

## Percutaneous insertion of bilateral double J in pelvic cancer patients: Indications, complications, technique of antegrade ureteral stenting

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### ABSTRACT

**Background:** Antegrade percutaneous insertion of a double J seems to be a good alternative when retrograde insertion fails. Malignant ureteral obstruction occurs due to occlusion of the ureter secondary to tumor invasion, extrinsic compression, which prevents intermittent urine flow, leading to acute renal failure, increased morbidity, mortality and interruption of cancer treatment.

**Case:** A 26-year-old woman with endometrial carcinoma with internal invasion of pelvic structures due to urosepsis and acute renal failure. She underwent antegrade percutaneous double-J implantation by interventional radiology due to the failure of retrograde catheter implantation.

**Conclusion:** The antegrade double-J percutaneous implant technique is an alternative when the retrograde technique fails. This technique is feasible, with low morbidity and mortality and good quality of life for continuing cancer treatment.

### 1. Introduction

Antegrade percutaneous insertion of a double J seems to be a good alternative when retrograde insertion fails. Malignant ureteral obstruction occurs due to occlusion of the ureter secondary to tumor invasion, extrinsic compression, which prevents intermittent urine flow, leading to acute renal failure, increased morbidity, mortality and interruption of cancer treatment. (Can der Meer et al., 2016; Thornton and Covey, 2016) The purpose of the present study is evaluate the indications, complications, technique of antegrade ureteral stenting in cancer patients.

#### 1.1. Case report

A 26-year-old woman with no previous comorbidities with endometrial carcinoma with invasion of pelvic structures such as the ureter, bladder, fallopian tube and ovary refractory to radiotherapy and chemotherapy treatment and no indication for surgery due to the advanced stage of the disease. She was hospitalized due to pyelonephritis and on admission, the patient was febrile, her general condition decreased, diuresis was reduced, her renal function was altered, and her

dialysis was urgent, hemodialysis was started with the implantation of a Schilley catheter for hemodialysis in the right internal jugular vein. Abdominal computed tomography scan showing signs of bilateral ureterohydronephrosis, with abrupt tapering and involvement of the distal third of the ureter due to expansive formation in the pelvis. (Fig. 1 A and B) The urology team was called to implant a double-J, in order to decompress the urinary system. However, retrograde double-j implantation was not possible due to anatomy distortion and tumor invasion in the vesical trigone.

The interventional radiology team was called for an antegrade double-J implant. After evaluating the images of the tomography of the abdomen and pelvis, an antegrade percutaneous double-J implant was chosen. We chose to perform the renal puncture with the patient in the prone position under local anesthesia and sedation, as the patient was cooperative. Pyelography with dilated pelvis and ureter and in the distal third an image of severe stenosis due to a pelvic mass making extrinsic compression. Initial tests before draining creatinine 7.8 mg/dl and urea: 152 mg/dl. After 2 days of percutaneous implantation, hemodialysis was suspended and renal function and nitrogenous slag improved, 1.4 mg/dl creatinine, 46 mg/dl urea and improved general condition. After unblocking the ureters by interventional radiology, the patient

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continued under the care of the oncology team and was referred to urology to change the ureters every 4 months, in order to avoid double-J-related complications such as calcification and infection. And the exchange of double-Js for urology starts to be performed retrogradely, since the stents are already properly positioned.

## 1.2. Technique and procedure

Patient under general or local anesthesia with moderate intravenous conscious sedation and prone position for percutaneous access to the collecting system was achieved under ultrasound and fluoroscopic guidance, an 22 G (NPAS-Cook) echogenic needle being used in order to allow adequate visualization of the advancement of the needle from the skin to the renal calyx. In the right side, the puncture was performed through the middle calyx, which provides easier access to the ureteropelvic junction. After puncture, was changed by introducer NPAS kit and antegrade pyelography was performed with injection of iodinated contrast medium and fluoroscopic visualization of the anatomy of the collecting system. (Figs. 2 and 3) Once access had been established, a hydrophilic guidewire and 4F vertebral diagnostic catheter were advanced, under fluoroscopy, from the collecting system to the bladder. A superstiff guidewire was changed and positioned distal tip into of the bladder. Double J was advanced under the super stiff guidewire to the inside of the bladder being the distal tip in the bladder and the proximal tip in the renal collecting system. (Fig. 4) The same technique was performed on the left side.

## 2. Discussion

Interventional radiology has a huge interface with various specialties and within urology there has been a great demand in the diagnosis and treatment of urinary tract pathologies, especially when attempts to implant a retrograde ureteral stent fail as a malignant obstruction of the distal ureter or when a ureteral stent retrograde is contraindicated in cases of ureteral obstruction is accompanied by sepsis by gram-negative bacteria or renal failure. (Tibana et al., 2019)

Drainage of the urinary tract is routinely placed by urologists in a retrograde manner can be performed via several techniques and devices, including retrograde cystoscopy. Retrograde stenting has several advantages such as manage obstructive stones, to take a biopsy of intra-ureteral malignancy or to incise strictures and less risk of bleeding. However that retrograde insertion of a double J stent may be unsuccessful in up to 50% in patients with distal and extra-ureteral obstruction caused by malignancies, malignant extrinsic compression in the pelve, bladder tumor, prostate carcinoma or anatomic alteration. (Nunes et al., 2019; Van der Meer et al., 2016)

Percutaneous nephrostomy is commonly used as treatment for acute hydronephrosis aiming at preservation of kidney function and evacuation of infected material when it is not possible by the retrograde technique. Drawbacks of externally draining nephrostomy catheters are the risk of infection, drain dislocation, leakage of urine and reduced quality of life. As an alternative technique, percutaneous antegrade insertion of a Double J using ultrasound, fluoroscopic guidance and local or general anesthesia can prevent these complications. (Nunes et al., 2019)

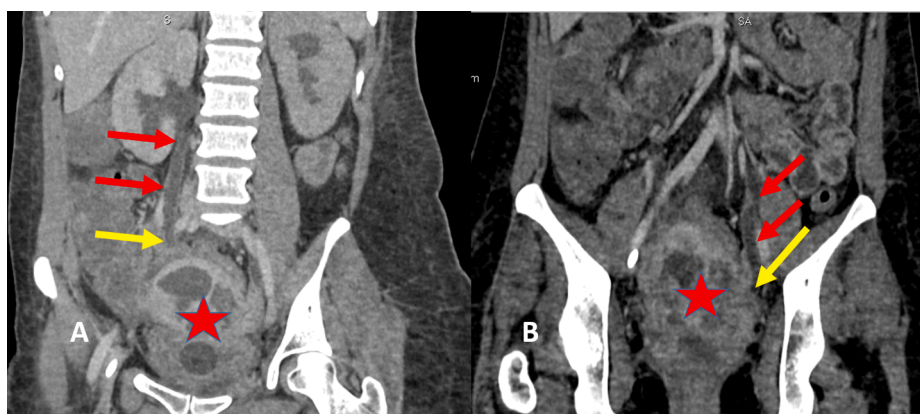
Before the procedure, it is important to review the imaging exams to assess the best access to the renal collecting system, in order to contribute to technical success and to identify complementary factors for the occurrence of adverse events such as the interposition of the colon between the flank and the kidney or hypersplenism.

In all cases, we opted to use the NPAS KIT with a coaxial technique to access the collector system guided by ultrasound and with the patient in a supine position. The access to the middle calyx has been our preference because it offers easier access to the ureteropelvic junction. Another possibility is to pass through the calyx of the lower pole, in a posterolateral region, which provides a safe approach in the avascular region, which can minimize the risk of complications such as bleeding and pneumothorax. However, there may be excessive tortuosity with difficulty in accessing the ureter as well as reducing the torque in the Double J implant. With the definitive access, a urine sample is collected for bacterial analysis and antibiograma, after performed an antegrade pyelography with iodinated contrast under fluoroscopic visualization of the entire urinary tract.

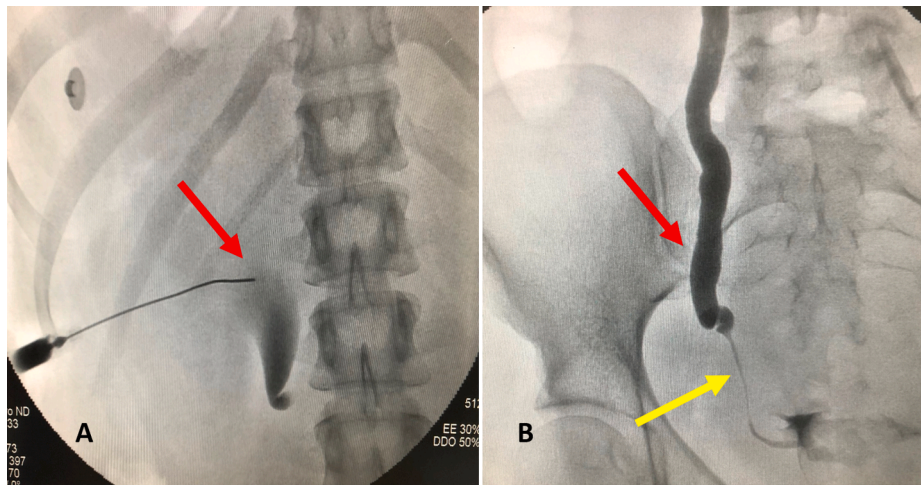
Once access has been established, a hydrophilic guidewire and a diagnostic catheter 4 are introduced, under fluoroscopic orientation, from the collecting system to the bladder and exchanged for an extrastiff thread to support the introduction of Double J. After 24 h, an X-ray is performed to visualize the placement of the Double J and to evaluate the proximal pigtail's format in the renal pelvis. The technical success of the procedure is considered as maintenance of the urinary tract permeability and reduction of hydronephrosis and clinical success as pain relief, improvement of renal function and nitrogenous waste.

In the same way that the retrograde double J implant needs to be changed every 30 to 60 days to avoid encrustation, infection or fracture, the antegrade double J implant has the same approach, but with the advantage of having a guaranteed access and because it is done through the retrograde route by the urology team.

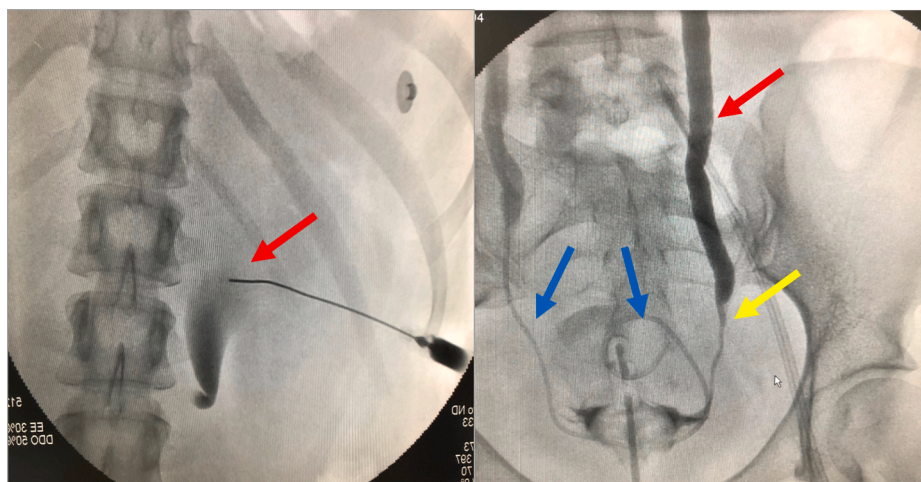
One of the advantages of the antegrade route is the possibility of performing the procedure with local anesthesia and moderate intravenous conscious sedation different of the retrograde approach that requires spinal anesthesia or general anesthesia a diversified arsenal for transposing the lesion as 0.014 “, 0.018” guidewires and the possibility



**Fig. 1. A and B:** Contrast-enhanced coronal computed tomography showing intense bilateral hydronephrosis (red arrow) and occlusion of the distal ureter (yellow arrow) by the pelvic mass (red star) invading both ureteral orifices, rendering cystoscopic double J stenting impossible. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



**Fig. 2. A and B:** Ultrasonography-guided left pelvic puncture followed by iodinated contrast pyelography demonstrating dilation of the renal pelvis, ureter (red arrow) and severe stenosis of the distal ureter. (yellow arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



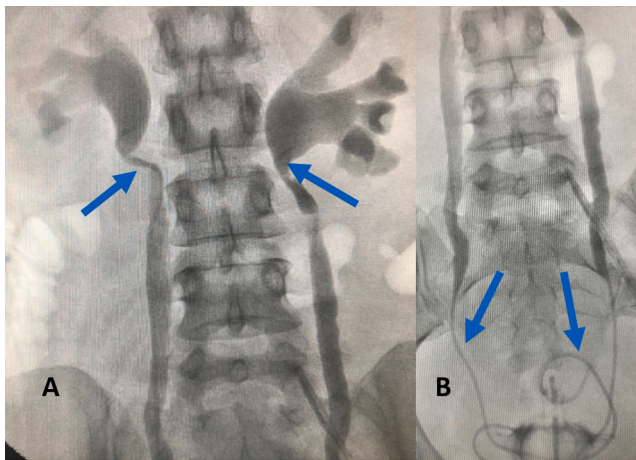
**Fig. 3. A and B:** Ultrasonography-guided right pelvic puncture followed by iodinated contrast pyelography demonstrating dilation of the renal pelvis, ureter (red arrow) and severe stenosis of the distal ureter. (yellow arrow). Double J deployed to the left (blue arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

of pre-dilating the ureter with an expansion balloon diameter of 2 to 4 mm that facilitates the passage of the double J through the obstruction or stenosis, if the double J implant is not possible, the access to the nephrostomy is guaranteed and, finally, allows a new attempt to overcome the obstruction or some stenosis days after the nephrostomy, as there is a possibility of having reduced edema and ureteral inflammation with decompression of the urinary system. (Nunes et al., 2019) In addition, the double-J implant allows a recovery of renal function, prevents acute and chronic renal failure in a cancer patient, improves quality of life without the need for bilateral nephrostomy. Most of the times they are cancer patients with invasion of the ureter or extrinsic compression by a pelvic mass and with palliative or conservative treatment. However, it is possible to implant a percutaneous double-J in those patients who underwent renal transplantation or ureter reimplantation in the bladder with stenosis in the ureterovesical anastomosis, in which the retrograde approach was not possible.

The success rate in antegrade double J implants present an with a high technical success rate acima de 94.7% and a low risk of complications. [3,5] Hyams et al conducted a study comparing the methods and techniques of ureteral drainage in patients with malignant disease with obstruction of the urinary tract from the perspective of urologists

and oncologists in hypothetical situations. They noticed a significant discrepancy when determining initial conduct in patients with obstructive urinary tract. For example, as far as the choice of drainage of the urinary tract is concerned, urologists prefer to try the retrograde route first while oncologists nephrostomy (79% vs. 62%); after nephrostomy urologists believe that there is a risk of migration (48% vs. 18%), for infection oncologists (40% vs. 8%). urologists were more concerned with the impact on quality of life (65% vs. 13%), and oncologists were concerned about the risk of infection (43% vs. 3%). On the other hand, urologists and oncologists agreed that the double ureters increased patient comfort (87% and 93%, respectively) and improved quality of life (95% and 93%, respectively). (Tibana et al., 2019; Nariculam et al., 2009)

The incidence in the literature of complications in the percutaneous double J implant technique was 3,5–37%. (Nariculam et al., 2009; Jalbani et al., 2010; Romero et al., 2005; Shao et al., 2008; Arshad et al., 2006) Contraindications are coagulation disorder, failure of percutaneous access to the kidney and urosepsis. The main complications are perirenal hematoma, inflammation of the skin at the catheter exit site, painful irritation of the bladder trigone (10%), sepsis after double J implant (10.2%), double J encrustation (2 to 17.5%), double J migration



**Fig. 4. A and B:** Postoperative images demonstrate a distal pigtail loop in the bladder and a proximal loop in the renal pelvis. (Blue arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

(7% to 16.3%). (Tibana et al., 2019; Arshad et al., 2006) incorrect positioning of the proximal pigtail within the renal parenchyma leading to renal injury with potential risk of macroscopic hematuria. If the proximal pigtail remains inside the renal parenchyma, the urology team can reposition it via cystoscopy.

### 3. Conclusion

The double-J anterograde percutaneous implant technique is little known and disclosed as an alternative in the failure of the retrograde technique. In this case report, the clinical and laboratory response was satisfactory with anterograde double-J percutaneous implant in a cancer patient, improving the quality of life and providing conditions for the treatment of endometrial cancer.

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This study was not supported by any funding.

### Ethical approval

Not applicable.

### Informed consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent form is available for review by the Editor-in-Chief of this journal.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Not applicable.

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