Bilateral renal forniceal rupture due to retroperitoneal hematoma after femoral venous access

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ABSTRACT

Retroperitoneal hematoma is a potential complication of femoral venous access that rarely leads to bilateral ureteral obstruction. We present the case of a 73-year-old woman who underwent an ablation procedure for atrial fibrillation complicated by laceration of an aberrant obturator artery during femoral venous cannulation, leading to a compressive retroperitoneal hematoma, bilateral ureteral obstruction, acute renal failure, and renal forniceal rupture. The patient was successfully treated with embolization of the inferior epigastric artery and aberrant obturator artery, hematoma evacuation, and ureteral stent placement. This case illustrates a rare complication of arterial laceration during femoral venous access without ultrasound guidance. (J Vasc Surg Cases and Innovative Techniques 2020;6:143-6.)

Keywords: Forniceal rupture; Retroperitoneal hematoma; Vascular access

Major hematoma is a potential complication of femoral venous access, occurring in 1.3% of cases and typically associated with inadvertent arterial injury.[1] Rarely, major retroperitoneal hematomas can cause bilateral ureter obstruction, as reported in cases such as pelvic fracture and anticoagulation-associated bleeding.[2,3] Forniceal rupture is a rare complication of ureteral obstruction, with the majority of cases being unilateral.[4] We present a case of bilateral renal forniceal rupture due to retroperitoneal hemorrhage secondary to laceration of an aberrant obturator artery during femoral venous cannulation for a cardiac electrophysiology procedure. The patient consented for publication.

CASE REPORT

A 73-year-old woman with a past medical history of hypertension, coronary artery disease, and symptomatic atrial fibrillation managed with warfarin therapy was admitted for an elective complex ablation procedure. Warfarin was held for 3 days, and international normalized ratio was 1.9 before the procedure. Vascular access was obtained using landmarks and palpation of the arterial pulse. This included a 5F and 7F sheath in the left common femoral vein and a 7F and 9F sheath in the right common femoral vein, all placed uneventfully on the first attempt. Arterial access (5F) was obtained in the right common femoral artery. During the procedure, the 5F venous sheath was exchanged for an 8.5F sheath. Heparin was administered to achieve an activated clotting time between 350 and 400 seconds throughout left atrial access with full protamine reversal at completion. No complications were observed during the procedure.

In the recovery area, the sheaths were sequentially pulled after confirmation of an activated clotting time <160 seconds. Immediately after removal of the left-sided femoral venous sheaths, the patient became progressively hypotensive, requiring resuscitation and vasopressor support. A vascular surgery consultation was obtained immediately. Physical examination revealed left lower quadrant abdominal distention, tenderness, and palpable femoral pulses. Computed tomography angiography revealed a large acute hematoma in the retroperitoneal and preperitoneal space measuring 15 × 15 cm, causing compression of the urinary bladder and the left external iliac artery. Active extravasation was noted from a branch off the proximal left inferior epigastric artery, later determined to be the origin of an aberrant obturator artery (Figs 1 and 2). The hemoglobin concentration decreased from the preoperative level of 12.7 mg/dL to 5.8 mg/dL.

Emergent angiography was performed with embolization at the site of extravasation using a 3-mm Tornado coil (Cook Medical, Bloomington, Ind) along with two 3-mm × 5-cm Ruby coils (Penumbra, Alameda, Calif) at the origin of the left inferior epigastric artery.

After the procedure in the intensive care unit, she experienced increasing abdominal pain and developed an ipsilateral femoral nerve neuropathy with diminished femoral pulse. Therefore, she was taken to the operating room for decompression. On entering of the abdomen through a left lower quadrant incision, a pressurized collection of clear fluid was encountered, followed by 2000 mL of blood and clot. The origin of the initial fluid was unclear. No hematuria was present in the Foley catheter, implying no bladder injury. After decompression, the pulse improved, and no bleeding was noted. A 19F round Blake drain was placed, and she was readmitted to the intensive care unit.

Once again, she decompensated hemodynamically. Multiphasic computed tomography angiography was done.

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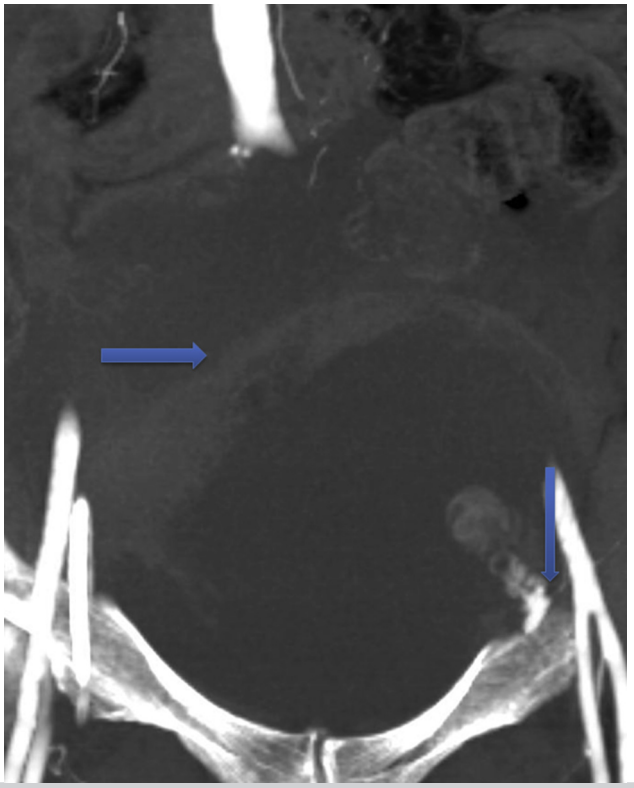

Fig 1. Coronal multiplanar reconstruction of computed tomography angiography image demonstrating the site of active extravasation off the aberrant obturator artery (*vertical arrow*) and the expanding retroperitoneal hematoma (*horizontal arrow*).

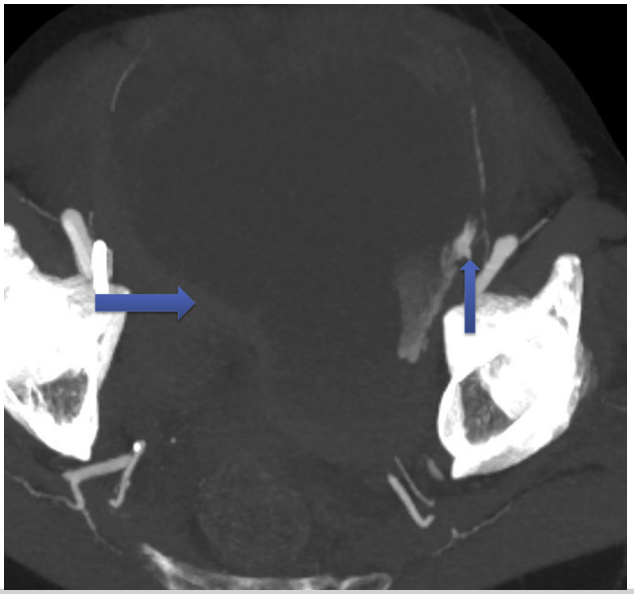

Fig 2. Axial multiplanar reconstruction of computed tomography angiography image demonstrating the site of active extravasation off the aberrant obturator artery (*vertical arrow*) and the expanding retroperitoneal hematoma (*horizontal arrow*).

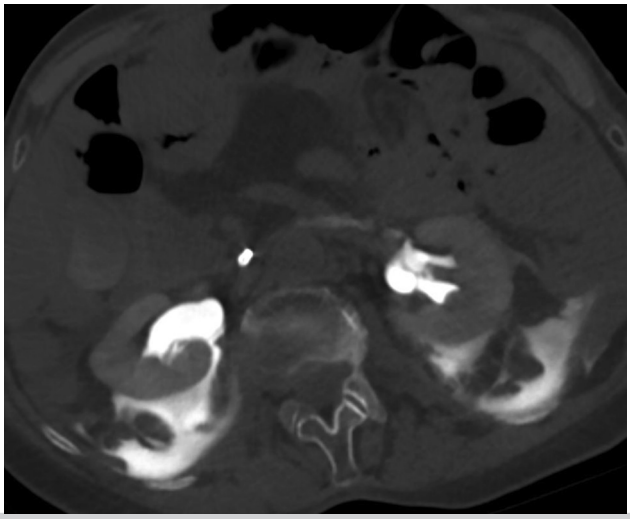

Fig 3. Axial non-contrast-enhanced computed tomography image demonstrating distention and opacification of the bilateral renal collecting systems (from previous administration of contrast material) with bilateral extravasation of contrast material compatible with bilateral renal forniceal ruptures (related to the obstructed bilateral ureters from the massive retroperitoneal hematoma).

The pre-contrast-enhanced phase demonstrated opacification of the bilateral renal collecting systems from previous administration of contrast material, with hydroureterectasis and bilateral extravasation of contrast material surrounding the renal sinuses consistent with forniceal rupture (Fig 3) despite the presence of a Foley catheter (Fig 4). The arterial contrast phase demonstrated active extravasation due to backbleeding at the previous site of extravasation.

Angiography confirmed bleeding through collateral supply off the anterior division of the internal iliac artery, which was reached with an Echelon 14 microcatheter (Medtronic, Minneapolis, Minn) and successfully treated with multiple 2-mm Axium coils (Medtronic; Fig 5).

The urology service was consulted for forniceal rupture. Despite adequate resuscitation and hemodynamic stabilization, she continued to be anuric with progressive acute renal failure (creatinine concentration peak, 2.02 mg/dL). Given the deterioration in renal function, the urology team placed bilateral ureteral double-J 6- × 28-mm stents. After this, renal function normalized. No antibiotic treatment was administered other than preoperative prophylaxis. The drain was removed on postoperative day 5. She was discharged home on postoperative day 8 with therapeutic international normalized ratio on warfarin. Follow-up imaging revealed no further extravasation from the renal collecting system. The ureteral stents were removed by the urology service. At follow-up with the vascular surgery service 10 weeks after discharge, she was doing well with no further sequelae.

DISCUSSION

Renal forniceal rupture is a potential complication of ureterovesical obstruction due to increased pressure in

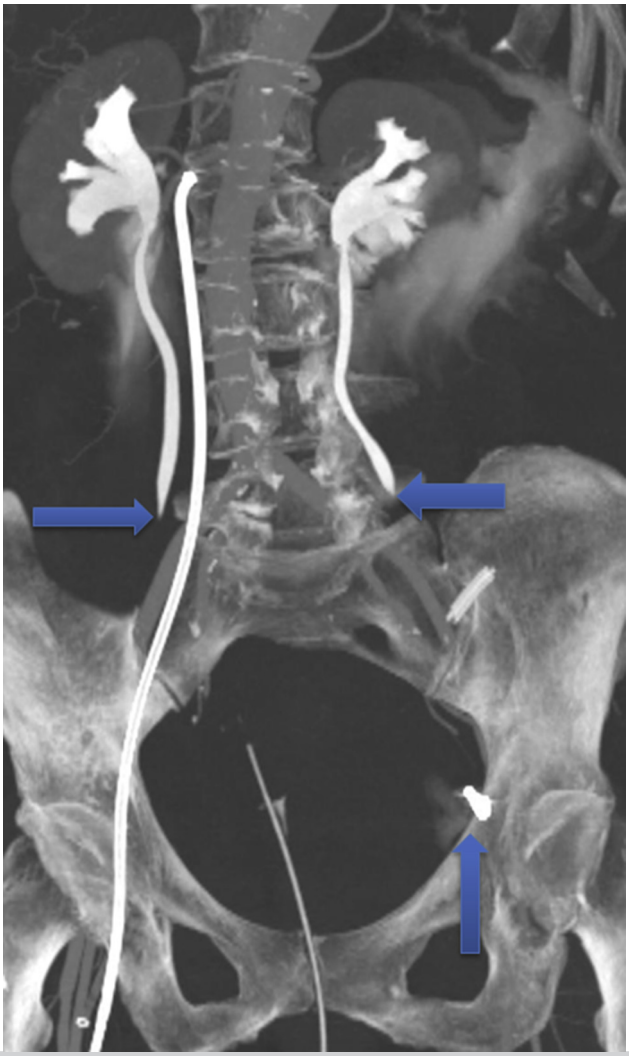

Fig 4. Coronal multiplanar reconstruction of computed tomography angiography image demonstrating persistent or recurrent site of active extravasation off the aberrant obturator artery through accessory or collateral filling from the anterior division of the internal iliac artery despite coils at the origin of the vessel and in the inferior epigastric artery (*vertical arrow*). In addition, the hematoma can be seen obstructing bilateral mid to distal ureters (*horizontal arrows*). A Foley catheter and right femoral venous central vein catheter may also be noted.

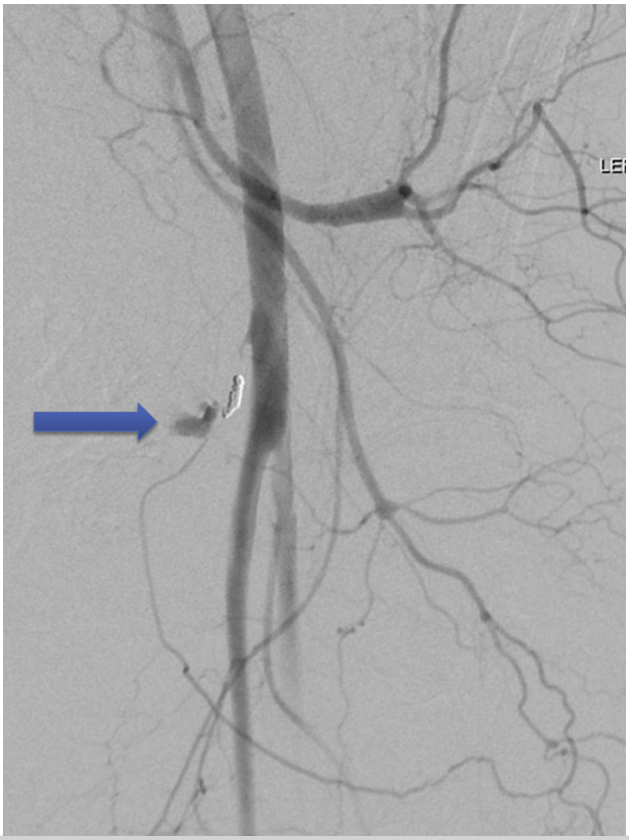

Fig 5. Catheter-based left iliac arteriogram demonstrating persistent or recurrent site of active extravasation off the aberrant obturator artery through accessory or collateral filling from the anterior division of the internal iliac artery (*arrow*).

the pyeloureteral system. The most common cause of obstruction is ureteral stones.[4] An unusual cause of bilateral ureteric obstruction is retroperitoneal hematoma, and to our knowledge, there is none occurring after femoral venous access.[2,3]

Management of renal forniceal rupture ranges from conservative to surgical. Studies have shown that conservative management, with intravenous fluids, analgesics, and optional tamsulosin administration for stone passage, is safe and provides adequate treatment of uncomplicated forniceal rupture.[5,6] The most common intervention is ureteral stenting, which has been recommended for patients experiencing complications, such as persistent obstruction, urinoma, or abscess, and for patients in an unstable condition.[7]

In our case, the mechanism of obstruction was the acute formation of a massive retroperitoneal hematoma after removal of the venous sheath that had traversed through the aberrant obturator artery. This caused compression of the distal ureters bilaterally with anuria ensuing, despite Foley catheter placement, and pressurization of the collecting system to the point of rupture. With progressing symptoms after embolization and surgical decompression, repeated computed tomography facilitated the diagnosis of continued bleeding, bilateral hydroureterectasis, and renal forniceal ruptures. She responded well to repeated embolization; but with continued anuria and acute renal failure, conservative management was no longer appropriate, and ureteral stents were placed.

An aberrant obturator artery has been described previously as seen in 21% of specimens in the largest series to our knowledge.[8] Its presence in this case facilitated a severe, unusual complication from a normally safe procedure.

Femoral venous access is performed often by electrophysiologists, commonly by use of anatomic landmarks and palpation of the arterial pulse, as was done in this case. This anatomy can be variable, however, and give rise to complications.[9] Femoral access complications are the most common cause of adverse events for electrophysiology procedures, with major hematoma being reported in 0.7% to 1.4% of cases, most commonly due to puncture of an adjacent artery.[10-12] The use of ultrasound has been shown to improve the complication rate of vascular access, to reduce the number of unsuccessful attempts, to reduce the risk of bleeding, and to reduce the likelihood of inadvertent arterial puncture.[9,13] Despite this, ultrasound for vascular access in electrophysiology procedures has not become a widespread standard of care.[14] Although the vascular access complication in this case may still have occurred with ultrasound guidance, it would have provided an opportunity to identify and to avoid the aberrant artery.

CONCLUSIONS

Bilateral renal forniceal rupture due to retroperitoneal hemorrhage and bilateral ureteral obstruction is an unusual complication of femoral venous access. When it occurs, active bleeding must be addressed with consideration of hematoma decompression and ureteral stent placement to avoid further sequelae of obstructive uropathy. The inadvertent arterial laceration of the aberrant obturator artery in this case may have been prevented with ultrasound-guided vascular access.

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