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Antegrade Double-J Catheter Insertion as an Alternative to the Retrograde Approach: A Descriptive Study

Samer Ghaith Al-Jfoot, MD[1], Muaad Saleh Al-Zorghan, MD[1], Layth Ahmad Al-Shloul, MD[1], Nemer Issam Alshakhshir, MD[1], Mohammad Thaer Obeidat, MD[1], Hamzeh Zaki Alqudah, MD[1], Maher Ali Al-Khawaldeh, MD[1], Ashraf Suleiman Al-Majali, MD[2*]

[1]Radiologist in Department of Radiology (Interventional Radiologist) in King Hussien Medical Hospital (KHMH) at Royal Medical Services (RMS), Amman, Jordan
[2]Urologist in Prince Hussien Urology Centre at Royal Medical Services (RMS), Amman, Jordan

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***Corresponding author:** Ashraf Suleiman Al-Majali
Urologist in Prince Hussien Urology Centre at Royal Medical Services (RMS), Amman, Jordan

Abstract **Original Research Article**

Aim: The retrograde double-J (JJ) catheter (DJC) stenting is the gold standard treatment of the ureteral obstruction. This technique can be replaced by the antegrade approach, which in many cases can be a successful option. Therefore, herein we reviewed the indications for antegrade JJ ureteral insertion, its success rate, and associated complications. ***Methods:*** This retrospective descriptive study included 644 patients who underwent successful antegrade DJC insertion at the Interventional Radiology Department, King Hussein Medical Hospital, between (June 2019 and October 2024). The medical and radiological data were reviewed. Data on patient characteristics, the antegrade JJ stent insertion procedure, and recorded complications were collected. The patients were followed-up for 12 weeks. ***Results:*** Enrolment of (702) antegrade DJC manipulations and discussion were done herein. A percutaneous nephrostomy catheter was functioning in most patients (n = 601) due to initial treatment for hydronephrosis. Obstructive ureteral stones were the most prevalent indication for JJ stenting (n = 436). JJ stents were successfully inserted in 644 of the 702 obstructed kidneys. In 279 cases, the retrograde ureteral stenting was failed, but was then followed by successful antegrade ureteral stenting. The complicated cases were (82) as follows: 67 infections, 13 false tract and 2 mal-positions. ***Conclusion:*** JJ stenting, typically performed in a retrograde technique, has a viable alternative choice in antegrade percutaneous insertion.

Keywords: Double-J catheter stenting, Ureteral stenting, Retrograde insertion, Antegrade insertion.

INTRODUCTION

In the last years, interventional radiology has increased an interest in percutaneous nephrostomy [1]. Nephrostomy tube placement is commonly used to preserve kidney function in cases of obstructive uropathies due to cancer, stones or ureteral leaks. On the other side, nephrostomy catheters may are not out of complications such as infection.[2]

Conversely, retrograde ureteral stenting is the preferred method for relieving ureteral obstruction; but when this method failed like in cases of extrinsic obstruction, then drainage by percutaneous nephrostomy becomes necessary [3]. While percutaneous nephrostomy provides effective drainage for upper urinary tract occlusion, the external tube can be uncomfortable for patients. This discomfort can be alleviated by replacing it with an internal catheter (double-J (JJ) catheter (DJC)), particularly as most ureteral obstructions require prolonged drainage treatment [4]. In patients with an ileal conduit urinary diversion, a transplant kidney, or contraindications to general anaesthesia, retrograde JJ insertion may not be feasible. So that, antegrade percutaneous JJ insertion offers a viable alternative [5].

Herein, we found that antegrade ureteral stenting had replaced the retrograde JJ insertion in many cases in terms of indications, success rates and complications.

METHODS

In this retrospective descriptive research, we analysed data from patients who underwent antegrade JJ insertion by reviewing the patients' records and radiology reports. Antegrade DJC insertion was successful in 644 out of 702 patients, performed at the Interventional Radiology Department, King Hussein

Medical Hospital, between June 2019 and October 2024. The interventional radiologists used ultrasound and fluoroscopy guidance to perform all the procedures with local analgesia with or without conscious sedation. General anaesthesia was used only exceptionally on demand of the patient. Patients received prophylactic antibiotics preceding the procedure.

Non-heparin-coated JJ stents (sizes 5, 6, or 7 French) were used.

When the patients did not have previous nephrostomy, the renal pelvicalyceal system was accessed by a Neff percutaneous access set via an anterior middle calyx or a posterolateral lower pole calyx. Then, a stiff guide wire was introduced under fluoroscopy for replace with a 6 or 8 French introducer sheath.

While in patients with an existing nephrostomy tube, the Neff catheter was similarly exchanged for a 6 or 8 French introducer sheath.

A hydrophilic 0.035-inch guide wire was then inserted to catheterise the ureter up to the urinary bladder. This wire was replaced with a stiff guide wire, over which the DJC was placed. In cases where the angiographic catheter or JJ stent could not traverse the obstruction, a 4–5 mm balloon dilator was used to widen the obstructed ureter. To confirm correct stent placement, antegrade pyelogram was done. So, in cases of mal-positioned stents, the action for correction was taken.

When haematuria was observed, a nephrostomy tube was left in situ for follow-up antegrade pyelogram in the following day to remove the tube once stent function was confirmed.

Statistical analysis: A software SPSS v26. depending on Chi-square and t-tests to calculate continuous and categorical variables, was used. A p-value < 0.05 was considered statistically significant.

Ethical approval was obtained from the Ethical Review Board of the Jordanian Royal Medical Services.

RESULTS

Out of 702 attempts for JJ stent placement, 644 successful antegrade JJ insertions were achieved. Bilateral JJ stent insertion was performed in 116 patients and some patients underwent the procedure more than once. Thus, the real number of patients who underwent antegrade JJ stenting was 431. Patient ages ranged as 16–81 years, and included 201 males and 230 females. A percutaneous nephrostomy catheter was already in situ in 601 patients prior to JJ stenting. The primary indications for JJ stenting included obstructive ureteral pathologies due to stones (n = 302), stricture (n = 47), perforation (n = 52), or malignancies (n = 109) (see Table 1).

Table 1: Demographic Data

Variables	Number of Patients and Percentages (N© (%*))
Ages (16–40 years)	138 (32%)
Ages (41–60 years)	201 (46.6%)
Ages (61–81 years)	92 (21.4%)
Males	201\46.6
Females	230 (53.4%)
Causes of Ureteral Obstruction	
Stones	264 (61.3%)
Cancer	98 (22.7%)
Ureteral Stricture	36 (8.4%)
Ureteral Perforation	24 (5.6%)
Retroperitoneal Fibrosis	9 (2%)

N©: The actual number of total patients. %*: The percentage of patients for each variable relative to the total number of patients.

Around in (92%) (644) of total patients (702) the DJC was inserted. In 58 patients, the obstruction could not be crossed. In 47 patients, the ureter could not be catheterised owing to gross hydronephrosis. In the 11 patients, two separately scheduled attempts were made, but in both cases, it was impossible to overcome an iatrogenic defect in the ureter, a complication of a prior surgical procedure.

In 36 procedures, the ureteral obstruction was dilated with a balloon before the JJ stent could be passed.

Patients who underwent kidney transplantation (14 cases) or urinary diversion with an ileal conduit (22 cases), scarring of the ureter was the most prevalent indication for antegrade DJC insertion. Other indications included obstruction caused by stones, malignancy or ureteral damage after surgery (total n = 395).

Of the total cases, 62 JJ stent insertions (9.6%) showed complications within 12 weeks.

Of these, 37 complications (5.7%) were directly related to the antegrade procedure. Further, 28 patients developed urinary tract infections (UTIs), confirmed by urine sediment analysis or culture, within 12 weeks following antegrade JJ stent insertion. False passage and

incorrect position of JJ catheter was occurred in 5 and 4 patients, respectively.

The remaining 25 complications were attributable to the JJ stent itself: in 21 cases, the JJ stent dislodged, and in 4 cases, the JJ stent became obstructed.

UTIs were treated with antibiotics; however, in 12 patients, the JJ stent was removed to effectively treat the infection.

In 17 cases, complications persisted for more than 12 weeks following antegrade JJ stenting. These complications were not directly related to the procedure: the JJ stent dislodged 4 times. In 9 patients, the JJ stent was obstructed, and one patient developed recurrent UTIs. Most patients with dislodged JJ stents at short- or long-term follow-up had a history of an ileal conduit urinary diversion (n = 11).

Discussion

In this research, the antegrade DJC insertion was optimal in 92% of cases and carried a low risk of complications when used after the failure of retrograde JJ stenting.

Retrograde ureteral stenting remains the gold standard for managing ureteral obstruction, obtaining ureteral biopsies in suspected malignancies, and treating strictures. However, in cases involving ureteral orifice strictures due to bladder tumour involvement, tight stenosis of the ureterovesical junction, obstruction from gynaecologic malignancies, or extrinsic distal ureteral obstruction with marked hydronephrosis, percutaneous drainage may offer more benefit [6,7,8]. Our result reported in the contrast of that and noticed that antegrade JJ stent insertions were indicated in ureteral obstruction caused by stones, followed by malignancies, perforations, and strictures.

Furthermore, the complications of retrograde JJ stenting can be avoided when we replaced it by antegrade option, especially when previous nephrostomy was inserted due to acute obstruction [9,10].

The most common complications following antegrade DJC stenting were UTIs, followed by DJC dislodgement or obstruction, malpositioning, and the formation of false passages in the ureter. These complications can be mitigated by encouraging adequate fluid intake and conducting prompt evaluations of patient complaints. Effective infection management is crucial, and radiological imaging should be used to assess DJC positioning [11].

Haematuria may result from renal parenchymal puncture during nephrostomy or from urothelial injury during DJC placement. However, most reports in the literature indicate that such haematuria is self-limiting and clinically insignificant [12].

False tracts and perforation are very rare complications which can be delt during the procedure by keeping nephrostomy tube in situ to decrease the urinary pressure and resulting in a recovery of the false passage or the perforation. Then later on attempting of JJ catheter reinsertion is very useful which can assist for healing for the most of the perforations [13].

Conclusion

There are two options for JJ stenting to treat ureteral obstruction. The usual one is performed in a retrograde manner. The second one is through percutaneous rout in an antegrade way. The second choice carries a low risk of complications and considered as a success alternative technique for first option. It is particularly advantageous in cases where a percutaneous nephrostomy tube is already in place or when retrograde insertion has failed.

References

1. Kaskarelis IS, Papadaki MG, Malliaraki NE, Robotis ED, Malagari KS, Piperopoulos PN. Complications of percutaneous nephrostomy, percutaneous insertion of ureteral endoprosthesis, and replacement procedures. Cardiovasc Intervent Radiol. 2001;24:224–8.
2. Bahu R, Chaftari AM, Hachem RY, Ahrar K, Shomali W, El Zakhem A, et al. Nephrostomy tube related pyelonephritis in patients with cancer: epidemiology, infection rate and risk factors. J Urol. 2013;189:130–5.
3. Yossepowitch O, Lifshitz DA, Dekel Y, Gross M, Keidar DM, Neuman M, et al. Predicting the success of retrograde stenting for managing ureteral obstruction. J Urol. 2001;166:1746–9.
4. Chitale SV, Scott-Barrett S, Ho ET, Burgess NA. The management of ureteric obstruction secondary to malignant pelvic disease. Clin Radiol. 2002;57:1118–21.
5. Van der Meer RW, Weltings S, van Erkel AR, Roshani H, Elzevier HW, van Dijk LC, et al. Antegrade ureteral stenting is a good alternative for the retrograde approach. Curr Urol. 2017;10(2):87–91. doi:10.1159/000447157. PMID: 28785193; PMCID: PMC5527183.
6. Uthappa MC, Cowan NC. Retrograde or antegrade double-pigtail stent placement for malignant ureteric obstruction? Clin Radiol. 2005;60(5):608–12. doi:10.1016/j.crad.2004.11.014. PMID: 15851050.
7. Song Y, Fei X, Song Y. Percutaneous nephrostomy versus indwelling ureteral stent in the management of gynecological malignancies. Int J Gynecol Cancer. 2012;22(4):697–702. doi:10.1097/IGC.0b013e318243b475. PMID: 22315095.
8. Yossepowitch O, Lifshitz DA, Dekel Y, Gross M, Keidar DM, Neuman M, et al. Predicting the success of retrograde stenting for managing ureteral

obstruction. J Urol. 2001;166(5):1746–9. PMID: 11586215.
9. Sharma SD, Persad RA, Haq A, Appleton DS, Doyle PT, Bullock KN, et al. A review of antegrade stenting in the management of the obstructed kidney. Br J Urol. 1996;78:511–5.
10. Hackethorn JC, Boren SR, Dotter CT, Rosch J. Antegrade internal ureteral stenting: A technical refinement. Radiology. 1985;156:827–8.
11. Dyer RB, Chen MY, Zagoria RJ, Regan JD, Hood CG, Kavanagh PV. Complications of ureteral stent placement. Radiographics. 2002;22:1005–22.
12. Wah TM, Weston MJ, Irving HC. Percutaneous nephrostomy insertion: outcome data from a prospective multi-operator study at a UK training centre. Clin Radiol. 2004;59(3):255–61. doi:10.1016/j.crad.2003.10.021. PMID: 15037138.
13. Rao AR, Alleemudder A, Mukerji G, Mishra V, Motiwala H, Charig M, et al. Extra-anatomical complications of antegrade double-J insertion. Indian J Urol. 2011;27(1):19–24. doi:10.4103/0970-1591.78408. PMID: 21716883; PMCID: PMC3114581.