Case Report/Series

Rare nephrostomy complication mimicking rupture of abdominal aortic aneurysm: a case report

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ABSTRACT
Percutaneous nephrostomy (PCN) is a routine procedure in urology with up to 99% success rate and less than 6% of total complications dominated by minor cases. This was a case report of a 59-year-old male patient with an unusual major bleeding complication after PCN that mimicked a ruptured abdominal aortic aneurysm. The laparotomy exploration identified the bleeding source from the right lobar artery, thus renorrhaphy was performed. Proper visualization of anatomic layout, color Doppler imaging, and selecting a guiding method and technique could reduce bleeding complications following PCN.

KEYWORDS complications, hemorrhage, percutaneous nephrostomy

Percutaneous nephrostomy (PCN) is a routine procedure in urology performed as a urinary diversion or access for endourological procedures. Up to 99% of PCNs are successful,[1] with a total complication rate of less than 6%, most of which are minor. According to the American College of Radiology, severe complications of nephrostomy include sepsis (4%) and major hemorrhage (1–4%).[1] Some major complications may lead to life-threatening conditions such as cardiac arrest, pneumothorax, hemothorax, major bleeding requiring transfusion, and embolization.[2] We report a case of an unusually severe PCN complication that mimicked a ruptured abdominal aortic aneurysm (AAA).

CASE REPORT

A 59-year-old male patient presented with abdominal pain that had persisted for 2 weeks. He was diagnosed with AAA, acute kidney injury (AKI) with an urea level of 124 mg/dl and a creatinine level of 5.4 mg/dl, and suspected bilateral hydronephrosis due to bilateral distal ureteral stones (Figure 1). He was initially scheduled to undergo bilateral PCN. However, we performed the right PCN only due to minor hydronephrosis. In the initial attempt to perform the right PCN with an 8Fr nephrostomy pigtail catheter, the nephrostomy tube was difficult to insert, with no blood or urine drainage despite

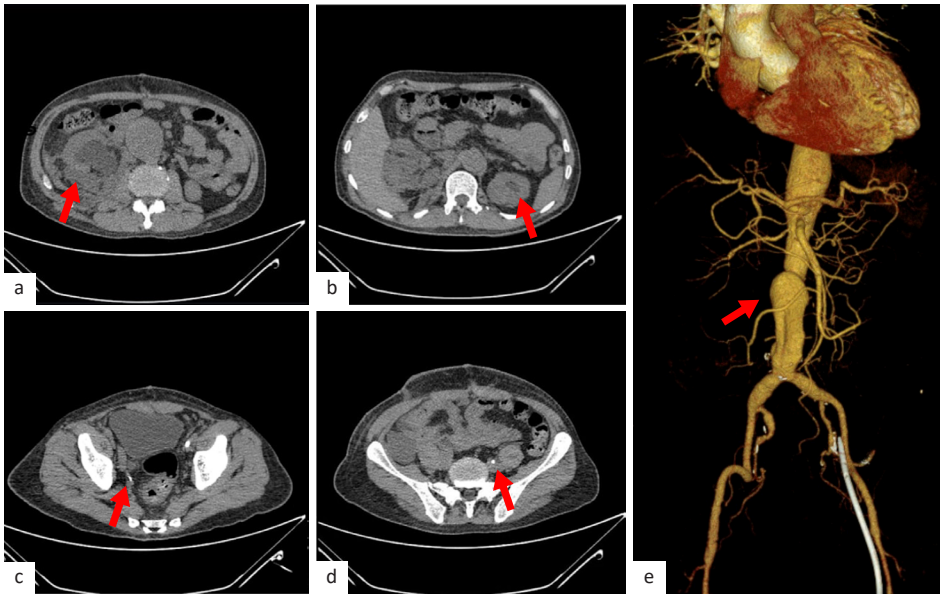

Figure 1. Non-contrast CT of the kidney. The figure shows hydronephrosis of the right kidney (red arrow) (a), left kidney (red arrow) (b), right ureteral stone (red arrow) (c), and left ureteral stone (red arrow) (d), and AAA (red arrow) (e). AAA=abdominal aortic aneurysm; CT=computed tomography

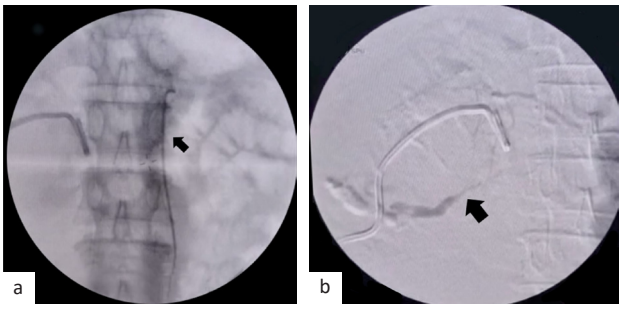

Figure 2. Aortography and angiography of right kidney. (a) Aortography showed no extravasation of abdominal aortic aneurysm (AAA) (black arrow); (b) angiography of right kidney showed contrast extravasation (black arrow) on the posteroinferior part of the kidney

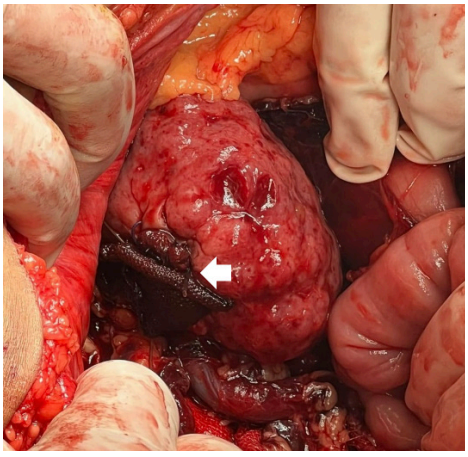

Figure 3. The source of intraoperative bleeding from the lobar artery was ligated (white arrow)

successful puncture and inferior calyx dilation. We then decided to perform a second puncture of the superior calyces, successfully inserted a nephrostomy tube, and drained clear yellow urine. His condition stabilized postoperatively.

Five hours after the PCN, he appeared pale with a decreased blood pressure (75/50 mmHg) and postoperative serum hemoglobin level (7.8 mg/dl). He also experienced abdominal pain (visual analog scale score 5–6) in the mid-to-right hemiabdomen. The nephrostomy revealed pinkish urine without bulging and a flank hematoma during physical examination. He was referred to the vascular surgery division with suspicion of a ruptured AAA and planned to undergo aortography, with the possibility of performing an open AAA repair. Angiography revealed no contrast extravasation from the AAA (Figure 2a); however, contrast extravasation was observed from the posteroinferior lobar artery of the right kidney (Figure 2b). He then underwent a median incision laparotomy. The intraperitoneal cavity showed a little yellow ascitic fluid, and a hematoma was found in the retroperitoneal zone 2. The white line indicates the opening. We discovered active bleeding from the lobar artery due to a 0.5 cm cut in the posteroinferior right kidney parenchyma. The nephrostomy tube was removed, renorrhaphy was performed using chromic catgut 1–0 sutures (Figure 3), and a retroperitoneal

drain was placed. He was stable and transferred to the intensive care unit with mechanical support postoperatively. After 2 days, he was transferred to the ward and discharged 14 days later without significant complications. He was followed-up a week later with no complaints, unremarkable surgical wounds, improved kidney function, and a frequently monitored AAA by the vascular surgery division. He was still followed-up by the vascular surgery division for his AAA after 2 years and is now routinely followed-up in a nearby hospital with normal kidney function and no symptoms.

DISCUSSION

PCN is a minimally invasive procedure typically used for temporary urinary diversion for obstruction by stones, malignancy, or stenosis. Typically, minor hematuria after PCN resolves spontaneously within 48 hours. However, rare complications such as significant hemorrhage may occur, accompanied by a decline in vital signs, raising the possibility of vascular injury and hemorrhagic shock.[1,3]

In the present case, the patient had a history of AAA, bilateral ureteral stones with bilateral hydronephrosis, hypertension, and AKI. An abrupt decline in his vital signs and an acute abdomen raised suspicions of massive active hemorrhage from a ruptured AAA or a post-nephrostomy complication. Renal trauma is managed conservatively in a hemodynamically stable patient; however, his comorbid AAA diagnosis should always be considered as the source of his unstable vital signs. Therefore, aortography and endovascular approaches were chosen to rule out ruptured AAA. The endovascular approach is also critical in detecting the bleeding source and is one of the treatment options for renal arterial laceration.[3,4] However, the endovascular approach as the treatment for his renal laceration was not possible due to limitations in our setting; instead, exploratory laparotomy was needed to control the bleeding. Further exploration showed that the massive hemorrhage originated from a ruptured lobar artery in the right kidney, which caused active bleeding. Thus, renorrhaphy was performed to control bleeding.

Massive hemorrhage was suspected based on the first attempt at nephrostomy in the inferior calyces. Furthermore, AKI and uremia caused platelet dysfunction, making him prone to bleeding.[5] In this case, he had mild hydronephrosis, and puncturing a mildly or non-dilated pelvicalyceal system is always more challenging than puncturing a severely dilated pelvicalyceal system. To prevent and reduce the risk of bleeding complications, proper visualization of the relatively low-vascular area of the kidney should be performed before puncture. The section between the anterior two-thirds and posterior one-third of the renal parenchyma, known as the avascular plane of Brodel or Brodel's line, is a safer access route for the PCN to enter the pelvicalyceal system. Color Doppler imaging also helps with intrarenal vessel identification to avoid injury.[4,6]

Moreover, the choice of the guide method has advantages, as ultrasound (US)-guided nephrostomy can detect the retrocolon and determine the degree of hydronephrosis, while computed tomography (CT) guidance can benefit patients with varying degrees of anatomical difficulties. CT guidance increases radiation exposure, whereas US guidance can not examine the precise location of the nephrostomy pigtail.[1,4] The Seldinger technique can also used in US-guided PCN for hydronephrosis less than 3 cm in diameter.[6] A prompt diagnosis and treatment of acute massive hemorrhage after a routine nephrostomy procedure should be suspected if his condition deteriorates and vital signs drop within a few hours of the procedure. Complications of other prior diseases should be ruled out to improve prognosis, and close monitoring with blood transfusion should be performed.[1,4]

In conclusion, a rare complication of acute hemorrhagic shock caused by massive hemorrhage should always be expected and never underestimated, even after a simple nephrostomy procedure. While a patient's underlying condition could increase the complication rate, correctly visualizing the anatomy, color Doppler imaging, and selecting an appropriate guide method and technique could reduce bleeding complications. Early detection and treatment of major complications are important for reducing mortality and morbidity.

Conflict of Interest
The authors affirm no conflict of interest in this study.

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