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CASE REPORT

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Peritoneal perforation and peritonitis after antegrade double-J stent insertion: A case report and review of the literature

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Abstract

Penetration of peritoneal cavity during antegrade double-J (DJ) stenting is rare. A 52-year-old woman presented with signs of peritonitis for 3 days after left PCNL. Abdominal CT scan revealed a perforation of the peritoneum by the distal coil of DJ stent, which was reinserted into the bladder by ureteroscopy.

KEYWORDS

case report, complications, double-J stent, percutaneous nephrolithotomy, peritonitis

1 | INTRODUCTION

Double-J (DJ) stents facilitate the urine drainage from the renal pelvis to the urinary bladder to relieve the urinary tract obstruction or stenosis, after percutaneous nephrolithotomy (PCNL) procedure, and fistula in several urological conditions.[1,2]

The DJ stent placement is performed via antegrade or retrograde approach.[3] Infection, stent irritation, stent migration, encrustation, and a forgotten stent are all considered risks associated with this procedure. Peritonitis due to perforation of the abdominal cavity is a rare complication.[4,5] We report a rare case of perforation of the ureter during DJ stenting in the PCNL procedure, with the subsequent location of the distal coil of the DJ stent within the peritoneal cavity, which was successfully managed by reinserting the DJ stent to the bladder by the ureteroscopic procedure.

2 | CASE REPORT

A 52-year-old woman presented with severe abdominal pain, high-grade fever, and constipation in the last 3 days of PCNL for left multiple renal stones (Figure 1).

The patient revealed no history of chronic illness; she only had thyroidectomy several years ago, spondylosis, and high body mass index (BMI: 28 kg/m^2).

The patient's vital sign was stable on physical examination, and just a high-grade fever was detected (oral

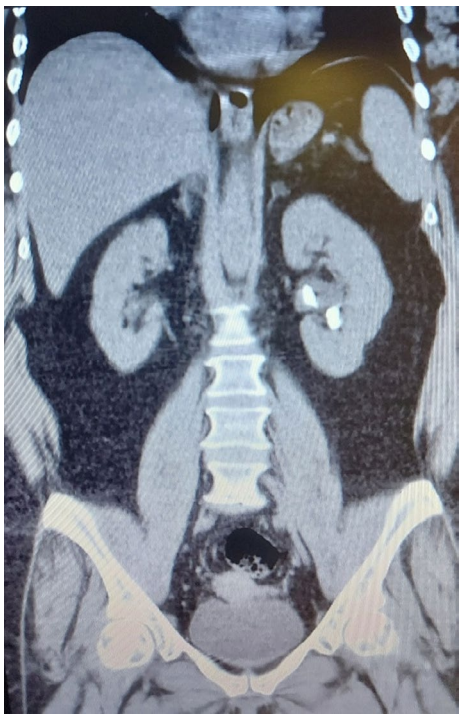

FIGURE 1 Abdominal computed tomography scan showing left multiple renal stones

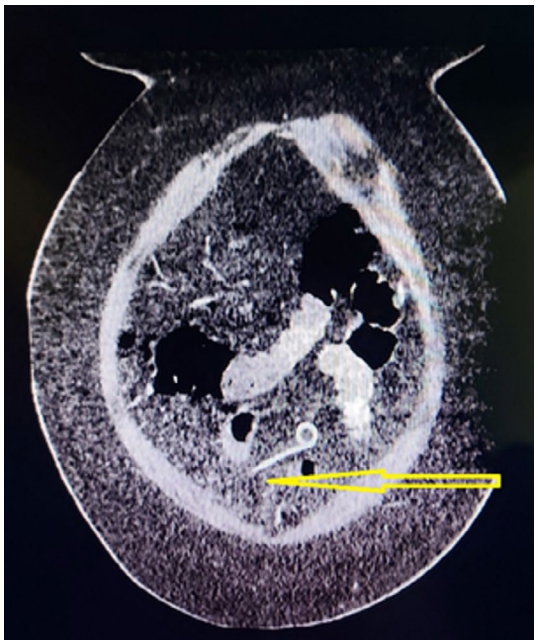

FIGURE 2 Abdominal computed tomography scan showing the distal coil of double-j stent in the peritoneal cavity (Arrow)

temperature: 38.5°C). She was pale and had severe and generalized abdominal tenderness on palpation.

Urine analysis showed microscopic hematuria (15–20 RBCs/HPF). The urine culture was negative. The blood investigation revealed that the serum creatinine level was 1.4 mg/dl, with blood urea nitrogen (BUN) of 45 mg/dl. White blood cells were 15×10^3/ml and hemoglobin: 12.4 g/dl; the results of all other blood tests were within the normal range. An abdominal computed tomography (CT) scan revealed that the DJ stent's distal coil was incorrectly positioned in the peritoneal cavity with mild-to-moderate fluid in favor of peritonitis (Figure 2).

2.1 | Therapeutic interventions

Via general anesthesia with lithotomy position, the proximal part of the DJ stent was identified and removed under fluoroscopy guide, and, by the ureteroscopic procedure after bypassing the defect under direct vision, a new double-j stent was inserted to the urinary bladder (Figure 3).

2.2 | Follow-up and outcome of the interventions

Antibiotic therapy was maintained for 1 week (ceftriaxone 1000 mg twice daily and metronidazole 500 mg twice daily). With conservative management, the peritonitis symptoms were relieved, and the abdominal fluid was reduced without more intervention. On the 5th postoperative day, the patient left our department in good condition. The DJ stent was removed 4 weeks later without complications.

3 | DISCUSSION

To the best of our knowledge, only a few similar cases of intraoperative abdominal cavity penetration of a DJ stent after antegrade placement were reported in the literature. The reported complication rate of antegrade DJ stent insertion was 2%–5%.[6,7]

The mechanisms of stent displacement could be either initial malposition after ureteral rupture or the resulting erosion of the excretory system due to infection or long device constancy.[5] In our case, the ureteral perforation to the abdominal cavity was generated by the forced placement of the closed tip stent, which most likely caused erosion to the ureter, passed into the submucosa, and was adjacent to the peritoneal cavity.

Many factors influence stent migration, including the shape of the stent, length of the stent, and stent materials such as polyurethane, which is less prone to migration. The patient's characteristics that could lead to stent malposition include low BMI, Kyphoscoliosis, and renal movement during respiration.[3,8] Furthermore, the surgeon's factors, such as poor positional play, may contribute to stent displacement.

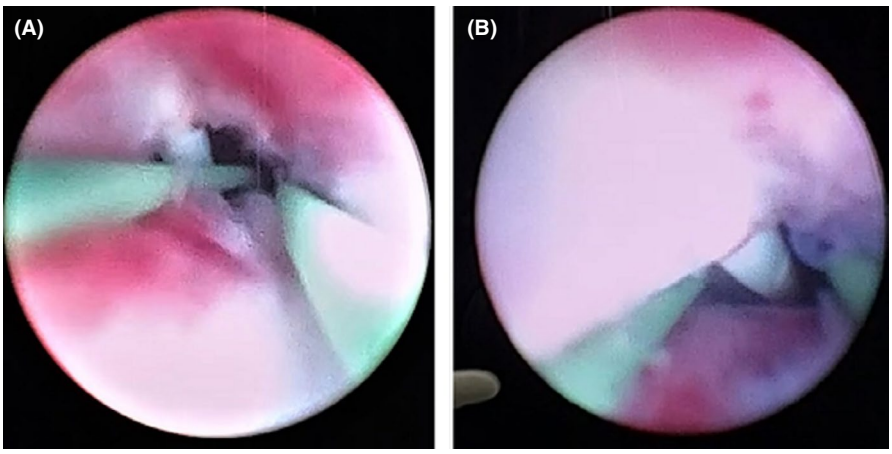

FIGURE 3 (A) Showing the perforation site during ureteroscopy procedure. (B) Showing the ureteroscopy procedure for reinsertion of DJ stent to the bladder

The use of fluoroscopy during insertion aids in detecting malposition and subsequent correction.[3,8] In our case, we were using fluoroscopy during operation, and we just followed antegrade DJ stent insertion till the pelvic brim. However, the stent had just perforated the ureter in the distal part and moved alongside the ureter.

Urinary leakage to the peritoneal cavity and subsequent peritonitis is a rare complication. It requires a high index of suspicion, especially in patients with symptoms of peritonitis in the postoperative period. Our patient had a sign of peritonitis, and the CT scan documented our diagnosis. In another case reported by Katz et al., who operated due to rectal carcinoma, the patient passed the postoperative course without any complications or hydronephrosis in image studies. The diagnosis was made in the second postoperative week of surgery, and the patient was treated with antegrade DJ stent insertion.[9]

The main symptom seemed to be severe abdominal discomfort and rapid, profound, continual pelvic pain. Vast urinary leaking into the peritoneal cavity may lead to abdominal compartment syndrome, respiratory distress, and anuria.[10] Our patient experienced progressively worsening abdominal distension and peritoneal irritation, which may be typical of urinary peritonitis. Preoperatively, it is exceedingly harder to predict a ruptured ureter in patients who present with vague peritonitis. Radiological evidence and peritoneal fluid analysis are required. Drip infusion pyelography, abdominal pelvic CT scan, and retrograde pyelography are effective methods for detecting ureteral perforation.[9,10]

Regarding previously published cases, Wani et al[11]. described how the tip of a DJ stent entered the intraperitoneal cavity via a fistula at the upper pole of the kidney. Turri et al.[5] described another case of complete displacement of a DJ stent to the abdominal cavity, which was discovered 8 months after the first insertion. Rao et al. reported the ureteral perforation of DJ stent in 5 (3%) out of 55 patients whose DJ stent was inserted via antegrade approach. These complications had delayed manifestations and included retroperitoneal abscesses in two patients, pelvic urinoma in one patient, uretero-rectal fistula in one patient, and ureterovaginal fistula in one patient. The risk factors for ureteral perforation in this study were previous pelvic malignancy and radiotherapy, pelvic surgery, and history of ureteral manipulation.[12]

Van et al. reported the complications of antegrade DJ stent placement in 8 out of 130 patients. The complications included urinary tract infections in 6 patients and stent malposition in one patient.[13] Chen and associations reported a rare ureteral stent migration to the pleural cavity and caused a reno-pleural fistula. The DJ stent was removed by the thoracoscopic procedure.[14]

A recently published case report by Takashi et al. reported a renal penetration of the DJ stent with subcapsular hematoma during trans-ureteral lithotripsy (TUL) in a 48-year-old man. The stent migrated into the ureter, directly penetrating the renal parenchyma. The patient was treated by removing the DJ stent in the TUL procedure.[7]

Regarding treatment, ureteral rupture is effectively treated by draining the urinoma and closing the punctured ureter. Endourological intervention is usually safe and effective when a combination of percutaneous urinoma drainage, nephrostomy catheter insertion, and DJ stent insertion is used. In the right circumstances, these interventions may eliminate the need for open surgery, as in our case.[15]

Several policies may be used to diminish the risk of such migration: The guidewire should not be forced blindly through the ureter; the urologist should use hydrophilic wire to prevent the wire from transient into the submucosal layer. Furthermore, choosing the optimal length of the DJ stent, the optimal sent material, and the appropriate position may be beneficial in preventing these complications. The optimal way to avoid this complication is to have the DJ stent placed under fluoroscopic control. If fluoroscopy is not available, a postoperative X-ray should be considered.[3,8]

Maintaining a high index of suspicion, particularly in patients who have postsurgical symptoms of peritonitis such as abdominal pain, abdominal distention, constipation, and high-grade fever, is essential if mortality from this complication is to be avoided.

4 | CONCLUSION

Perforation of the peritoneal cavity by the distal coil of the DJ stent during the PCNL procedure, followed by peritonitis, is a rare complication reported in the literature. In this case, reinserting or changing the DJ stent ureteroscopy was curative.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

AH and SH: designed the study and were involved in the record collection. FA and AM: wrote the manuscript. AD and SR: edited the manuscript and provided guidance. FA: conceptualized the study, designed the study, edited the manuscript, provided guidance, and approved the final version of the manuscript.

ETHICAL APPROVAL

None.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

DATA AVAILABILITY STATEMENT

None.

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