Endoscopic diagnosis of renal pseudoaneurysm following ureteroscopy

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Renal pseudoaneurysm following ureteroscopy is a rare cause of hematuria usually diagnosed and treated with angiography and embolization. Here we present a case of a small pseudoaneurysm causing intermittent flank pain and gross hematuria associated with clot retention initially diagnosed during ureteroscopy and subsequently treated with a combined endourologic and endovascular approach.

Key Words: renal pseudoaneurysm, ureteroscopy

Introduction

Renal pseudoaneurysm following ureteroscopy is an exceedingly rare but serious complication, with only five prior case reports in the literature.[1-5] Most commonly, patients present with gross hematuria, flank pain, and/or anemia. Angiography typically confirms the diagnosis and coil angioembolization is the preferred treatment. Here, we describe a case of a woman who was diagnosed via ureteroscopy with a pseudoaneurysm 5 months after ureteroscopy with laser lithotripsy. She was subsequently successfully treated with coil embolization during simultaneous ureteroscopic localization of the pseudoaneurysm. To our knowledge, this is the first case of intrarenal pseudoaneurysm diagnosed primarily by ureteroscopy and treated with a combined endourologic and endovascular approach.

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Case report

A 62-year-old woman with a history of gastric cancer on paclitaxel and ramucirumab was initially referred to urology for an obstructing 8 mm right ureteropelvic junction stone seen on surveillance CT scan. She underwent uncomplicated ureterorenoscopy and holmium laser lithotripsy using an 8F flexible ureteroscope and 200 micron laser fiber.

Five months later, she presented to the emergency department with flank pain, gross hematuria, and clot retention. Her hematuria resolved after 1 day of continuous bladder irrigation. Work up with three-phase hematuria protocol CT scan revealed a small ureteral calculus in the right distal ureter which was initially presumed to be the cause of her hematuria.

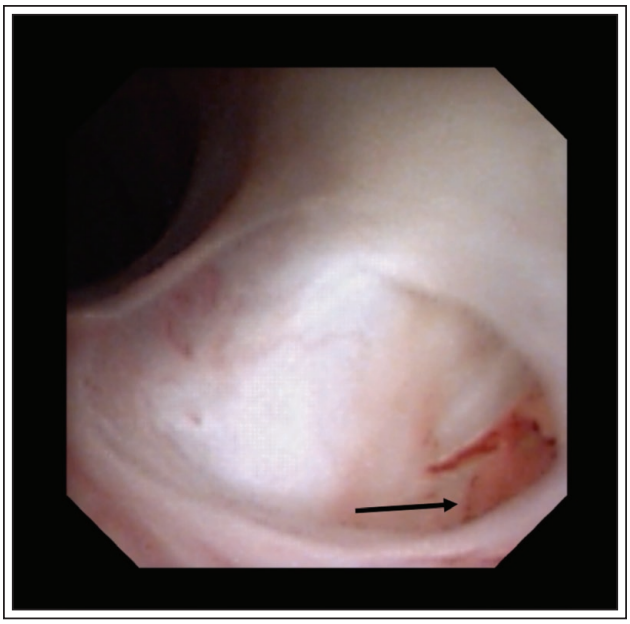

Figure 1. The pseudoaneurysm seen endoscopically. The small structure indicated by the arrow pulsated synchronously with the patient's heartbeat. There is a thin blood clot attached to the pulsatile vessel.

A right ureteral stent was placed and primary ureteroscopy was deferred due to a positive urine culture. She presented two more times in the span of 1 week with severe flank pain, hematuria, and clot retention. Each time the hematuria resolved quickly after initiation of bladder irrigation.

Right ureteroscopy and laser lithotripsy was then performed. After successful treatment of the distal ureteral stone, upon entering the kidney, a large amount of clot was visualized but was able to be evacuated with aspiration through the ureteroscope. Systematic inspection of the collecting system revealed a small, red, pulsatile structure in the renal pelvis just off of an interpolar calyx concerning for a vascular abnormality, Figure 1. The rest of the kidney was unremarkable. Considering these findings, interventional radiology was consulted for angiographic evaluation of the kidney, but this showed no abnormalities. One day after angiography, she had another episode of severe flank pain and gross hematuria. Emergent CT angiogram (CTA) showed a very small focus of active bleeding into the right collecting system, Figure 2. She was urgently taken to the interventional radiology suite for angiography but it was again read as negative. Ureteroscopy was then performed while still in the radiology suite to visualize the vascular abnormality endoscopically and aid in localization. CTA images, prior saved intraoperative fluoroscopic images, Figure 3-left, and current fluoroscopic images were then compared with the right renal angiogram. A subtle (roughly 0.5 mm) abnormality in a mid-pole segmental artery was then identified corresponding to the CTA and endoscopic localization. This vessel was embolized with a 3 mm x 4 cm Azur detachable coil followed by 3 mm x 2 cm nondetachable Tornado coil, Figure 3-right. She has had no further episodes of hematuria in 5 months since this procedure.

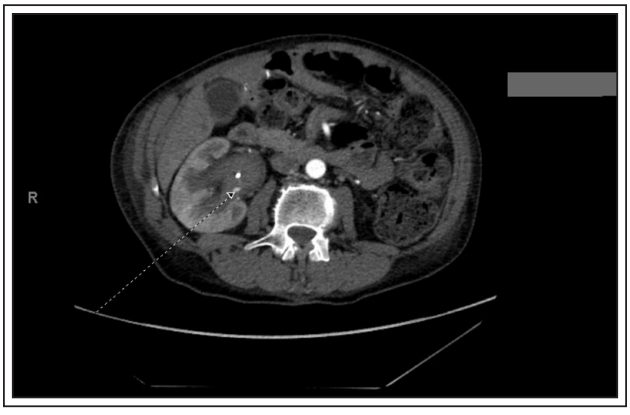

Figure 2. CT angiogram demonstated a small area of extravasation in the right kidney. The location was similar to where the pseudoaneurysm had been seen endoscopically.

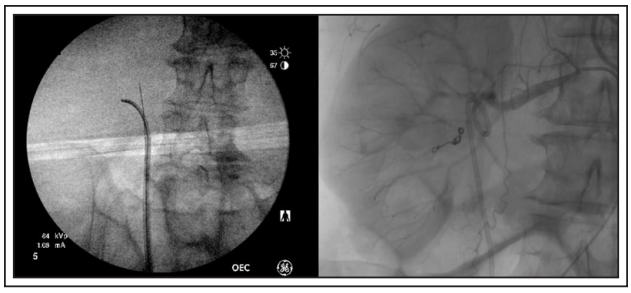

Figure 3. Left. The location of the pseudoaneurysm seen fluroscopically. **Right.** After localizing the vessel's location using a combination of ureteroscopy and CT angiograpahy, a coil was placed in the midpole segmental artery.

Discussion

Renal pseudoaneurysms can occur after trauma, renal surgery, and percutaneous procedures, or in the setting of inflammatory or neoplastic processes. The etiology of post-ureteroscopy pseudoaneurysm likely stems from trauma related to high-pressure irrigation fluid, guidewire insertion, or laser proximity to parenchyma.[6]

Post-ureteroscopy pseudoaneurysms are extremely rare with only five case reports present in the literature.[1-5] In each of these cases, patients presented with hematuria within 2 months of the procedure and the pseudoaneurysm was detected initially by angiography. Our patient was unique in that her hematuria developed five months after ureteroscopy and the pseudoaneurysm was discovered endoscopically.

Anti-VEGF monoclonal antibodies such as ramucirumab may have also contributed to the development of a pseudoaneurysm in the patient described. Multiple case reports have described a possible association between anti-angiogenic immunotherapy and pseudoaneurysms.[7,8] Although the precise mechanism is not known, nonphysiologic apoptosis of endothelial cells may predispose vessels to endothelial damage and subsequent vascular abnormalities.[8] If this were true, even very small parenchymal injuries (e.g from guidewire-associated trauma) in patients on anti-VEGF immunotherapy could progress to pseudoaneurysms.

This report demonstrates that negative angiography does not necessarily exclude a vascular abnormality. CTA and repeat angiography are reasonable subsequent diagnostic steps in persistently symptomatic patients in whom pseudoaneurysm is suspected. There are no studies which define the absolute specificity and/or sensitivity of CTA or conventional digital subtraction angiography (DSA) for detecting renal pseudoaneurysms. In a study of 41 patients with nonmalignant renal hemorrhage by Jain et al 14.6% of the cohort did not have a demonstrable vascular lesion on DSA and required more invasive therapies (including nephrectomy and surgical exploration of a nephrostomy tract),[9] showing that even the diagnostic gold standard may not visualize all vascular anomalies. We have shown that ureteroscopy may be a valuable, minimally invasive diagnostic tool for some pseudoaneurysms in stable, intermittently bleeding patients. In the setting of questionable or subtle vascular abnormalities seen on angiogram, simultaneous ureteroscopy may assist with localization and confirmation of the lesion.

Conclusion

Renal pseudoaneurysms are rare complications following endourologic procedures. Although angiography (both CTA and DSA) is the gold standard for diagnosis, some pseudoaneurysms are missed by these techniques. In select cases, ureteroscopy may be an effective, minimally invasive diagnostic tool for intrarenal vascular abnormalities. Maintaining a high level of suspicion is required. □

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