



Contents lists available at ScienceDirect

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

# Arterial embolization of retained kidney remnant following blunt traumatic injury: A case report



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## ARTICLE INFO

### Article history:

Received 21 April 2015

Received in revised form 16 October 2015

Accepted 17 October 2015

Available online 28 October 2015

### Keywords:

Urinoma

Renal trauma

Arterial embolization

Nephrectomy

Minimally invasive management

Solid organ injury

## ABSTRACT

**INTRODUCTION:** There has been a recent trend toward nonoperative management of solid organ injuries with arteriography and embolization as alternatives to surgical exploration. We examine the use of arterial embolization in the management of a post-subtotal nephrectomy urinoma in a patient with severe renal injury secondary to blunt trauma.

**METHODS:** This case report has been reported in line with the CARE criteria [13].

**PRESENTATION OF CASE:** A 35-year-old female patient presented with a persistent urinoma after an incomplete nephrectomy for blunt renal trauma. Computed tomography scan of the abdomen demonstrated a  $47 \times 68 \times 101$  mm<sup>3</sup> collection superior to the remnant of the resected right kidney. With persistence of the urinoma after placement of an 8 French drainage catheter, the patient was taken for arterial embolization of the lower renal artery for ablation of the kidney remnant.

**DISCUSSION:** Most kidney injuries with urinoma formation are treated successfully with supportive measures, however refractory cases require intervention. Arterial embolization has been used successfully in the treatment of traumatic pseudoaneurysms, arteriovenous fistulas, and some renal tumors. In this patient, we extended the use of embolization to infarct vessels of the functioning kidney remnant as an alternative to surgery. Post-embolization the patient recovered well with permanent resolution of the urinoma and short-term side effects limited to short-lived fever and lumbar pain.

**CONCLUSION:** Arterial embolization should be considered as an alternative to surgery in cases of persistent urinoma following renal trauma with retained remnants.

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## 1. Introduction

There has been a recent trend towards nonoperative management of solid organ injuries [1]. Nonoperative management includes adjunctive therapy with arteriography and embolization as an alternative to open surgical exploration. This has been shown to be successful in splenic, hepatic, and renal injury due to trauma [2]. Arteriographic embolization procedures have also been used with success in benign and malignant tumors as well as in iatrogenic vascular injuries [3]. Here, we examine the use of arterial embolization in the management of a post-subtotal nephrectomy urinoma in a patient with severe renal injury secondary to trauma.

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<http://dx.doi.org/10.1016/j.ijscr.2015.10.027>

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## 2. Methods

This case report has been reported in line with the CARE criteria [13].

## 3. Case presentation

A 35-year-old helmeted female bicyclist with no past medical or surgical history was brought in by emergency medical services as a level 1 trauma code after being struck by a motor vehicle with loss of consciousness. On initial presentation her Glasgow Coma Scale (GCS) was 15 but was noted to be in severe respiratory distress with complaints of shortness of breath. Vitals at this time were significant for a pulse rate of 125 beats per minute, BP 67/20, and a respiratory rate of 45 breaths per minute. On exam she was noted to have ecchymoses around her left eye along with a facial laceration as well as decreased breath sounds on her right side, however there were no other obvious external signs of trauma. A Focused

Assessment with Sonography for trauma (FAST) was performed by the ED physician which was reported to be negative. She responded to one liter of isotonic fluid with normalization of her blood pressure. A chest X-ray was obtained and demonstrated a large right pneumothorax; successful re-expansion of the lung was accomplished with a chest tube. Her vitals normalized. She was intubated for agitation and brought to the Cat Scan (CT) for further workup.

A non-contrast CT head/C-spine, and CT Chest/Abdomen/Pelvis with IV contrast were obtained and significant for a grade 5 liver laceration, grade 5 right kidney laceration, grade 1 splenic laceration as well as a left clavicle fracture and bilateral small pneumothoraces. Shortly after completing CT scan, she became hypotensive and the decision was made to take her to the operating room.

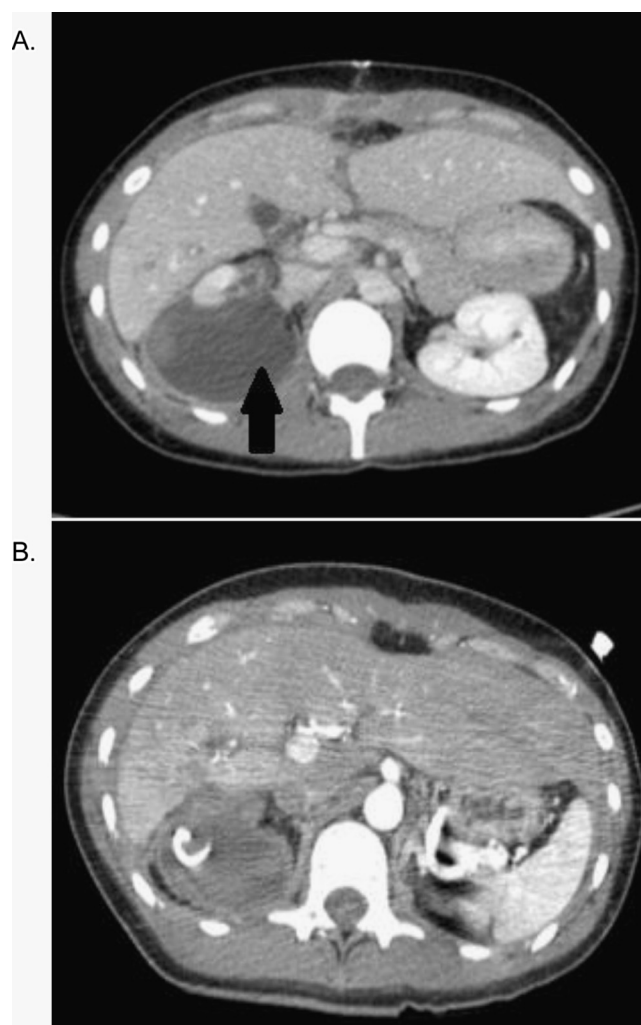
Upon entering the abdomen a large amount of blood was encountered and evacuated followed by four-quadrant packing. A right medial visceral rotation was performed to reveal a large hematoma in the retroperitoneum. Exploration of the hematoma revealed a shattered inferior portion of the kidney. The superior portion of the kidney was noted to be bleeding significantly, at which time the renal vessels were doubly ligated with 2–0 silk suture and a nephrectomy was performed. Secondary to limited visibility in the surgical field and her hemodynamic instability, the right ureter was unable to be located for resection or ligation. Hemostasis of the spleen and liver was appreciated upon removal of the packs and other abdominal injuries were excluded. However, given the degree of injuries she sustained seen on imaging she was repacked, a Barker vac was placed and she was brought back to the Intensive Care Unit (ICU) for further resuscitation. Intraoperatively the patient had received 7 units of packed red blood cells, 3 units of fresh frozen plasma, and 4 l of crystalloid.

The patient was taken to Interventional Radiology several hours later at which time no active extravasation was appreciated from the hepatic or splenic artery. She returned to the OR post-operative day (POD) #2 for re-exploration at which time she was found to have active bleeding over the dome of the liver once packs were removed. She was repacked with subsequent hemostasis. She continued to be monitored in the ICU and returned again to the OR three days later on POD#5 for her third laparotomy at which time the packs were again removed without any bleeding noted. At this time a right ureterectomy was performed, her abdomen was closed primarily and she was brought back to the ICU. The patient was successfully extubated two days later on POD#7.

During her hospital course, her labs were significant for a persistently elevated WBC prompting further workup including a CT abdomen/pelvis with IV contrast on POD#13 which revealed a right kidney remnant isolated from the collecting system with a large, well-defined rim-enhancing collection (47 × 68 × 101 mm) posterior and superior to the residual lower pole fragment of right kidney with contrast visualized in the collection suggestive of a urinoma (Fig. 1). On POD#16 she underwent ultrasound-guided drainage of the collection with placement of an 8 French drainage catheter. Cultures sent from the collection were without growth.

Over the next few days secondary to persistent drainage, options for management including IR angioembolization of the remnant right kidney versus completion nephrectomy were discussed. The decision was made to proceed with angioembolization as her recent history of multiple abdominal surgeries placed her at high risk. Interventional radiology performed embolization of the right kidney remnant on POD#19. Two traumatic pseudoaneurysms were found in segmental arteries and these were embolized with 300–500 micron embospheres. The lower renal artery was completely occluded with a 2 × 3 mm tornado microcoil. Completion arteriogram demonstrated successful occlusion and zero blood flow within the kidney remnant (Fig. 2).

Post-embolization the patient was febrile with complaints of severe flank pain and was kept on antibiotics for another 24 h. She



**Fig. 1.** (A) Contrast enhanced CT scan shows a large, well-defined fluid collection (black arrow) measuring 47 × 68 × 101 mm posterosuperior to the residual lower pole fragment of the right kidney. (B) CT scan after placement of an 8 French percutaneous drainage catheter with a slight interval decrease in the size of the urinoma/hematoma.

was subsequently afebrile with resolution of her pain. Her drain was removed on POD#25 and she was stable for discharge home on POD#26 with no residual functional deficits. A follow-up BUN/Cr was 17/1.16.

#### 4. Discussion

Blunt or penetrating trauma is the most common cause of urine extravasation from the urinary system [4] and the kidney is the most commonly injured organ of the genitourinary system [5]. Extravasation can be frank or result in formation of an encapsulated urinoma or tract within the retroperitoneum. Initially, many cases of urinomas are occult and present insidiously and non-specifically with flank pain, fever or ileus. The diagnostic test of choice is CT Abdomen/Pelvis with IV contrast and delayed imaging which allows detection of contrast accumulation within the urinoma. If there is uncertainty about the origin of the fluid collection, percutaneous drainage can be performed with fluid analysis and confirmation. Urinary fluid will have elevated creatinine and decreased glucose as compared to serum levels [4].

Ninety percent of kidney injuries with urinoma formation can be treated conservatively with continued observation and supportive measures [6]. Refractory cases that demonstrate enlargement

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