Case Report

A case of renal artery embolization for Grade 5 renal injury, usually reserved for surgery

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Abstract

Kidney trauma occurs in approximately 1%–5% of all traumas with the male preponderance. The consequences of blunt renal trauma range from a simple contusion or renal hematoma to complete shattering of the organ or avulsion of the vascular pedicle. Recently, there is more focus on conservative management as newer techniques evolve and its currently the preferred approach to most renal injuries; however, surgery is the main treatment modality for avulsion of the renal pelvis, injuries to the vascular pedicle, and life-threatening hemodynamic instability. Renal artery embolization is a minimally invasive procedure used in the management of many disease conditions and also to control hemorrhage. We report of a Grade 5 renal injury with hemodynamic instability managed with renal artery embolization which otherwise would have been managed with surgery. A 33-year-old presented with Grade 5 left renal injury and hemodynamic instability after a fall. Computed tomography of the abdomen after resuscitation showed shattered left kidney with disruption of the renal hilum and features suggestive of active bleeding. Due to the hypovolemic nature of the patient, embolization of the renal artery was requested. With anesthetic support and antibiotic cover, the right common femoral artery was punctured and a 5 French sheath inserted. Both left renal arteries were selectively catheterized and embolized to stasis with coils. An Angio-Seal device was deployed in the groin and no immediate complications seen. The patient was discharged few days after. This case report shows that Grade 5 renal artery can also be managed through a minimal invasive procedure to reduce the length of time at the hospital and also reduce the metabolic response of the patient.

Keywords: Hematoma, kidney trauma, renal artery embolization

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INTRODUCTION

Most often grade 5 renal injuries are managed through surgery, however recent successes accomplished with embolization in major injuries to solid organ notably the kidney has given a different dimension to managing solid organ injuries irrespective of the degree of injury.

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CASE REPORT

A 33-year-old male patient presented with severe left-sided torso pain after falling off his push bike. He was without a helmet and admits to losing consciousness briefly. He also had nausea and retching but no vomiting. His breath smelt of alcohol and he admitted taking excess alcohol. He generally takes 8 unit of alcohol per day. On examination, his temperature was 35.1, blood pressure 95/61, Sa02 97% and

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heart rate 92. His Glasgow coma score was 15/15. He was sweaty and clammy. He had a 7 cm × 6 cm abrasion on the left side of his face and had no neck tenderness. He had generalized tenderness throughout the abdomen with marked guarding and rebound tenderness at the left lower abdomen. No pelvic and long bone tenderness. Computed tomography of the abdomen after resuscitation showed shattered left kidney with disruption of the renal hilum and features suggestive of active bleeding [Figure 1a, solid arrow]. There was also a massive retroperitoneal bleed. Furthermore, he had a slit-like inferior vena cava indicative of hypovolemia [Figure 1a, curved arrow]. He received a transfusion of four units of pack cells, three units of fresh frozen plasma, and a pool of platelets. He was also treated with alcohol detoxification regimen. Due to the hypovolemic nature of the patient, embolization of the renal artery was requested. With anesthetic support and antibiotic cover, the right common femoral artery was punctured and a 5 French sheath inserted. Both left renal arteries were selectively catheterized and embolized to stasis with coils [Figure 2]. An Angio-Seal device was deployed in the groin, and no immediate complications were seen. He developed pain, fever, nausea, and vomiting (postembolization syndrome) 48 h after the procedure, but this subsided with analgesia, IV fluids, and antiemetic. A repeat computed tomography scan 6 days postembolization showed almost complete left renal infarct, with the left kidney replaced with heterogeneous mass in keeping with necrotic tissue and hematoma [Figure 3]. Furthermore, there remains patchy enhancement at the left upper pole with faint opacification of small vessels supplying the upper pole with no active extravasation. He was discharged 9 days after admission. He presented a week after discharge with frank hematuria, and a repeat computed tomography of the abdomen showed resolving hematoma compared with previous scans.

DISCUSSION

Injuries to the renal parenchyma and renal vessels carry a significant morbidity and mortality. Renal injuries account for about 3%[1,2] of all trauma cases, and 10% of

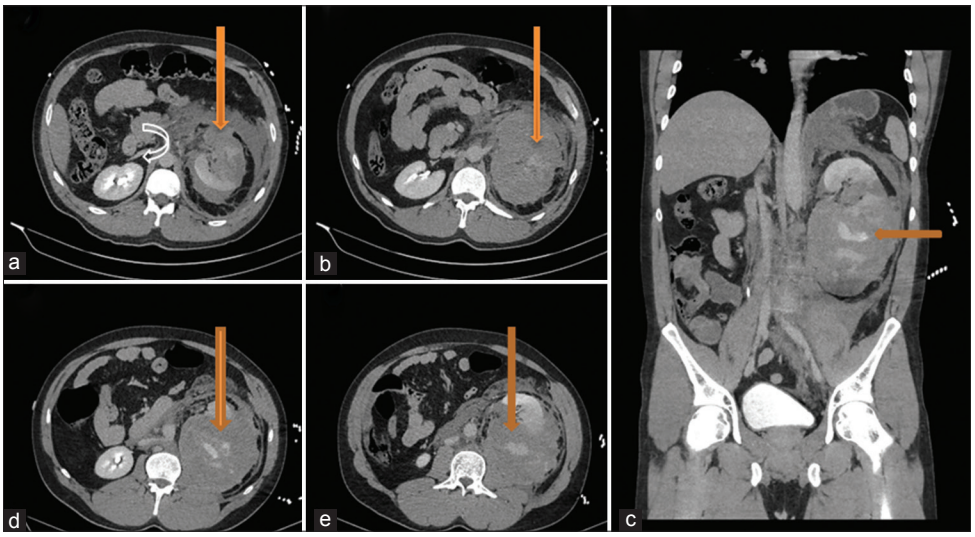

Figure 1: Computed tomography scan of the abdomen with contrast showing complete disruption of the normal left kidney architecture and the renal hilum. Central foci of high density suggestive of active bleeding as demonstrated by the straight solid arrow in 1A – 1E. There is also a slit-like inferior vena cava indicative of marked hypovolemia (curved arrow – 1A)

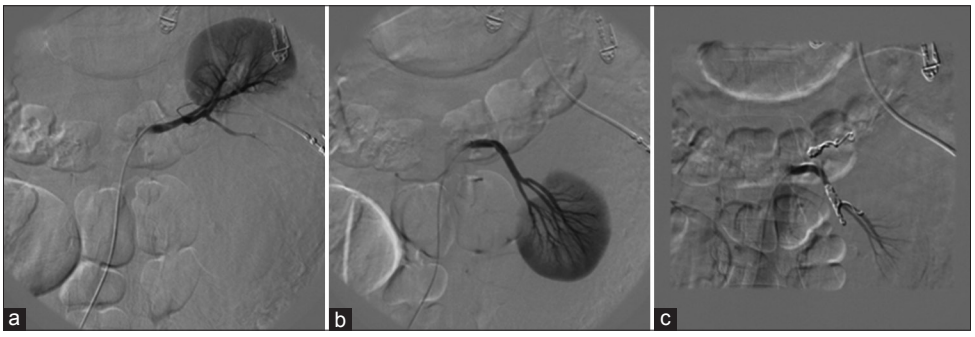

Figure 2: Embolization and computed tomography showing selective catheterization of left renal upper arteries (a) and left renal lower arteries (b), and inserted coils (c)

all abdominal traumas are as a result of renal injuries.[3,4] Blunt abdominal injuries account for the majority of renal injuries with penetrating abdominal injury much more likely to cause worse renal injuries requiring operative intervention.[5,6] Young men below the age of 45 years are the worse culprits probably due to male involvement in more risky activities.[7] Kidneys are protected due to its anatomical location and surrounding structures. Due to its position heavy force is needed to cause renal injury thus making injuries to other organs more likely.[8] Most renal injuries affect the kidney parenchyma with a few of them involving the renal pedicle.[9] Renal trauma grading is done using the American Association for the Surgery of Trauma, and this grading correlates with effect on renal function.[10] It is divided into 5 grades. Grade 1, 2, and 3 are classified as minor, whereas 4 and 5 are major [Table 1].

Over the last few years, nonoperative management of renal trauma has been the preferred approach for minor injuries[11,12] and this is achieved by early diagnosis using ultrasonogram, Computed tomography, and magnetic angiography.[13] However, surgery and remain the mainstay for Grade 5 and some Grade 4.[14-16] Hemodynamic instability after rigorous resuscitation is the likely indication for nephrectomy irrespective of the grade. Renal artery embolization is a useful endovascular technique useful in the emergency treatment of many traumatic injuries to the kidneys.[17] Renal artery embolization is a technique by which arterial blood flow can either be decreased or completely terminated. Several renal artery embolization techniques can be performed, such as partial renal artery embolization, super selective embolization, or total embolization. Partial renal artery embolization techniques are used when only a portion of the kidney is to be removed with the goal of minimizing the destruction of functioning kidney. This can be accomplished by careful selective catheterization of segmental renal artery branches supplying the traumatized portion or growth. Embolization of such arteries may cause segmental infarcts of the kidney. Alternatively, superselective embolization can provide controlled occlusion of specific minute renal artery branches that feed the traumatized portion or a lesion, with minimal compromise of surrounding normal vascularization. On the other hand, the goal of total embolization is the complete obliteration of renal function or elimination of blood supply to kidney or tumors that involve a large portion of the renal parenchyma. Renal artery embolization has many advantages in that it avoids: the need for subjecting patients to general anesthesia, a postsurgical scar that affects the cosmetic appearance and a long period of recovery and convalescences following open surgery. There are not many published data with arterial embolization of Grade 5 renal injuries, and this is a classic example of minimally invasive surgery in an otherwise a procedure that routinely requires open surgery. This case presented showed favorable outcome with renal artery

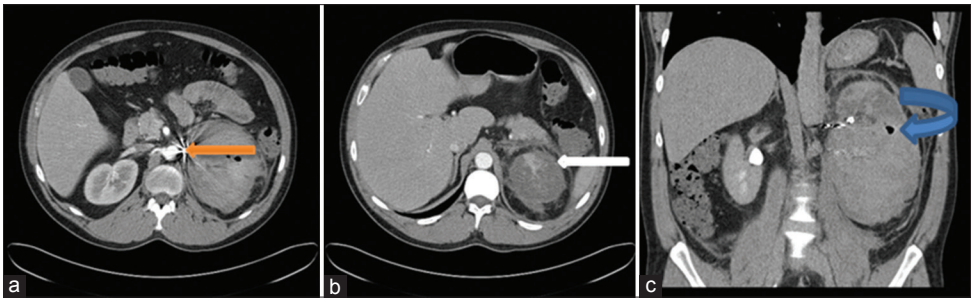

Figure 3: Postembolization computed tomography of the abdomen with contrast showing the positioned coil (orange arrow in 3a), almost complete left renal infarct with the left kidney replaced with heterogeneous mass in keeping with necrotic tissue and hematoma (white arrow in 3b). There are also locules of air seen centrally within the hematoma (shown by the curved arrow in 3c which may represent postembolization syndrome)

Table 1: American association for the surgery of trauma classification of renal injuries

Grade	Type of injury	Description
I	Normal, contusion Hematoma	Microscopic or gross hematuria with normal urologic findings, Nonexpanding subcapsular hematomas with no laceration
II	Hematoma Laceration	Nonexpanding perinephric (perirenal) hematomas confined to the retroperitoneum Superficial cortical lacerations less than 1 cm in depth without collecting system injury
III	Laceration	Renal lacerations >1 cm in depth without collecting system injury
IV	Laceration Vascular injury	Renal lacerations extending through the renal cortex, medulla, and collecting system Injuries involving the main renal artery or vein with contained hematoma, segmental infarctions without associated lacerations
V	Laceration Vascular injury	Shattered kidney, ureteropelvic junction avulsions Complete laceration (avulsion) or thrombosis of the main renal artery or vein that devascularizes the kidney

embolization that abated bleeding, decreased metabolic response, and precipitated early hospital discharge.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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