Endovascular Angioembolization of Intrarenal Pseudoaneurysm in Ectopic Kidney after Blunt Abdominal Trauma

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Abstract
Renal artery pseudoaneurysm is a very rare complication after blunt trauma. Congenital anomalies like horseshoe kidney, ectopic kidney, pelvi-ureteric junction obstruction, etc., make it more vulnerable to trauma. We report a case of a 21-year-old male admitted to our hospital 3 days after blunt abdominal trauma with complaints of lower abdominal pain, hematuria, and hypotension. The diagnosis of ectopic right kidney with interlobar laceration was established by ultrasonography. Computed tomography angiography showed interlobar renal artery pseudoaneurysm in ectopic right kidney. Successful superselective endovascular coil embolization of the pseudoaneurysm was performed.

Keywords: Ectopic kidney, embolization, pseudoaneurysm

INTRODUCTION
Renal artery pseudoaneurysms are rare presentation of blunt abdominal trauma, seen predominantly in patients with road traffic accident.[1,2] Congenital anomalies such as ectopic location of the kidney, as was seen in our case, make it more prone to injury. Other reported renal vascular injuries after blunt abdominal trauma are arteriovenous fistula formation, renal artery dissection, vascular thrombosis, and rarely transection.[3] Superselective endovascular angioembolization is an effective and minimally invasive procedure for treatment of these pseudoaneurysms.

CASE REPORT
A 21-year-old male was brought to the trauma center Emergency Department (ED) with chief complaints of lower abdominal pain, giddiness, and hematuria. The patient had a history of road traffic accident (fall from bike) 3 days back. He was being managed conservatively for Grade 3 renal trauma at secondary health-care center and was referred to our tertiary care facility for further management.

On arrival at our ED, the patient was hypotensive with tachycardia (blood pressure: 98/51 mmHg, heart rate: 102 bpm). The patient was on inotropic support and had two units of blood transfusion at previous health-care center. On physical examination, he had lower abdominal tenderness and gross hematuria. Complete hemogram showed decreased hemoglobin (10.2 g/dL) and hematocrit (31%) levels. Coagulation profile (prothrombin time-12 s, international normalized ratio-1.1) and creatinine levels (1.3 mg/dL) were normal.

A computed tomography (CT) scan done outside showed ectopic location of the right kidney in the lower abdomen and a 3.5 cm interlobar laceration extending up to the renal sinus. Furthermore, there was approximately 68 mm × 47 mm × 33 mm sized perinephric hematoma, extending into the pelvis. CT angiography showed well-defined rounded enhancing lesion of 9 mm × 6 mm at interlobar region with surrounding hematoma, suggesting a posttraumatic pseudoaneurysm [Figures 1 and 2]. In view of falling blood pressure and hematocrit levels, the patient was referred for urgent endovascular angioembolization of the pseudoaneurysm. Under all aseptic precautions and fluoroscopy guidance, 5F femoral sheath was inserted into the right common femoral artery. Using Sim 1 Catheter and Terumo J-shaped guidewire, selective cannulation of renal artery was done. Angiography confirmed the presence of

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pseudoaneurysm from interpolar branch of ectopic kidney with overlying cortex devascularization [Figure 3]. Superselective catheterization of that branch was done using Progreat microcatheter (Terumo Interventional Systems, Somerset, NJ, USA) [Figure 4], and embolization was performed using a single 2 mm × 2 mm microcoil. Postembolization images confirmed nonopacification of pseudoaneurysm with preservation of the remaining renal vasculature [Figure 5]. The patient’s postoperative course was uneventful. He was hemodynamically stable (blood pressure: 122/80 mmHg, heart rate around 78 bpm) and was discharged 2 days after the procedure with a normalizing blood parameters (hematocrit 36%, hemoglobin 12.5 g/dL).

**Discussion**

Renal artery pseudoaneurysm following blunt abdominal trauma is much less common than following penetrating trauma. Renal artery laceration following sudden deceleration is proposed as the most favored mechanism.[4] Although the presence of congenital anomalies, such as ectopic location of the kidney, makes it more vulnerable to injury, very few reports of posttraumatic pseudoaneurysm in such cases are available.[5] Usually, the renal function is preserved in such cases; however, rupture of pseudoaneurysm ruptures into the collecting system may lead to clot formation, clot retention with partial obstruction of the collecting system, and eventually renal function deterioration.

Perirenal hematoma after trauma is usually contained by Gerota’s fascia and renal parenchyma. Activation of clotting mechanisms and secondary hypotension may result in temporary cessation of active bleeding. However, gradual recanalization of the pseudoaneurysm occurs that can eventually rupture into the pelvicalyceal system leading to gross hematuria or in the perirenal space, resulting in large hematoma.[1,6]
Although most of the renal injuries are being managed conservatively, the presence of gross hematuria, falling blood pressure, and hematocrit values should prompt emergent investigation and management. Focused assessment sonography for trauma might help in the initial evaluation of renal injury; however, contrast-enhanced CT is essential for classification of renal injuries to guide further management. CT angiography is very helpful in diagnosis of renal vascular injuries. Although the initial angiogram may be negative, follow-up imaging often demonstrates previously undetected vascular injuries, especially in patients with strong clinical suspicion. Digital subtraction angiography is the “gold standard” examination used for diagnoses as well as endovascular treatment of such traumatic arterial pseudoaneurysms.

A recent advance in endovascular intervention has made endovascular angioembolization as the treatment of choice in most cases. Embolization can be done using stainless steel/platinum coils or adhesive glue. However, superselective arterial cannulation is recommended to avoid major renal infarction.

Using mechanically, detachable coils are more advantageous as these are economical and offer greater control over delivery as compared to electronically detachable coils.

Procedure-related complications such as renal infarction and hemorrhage are rare if the superselective cannulation is done. However, it may not be always possible to negotiate the coils through the dilated and tortuous renal vessels. Endovascular technique needs centers where expertise in intravascular procedures is available. Open exploration such as partial and total nephrectomy is reserved for selective cases where endovascular approach fails or is technically not possible.

**Conclusion**
Renal artery pseudoaneurysm is a rare presentation after blunt abdominal trauma. Noninvasive modalities such as ultrasonography and CT angiography can suggest the diagnosis. Endovascular angioembolization is a minimally invasive procedure and is the treatment of choice for management of such pseudoaneurysms.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

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