Laparoscopic management of calcified double-J catheter in thrombocytopenic purpura patient


ABSTRACT

Introduction: Encrustation or calcification of double-J catheters is well-documented. The cause of calcification is multifactorial, and among the known risk factors is that of prolonged catheter indwelling. Catheters should be changed within periods no greater than four months. It is not always possible to identify calcified catheters preoperatively. However, treatment should be rapid and if there is any doubt as to kidney function, renogram should be carried out. If encrustation is minimal, its removal can be attempted under general anesthesia and fluoroscopy, followed by control ureteroscopy.

Clinical case: Patient is a forty-five-year-old woman with past history of thrombocytopenic purpura of eight-year progression, treated with prednisone. Patient sought medical attention at the authors’ hospital with history of stone in the right renal pelvis and two calcified double-J catheters in right collecting system. Upon admittance patient did not present with hematuria or pain and platelet count was 25,000. Plain abdominal computed tomography scan showed 1.5 cm stone in right renal pelvis and two calcified double-J catheters. Endoscopic approach was used to resolve distal loops and laparoscopic right pyelotomy was performed to extract double-J catheters en bloc. Renal pelvic stone was then extracted with the aid of flexible nephroscope.

RESUMEN

Introducción: La incrustación o calcificación de los catéteres JJ está bien documentada. La causa de la calcificación es multifactorial, entre los factores de riesgo conocidos está dejarlos por mucho tiempo. Los catéteres deben cambiarse en un periodo no mayor de cuatro meses. No siempre es posible identificar los catéteres calcificados preoperatoriamente, sin embargo el tratamiento debe ser pronto y si existe duda de la función renal será necesario realizar un renograma. Si la en-crustación es mínima, puede intentarse su retiro bajo anestesia general y fluoroscopia, seguido de ureteroscopia de control.

Caso clínico: Femenina de 45 años, con antecedentes de púrpura trombocytopenica de ocho años de evolución, tratada con prednisona. Acudió a nuestro hospital, con historia de lito piélico derecho y dos JJ calcificados, dentro de su sistema colector derecho. A su ingreso se presentó sin hematuria ni dolor, con recuento plaquetario de 25 000. Se realizó tomografía axial computada (TAC) simple de abdomen, que evidenció lito piélico derecho de 1.5 cm y ambos catéteres doble JJ calcificados. Se realizó abordaje endoscópico para resolución de los rizos distales, se procedió a pielotomía derecha laparoscópica, a través de la cual se extrajeron los dos JJ calcificados en bloque. Posteriormente, se extrajo lito piélico con ayuda de nefroscoPIO flexible y dormía. La paciente evolucionó satisfactoriamente, se
INTRODUCTION

Encrustation or calcification of double-J catheters is well-documented, although recent data report that massive calcification impeding catheter removal only occurs when there are catheter management problems. The cause of calcification is multifactorial and prolonged catheter indwelling, urinary sepsis, history of recurrent lithiasis, chemotherapy, pregnancy, chronic kidney damage, and metabolic and congenital anomalies are among the known risk factors. Prolonged catheter indwelling is one of the most important. Seventy-five percent of catheters have calcification at 6 months and 40% at 4 months. Therefore catheters should not be left in place for longer than 4 months.1

A normal catheter has an extraluminal/intraluminal flow ratio of 60:40. Even catheters placed in normal ureters create partial obstruction.2 Extraluminal obstruction reduces ureteral flow more than intraluminal obstruction (74% with 5 F, 43% with 6 F, and 25% with 7 F for extraluminal obstruction compared with 83% with 5F, 66% with 6 F, and 57% with 7 F for intraluminal obstruction).3 Incrustation is intraluminal obstruction and encrustation is extraluminal obstruction. Incrustation is believed to precede encrustation and therefore catheters continue to function temporarily. Finally total obstruction leads to urinary obstruction and loss of kidney function.4

It is not always possible to identify calcified catheters preoperatively. However, treatment should be rapid and if there is doubt as to kidney function, renogram should be done. If encrustation is minimal, removal can be attempted under general anesthesia and with fluoroscopy, followed by control ureteroscopy. If that fails, extracorporeal shockwave lithotripsy (ESWL) should be performed as primary treatment, directing it toward the most encrusted area and aided by ureteroscopy if necessary, especially if there is synchronous calcification of the distal loop. Eighty-five percent of cases can be resolved in this manner with a mean 1.86 procedures per patient. It may be necessary to use nephrostomy or a second double-J catheter to temporarily resolve kidney obstruction in failed cases, until the definitive solution has been carried out. Percutaneous nephrolithotomy (PNL) has been used as second
line management unless stone burden makes it the necessary primary procedure. Open surgery rarely is necessary and should be used in cases that are resistant to less invasive therapies.\(^1,5\)

In 2009 Acosta et al.\(^6\) developed a catheter calcification grade classification (Figure 1) to simplify their management. It is based on calcification size, location, and degree of encrustation and is defined as follows:

- **Grade I**: minimal linear encrustations in either of the catheter loops
- **Grade II**: circular encrustations that completely surround a loop
- **Grade III**: circular encrustation that completely surrounds a loop plus linear encrustation in the ureteral portion of the catheter
- **Grade IV**: circular encrustations that completely surround both loops
- **Grade V**: circular and diffuse encrustations that completely surround both loops and the ureteral portion of the catheter

Initial CAT scan and encrustation classification is recommended for all patients along with kidney scintigram, and according to its results, nephrectomy is considered if the patient has less than 20% kidney function. In patients with more than 20% kidney function, calcification is treated according to its grade.\(^5\)

## CASE PRESENTATION

Patient is a 45-year-old woman with a past medical history of thrombocytopenic purpura of 8-year progression treated with prednisone. She sought medical attention at the authors’ institution presenting with clinical symptoms of gastroenteritis. Eight months earlier incidental finding of right pelvic stone was managed with double-J catheter in private medical sector with no additional treatment. Later, the device calcified, causing pain, and the patient sought treatment in the public health sector and another double-J catheter was placed and patient was referred to the authors’ institution for treatment. Upon admittance patient did not present with hematuria or pain or signs of bleeding and her platelet count was 25,000. Plain abdominal film and CAT scan were taken that showed a 1.5 cm right pelvic stone, 2 calyceal stones measuring less than 1 cm, and calcification of both double-J catheters, with 1080 Hounsfield units (HU) (Figure 2). Diethylenetriamine penta-acetic acid (DTPA) kidney scintigram showed glomerular filtration rate of left kidney (GFRL) of 25 mL/min (25%) and glomerular filtration rate of right kidney (GFRR) of 76 mL/min (75%). Patient was programmed for

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**Figure 1.** Forgotten, Encrusted and Calcified (FECaI) classification system for ureteral catheters.
elective surgery and received 2 intraoperative apheresis transfusions. Initial cystoscopy fragmented distal loop calcifications (Figure 3). Later right laparoscopic pyelotomy was done through which the two calcified double-J catheters were removed en bloc (Figures 4A and 4B). Following that the pelvic stone was removed with the aid of flexible nephroscope and Dormia basket (Figure 5). The patient progressed satisfactorily and right double-J catheter was removed one month after surgical procedure. Patient is presently asymptomatic and has had no lithiasis recurrence up to now (Figures 6A and 6B).

**DISCUSSION**

A catheter is defined as forgotten, calcified, or encrusted when it cannot be extracted by cystoscopy on the
first attempt without the aid of auxiliary equipment.\(^7\) Associated complications include infection, catheter fracture, ureteral obstruction, and loss of kidney function.\(^8,9\) Calcified double-J management is one of the most problematic and difficult challenges for the urologist. A combination of multiple methods such as ESWL, *in situ* ureterolithotripsy, and percutaneous procedures such as open surgery is required to resolve such cases. Despite not being widely used, laparoscopic approach is an excellent minimally invasive option that can resolve complex cases in a single procedure and it allows for simultaneous endoscopic approach for resolving distal loop calcification.

Prevention continues to be a key management element. Patient education is foremost in which the temporary nature of the catheter, the need for follow-up, and the risks involved are all explained. Early catheter replacement (before 4 months) should be carried out in patients that are pregnant, have congenital anomalies, cancer, or long-term catheter use.\(^5,6\) There have been reports on biodegradable catheters, but they have presented the defects of particle migration and incomplete dissolution.\(^5\)

Treatment should always be individualized, based on encrustation grade and patient characteristics.

**CONCLUSIONS**

It is of the utmost importance for the attending urologist to explain catheter calcification risk to the patient if catheter is to be used for a prolonged period of time and to also explain follow-up procedures to avoid complications. Laparoscopic approach is an excellent management option in these cases.
REFERENCES