



Multidisciplinary approach for ureteral stent intravascular migration: a case report

Manejo multidisciplinar de un caso de migración intravascular de catéter ureteral

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Abstract

Clinical case description: We report the case of a patient who underwent a double-pigtail ureteral stent (DPS) retrograde placement, following a complicated right renal colic. After two days with persisting pain and hematuria, a CT-Scan revealed a proximal pigtail misplacement into the inferior vena cava (IVC). In a multidisciplinary approach, an endourological removal was performed, pulling the distal loop with a cystoscope, while the vascular surgery team performed femoral access and phlebography during and after the DPS removal to prevent bleeding from IVC. Abdominal access for laparotomy was ready, anticipating potential bleeding.

Relevance: DPS retrograde placement is a very frequent, usually uneventful procedure, but major complications may occur, such as the one described in the present case. It is important to know the risk of intravascular misplacement of the DPS, especially in cases of bad evolution or hematuria.

Conclusion: DPS intravascular migration is a rare but potentially severe complication. An early detection and a multidisciplinary collaboration between the urology and vascular surgery teams is paramount to perform a minimally invasive removal and prevent major events.

Keywords:

ureteral stent, inferior vena cava, intravascular migration, complication, case report

Citation: Bernal-Gómez A., Gómez-Palomo F., López-Acón J. D., Bonillo-García M. A. *Multidisciplinary approach for ureteral stent intravascular migration: a case report. Rev Mex Urol.* 2022;82(5):pp. 1-7

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Received: February, 2, 2022
Accepted: October, 6, 2022



Resumen

Descripción del caso clínico: Presentamos el caso de un paciente al que se le colocó un catéter ureteral doble pigtail (DP) por un cólico derecho complicado. Tras dos días de persistencia del dolor y hematuria, una tomografía computarizada demostró la malposición del extremo proximal del DP dentro la vena cava inferior (VCI). En un abordaje multidisciplinario, se realizó una extracción endourológica tirando del extremo distal del catéter con un cistoscopio, mientras que el equipo de cirugía vascular realizó un acceso vascular percutáneo femoral con flebografía durante y después de la retirada del DP, descartando sangrado activo por la VCI. Del mismo modo, se había preparado el material para una posible laparotomía de emergencia en caso de eventual sangrado.

Relevancia: La colocación retrógrada de DP es un procedimiento muy frecuente, generalmente inocuo, pero que puede presentar complicaciones importantes, como la que describimos en este caso. Es importante conocer el riesgo de malposición intravascular del catéter DP, especialmente en caso de mala evolución o hematuria.

Conclusión: La migración intravascular del DP es una complicación rara pero potencialmente grave. La detección precoz y la colaboración multidisciplinaria entre los equipos de urología y cirugía vascular son primordiales para realizar una extirpación mínimamente invasiva y prevenir complicaciones mayores.

Palabras clave:

catéter ureteral, vena cava inferior, migración intravascular, complicación, caso clínico

Introduction

A double-pigtail stent (DPS), also known as double-J stent, is a self-retaining ureteral catheter broadly used to drain an obstructed upper urinary tract (e.g., after an impacted lithiasis). Usually, a DPS retrograde placement is a short and straightforward procedure, which however, may have some minor complications, most commonly hematuria or pain.⁽¹⁾ The migration and misplacement of the catheter have rarely been described. We report here a case of intravascular DPS misplacement into the inferior vena cava (IVC), its implications and resolution with a multidisciplinary approach by urology and vascular surgery teams.

Case Report/Case Presentation

A 53-year-old man with no previous records was admitted to a secondary hospital due to a right flank colic pain with fever. A computed tomography (CT) revealed an 11 mm urinary stone located in the distal right ureter, with moderate hydronephrosis of the right kidney. He underwent retrograde DPS placement at that institution. According to the surgery report, mild resistance was found when ascending the guidewire through the ureter, although the final DPS position in fluoroscopy control was considered correct. Two days later, fever and right flank pain persisted, along with onset of gross hematuria. A second CT was performed, revealing

ling DPS misplacement, with its proximal loop located into the inferior vena cava (IVC) (shown in Fig. 1). Antibiotic and thromboprophylaxis were started, and the patient was referred to our tertiary hospital for stent removal.

Figure 1. CT-Scan image showing misplaced proximal double-pigtail ureteral stent inside inferior vena cava



Once in the operating room, the patient was set in dorsal lithotomy position for an endourological intervention, but his abdomen was exposed and cleaned, ready for an emergency laparotomy if needed. A cystoscopy identified the catheter's distal end normally placed inside the bladder. A hydrophilic-tipped guidewire was passed through the right ureteral meatus, parallel to the previous DPS, advancing it up gently with no resistance until the renal pelvis, 3 cm lateral from the misplaced DPS under fluoroscopy control.

Afterwards, in a supine position, vascular surgeons proceeded with ultrasound-guided femoral vein puncture, introducing a 5-french intravascular catheter up to the iliac vein. Phlebography was performed, ruling out thrombus in the stent and contrast media extravasation (shown in Fig. 2).

Figure 2. Intraoperative phlebography of inferior vena cava, no leak is detected



With the cystoscope, the distal loop of the misplaced DPS was pulled out gently and removed, while real-time phlebography showed no contrast leakage from IVC. No visible bleeding from ureteral meatus or hemodynamic instability occurred. Few minutes later, a second phlebography was done ruling out again any leakage. A new open-ended DPS was placed, checking with both fluoroscopy and kidney ultrasound its correct position inside the right renal collecting system.

The patient was discharged uneventfully after 2 days. One month later, a CT urography ruled out any collection or leakage. After three months, the patient underwent ureteroscopy to treat the right ureter urolithiasis, showing a normal aspect of the whole ureteric wall. At last follow-up visit (one year later), no complication or lithiasis recurrence had appeared.

Discussion/Conclusion

DPS migration or misplacement into the IVC is a rare, but possible complication when placing a urinary catheter. An impacted lithiasis or rigid ureter may cause resistance ascending the guidewire or the catheter, forcing the surgeon to push with excessive strength, as presumably happened in our case.

An intravascular DPS can provoke sepsis and intravascular thrombosis, as well as pulmonary embolism or valvular heart disease. Early suspicion of misplacement in the event of hematuria or poor evolution after catheterization is essential to prevent further complications.

Very few authors have reported DPS to IVC migration. Several approaches have been described, including open surgery,⁽¹⁻³⁾ as well as laparoscopic,⁽⁴⁾ endovascular and endourologic stent removal.⁽⁵⁻¹⁰⁾ Most reported cases had a favorable outcome.

The first reported endourological removal of a misplaced ureteral stent was done by Ozveen & Sahin.⁽⁸⁾ In another case reported later by Marques *et al.*, the endoscopic removal with cystoscopy was chosen as well, as the distal end of the DPS was accessible from inside the bladder.⁽⁹⁾ In the two cases of DPS into IVC misplacement after percutaneous nephrolithotomy (PNL) reported, the stent was removed intravascularly or through nephroscopy.^(11,12) In our case, we agreed that an endourological DPS removal was preferable, as the distal half of the catheter was still into the urinary tract.

As we did with our patient, we recommend a multidisciplinary approach alongside vascular surgeons. The intravascular access allows angiographic control to rule out any contrast extravasation during the endoscopic DPS removal. A similar combined approach was

performed by Tilborghs *et al.*, who considered it to be a low bleeding risk procedure, due to the venous valves and the low blood pressure in IVC.⁽¹⁰⁾

However, we find it important to anticipate the worst-case scenario possible, which is a retroperitoneal bleeding from the IVC when the misplaced stent is removed. Bleeding can be massive if a severe defect on the fragile venous wall happens, and it may require emergency laparotomy. Thus, we recommend open surgery instruments to be ready, and abdominal skin to be cleaned and prepared, as well as the presence of an experienced vascular surgery team, since vessel repair might be needed.

For a similar case, Ioannou *et al.* performed an open pararectal laparotomy access to allow better vessel management in the event of hemorrhage after DPS removal.⁽¹⁾ However, we consider our endourological & intravascular combined approach to be less invasive, less aggressive, and safe enough, since a possible conversion to open laparotomy had been anticipated. On the other hand, this approach allowed us to perform an endourological stone treatment 3 months after the emergency was solved, with no more complications than on a regular basis.

Before the migrated DPS removal, it is paramount to correctly place a parallel guidewire to secure the urinary tract in case of any complication. The choice of guidewire can be critical, as Liu *et al.*⁽¹³⁾ reported a case of a fatal uretero-ileal fistula due to the use of a stiff guidewire that perforated the ureter and ileum walls during DPS replacement in a patient with a cutaneous ureterostomy. This case highlights the importance of choosing a hydrophilic guidewire during endourological procedures to avoid any lesion to the ureter.

Conclusions

In conclusion, a DPS intravascular misplacement is a rare but important complication, to be suspected if resistance is found during DPS placement. Management will depend on DPS location, but a multidisciplinary approach at a tertiary hospital is advised. We recommend a combined approach with endourological removal of the misplaced catheter and intravascular and fluoroscopic control to rule out leakage. Complications such as severe bleeding which could require conversion to laparotomy must be foreseen.

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