogram was performed. Non-contrast enhanced stone protocol CT showed minimal encrustation on both sides. Initially, cystolithotripsy and retrograde ureteroscopy were performed in the dorsal lithotomy position. For the lower coil of the stent, cystolithotripsy with a pneumatic lithotripter was performed under general anesthesia. A safety guidewire was passed along the retained stent and ureteroscopy was performed using an 8/9.8F semi rigid ureteroscope. There was no encrustation or calcification at the ureteric part of the stent. Under fluoroscopic guidance, the stent was gently removed with grasping forceps passed through the ureteroscope. Following the removal of the stent, a 5 Fr open ended ureteric catheter was placed in position and the patient was lain prone. Percutaneous procedure was performed as previously described and the stent is gently removed with an antegrade approach. A 14Fr nephrostomy tube was kept indwelling for 24 hours. KUB radiography was performed to confirm the stone-free and stent-free status postoperatively. The patient was discharged the next day.

Discussion

Ureteral stents are frequently preferred in the armamentarium of urological practice and the potential complications related to their use should not be underestimated. Especially when stents have been in place for a long time, serious complications (such as migration, encrustation, stone formation, fragmentation and infections) can be seen [2-4]. To avoid these complications, different materials and coatings have been designed [5]. A forgotten ureteral stent is another challenging problem for urologists arising from poor patient compliance with instructions to return for stent removal, and inadequate counselling by practitioners. However, there are no widespread guidelines for the management of these potentially serious problems [7].

The mechanism of stent encrustation is multifactorial and common risk factors include long indwelling time, urinary sepsis, previous or concurrent stone disease, chemotherapy, chronic renal failure and metabolic or congenital abnormalities [3]. A duration of between 2-4 months has been reported by some authors as the safely indwelling time [6]. In our cases no correlation was detected between indwelling time and stent stone burden. In one of the cases, no stent encrustation was detected when the stent was forgotten for about 36 months, while in the other case a severe stent encrustation was encountered when the interval was approximately 18 months. The causative factor could be due to increased risk of encrustation and lithogenic history.

Before making any venture to remove these stents, preoperative radiological imaging must be arranged to assess the stone burden and proximal coil orientation. The stone burden associated with encrusted ureteral stent is more accurately predicted by non-contrast CT than KUB [8]. The site of encrustation, the size of the stone burden and the function of the affected kidney determines the specific endourological procedure. Various endourological approaches (single or multiple) or occasionally, open surgical removal are needed because of the encrustations and the associated stone burden that may involve the bladder, ureter and kidney [2,3,6].

Although, extracorporeal shock wave lithotripsy is the initial treatment for encrustations located at the upper coil and/or stent body, it is mainly indicated for localized, low volume encrustations in kidneys that have reasonably good function to allow spontaneous clearance of fragments [7]. However, SWL was not needed in the cases presented here because there was an extensive stone burden or minimal encrustation.

Cystolithotripsy may also be attempted with the help of a pneumatic or ultrasonic lithotripter, if encrustations are located at the lower coil [2]. In patients with encrustation involving the ureteric part of the stent, ureteroscopy can be used with a pneumatic lithotripter, ultrasonic lithotripter or laser energy, either as first-line therapy or after failure of SWL [7,9]. Another minimally invasive treatment option is flexible ureteroscopy with holmium laser lithotripsy [9]. When these techniques fail or there is a large stone burden, PCNL is generally sufficient to manage these cases [6]. Open surgery has a role when minimally invasive procedures are unsuccessful or when such equipment is not available. Nephrectomy is another alternative for non-recoverable function of the kidney. However, therapeutic strategy is also determined by the availability of technology.

All patients should be fully informed, particularly in respect of the complications of long-term use and they must be advised of when their stents should be changed. The best treatment is the prevention of this complication. Some authors have proposed the use of a computer tracking program to ensure that stents are removed or changed in a timely fashion [10].

Conclusions

Combinations of endourological approaches can be applied for effective stent and stone removal in a single anesthesia session with minimal morbidity and a short hospital stay. However, therapeutic strategy is also determined by the availability of technology. The best treatment would be the prevention of this complication by ensuring that detailed patient education is provided. Urologists should explain the importance of ureteral stents to their patients.

Competing interests

The authors declare that they have no competing interests.

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