

Case Report: Two Cases of Uretero-Iliac Artery Fistula Managed with Endovascular Therapy

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Received date: April 15, 2015; Accepted date: April 27, 2015; Published date: April 30, 2015

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Abstract

This case report presents two cases of arterial-ureteral fistulas following urological surgical procedures managed with endovascular therapy.

Case 1

This is an 83 year-old male who was diagnosed with bladder cancer treated with robotic radical cystectomy with bilateral pelvic lymph node dissection and ileal conduit urinary diversion one year ago. The surgery was complicated by urinoma secondary to the right uretero-ileal conduit anastomotic leak. Urinoma was percutaneously drained, and bilateral upside-down nephrostomy catheters acting as the transureteral stents were placed for urinary diversion. However, the patient presented with recurrent urinary tract infection, and interventional radiology was consulted.

The patient underwent successful placement of bilateral nephrostomy catheters. Removal of the right upside-down nephrostomy catheter was uneventful. However, removal of the left-sided catheter was complicated by brisk pulsatile arterial bleeding from the right lower quadrant ostomy.

Based on the review of prior imaging which showed close proximity of the distal left ureter to the right hypogastric artery in the region of the urinoma, the right hypogastric artery was empirically embolized using multiple coils. However, the patient experienced recurrent bleeding overnight in the surgical ICU, and CT angiography was performed demonstrating blood clots in the moderately dilated left renal pelvis (Figures 1A, 1B and 1C) and ureter, and a small pseudoaneurysm of the left distal common iliac artery protruding into the mid left ureter, compatible with an arterioureteral fistula.

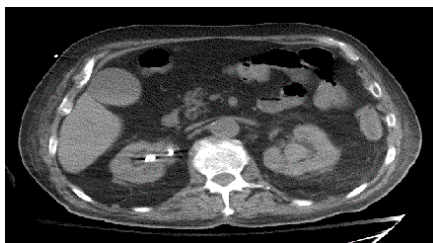


Figure 1A: Axial image from noncontrast abdominal CT demonstrating blood clots in the left renal pelvis.



Figure 1B: Axial images from CT angiography demonstrating a small pseudoaneurysm arising from the distal common iliac artery extending into the left ureter compatible with an AUF (arrows).

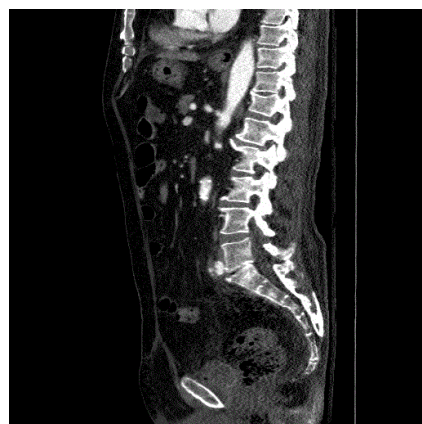


Figure 1C: Sagittal images from CT angiography demonstrating a small pseudoaneurysm arising from the distal common iliac artery extending into the left ureter compatible with an AUF (arrows).

Conventional angiography confirmed a small contour irregularity (Figure 2) along the anterior wall of the left distal common iliac artery at the site of the pseudoaneurysm seen on the CT angiography (Figure 3). Two stent-grafts were deployed in an overlapping fashion across the fistula followed by balloon dilatation.

obstruction of the right ureter which was treated with a tandem right ureteral stent. The patient was lost to the follow-up until she presented with gross hematuria and urinary tract infection. CT scan demonstrated a right ureteral stent with marked hydronephrosis containing blood clots in the right renal pelvis and bladder (Figures 4A, 4B and 5).

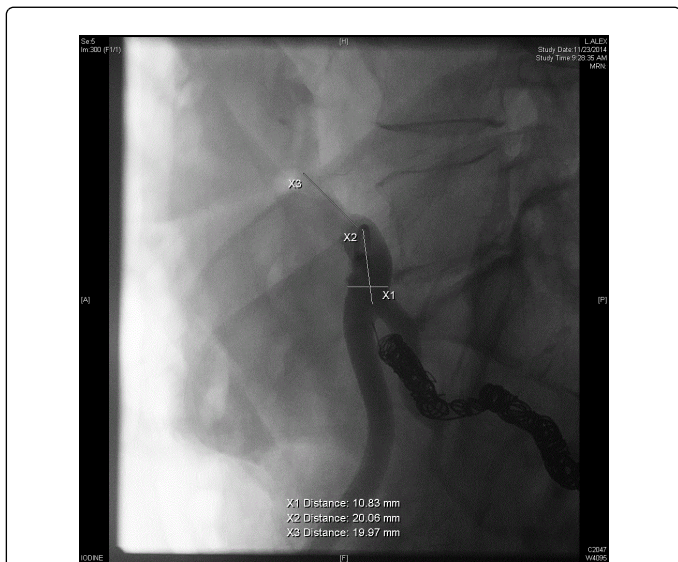


Figure 2: Sagittal DSA image demonstrate subtle contour irregularity (arrow) of the anterior distal wall of the common iliac artery likely representing the abnormality demonstrated on CT.



Figure 3: Successful deployment of stent-graft into the distal common iliac artery.



Figure 4A: Noncontrast abdominal CT demonstrating severe right hydronephrosis and high density blood clots in the right renal pelvis. Layering calculi are incidentally noted bilaterally. A right ureteral stent is partially imaged.



Figure 4B: Large, hyperdense hematoma (star) is visualized in the urinary bladder. Foley catheter and ureteral stent are partially imaged.

Case 2

This is a 73 year-old female with a history of uterine cancer status post total abdominal hysterectomy and radiation therapy. The postoperative course was complicated by an enterocutaneous fistula requiring colostomy. The patient previously presented with malignant

The patient underwent cystoscopy demonstrating a large formed clot in the bladder. Upon removal of the right ureteral stent, there was brisk, pulsatile bleeding from the right ureteral orifice. Compression of the orifice was performed with the resectoscope loop leading to hemostasis. A retrograde pyelogram was then performed showing

massive hydroureteronephrosis down to the level of the iliac vessel crossing. A double J ureteral stent was then placed (Figures 6 and 7).

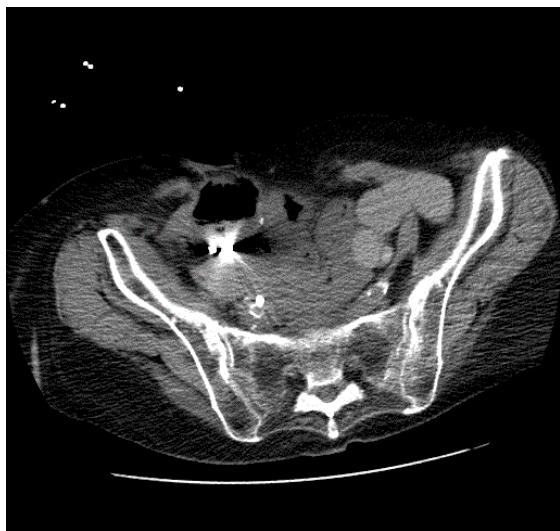


Figure 5: Note proximity of right ureteral stent and the heavily calcified iliac artery posteriorly (arrow).

Intraoperative vascular surgery consultation was obtained. An on-table angiogram however did not reveal active contrast extravasation in the region of suspected fistula where the ureteral stent crossed the iliac arteries, just distal to the iliac bifurcation. Because of the high suspicion for an underlying AUF, the right internal iliac artery was coil embolized followed by deployment of a stent-graft over the iliac bifurcation.

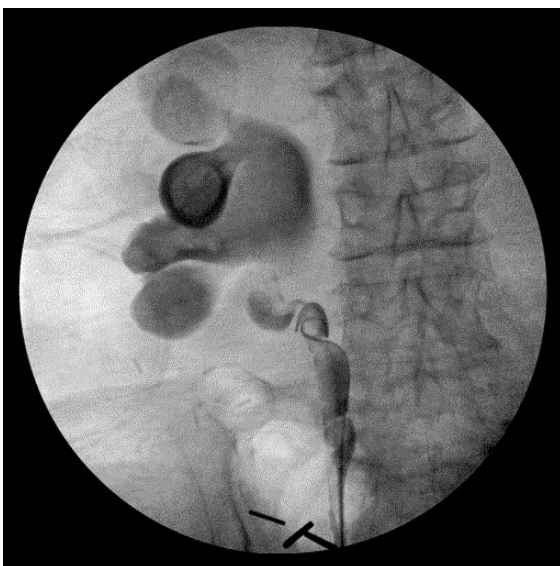


Figure 6: Intraoperative pyelogram demonstrating severe right hydroureteronephrosis.

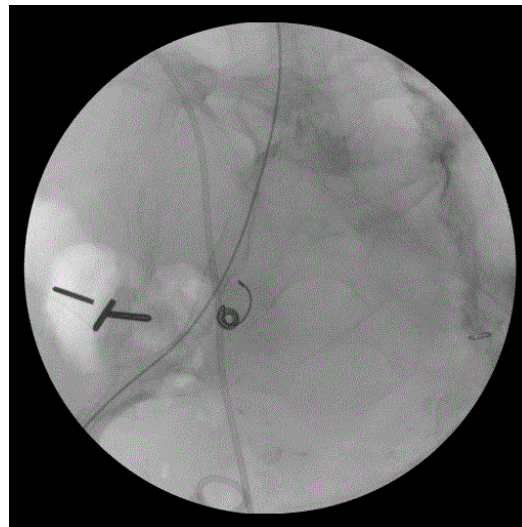


Figure 7: Post-procedural image demonstrating placement of a stent across the iliac bifurcation with embolization of the internal iliac artery.

Discussion

Arterioureteral fistula (AUF) is a rare diagnosis that has come into greater spotlight thanks to the recent publication of multiple case reports and literature reviews [1]. AUF is an important cause of gross hematuria and can result in life threatening hemorrhage. Thus, it is important for all clinicians to be aware of this entity.

AUF is defined as an abnormal communication between the ureter and a major artery. Presenting symptoms can range from intermittent to massive hematuria [1,2]. The intermittent nature of the hematuria is thought to be the result of blood clot formation tamponading the bleeding. As in our case, provocative maneuvers such as stent removal can incite episodes of massive hematuria. The diagnosis of AUF is notoriously difficult as angiograms are usually normal.

The causes of AUF can be broadly categorized as primary or secondary. Primary causes are usually secondary to aortoiliac aneurysmal disease. Secondary causes represent the majority of cases and include prior pelvic surgery, urinary diversion, pelvic radiation, vascular reconstruction, and use of ureteral catheters/stents [3].

Because of its intermittent nature, the diagnosis of AUF can prove elusive. Diagnostic options include CT angiography, conventional angiography, and ureteroscopy. The sensitivity of these modalities varies. Examination of the patient's nephrostomy drainage or cystoscopy can help localize the side of bleeding. A technique commonly referred to as "provocative angiography" involves manipulation of a ureteral stent during angiography in order to dislodge any tamponading clot. Some authors have found ureteral contrast studies to have the highest sensitivity. As in the first case, preprocedural CT angiography may facilitate the localization of the pseudoaneurysm or fistula before conventional angiography.

As with its diagnosis, there are many options for the treatment of AUF. With the recent advent of endovascular stents, this approach has been employed with favorable outcomes in many published reports

[4-6]. Complications of this technique include infection, stent occlusion, refistulization, and recurrent hematuria. A recent study estimated the hematuria recurrence-free rates at 1 and 2 years were 76.2 and 40.6% respectively [7]. Muraoka et al. reported a stent patency rate of over 6 years in one patient. Nevertheless, more investigations will need to be performed to establish long term stent patency rates.

Embolization of the internal iliac artery can be employed when it is the source. The placement of coils into the distal ureter with concomitant nephrostomy placement has also been used. Open surgical approaches remain an effective treatment in patients whom the diagnosis or site of AUF is uncertain or in patients where the use of endovascular approaches are contraindicated. Surgical approaches are varied including fistula closure with a patch, vascular ligation, vascular bypass, renal autotransplant and omentoplasty [8]. Nephroureterectomy has also been performed in patients in whom the diagnosis of AUF is suspected.

Overall, the diagnosis of an AUF should be considered in any patient with the aforementioned risk factors who presents with hematuria. A multi-disciplinary approach to treatment should be employed with involvement of urology, radiology, and vascular surgery.

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