



Trauma and reconstruction

Traumatic injury of an ectopic kidney with iatrogenic ureteral injury and endovascular control of aberrant renal vessel

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ABSTRACT

The management of traumatic injuries in patients with ectopic kidneys presents special challenges. There is a paucity of literature regarding optimal strategies for renal salvage. We describe a case of a patient who presented in hemorrhagic shock after a motor vehicle collision. On initial operative exploration, he was found to have a large retroperitoneal mass. Subsequent imaging demonstrated a large retroperitoneal hematoma and an ectopic kidney. The patient was successfully treated with a combination of open renorrhaphy and endovascular angioembolization. This case demonstrates the importance of a multidisciplinary approach to treating these complex injuries.

1. Introduction

There is a paucity of literature on ectopic kidney in the setting of trauma. We present a case of an ectopic kidney with aberrant vascularity causing a retroperitoneal perinephric hematoma resulting in abdominal compartment syndrome following blunt trauma and iatrogenic ureteral injury.

2. Case presentation

A 60-year-old man presented to the emergency department as a restrained driver involved in a motor vehicle collision. On exam, the abdomen was distended with diffuse tenderness and guarding. He was hypotensive to 80/60 mmHg. Abdominal Focused Assessment with Sonography in Trauma (FAST) exam was positive.

Massive transfusion protocol was initiated, and the patient was taken immediately to the operating room (OR) for exploratory laparotomy. Intraoperatively, there was a large fullness in the central and right retroperitoneum, along with contusions along the hepatic flexure of the colon. There was no hemorrhage or intraperitoneal injury found. A temporary abdominal closure was performed, and the patient was taken to CT scan.

CT of chest/abdomen/pelvis showed a 14.2 cm malrotated and malpositioned right kidney, with moderate right hydronephrosis and no active hemorrhage (Fig. 1). At this point, the patient's hemodynamics had stabilized. The patient was transferred to the intensive care unit still intubated for a trial of nonoperative management and serial labs.

Over the next 8 hours, he required four additional units of blood and intermittently required vasopressors. Due to the ongoing need for transfusions and vasopressor support, repeat CT angiography was performed 8 hours after admission. This scan showed an increase in size of the retroperitoneal hematoma, now measuring 18.3 × 14.2 × 11.3 cm and with a small focus of arterial extravasation along the inferior aspect of the malpositioned right kidney. Arterial phase of the CT demonstrated a superior right renal artery arising directly off the aorta and an inferior accessory renal artery arising from the right common iliac artery (Fig. 1). This also revealed partial compression of the proximal common iliac veins and infrarenal IVC secondary to mass effect from the hematoma. On delayed phase imaging, the ureter is seen coursing anterior to the malrotated right kidney (Fig. 1).

Because of the mass effect of the retroperitoneal hematoma on the IVC and the new active extravasation with ongoing transfusion requirement, he was taken to the operating room for re-exploration of the retroperitoneum. Intraoperatively, a transverse incision was made

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through the retroperitoneum due to the large retroperitoneal hematoma. There was immediate evacuation of 500ml of hematoma, causing immediate improvement in blood pressure. The ectopic kidney was able to be partially visualized, revealing significant laceration to the inferior pole of the kidney. Renorrhaphy was done, the retroperitoneum was packed, and the patient was transported to interventional radiology emergently. Angiography revealed extravasation from an aberrant renal artery, which was subsequently coil embolized.

On hospital postoperative day 2, the patient returned to the OR for removal of packing and abdominal wall closure. The color and increased quantity of wound vacuum output caused concern for a urine leak. Retrograde ureterogram demonstrating a complete transection of the anomalous right ureter (Fig. 2). A ureteroureterostomy was performed and the abdomen was closed (Fig. 3). He was discharged 11 days after his injury. Outpatient follow-up cystoscopy demonstrated an intact ureteral repair with continued extravasation from the lower pole of the renal collecting system, near where the prior angioembolization coils were located, which eventually resolved with stent drainage.

3. Discussion

The reported incidence of ectopic kidney is 2–10:10,000.¹ They are frequently incidentally found on imaging.¹ Because of its aberrant location in the retroperitoneum, an ectopic kidney may lack the protective surroundings of ribs, musculature, perirenal fat, and Gerota's fascia and may therefore be more susceptible to traumatic injury.² Ectopic kidneys typically have aberrant vasculature that may arise from the aorta, iliac or hypogastric arteries and a ureter that is more lateral and anterior than that of orthotopic kidneys.¹

Small studies have shown that patients with abnormal kidneys require operative management following renal trauma more frequently than patients with orthotopic kidneys.³ It is theorized that this aberrant anatomy may result in higher rates of complications such as perinephric hematoma, abdominal compartment syndrome, ureteral transection during emergent laparotomy, and hemodynamic instability due to adjacent large vessel compression.¹ Trauma surgeons must be aware of these anatomic variations to appropriately manage injuries to ectopic kidneys, avoid potential iatrogenic injury, or perform nephrectomy if necessary.

This case highlights several of the complications of treating patients with injuries to ectopic kidneys. It is important to understand that there may be accessory arteries that may need to be managed either endovascularly or open. Depending on the location of the kidney, hematomas that may otherwise be contained in the retroperitoneum can cause

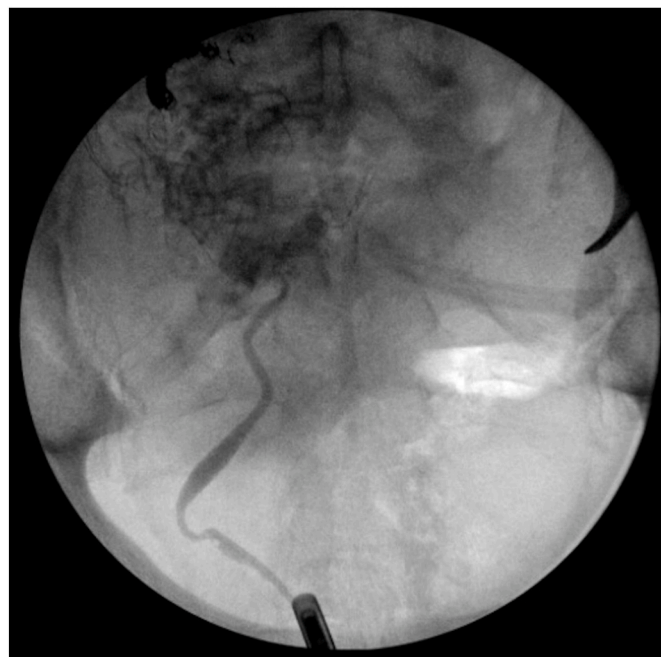


Fig. 2. Retrograde pyelogram demonstrating ureteral injury.

compression to other crucial structures. For instance, in this case the kidney was adjacent to the IVC and the retroperitoneal hematoma directly compressed the IVC and reduced blood flow. Lastly, understanding the location of the ureter is necessary prior to surgical management. If possible, a CT with delayed phases to identify vasculature and the urinary tract should be obtained.

4. Conclusion

Patients with ectopic kidneys may be at higher risk of complications following traumatic injuries. A multidisciplinary approach involving urology, interventional radiology, and trauma surgery can be beneficial in improving outcomes and renal salvage.

Prior presentations/publications

This manuscript has not been previously presented and is not



Fig. 1. Initial CT A/P showing central location of ectopic kidney and perinephric hematoma. Arrow on the left image marks lower pole artery from right common iliac. Arrow on the right image marks ureter.

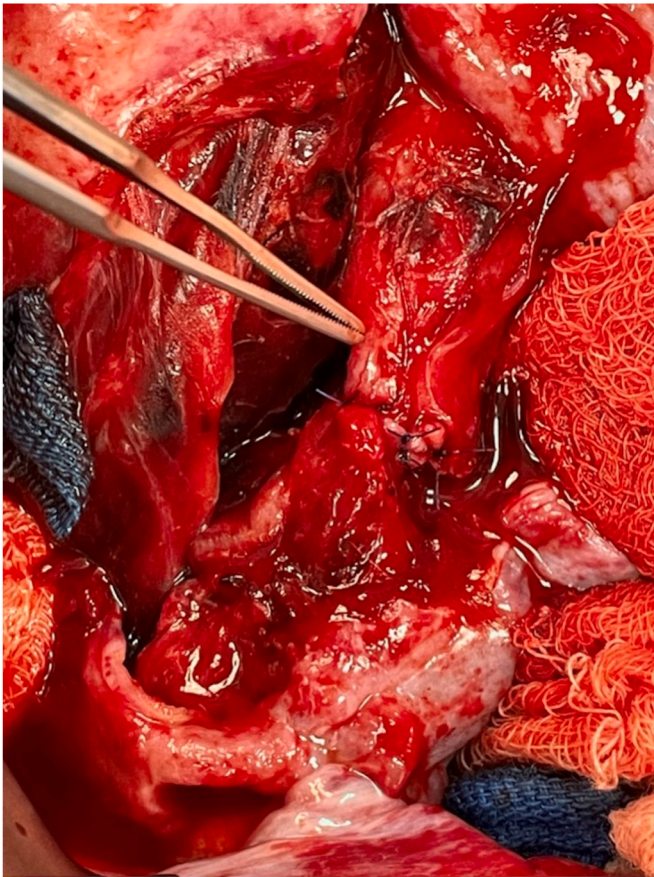


Fig. 3. Ureteroureterostomy.

presently under consideration by any other entity.

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Declaration of competing interest

The authors have no financial conflicts of interest.

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