Case Report

Ureteroarterial fistula embolization by transradial approach: A case report ☆

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A B S T R A C T

Ureteroarterial fistula is a rare condition wherein a communication develops between a ureter and the common, internal, or external iliac artery. Localizing the fistula can be difficult, as cystoscopy, CT angiography, and conventional angiography have low sensitivity in identifying the fistula. Provocative maneuvers within the ureter, however, can aid in the visualization of fistulae on angiography. Prior reports of endovascular repair have utilized transfemoral access, which makes performing concurrent provocative maneuvers in the ureter challenging. We present a case of successful endovascular ureteroarterial fistula localization and embolization in an 80-year-old woman with recurrent gross hematuria by the transradial approach, aided by concurrent provocative maneuvers performed via cystoscopy. The transradial endovascular approach facilitated a multi-disciplinary joint procedure that resulted in effective treatment of the patient.

Introduction

Ureteroarterial fistula is a rare condition with only around 150 cases reported in the literature to date [1]. Pathophysiology involves the development of a fistulous communication between the ureter and the common, external, or internal iliac artery in response to the prolonged presence of a ureteral stent or secondary to pelvic malignancy, surgery, or radiation [2]. In patients who have undergone urinary diversion, the fistula can also involve the distal aorta [1]. Hematuria and flank pain are the most common initial presentations. Evaluation by cystoscopy and CT fail to identify the fistula in up to 60% of cases, whereas digital subtraction angiography (DSA) has a reported sensitivity of 69% [3]. Provocative maneuvers involving scraping of the ureter using a balloon can aid in the visualization of the fistula on angiography or ureterography, but must be done with care due to possible massive hematuria [4]. Endovascular management is associated with reduced morbidity compared to surgery and can be achieved by either stent-graft placement or coil embolization, although embolization is preferred in fistulae involving the internal iliac artery [5]. Previously reported ureteroarterial fistula repairs were performed via a transfemoral approach; however, transradial access has
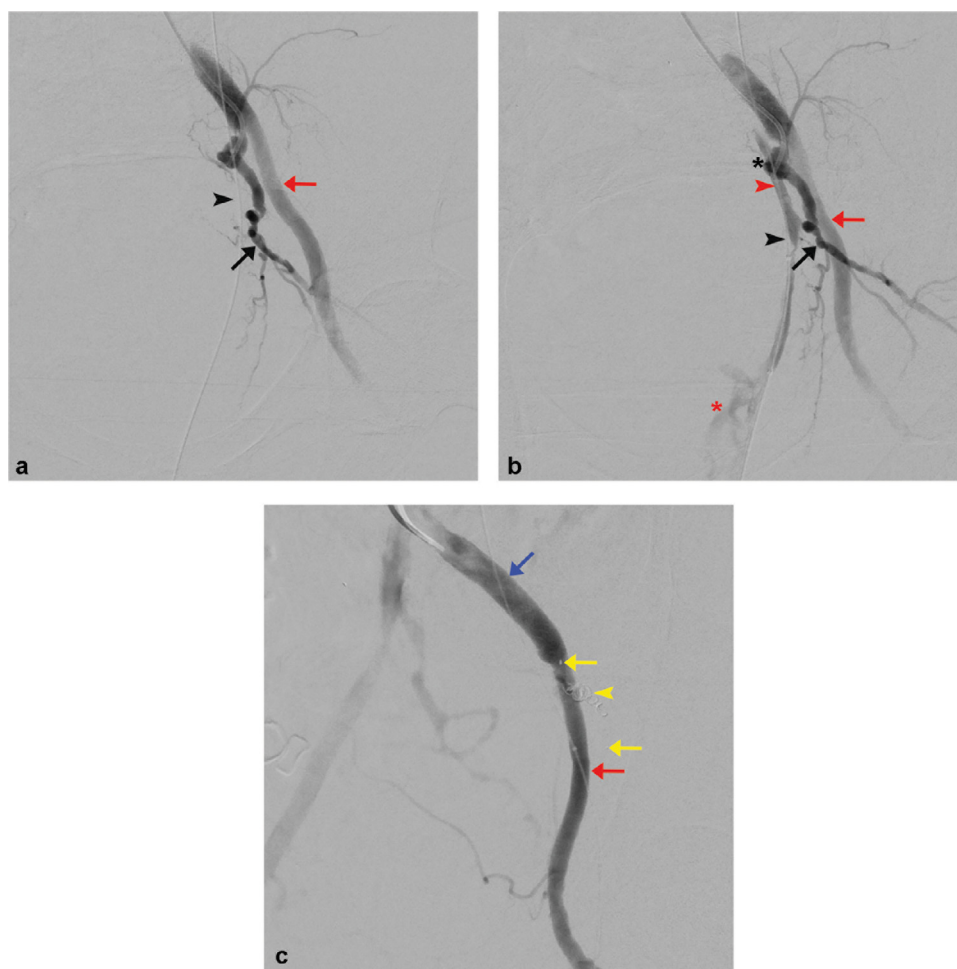

Fig. 1 – Intraprocedural left iliac artery angiography. (A) DSA of the left external (red arrow) and internal (black arrow) iliac arteries with the ureteral Fogarty balloon inflated (black arrowhead). (B) DSA of the left external (red arrow) and internal (black arrow) iliac arteries immediately following deflation of the ureteral Fogarty balloon (black arrowhead) shows contrast flowing through the ureteroarterial fistula (black asterisk) through the ureter (red arrowhead) and into the bladder (red asterisk). (C) DSA of the left common (blue arrow) and external (red arrow) iliac arteries following MVP (yellow arrows) and coil (yellow arrowhead) embolization of the internal iliac ureteroarterial fistula shows no contrast flow into the internal iliac artery, ureteroarterial fistula, or ureter. (Color version of figure is available online.)

been gaining popularity for endovascular procedures due to low morbidity [6]. Here, we report a case of ureteroarterial fistula embolization by the transradial approach.

Case report

The patient is an 80-year-old woman with a history of uterine carcinosarcoma treated 6 years ago with total robotic hysterectomy, bilateral salpingo-oophorectomy, regional lymph node dissection, and whole pelvis external beam radiation with subsequent no evidence of disease. Her history was also significant for a retrograde JJ stent placement for left hydroureteronephrosis 3 years prior to presentation. She presented to our institution with intractable gross hematuria in the setting of multiple recent admissions and extensive workup for gross hematuria– including CT, CT angiography, cystoscopy, and retrograde pyelogram – that failed to localize the source of her bleeding. The hematuria was refractory to recent bilateral internal iliac artery Gelfoam embolization and empiric left common iliac artery stent graft placement. Nonetheless, there was a high degree of suspicion for a left-sided ureteroarterial fistula given persistent severe gross hematuria despite the aforementioned interventions. In order to identify the source of bleeding, a plan was devised for angiography with provocative measures in collaboration between Interventional Radiology and Urology services.

With the patient under general anesthesia, left radial access was obtained by ultrasound guidance using a 21G x 3.5 cm needle. A 0.021in guidewire was advanced under fluoroscopy, and the access needle was exchanged for a 5F Glidesheath Slender (Terumo, Tokyo, Japan). The guidewire was exchanged for a 125cm, 5F Glidecath vertebral catheter (Merit Medical, South Jordan, UT) and Glidewire (Terumo), which were advanced through the thoracic aorta and into the left internal

iliac artery under fluoroscopic guidance. Concurrently, a 22F rigid cystoscope was introduced into the bladder by the urology team, with blood clots noted within the bladder. The indwelling left ureteral stent was then removed over a Sensor wire (Boston Scientific, Marlborough, MA) without evidence of acute hemorrhage. A Fogarty balloon (Edwards Lifesciences, Irvine, CA) was introduced over the wire and placed in the left ureter just inferior to the left common iliac artery, which was visible due to the prior arterial stent placement, as above. The balloon was inflated to 10F and DSA was performed of the left internal iliac artery without evidence of extravasation or fistula (Fig. 1A). Repeat DSA was performed immediately upon balloon deflation and 5cm retraction distally into the left ureter, demonstrating a brisk fistulous connection between the proximal left internal iliac artery and the left ureter, with contrast opacifying the ureter and emptying into the bladder (Fig. 1B). In an attempt to tamponade the active hemorrhage, the Fogarty balloon was re-inflated at the location of the communication. The vertebral catheter was advanced within the internal iliac artery distal to the fistula. Embolization of the left internal iliac artery distal to the fistula was performed with a 5 mm MVP 5Q vascular plug (Medtronic, Minneapolis, MN) and proximal embolization was with a 7 mm MVP 7Q plug (Medtronic). Contrast angiography revealed residual filling of the artery between the plugs. The vertebral catheter was exchanged for a 150 cm, 2.4F Progreat microcatheter (Terumo) and two 5 mm Nester coils (Cook Medical) were deployed between the MVPs. Repeat angiography showed complete left internal iliac occlusion, and DSA with the Fogarty balloon deflated confirmed absence of contrast filling the ureter (Fig. 1C). The left external iliac was visualized and noted to be patent. Wire, catheter, and access sheath were withdrawn and radial hemostasis was achieved with a TR band (Terumo). The Fogarty balloon was removed and an 8F x 22 cm JJ ureteral stent (Boston Scientific) was placed from the left renal pelvis to the bladder. Residual blood in the bladder was evacuated and cystoscopy did not identify continued bleeding. A 24F Rusch hematuria catheter (Bard Medical, New Providence, NJ) was placed in the bladder, which was irrigated for 24 hours with subsequent complete resolution of gross hematuria. She remains free of gross hematuria at 2.5 years postprocedure.

Discussion

This case demonstrates the safety and efficacy of the transradial endovascular approach for treating ureteroarterial fistulae, in addition to the importance of multidisciplinary collaboration in successful treatment outcome. In this patient, initial imaging, including CT and several sessions of conventional angiography, failed to identify the fistula, likely secondary to tamponade by the presence of an indwelling ureteral stent. By removing the stent over a wire via a retrograde approach and after inflating and subsequently deflating and withdrawing a balloon within the ureter, we were able to visualize the fistula, which helped to guide treatment. Re-inflation of the balloon within the ureter allowed for temporary hemostasis so that embolization could be performed in a controlled fashion. Furthermore, the transradial approach facilitated intraprocedural collaboration with our urology colleagues, since the lithotomy position required for cystoscopy and ureteral provocative maneuvers did not interfere with arterial access at the wrist. Thus, this case demonstrates the importance of collaboration between interventional radiologists and urologists in the diagnosis and management of ureteroarterial fistulae, given the utility of provocative measures in localizing the communication [1]. Unfortunately, data on long-term outcomes following endovascular ureteroarterial fistula repair are currently lacking, though 1 study has demonstrated noninferiority compared to surgery [7].

Patient consent

Informed consent was obtained from the patient/patient's representative for publication of this case report.

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