VIDEOABSTRACT

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Calyceal migration of vascular embolization coils used to treat massive hemorrhage following percutaneous nephrolithotomy: an endoscopic finding during repeat percutaneous nephrolithotomy

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Percutaneous nephrolithotomy (PCNL) is a well-established procedure for renal stones. Whilst minor bleeding is common after PCNL, major hemorrhage is a rare complication (0.6–2.6%) for which angiographic renal artery embolization (RAE) is the treatment of choice.

RAE was initially developed in the 1970s for palliation for unresectable renal tumors and nowadays is a widely used treatment for different renal or vascular diseases such as embolization of renal angiomyolipomas, occlusion of renal arterio-venous fistulae, treatment of renal artery aneurysms, vascular malformations and acute renal bleeding control.

A variety of embolic agents such as metal coils, particulate or sclerosing agents (liquids, foams) are available. The selection of the embolic material depends on several factors such as vessel size, vascular anatomy and hemodynamics. In case of acute renal hemorrhage, metal coils are more often used but can sometimes migrate or erode into the collecting system. Coils can appear in the collecting system early or years after the procedure. This foreign body can, in some cases, encrust or dislodge causing symptomatic ureteric obstruction.

We report a case of an endocoil placed after a PCNL bleeding complication that eroded into the collecting system, diagnosed during a secondary approach by mini-percutaneous nephrolithotomy (mPCNL).

A 65-year-old female patient with past medical history of total hysterectomy for cervical cancer in 1994 and adjuvant radiotherapy, radiation-induced cystitis with paroxystic events of macroscopic hematuria and laparoscopic left nephrectomy for renal cell carcinoma pT1a in 2015, was diagnosed with a right renal stone causing ureteropelvic junction obstruction and anuria in 2017. A nephrostomy tube was placed and renal function recovered to its baseline (serum creatinine of 2 mg/dl, estimated glomerular filtration rate (eGFR) of 27 ml/min/1.73 m^2).

In February 2018, the patient was scheduled for a PCNL. Retrograde access was not possible due to a long distal radiation-induced ureteral stricture. Dilation of the previously established lower pole percutaneous tract was performed by using a 30F

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balloon and the corresponding Amplatz sheath was advanced into the right collecting system. On advancement of the nephroscope, massive bleeding was encountered and the procedure was aborted, placing a tamponade catheter through the tract. The patient was immediately referred to vascular surgery who performed angiography that demonstrated bleeding from a segmental branch in the interpolar region with a pseudoaneurysm sac. A selective embolization with 4 mm x 60 mm, followed by a 4 mm x 120 mm and a 4 mm x 100 mm detachable coils was made and final angiography showed satisfactory hemostasis with occlusion of the proximal feeding vessel, no further filling of the pseudoaneurysm sac, and no extravasation of contrast.

The patient was then kept on nephrostomy drainage, but as renal function progressively deteriorated and obstruction of the nephrostomy tube frequently occurred, she was referred to our unit for further treatment.

A computed tomography (CT) scan revealed 13 mm x 13 mm middle calyx and 18 mm x 16 mm lower calyx stones (770 Hounsfield Units) and dilated ureter until the crossing with the illiac vessels; endocoils were located in the inferior aspect of the kidney. Estimated GFR was 16 ml/min/1.73 m^2.

The patient underwent a mPCNL in the Valdivia position in June 2019. Pyelography was performed through the lower pole nephrostomy tube. A 17.5F access to the upper calyx was performed under combined ultrasound and fluoroscopic guidance. A 12F mini-nephroscope was inserted and partial fragmentation of the lower calyx stone protruding into the renal pelvis was done. Insertion of a flexible ureteroscope through the percutaneous sheath allowed complete ablation of the stone in the lower calyx using a 270 μm Holmium LASER fiber. Endocoils in the inferior calyx with very tiny calcifications were then visualized but not removed. A narrow infundibulum to the middle calyx harboring stone did not allow the passage of the flexible ureteroscope. An additional access of 16F was established to the middle calyx and stone clearance was achieved. Antegrade flexible ureteroscopy confirmed the long right ureteral stenosis. A nephrostomy tube was placed through the middle calyx tract at the end.

Post-operative course was uneventful. Pre-operative urine culture was negative but stone culture was positive for Enterococcus faecalis and Morganella morganii. Infrared spectroscopy analysis depicted a 20% struvite + 80% apatite stone. Post-operative KUB showed no signs of urolithiasis.

Massive hemorrhage is a known and feared complication of PCNL. In some cases of massive hemorrhage, arteriography is inadequate to identify the source of hemorrhage, and nephrectomy may be required to stop the bleeding. According to the largest series of renal embolization, clinical stabilization was achieved in 84% of the cases. However, foreign bodies used can migrate or extrude causing encrustation, infection, urinary obstruction, hematuria and fistula formation.

It is well known in urology that foreign bodies in the urinary system act as calcification cores and their removal seems essential in preventing stone recurrence. This case was unusual in that an intra-arterial device had presumably migrated or eroded into the collecting system of the kidney without encrustation at the time of diagnosis. Several concerns regarding coil removal were described. It is important to perform a simultaneous arteriography with placement of an arterial occlusion balloon while removing the coil to prevent sudden massive bleeding. Because of the short interval that had occurred since the embolization procedure and absence of coil calcification, we were concerned about hemorrhage resulting from extraction of the coil so we decided to leave it in place. However, it remains to be seen whether further stone or coil calcification will occur.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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