

Percutaneous repair of a disrupted left renal artery after rapid stabilization

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Abstract

Fortunately, acute renal artery injuries occur infrequently in blunt trauma patients. Renal salvage in the multi-trauma patient is a daunting task. If after judicious consideration, intervention is warranted, then expeditious repair should follow. Rapid control of exanguinating injuries should be accomplished and the patient stabilized for further intervention - surgical or endovascular. We present the case of a patient who presented with left pneumothorax, multiple bilateral rib, scapula, long bone fractures, hypotension, hemoperitoneum, non perfusion of the left kidney, and a shattered spleen. She underwent emergent splenectomy and stabilization of her pressure. The left renal artery was evaluated and repaired with a covered stent. This approach might be beneficial in highly selected patients with favorable physiologic and anatomical presentations.

Introduction

Acute renal artery revascularization in the multi-trauma patient with increased body mass can be a daunting task. As this case illustrated, life-preserving procedures should be implemented rapidly to allow a window of opportunity for less invasive organ salvage procedure.

Case Report

An unidentified hypotensive adult female presented to the emergency room after a motor vehicle collision. Her Glasgow coma scale was 14. She was resuscitated and a left chest tube placed for a suspected left pneumothorax. A computed tomography (CT) scan from head to pelvis was obtained. Scout image from Rapid CT-scan in Figure 1 showed left subcutaneous emphysema around the recently placed left pleural tube and a patient with elevated body mass index (BMI). CT imaging without and with contrast revealed a shattered spleen (grade V) and significant hemoperitoneum

(Figure 2). A non-perfused left kidney is also noted in Figure 3. In addition, patient had a left scapula fracture, bilateral rib fractures; left 3-7 and right 7-9 and a fracture of the left tibia. The patient was taken directly to the operating room for splenectomy, exploration, and stabilization of the leg fracture. A stable retroperitoneal hematoma was observed and the abdomen was closed. She was brought to the Interventional Suite for an aortic and left renal angiogram within six hours of arrival.

Results

Using a right femoral approach, an aortogram was performed (Figure 4). This showed a normal right renal artery and an abrupt end to the left renal artery. A hydrophilic wire and catheter were used to cross the lesion after initial attempts showed the catheter outside the lumen of the vessel. Contrast was administered to demonstrate patency of the more distal renal artery and its branches (Figure 5). A 6 mm × 38 mm covered stent was deployed (Figure 6). Although the main renal vessel were partially avulsed continuity and flow was reestablished with the covered stent. Her creatinine increased from 1.3 on admission to 1.8 mg/dL by postoperative day 12. By discharge, postoperative day 16, her creatinine was trending down to 1.6 mg/dL. Post operative renal ultrasound showed flow to both kidneys and renal length greater than 10.6 cm bilaterally.

Discussion

Renal artery injury in blunt trauma occurs infrequently. Among 36,938 patients evaluate by Bruce *et al.* over a 14-year period in Memphis, only 28 (0.08%) had renal injury.¹ Over 93 percent of these injuries were diagnosed by CT. Nine patients had nephrectomies, 15 were observation, three died of other complications, and one had an endovascular repair. The presence of renal artery dissection / disruption in a multi-trauma patient poses many challenges. When there is no active hemorrhage the options are observation, surgical repair, nephrectomy, or percutaneous endoluminal repair. In 2004, Long *et al.* reported their experience with twelve multi-trauma adult and pediatric patients with renal artery disruption or thrombosis. The average ischemic time before intervention was over eight and one-half hours in all the treated patients. Six patients had surgical repair, four had endovascular repair, and two patients were observed. There was no significant renal function by renal scintillography in any of the injured kidneys even when the repaired vessel was still

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patent. None of these patients had hypertension postoperatively. Given the poor outcomes regarding renal salvage, they suggested that intervention be considered in select patients within four hours of injury.² More recently, Chabrot *et al.* has had better success with endovascular renal artery revascularization. They reported renal salvage in three patients with traumatic renal artery thrombosis after trauma. One patient required another endoluminal stent procedure after 28 months for hypertension.³ As early as 1990, Feliciano noted in his review of retroperitoneal hematomas that not all central hematomas for blunt trauma need to be opened. He advised proximal and distal control in approaching these central hematomas if the patient's condition warranted such exploration. Hematomas without obvious active hemorrhage should not be explored.⁴ There were two important considerations in our patient. The first was expeditious splenectomy and control of active bleeding and the other important decision was to avoid operative approach to the left kidney once splenectomy had achieved hemostasis. This allowed an adequate window for endovascular repair and renal salvage. A covered stent was the endovascular treatment of choice since it was clear that the renal artery was partially disrupted and that thrombus lined part of the wall. The covered stent served not only to trap the thrombus in place but also to close the disruption in the left renal artery. While this approach is appropriate for the adult patient, stents in children might be fraught with recurrent complications. Hsu *et al.* reported on the repair of an occluded renal artery in a two-year-old child with an intimal flap. The patient went on to develop in-stent stenosis and hypertension ultimately requiring a nephrectomy.⁵ Furthermore, 10 h of ischemia had already tran-

spired. We requested a mercapto-acetyl tri-glycine technicium-99 (MAG3) study to evaluate differential renal function but the patient declined further testing. She was discharged home on the 16th postoperative day.

Conclusions

In the multi-trauma patient, early stabilizing of life threatening injuries may provide a window of opportunity for the percutaneous

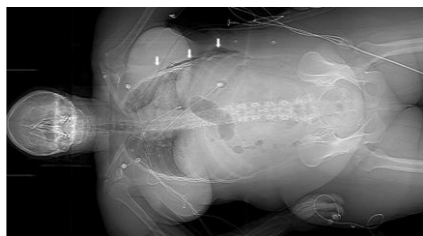


Figure 1. Reformatted scout image depicting left subcutaneous emphysema (arrowheads) below left chest tube. Also note elevated body mass index.



Figure 2. Hemoperitoneum (short arrows); disrupted spleen with active extravasation of contrast (long arrow).



Figure 3. Left renal artery stump (dotted white arrow), non-perfused left kidney (dotted black arrow), perfused right kidney (solid white arrow).

evaluation and repair of significant vascular injuries without extending the operative surgical interventions and the subsequent respiratory complications or increased fluid sequestration leading to abdominal compartment syndrome.



Figure 4. Aortogram showed normal right kidney and abrupt cut off of the left proximal renal artery with a filling defect noted at the proximal superior border (short arrow).



Figure 5. Late stage of selective left renal angiogram demonstrating patient renal vessels beyond the point of injury. Vascular sheath placed beyond the site of injury (long arrow).

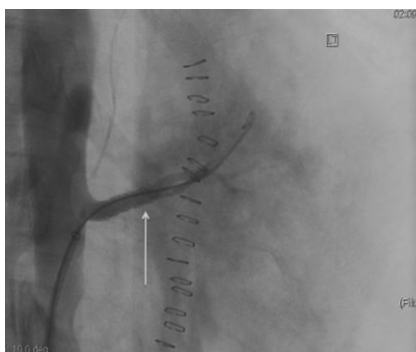


Figure 6. Fully deployed covered stent (long arrow); flow into both branches of the renal artery is preserved. Rosen guide wire maintained across stent pending review of angiogram.

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