

Displacement of a Ureteral Single J Stent into the Heart: A Case Report and Literature Review

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Abstract

Case Report

The placement of urethral stents is a commonly performed procedure in urology, typically without complications. However, as illustrated in the present case, major complications can arise. It is crucial to be vigilant about the risk of intravascular or intracardiac malpositioning of the ureteral device, especially when there is an unfavorable evolution or the presence of hematuria. We present the case of a 68-year-old patient undergoing treatment for locally advanced cervical cancer with concomitant radiotherapy and chemotherapy. In the course of her follow-up, the patient developed obstructive renal failure due to extrinsic compression of the ureters. Despite attempts with JJ stent placement, emergency renal drainage became necessary, leading to bilateral nephrostomy. In order to alleviate the patient from nephrostomy tubes and enhance her quality of life, bilateral direct cutaneous ureterostomy was performed, with Single-J probes placed in both ureters. However, during the 4th tube change, conducted without scopic control, the patient experienced thoracic and low back pain at 8 days post-operatively. The CT scan revealed that the left Single-J probe bypassed the renal pelvis without penetrating it. Instead, it ascended the IVC, entering the right atrium, and subsequently reached the right ventricle, accompanied by left pyelocaliectasis. The resolution of the issue was achieved through the implementation of a multidisciplinary approach, engaging the expertise of both urologists and vascular surgeons. The removal procedure involved extracting the distal end of the catheter using a ureteroscope, with simultaneous collaboration from the vascular surgery team. The vascular surgeons performed femoral access and phlebography both during and after catheter removal to mitigate the risk of potential bleeding from the inferior vena cava (IVC). Abdominal access for laparotomy was prepared in anticipation of potential bleeding." The patient underwent placement of a left Single-J catheter under fluoroscopic control.

Keywords: urology, intracardiac malpositioning, pyelocaliectasis, vascular surgery.

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INTRODUCTION

Upper urinary tract diversion techniques can be employed either temporarily or permanently, utilizing endoscopic, percutaneous methods, or a combination of both. In fragile patients, these techniques offer a means to safeguard the compromised function of one or both kidneys through effective urinary diversion. Nevertheless, it is essential not to underestimate the risks and complications associated with this seemingly simple and rapid procedure. The technique must be accurately indicated and executed with the utmost care.

The retrograde insertion of the Single-J catheter is a brief and straightforward procedure, although it may result in minor complications, most commonly hematuria or pain [1].

Catheter migration and malpositioning are seldom reported. We present a case of intracardiac migration of a Single-J catheter. Addressing this issue necessitates a multidisciplinary approach, with collaboration between urology and vascular surgery teams.

OBSERVATION

We present the case of a 68-year-old female patient with a BMI of 19.49 % (weight: 57 kg, height: 171 cm) and an ASA (American Society of Anesthesiologists) classification of 1. Her medical history includes a childhood appendectomy. The patient is currently undergoing follow-up for locally advanced cervical neoplasm treated with concomitant radiotherapy and chemotherapy.

Throughout her follow-up, the patient experienced obstructive renal failure attributed to extrinsic compression of the ureters

The patient underwent emergency renal drainage through bilateral nephrostomy tubes following the failure of JJ stent placement.

To alleviate the patient from nephrostomy tubes and enhance her quality of life, she underwent bilateral direct cutaneous ureterostomy with the intubation of the ureters using Single-J tubes.

Subsequently, the patient underwent iterative changes of the Single-J catheter every 6 months.

On the fourth changeover, performed without endoscopic control, the patient reported thoracic and low back pain on the 8th day postoperatively.

The clinical examination revealed a patient in relatively good general condition, exhibiting hemodynamic and respiratory stability with no other associated signs.

Examination of the ureterostomy site revealed the presence of a single Single-J catheter (Figure 1).



Figure 1: The presence of a single probe at the ureterostomy site

An EKG was conducted, revealing a cardiac arrhythmia, while the biological workup was normal.

1. The Abdominal x-ray revealed the right Single-J probe in its correct position, while the left Single-J probe was observed in a thoracic projection (Figure 2).



Figure 2: The loop of the left ureteral stent reaching the mediastinum

A complementary thoraco-abdominal angioscan was conducted, revealing that the left Single-J probe bypassed the renal pelvis without penetrating it. Instead, it ascended along the IVC (the inferior vena cava), entering the right atrium and then the right

ventricle, accompanied by left pyelocaliectasis (Figure 3).

Antibiotic therapy and thromboprophylaxis were initiated, and subsequently, the patient was referred to our tertiary hospital for the removal of the stent.

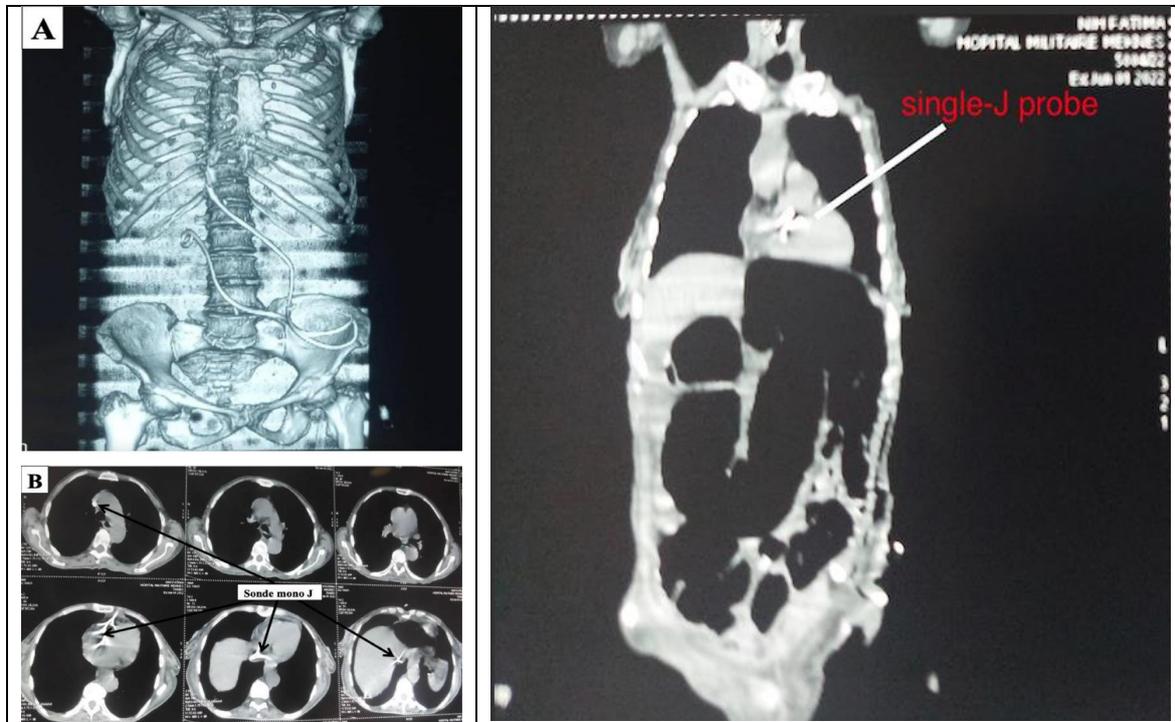


Figure 3: Scan images clearly confirming that the Single-j probe is located inside the heart chamber

The patient was later admitted to Mohammed V Military Training Hospital in Rabat, where vascular surgeons performed the removal of the Single-J catheter.

In the catheterization room, the patient was positioned supine. Following swabbing with alcoholic betadine, a standard drape was applied, exposing the abdomen for emergency laparotomy if required, in anticipation of potential bleeding

A rigid ureteroscope was utilized to identify the distal end of the catheter within the ureter.

Utilizing a soft hydrophilic guide introduced through the left lead and gently advanced without resistance to the free proximal end of the lead in the right ventricle, lead ablation was performed gradually, deliberately, and under fluoroscopic control (Figure 4).

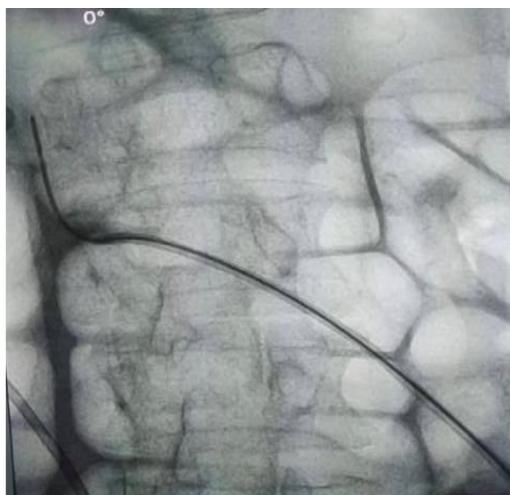


Figure 4: Probe removal under fluoroscopic control after a guide's ascent

Simultaneously, vascular surgeons conducted an ultrasound-guided femoral vein puncture, introducing an intravascular catheter into the iliac vein. Phlebography was performed to assess the stent for thrombus and to rule out extravasation of contrast medium.

Subsequently, the patient underwent left Single-J catheterization under fluoroscopic control, with the final position of the Single-J catheter considered correct. Real-time phlebography revealed no contrast leakage from the IVC. There was no visible bleeding from the ureteral meatus, and the patient maintained hemodynamic stability."

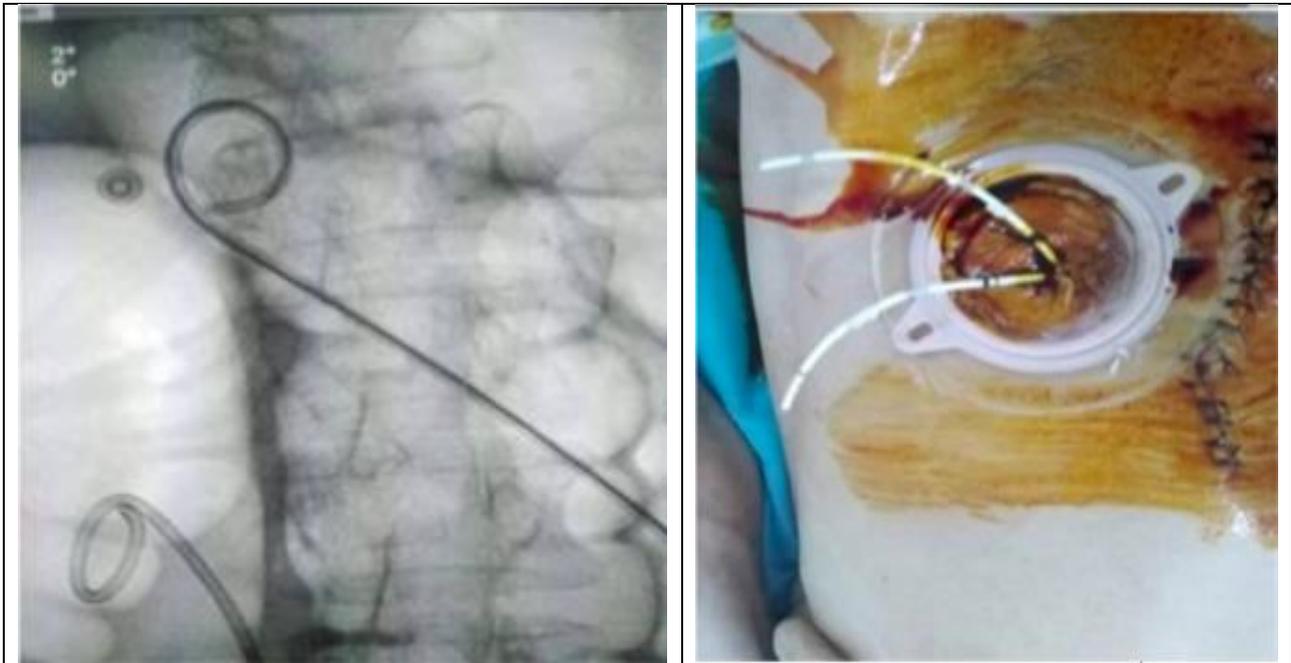


Figure 5: Photo on the left showing scopic inspection of the new Single-J insertion, photo on the right showing the ureterostomy bag with the two Single-J probes

The post-operative course was favorable, and the patient was discharged from the hospital three days later without any complications. One month after the procedure, a CT urography was conducted to rule out any collection or leakage.

DISCUSSION

Urinary diversion catheterization is an effective and minimally invasive technique to ensure urine drainage in cases of upper urinary tract obstruction, thereby preserving the function of one or both kidneys.

Ureteral stents are urinary diversion devices employed to alleviate or prevent ureteral obstruction. The most common complications associated with these stents include discomfort, low back pain, hematuria, dysuria, irritation, urinary tract infection, and potential issues such as migration, fragmentation, and stent obstruction, leading to the development of hydronephrosis [2, 3].

Less common complications encompass perforation of the renal pelvis, ureteropelvic junction, and renal vein, along with erosion of the ureteral wall into abdominal blood vessels or intestines, carrying the risk of fistula formation [2, 4, 5].

However, our literature searches revealed that the complication mentioned here has not been documented in indexed literature.

Migration or improper positioning of the stent in the heart, subsequent to the penetration of the inferior vena cava, is a rare but potential complication of the urinary catheter insertion procedure.

In our patient's case, it is probable that the stent entered the systemic circulation due to the trauma and fragility of the ureteral wall resulting from the anterior passage of the guidewire, followed by the stent itself. This occurrence might have been facilitated by coughing, inducing sudden increases in intra-abdominal pressure, which could be significant contributing factors. According to the report on the last stent replacement, a mild resistance was encountered while pulling the guidewire into the ureter, necessitating the surgeon to exert excessive force. Additionally, the final position of the ureteral device was not confirmed during fluoroscopic inspection.

An intravascular urinary stent can lead to complications such as sepsis, intravascular thrombosis, pulmonary embolism, and valvular heart disease. Early suspicion of malpositioning in the presence of hematuria

or poor evolution after catheterization is crucial to prevent further complications [6].

In contrast to cardiac migration, multiple authors have documented cases of stent migration or incorrect positioning in the inferior vena cava (IVC) [6].

To address these incidents, various approaches have been described, including open surgery [7, 8], laparoscopic stent removal [9], the endovascular route, and the endourological route [3, 10]. Most reported cases have resulted in a favorable outcome.

The first endourological removal of a misplaced ureteral stent was reported by Ozveen & Sahin [8]. In another case, as reported later by Marques *et al.*, endoscopic removal through cystoscopy was also chosen, given the accessibility of the distal end of the DPS from inside the bladder [11, 12]. In the two reported cases of DPS displacement in the IVC after percutaneous nephrolithotomy (PNL), the stent was removed either intravascularly or nephroscopically [4, 13].

Similar to our patient, we recommend a multidisciplinary approach involving vascular surgeons. Intravascular access provides angiographic control, mitigating the risk of contrast extravasation during the endoscopic removal of the ureteral stent.

A similar combined approach was adopted by Tilborghs *et al.*, and Adrian Bernal-Gómez *et al.*, who considered this procedure to pose a low hemorrhagic risk due to the presence of venous valves and low blood pressure in the inferior vena cava (IVC) [3, 6]

As described by Adrian Bernal-Gómez *et al.*, we believe it is crucial to contemplate the worst-case scenario, specifically retroperitoneal hemorrhage of the inferior vena cava (IVC) during the removal of the poorly positioned stent. In the event of a severe failure of the fragile venous wall, massive hemorrhage could occur, potentially necessitating emergency laparotomy. Vascular repair surgery may be required in such cases

CONCLUSION

Intravascular migration of a ureteral stent is a rare but potentially serious complication. Early detection and multidisciplinary collaboration between urology and vascular surgery teams are crucial for minimally invasive removal and the prevention of major events

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