FORGOTTEN JJ STENTS WITH STONES FORMATION, SPONTANEOUS FRAGMENTATION, MANAGEMENT AND OUTCOMES IN A CASE SERIES

Aziz Ur Rahman[1], Nouman Khan[2], Asad Khalil[1], Mian Naushad Ali[1]

Abstract

Background: JJ stent insertion is a widely performed urological procedure globally. In the absence of appropriate precautions, patients may present at a later stage with forgotten stents in place, which can lead to complications. The likelihood of these complications rises as the duration of stent placement increases. This issue is prevalent worldwide, particularly in hospitals lacking a comprehensive patient record system.

Objectives: The aim of this study was to explore the complications of forgotten JJ stents and management of its successful removal by avoiding further complications.

Methods: This case series comprises 9 patients who experienced complications due to forgotten stents. Over the period from January 2015 to December 2020, a total of 36 patients sought medical attention at our hospital for the same issue of forgotten stents. Patients with having JJ stents in situ for more than 6 months were considered forgotten stents. Data was collected after hospital ethics committee approval. All the patients were followed for 3 months and assessed for stone clearance and other complications.

Results: In our study, nine patients were presented with complications of whom 6 patients were male and 3 were female. The mean age of the patients was 38.3 years. All the 9 patients needed PCNL for clearing the stones over the proximal coiled end of JJ stents. Two patients had retained pieces of broken stents either on the same side or opposite side respectively, which were removed with semi rigid ureteroscope. Two patients needed Cystolitholapaxy for clearing the stone from the distal coiled end of the JJ stent. Stones and fragmented pieces of stents were successfully cleared with no postoperative complications, the average hospital stay of the patients was 1.2 days.

Conclusion: In countries like Pakistan where resources are limited, mini PCNL is a good option to clear the stone and retrieve the stent or fragments of stents that are not accessible with semi rigid ureteroscope. Furthermore, it is crucial to provide comprehensive education and counseling to patients and maintain a stent register for reduction of such occurrence.

Keywords: JJ Stents, Ureteral, Nephrolithotomy, Percutaneous, Kidney Calculi.

Introduction

JJ stents were first introduced to urological procedures in early 1970s [1]. The main aim of the stent insertion was to make sure the continuity of urine flow from kidneys to the bladder through intra or extra luminal route. This unique invention gave surgeons a lot of confidence in generous use of JJ stents in almost all ureteric, verity of other urological surgeries, malignant or benign ureteric strictures, gyencological and other pelvic and abdominal surgeries for identification of ureters [2].

1. North West General Hospital & RC
2. King Faisal Specialist Hospital & RC, Jeddah, KSA

Address for Correspondence:
Aziz Ur Rahman
Consultant Urologist, North West General Hospital & RC Peshawar, Pakistan
arurologist@nwgh.pk

Although it has a lot of advantages, however it comes with variety of complications as well. According to one study 85-90% of patients with indwelling JJ stents complain of frequency, urgency, dysuria, supra pubic pain, flank pain and haematuria, resulting in adverse effects on their quality of life [3]. Different surgical procedures needs different duration of JJ stents placement. However, according to one article, the average duration of JJ stents placement ranges from 55 to 75 days [4]. Prolonged JJ stents placement predisposes patients to new complications like bacterial colonization and urinary tract infection, especially in patients with comorbidities, encrustations and stones formation over the stents, fracture and blockage. Hence JJ stents should be replaced in 2 to 6 month intervals if needed for prolonged period of time [5].

More serious complications can occur if the JJ stents remain in urinary tract for prolonged period of time without change. Though not all forgotten stents are complicated with stone formation, spontaneous fracture or displacement, it has been reported all over the

world in a lot of case series studies [6-8]. Biggest challenge for urologists are those patients, who develop stones over the JJ stents. Thus make them very difficult to remove and clear stones at the same time. Most of the studies mentioned above, used holmium laser and flexible ureteroscope for the clearance of stones and stents. However, in Pakistan use of laser and flexible ureteroscope are not only costly and beyond the affordability of majority of population, they are not available in secondary and tertiary healthcare facilities, both public and private. No doubt, the use of flexible ureteroscope and LASER are effective and safe while using it for clearance of the stones over the forgotten JJ stents. We share our experience of successful management of patients presenting with forgotten JJ stents, using urological procedures that are cost-effective and produced results comparable to the studies in developed world.

Methods

This case series as an original article of descriptive study comprises 9 patients who experienced complications due to forgotten stents. Over the period from January 2015 to December 2020, a total of 36 patients sought medical attention at our hospital (i.e. Northwest General Hospital & Research Center Peshawar, Pakistan) for the same issue of forgotten stents. Patients with having JJ stents in situ for more than 6 months were considered forgotten stents. Data was collected after ethics committee approval of Northwest General Hospital & Research Center vide (Approval no: NWGH/DMER/EC/1750); dated: December 25th 2020. All the patients were followed for 3 months and assessed for stone clearance and other complications. All the patients were followed for 3 months with renal profile, ultrasound, X-ray KUB and in two patients with CT KUB without contrast. Residual stones of less than 4mm were consider as complete clearance in this study.

Patient's demographics characteristics including age, gender, weight, height, occupation, symptoms, duration of JJ stent in urinary tract, complications at presentation were collected. The data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 20.

Results

A total of 9 patients were shown in our study of whom 6 were male and 3 were female. The mean age of the patient was 38.3 years. All of 9 patients needed PCNL for clearing the stones over the proximal coiled end of JJ stents with 100% clearance rate and no complication. Two patients also had retained pieces of broken stents either on the same side or opposite side which were removed with semi rigid ureteroscope as one of the broken stent was visible at pelvis of the kidney. The average size of stone was 1.5 cm and the mean stay of the patients at hospital was 1.2 days [details are shown in Table 1]. Two patient needed Cystolitholapaxy for clearing the stone from the distal coiled end of the JJ stents. Negotiation of semi rigid ureteroscope beside the stent was attempted in one patient but was abandoned soon as the stent start moving along the ureteroscope. The procedure was converted to mini PCNL.

Stones were successfully cleared in all the patients, 8 patients were discharged on 1st post-operative day while only one patient needed 2nd session of PCNL on the second post-operative day of the first procedure, during the same admission. No post-operative complications were noted. However 2 patients were having hematuria [details shown in Table 2[. All the patients were stone free at 3 months follow-up.

We have shared our management experience through this case series in successful removal of complicated forgotten JJ stents. PCNL procedure alone was used for the JJ stents that developed stone formation at their proximal ends of the stents. Figure 1 is showing stone formation over JJ stent at the proximal end with extension into the proximal ureter. It was removed with 2 sessions of PCNL with complete stone clearance. Figure 2 is the picture taken during PCNL procedure for another stone over the proximal end of JJ stent. Only one session of PCNL procedure was performed to clear the stone and the JJ stent in rest of the cases. Interestingly this patient was later on found to have cystinuria and JJ was inserted only 2 months back for management of ureteric stone. This shows how fast stones can grow over the JJ stents in patients with pre-existing metabolic disorders in the back ground. We suggest that in such patient the stones should be cleared in first instance and JJ stenting should be avoided whenever possible and if it cannot be avoided then they should be scheduled for JJ stents removal at the earliest.

Figure 3 shows a forgotten JJ stent with 3 months duration, on X-ray KUB showed stent with lower pole small stones formation however no stone or encrustations visible on the JJ stent itself. Cystoscopy was performed to retrieve the stent but was found stuck. Ureteroscopy was

performed encountering small encrustations in the proximal ureter that were cleared with Holmium laser however upon reaching the left renal pelvis we encountered large radiolucent stones formed over the proximal end of JJ stent. Figure 4 shows the cut JJ stent with laser near the Pelvo-ureteric junction. Lower part removed with URS and for the proximal PCNL was performed to clear all the stones and the remaining part of JJ stent. The figure 5 shows the JJ stent removed in 3 pieces, the chemical analysis of the stones showed cystin stone. We recommend to get CT KUB without contrast for all the Patients who present with forgotten JJ stents especially with history of urinary tract stones as X-ray and ultrasound may be misleading. We tried to pass the ureteroscope beside the encrusted stent that led to the upward migration of the JJ stent and felt the risk of ureter damage. Hence we don't recommend to pass the ureteroscope beside the JJ stent as it has greater chances of ureteric injury.

Figure 6, it was bilateral. The distal part of stents were removed with the help of cystoscopy. However the proximal parts needed mini PCNLs, the removed pieces are shown in figure 7. Similarly the second patient, presented with broken JJ stent on the left side and staghorn stone on the right side. She underwent rigid cystoscopy for removal of piece of stent from the bladder and semi rigid ureteroscopy on the left side. End of the JJ stent piece was seen lying in the pelvis of the kidney with no stone formation. It was removed with the help of a grasper, while the right staghorn stone was cleared with PCNL in the same operating setting, figure 8.

Tables 1

Mean age in Years	38.3 years
Male : Female	2:1
Average Stone Size	1.5cm
Mean hospital stay	1.2 days
Stone clearance	100%
Single Tract PCNL	8 patients
Double tract PCNL	1 patients

Table 2

Blood transfusion	0%
Post OP pyrexia	1 patient
Readmission	0%
Urosepsis	0%
Haematuria	2 patients

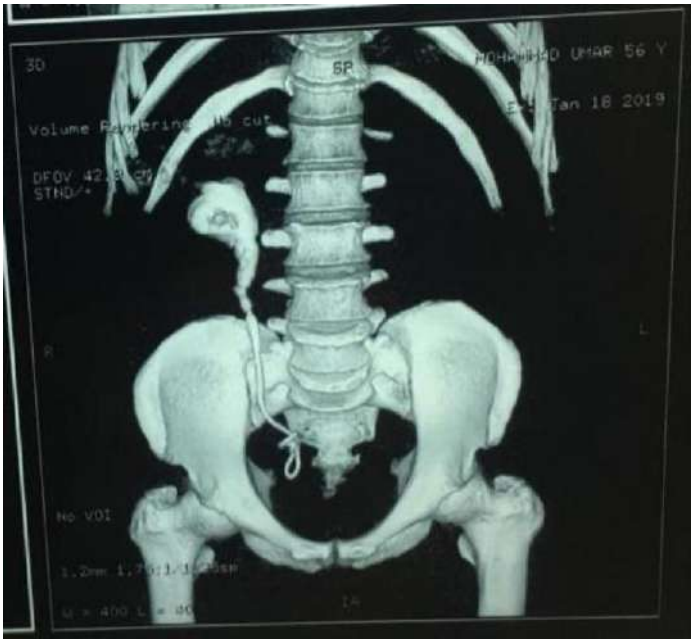

Figure 1


Figure 2

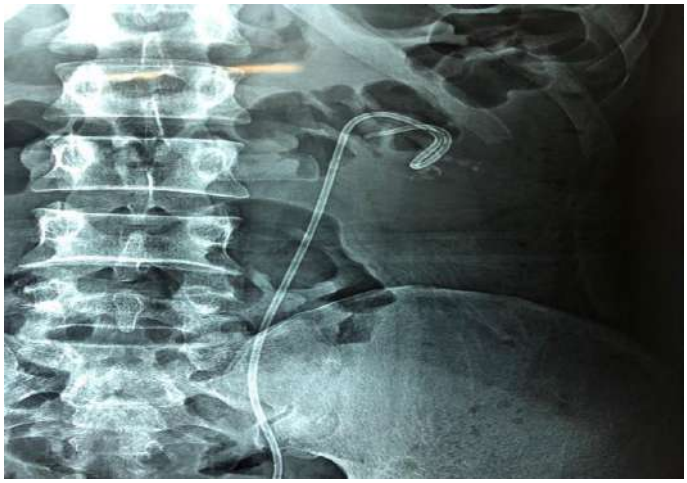
Figure 3

Figure 4

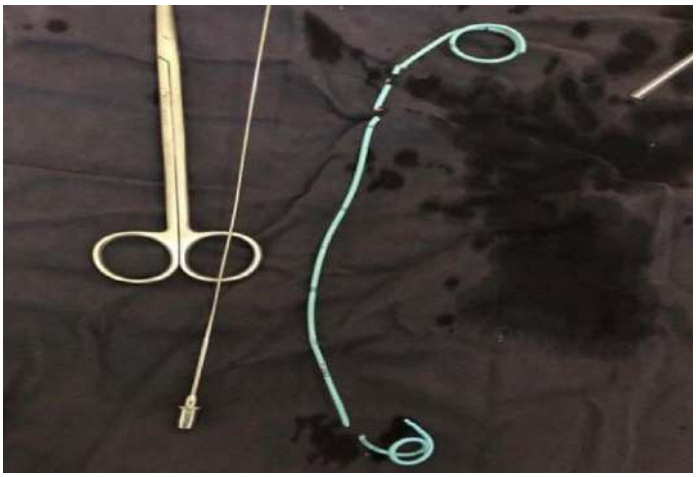

Figure 5

Figure 6

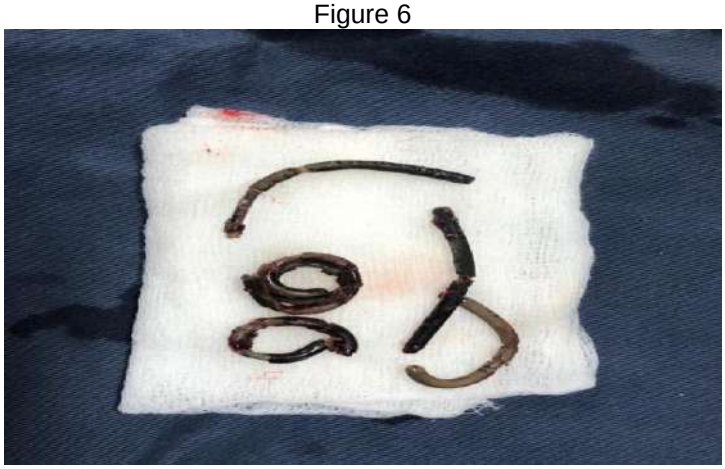

Figure 7

Figure 8

Discussion

Use of JJ stents has increased in urological procedure with passage of time. It is usually kept for (4-6 weeks) short term period to help in the healing of ureter, drainage of urine and prevent narrowing during healing [9]. Short term use of JJ stent associated with short lived mild complications, whereas long term complications are more severe, particularly when it is placed for more than 6 months duration. Most common stent related complication is ‘‘stent syndrome’’ [10]. Forgotten stent are responsible to cause severe morbidity in pediatric population along with UTI, hematuria and encrustation of stent resulting in obstruction [11]. Usually patients develop JJ stent related symptoms that forces them to seek medical advice and keep them aware of the JJ stent in their urinary system. However many patients remain asymptomatic with JJ stents in place. Such patients are at high risk of forgotten stents that present late once the JJ stents develop complications especially in countries where there is no record keeping system and communication gap between the doctors and the patients. In our study some patients have poor compliance and were of poor socioeconomics background. Similar studies also highlighted poor compliance and low socioeconomic status of patients as the main causes for forgotten JJ stent [12, 13].

Pakistan is a developing country, most of the government and small scale private hospitals don’t have electronic hospital information system, and records are kept through hard copies. Most of periphery hospitals lack facilities of basic urology services that has increased a lot of burden on the tertiary care hospitals in the big cities. This increasing burden, lack of electronic record keeping and communication gap among the doctors and between the doctors and patients, increase the risk of forgotten JJ stents in patients that present later with complications. Forgotten JJ stents are commonly encountered by the urologists in Pakistan which has led them to increased experience in managing these stents and have devised cost effective and safe methods to remove such stents safely. Forgotten JJ stent is a very common and serious condition in countries like Pakistan, encrusted JJ, enlarged stone burden are common side effects [14].

The incidence of complications related to stent increases with the duration of the stent; hence, it is important that it should be removed or replaced on time [15-17]. In our study, stent breakage/fracture and hematuria were common complications. While another study reported stent encrustation, stent breakage and recurrent urinary tract infections were common complications [13]. In our study ureteroscopy and PCNL were most commonly performed procedures for forgotten JJ stent removal in our study. Other studies also reported these two as a preferred method for removal of removal of JJ stents [9, 13].

Incidence of spontaneous fracture is not uncommon in long standing indwelling ureteric stents and have been reported from different parts of the world [18]. Similarly extra corporeal shock wave lithotripsy is another known cause of fracturing the JJ stents during sessions for kidneys stones for the last two decades [19]. In our study four patients were presented with the spontaneous fracture of JJ stents and in one case, it was bilateral. The exact reason and cause for stent fragmentation remains uncertain [9], when being in situ for a longer duration leads to spontaneous fracture of the stents [20, 21]. In certain cases, this fragmentation is linked to encrustation in forgotten stents [20]. In our study the mean size of the stone was

1.5cm, similar studies also reported that many urologist avoid the use of Stent with a stone size of < 2.0 cm while a large number of urologists still use JJ stents after shock wave lithotripsy [22].

Our approach differs from the other studies in the way that we used semi rigid ureteroscope to remove retained pieces of broken stents where possible and used percutaneous approach for the pelvicalyceal part of the stones and broken stent pieces, instead of the retrograde intra renal surgery (RIRS).

Conclusion

The issue of forgotten JJ stents continues to be prevalent in developing countries, causing significant financial burden for patients and also exert extra burden on limited healthcare resources and infrastructure country like Pakistan. In countries like Pakistan where resources are limited, mini PCNL is a good option to clear the stone and retrieve the stent or fragments of stents that are not accessible with semi rigid ureteroscope. Furthermore, it is crucial to provide comprehensive education and counseling to patients and their relatives both before the procedure. Maintaining a stent register is also a viable option that can be implemented which may assist in reduction of such occurrence.

Author declaration

Acknowledgment

All authors contributed equally to this research and all contributors meet the criteria for authorship.

Conflict of interest

None.

Funding

None.

References:

1. Bloom DA, Clayman RV and McDougal E. Stents and related terms: a brief history. *Urology* 1999; 54: 767-771.
2. Chew BH, Knudsen BE and Denstedt JD. The use of stents in contemporary urology. *Current opinion in Urology* 2004; 14: 111-115.
3. Joshi H, Stainthorpe A, Keeley Jr F, et al. Second prize (Co-winner): indwelling ureteral stents: evaluation of quality of life to aid outcome analysis. *Journal of endourology* 2001; 15: 151-154.
4. Al-Ghazo MA, Ghalayini IF, Matani YS, et al. The risk of bacteriuria and ureteric stent colonization in immune-compromised patients with double J stent insertion. *International Urology and Nephrology* 2010; 42: 343-347.
5. Nawaz H, Hussain M, Hashmi A, et al. Experience with indwelling" JJ" ureteral stents. *JPMA The Journal of the Pakistan Medical Association* 1993; 43: 147-149.
6. El-Tatawy H, El-Abd AS, Gameel TA, et al. Management of 'forgotten'encrusted JJ stents using extracorporeal shockwave lithotripsy: A single-centre experience. *Arab Journal of Urology* 2019; 17: 132-137.
7. Ulker V and Celik O. Endoscopic, single-session management of encrusted, forgotten ureteral stents. *Medicina* 2019; 55: 58.
8. Tefekli A. Percutaneous and Transurethral Lithotripsy for Forgotten Ureteral Stents. *Nephro-Urology Monthly* 2013; 5: 781-782.
9. Ray RP, Mahapatra RS, Mondal PP, et al. Long-term complications of JJ stent and its management: A 5 years review. *Urology Annals* 2015; 7: 41.
10. Lawrentschuk N and Russell JM. Ureteric stenting 25 years on: routine or risky? *ANZ journal of surgery* 2004; 74: 243-247.
11. Nerli RB, Magdum PV, Sharma V, et al. Forgotten/retained double J ureteric stents: A source of severe morbidity in children. *African Journal of Paediatric Surgery: AJPS* 2016; 13: 32.
12. Singh V, Srinivastava A, Kapoor R, et al. Can the complicated forgotten indwelling ureteric stents be lethal? *International urology and nephrology* 2005; 37: 541-546.
13. Patil S, Raghuvanshi K, Jain DK, et al. Forgotten ureteral double-J stents and related complications: a real-world experience. *African Journal of Urology* 2020; 26: 1-5.
14. Waqar Ahmed Memon SEK, Imran Sharif , Sherjeel Saulat, Ali Haider, Asadullah, Sana Tariq. The Efficacy of JJ Stent on Stone Free Rate After Extracorporeal Shock Wave Lithotripsy: A Retrospective Study. *Pakistan Journal of Medicine and Dentistry* 2021; 10 DOI: https://doi.org/10.36283/PJMD10-2/005.
15. Bultitude MF, Tiptaft RC, Glass JM, et al. Management of encrusted ureteral stents impacted in upper tract. *Urology* 2003; 62: 622-626.
16. Bukkapatnam R, Seigne J and Helal M. 1-step removal of encrusted retained ureteral stents. *The Journal of urology* 2003; 170: 1111-1114.
17. Kawahara T, Ito H, Terao H, et al. Ureteral stent retrieval using the crochet hook technique in females. *PLoS One* 2012; 7: e29292.

18. Chua ME and Morales Jr ML. Spontaneous fracture of indwelling polyurethane ureteral stents: A case series and review of literature. *Canadian Urological Association Journal* 2012; 6: 386.
19. Ilker Y, Türkeri L, Dillioğlugil Ö, et al. Spontaneous fracture of indwelling ureteral stents in patients treated with extracorporeal shock wave lithotripsy: two case reports. *International urology and nephrology* 1996; 28: 15-19.
20. Dakkak Y, Janane A, Ould-Ismail T, et al. Management of encrusted ureteral stents. *African Journal of Urology* 2012; 18: 131-134.
21. Mursi K, Fayad A, Ghoneim I, et al. Stones on a forgotten double-J stent: a case report of multiple stones casting a multi-fractured ureteral stent. *African Journal of Urology* 2005; 11: 247-249.
22. Kwon JK, Cho KS, Oh CK, et al. The beneficial effect of alpha-blockers for ureteral stent-related discomfort: systematic review and network meta-analysis for alfuzosin versus tamsulosin versus placebo. *BMC urology* 2015; 15: 1-10.