A multidisciplinary case of ureteroiliac fistula after radical cystectomy

Ricardo Rosales Morales, BS,[a] and David A. Rigberg, MD,[b] Los Angeles, Calif

ABSTRACT

Ureteroiliac fistula is a rare complication associated with ureteral stenting and iliac artery reconstruction and can lead to life-threatening hemorrhage. We report a case of acute bleeding from a ureteroiliac fistula in an 89-year-old man with bladder cancer who had undergone pelvic radiation, radical cystectomy, and ileal conduit complicated by ureteral strictures requiring routine stent exchanges. Multidisciplinary diagnostic therapies revealed the fistula, which was treated with hypogastric artery coiling and covered stent placement. No further bleeding issues had resulted from the fistula at 11 months of follow-up. The presence of a ureteroiliac fistula should be considered in any patient with a similar history. (J Vasc Surg Cases Innov Tech 2022;8:53-6.)

Keywords: Endovascular; Hematuria; Ureteral stenting; Ureteroiliac fistula; Ureteroiliac passage

Ureteroiliac fistula (UIF) is a relatively rare clinical entity related to long-term ureteral stenting in patients with a history of pelvic radiation therapy and/or extensive pelvic vascular and/or oncologic surgery.[1-3] It often occur from chronic erosion between a continuously pulsating artery and a stented ureter, triggering a local inflammatory response and eventual necrosis at the ureteroiliac passage.[2,4,5] The occurrence of unexplained gross hematuria with variable clot passage and flank pain in a patient with a history of pelvic surgery, a chronic ureteral stent, and/or history of pelvic radiotherapy is highly suspicious for a UIF.[2,6] A number of case reports and systematic reviews have suggested a comprehensive clinical evaluation and detailed treatment algorithms in the proper diagnosis and treatment of UIF, with endovascular approaches leading toward more favorable outcomes.[2,6-13]

We present the occurrence of a UIF in an 89-year-old man with a history of bladder cancer managed with radical cystectomy and chemoradiotherapy complicated by ureteral strictures that had required routine ureteral stent exchanges. We have also discussed the proper diagnosis and treatment of these lesions. The patient provided written informed consent for the report of his case and imaging studies.

CASE REPORT

An 89-year-old man with a history of bladder cancer and chemoradiotherapy and recurrence of the disease had undergone radical cystectomy with an ileal conduit that had been chronically managed for ureteral strictures with routine ureteral stent exchanges. He was initially admitted to the hospital after an episode of gross arterial hematuria appearing from the stoma during the left ureteral stent exchange. His estimated glomerular filtration rate had increased to 35 mL/min/1.73 m^2 from a measurement of 25 mL/min/1.73 m^2 1 week prior. Initial magnetic resonance angiography (MRA) obtained by urology before involvement of vascular surgery were negative for any evidence of an arteriovenous fistula or a UIF. The bleeding resolved spontaneously, and the patient was discharged home. However, he was noted to have resurgence of bleeding into his nephrostomy bag at home a few days later. He was readmitted via the emergency department and required a transfusion of 2 U of blood for management of hemodynamic instability and emergent operative intervention by urology.

In the operating room, the nephrostomy bag was removed, and the ureteral stent was accessed. A 0.035-in. polytetrafluoroethylene-nitinol guidewire with a hydrophilic tip (Sensor; Boston Scientific, Marlborough, Mass) was advanced up the left renal pelvis to remove the 10F Skater ureteral stent (Argon Medical Devices, Frisco, Tex). Immediate arterial bleeding arose from the conduit, requiring an additional 2 U of packed red blood cells. Afterward, a 10F dual-lumen catheter was advanced across the distal ureter to perform a retrograde pyelogram. This demonstrated a UIF at the level of the left common iliac artery (CIA). Contrast was visualized to the left CIA, with runoff into the external iliac artery (EIA) and hypogastric artery (HA; Fig 1). Approximately 500 mL of blood had been lost. However, the bleeding appeared to have stopped once the dual-lumen catheter had been placed. A 7F single J-stent was then placed. At this point, vascular surgery was urgently consulted intraoperatively for management.

Fig 1. Retrograde pyelogram completed by urology showing ureteroiliac fistula (UIF) at the level of the common iliac bifurcation with runoff into the left external iliac artery (EIA) and left hypogastric artery (HA).

Fig 2. Initial transfemoral angiogram performed by vascular surgery showing a widely patent vessel and absent communication into the left ureter.

Fig 3. Angiogram showing placement of three interlock coils in the left hypogastric artery (HA) and exclusion of the ureteroiliac fistula (UIF) with an 8-mm × 5-cm VBX covered stent graft (W.L. Gore).

Initial angiography of the left CIA via a left femoral sheath demonstrated that the vessel was widely patent (Fig 2). We visualized where the ureteral stent had crossed the artery but were unable to see any communication or any evidence of iliac arterial system aneurysmal disease. Additionally, contrast injected into the ureteral conduit showed no filling of the artery. However, when advancing the Bentson wire (Cook Medical, Bloomington, Ind), we noted it went directly into the conduit at the location of the ureteroiliac passage. Angiography via a Kumpe access catheter (Cook Medical) revealed that this was at the origin of the left HA. We cannulated the left HA with a Verrill contralateral flush tip catheter (Cook Medical) via the left common femoral puncture site without any issues. Had cannulation been difficult, we would have performed a contralateral femoral arterial puncture. After advancing the wire, the Verrill contralateral flush tip catheter was replaced with a Kumpe access catheter, allowing us to advance a Renegade catheter (Boston Scientific) ~4 cm below the origin of the left HA. Two Interlock coils (6 × 20; Boston Scientific) were subsequently placed in the artery for embolization (Fig 3).

After backing out of the HA, we advanced the Bentson wire into the aorta and upsized to a 7F sheath to accommodate the VBX covered stent graft (Gore Viabahn; W.L. Gore & Associates, Inc, Flagstaff, Ariz) positioned 3 cm above the bifurcation of the CIA with 3 cm of extension into the EIA. After deployment, a 10-mm balloon was used to postdilate the stent graft, allowing it to appropriately conform to ≤10 mm in the CIA and ≤8 mm in the EIA. A completion angiogram revealed absent flow in the left hypogastric system and no evidence of extravasation, with normal flow from the CIA into the left EIAs and no evidence of cross-filling from the contralateral side (Fig 4).

The remainder of the hospital stay was uneventful, and the patient was discharged 2 days after the intervention. On discharge from the hospital, the patient was instructed to take 81 mg of aspirin per day. The patient continued antibiotic therapy in accordance with the urology protocol and never exhibited any signs or symptoms of infection. At 3 months after the bleeding episode, imaging studies taken during a routine J-stent exchange showed the relationship between the VBX covered stent graft, interlock coils, and J-stent (Fig 5). The patient did not have any postprocedural sequelae related to the UIF. However, he died of the bladder cancer at 11 months after the bleeding episode.

DISCUSSION

The pathophysiology of a UIF involves a disruption of the iliac artery vasa vasorum that results in fibrosis, predisposing to fixation of the ureter to the iliac vessels in

Fig 4. Completion angiogram demonstrating complete exclusion of the ureteroiliac fistula (UIF) with normal flow from the left common iliac artery (CIA) into the left external iliac artery (EIA). Additionally seen is the VBX covered stent graft (W.L. Gore) deployed across the CIA and EIA and postdilated ≤10 mm in the CIA and ≤8 mm in the EIA.
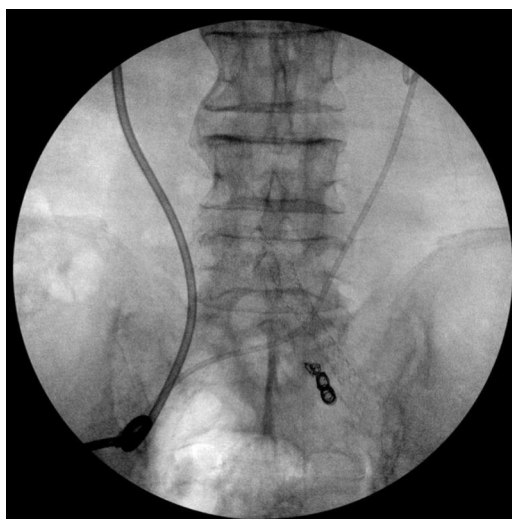
Fig 5. Subsequent image at 3 months from one of his later stent exchanges showing the relationship of the stent graft, coils, and J-stent.

patients with a history of pelvic surgery and/or radiotherapy.[2,4,5] Continuous pulsatile forces and the presence of ureteral stents and routine exchanges, which had occurred in our patient, facilitates fistula formation at the ureteroiliac passage.[1,6,11]

Because of the rare occurrence of UIF, the diagnosis is often difficult and delayed. The initial presentation is often nonspecific. However, it is important to remember that hematuria will be present in ≤74% of cases.[12] When considering the imaging modalities, the options include MRA, computed tomography (CT) angiography, and ureteroscopy. In patients with gross hematuria and/or flank pain in the context of pelvic surgery, radiotherapy, and ureteral stent placement, pelvic angiography should be considered.[11] In the present patient, a retrograde pyelogram revealed the UIF only after MRA had failed to demonstrate the lesion. Although CT and/or MRA are the initial modalities for diagnosing UIF, systematic reviews have shown that ureteral contrast-enhancing methods will usually be as helpful in making the diagnosis as CT and/or MRA, with digital subtraction angiography the most helpful modality.[2-4,11-13]

Treatment of UIF generally includes repairing both the ureteral and arterial defects and can include a combination of different procedures. The literature has suggested that endovascular and endoureteral procedures will yield the most promising and most favorable results.[2-4,7,8,11-14] Additionally, endovascular management is attractive owing to the unstable nature of these patients and the hostile anatomy for open approaches, given their history of pelvic surgery and radiotherapy. It is important to consider that although attractive, the endovascular approach is not without the risk of infection, stent occlusion, recurrent fistulization, recurrent hematuria, buttock claudication, and graft infection.[8-10] If infection were to become a clinical issue, further reconstruction that could potentially require a more aggressive approach, might be warranted. Ideally, the choice of the treatment option should consider the presenting situation and the technique on which the multidisciplinary team has agreed will be most maneuverable and yield the most favorable outcome.[14]

For patients for whom endovascular approaches are not successful, open surgical repair should be considered.[12] Additionally, for patients with a longer life expectancy, a more involved repair can be considered. For our patient, because he had had aggressive disease, the main concern was to stop the hemorrhage and provide a palliative repair. Total nephroureterectomy or ureteric coil placement with nephrostomy of the affected side will be an appropriate therapy for patients with normal contralateral renal function and uncontrolled life-threatening hemorrhage.[2,8,12] Wound healing is often delayed and, thus, compromised in patients with prior pelvic surgery and radiotherapy, making an open surgical approach much less attractive and should be used only when it is the sole option.[2,10,12,14]

Mortality related to UIF is dependent on the patient's medical history. Patients with an etiology related to an oncologic history (i.e., related to pelvic beam radiotherapy and oncologic surgery) will generally have worse outcomes (13%) than patients with a history of only pelvic vascular surgery (9%).[9,10] Patients with an extensive history of pelvic oncologic procedures, pelvic vascular surgery, and habitual ureteral stent replacements will usually also be older.

CONCLUSIONS

In the appropriate clinical setting for UIF, one must have a high clinical suspicion and pursue the diagnosis aggressively. Given its life-threatening characteristics, the occurrence of UIF requires prompt diagnosis and management with a multidisciplinary team. For our patient, the use of endovascular and endoureteral methods allowed for the resolution of an acute life-threatening condition with excellent results.

REFERENCES

1. Pozzilli P, Lenti M, Mosca S, Nunzi E, Mearini L. Ureteroarterial fistula from ureteral stump: a challenging case. Case Rep Urol 2014;2014: 514625.
2. Krambeck AE, Dimarco DS, Gettman MT, Segura JW. Ureteroiliac artery fistula: diagnosis and treatment algorithm. Urology 2005;66: 990-4.
3. Bergqvist D, Pärsson H, Sherif A. Arterio-ureteral fistula—a systematic review. Eur J Vasc Endovasc Surg 2001;22:191-6.
4. Bergh RCVD, Moll FL, Vries J-PPD, Yeung KK, Lock TM. Arterio-ureteral fistula: 11 new cases of a wolf in sheep's clothing. J Urol 2008;179: 578-81.
5. Sukha A, Smyth N. Fistula formation between the external iliac artery and ileal conduit following a radical cystoprostatectomy: a rare complication with prewarning signs of haemorrhage. BMJ Case Rep 2015;2015:bcr2014208914.
6. Palmerola R, Westerman ME, Fakhoury M, Boorjian SA, Richstone L. Ureteroarterial fistulas after robotic and open radical cystectomy. J Endourol Case Rep 2016;2:48-51.
7. Tselikas L, Pellerin O, Di Primio M, Ben Arfi M, Joskin J, Beyssen B, et al. Uretero-iliac fistula: modern treatment via the endovascular route. Diagn Interv Imaging 2013;94:311-8.
8. Choy A, Chang J, Kwak ACNB, Kissin M, Lobko I. Case report: two cases of uretero-iliac artery fistula managed with endovascular therapy. OMICS J Radiol 2015;4:185.
9. Malgor RD, Oderich GS, Andrews JC, McKusick M, Kalra M, Misra S, et al. Evolution from open surgical to endovascular treatment of ureteral-iliac artery fistula. J Vasc Surg 2012;55:1072-80.
10. Bergh RCNVD, Moll FL, Vries J-PPD, Lock TM. Arteriouretural fistulas: unusual suspects—systematic review of 139 cases. Urology 2009;74: 251-5.
11. Pillai AK, Anderson ME, Reddick MA, Sutphin PD, Kalva SP. Ureter-oarterial fistula: diagnosis and management. AJR Am J Roentgenol 2015;204:W592-8.
12. Das A, Lewandoski P, Laganosky D, Walton J, Shenot P. Ureter-oarterial fistula: a review of the literature. Vascular 2015;24:203-7.
13. Leone L, Scarcella S, Dell'Atti L, Tiroli M, Sternardi F, Galosi AB. Uretero-iliac artery fistula: a challenge diagnosis for a life-threatening condition: monocentric experience and review of the literature. Int Urol Nephrol 2019;51:789-93.
14. Kajaia D, Hager B, Heidorn T, Schneider H, Weingärtner K, Zugor V. Ureteroiliakale Fistel als eine Urologische Notfallsituation [Uretero-iliac artery fistula as a urological emergency]. [e-pub ahead of print]. Aktuelle Urol, https://doi.org/10.1055/a-1180-0191. Accessed August 11, 2021.