

## Conservative Salvage of a Penetrating Grade IV Renal Injury with Extravasation

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### Abstract

*Penetrating abdominal injuries have traditionally been managed with surgical exploration. The recent trend in renal trauma is selective nonoperative management, even if laparotomy is performed for associated injuries. This case describes the salvage of a grade IV kidney injury secondary to gunshot wound. A large perinephric hematoma and associated hollow viscus injury were discovered on CT scan. The patient underwent laparotomy for colonic repair. The perinephric hematoma appeared non-pulsatile, nonexpanding, and not actively bleeding, and thus was not explored. The injured kidney healed and the patient did not require nephrectomy.*

**Keywords:** Penetrating renal trauma, Nephrectomy, Renal salvage, Laparotomy, Selective management

### Abbreviations:

- CT- Computed Tomography
- AAST - American Association for the Surgery of Trauma
- OIS - Organ Injury Scale
- SNOM - Selective Nonoperative Management
- GCS - Glasgow coma scale
- FAST - Focused Assessment with Sonography for Trauma
- ED - Emergency Department

### Introduction

Ten percent of abdominal trauma involves injury to the genitourinary tract [1]. Traditionally, the AAST organ injury scale has been used to dictate management of penetrating renal injury. However, in the last few decades, selective nonoperative management (SNOM) of any grade has become increasingly accepted and carries a reported success rate greater than 90% [2-4]. In hemodynamically stable patients, SNOM with close observation is the recommended approach to penetrating renal injury [1].

### Case Presentation

A 42-year-old African American female sustained a gunshot wound to the left flank with no identifiable exit wound. On presentation, she was ambulatory and hemodynamically stable with a Glasgow Coma Score (GCS) of 15. FAST exam was inconclusive with questionable signs of free fluid in the splenorenal fossa. Pelvic x-ray showed a bullet along L2. Contrast-enhanced abdominal computed tomography (CT) revealed an AAST-OIS Grade IV injury to the left inferior renal pole with a 6.8 x 6.3 cm subcapsular hematoma with pockets of air and contrast extravasation [figure 1A & B]. Pericolonic fluid, fat stranding, and bowel wall

thickening of the descending colon posed concern for bowel injury. The patient was subsequently taken to the OR for a midline exploratory laparotomy. Partial left colectomy was performed for a trans-colonic injury at the splenic flexure. Medial visceral rotation revealed an entrance wound to the left kidney with a stable left perinephric hematoma, which was packed. The rest of the abdomen was explored and no other injuries were found. A decision to leave Gerota's Fascia intact was made due to the non-expanding nature of the hematoma and no obvious extravasation into the wound bed. Temporary abdominal closure device was placed and the patient was transferred to the ICU.

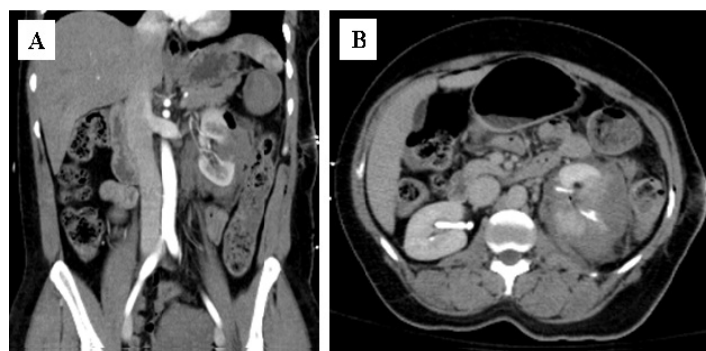


Figure 1: Initial Trauma CT. A) Coronal view, B) Axial view.

Post-operative x-ray and intravenous pyelogram confirmed left inferior pole calyx injury without evidence of ureteral injury. The patient returned to the OR for re-exploration, drain placement, and closure on hospital day 3. Repeat CT scan showed decreased hematoma size with no evidence of active bleeding, urinoma, ureteric injury, or signs of extraluminal colonic leak [figure 2A & B]. Following a 14-day course of IV cefoxitin and metronidazole,

the patient left against medical advice on hospital day 17. After 6 days, she returned to the ED asking for her drain to be removed.

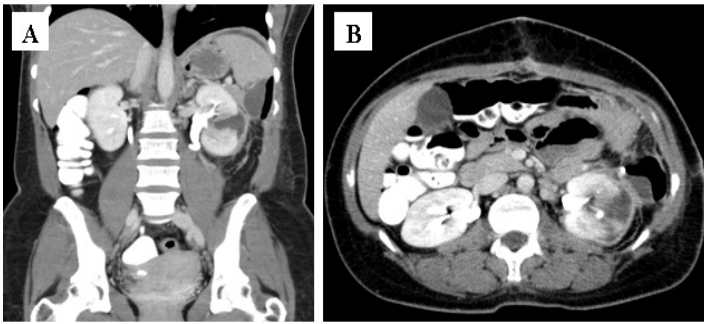


Figure 2: Repeat CT on hospital day 14. A) Coronal view, B) Axial view.

Eight weeks later, our center was contacted by a trauma surgeon in another state requesting the patient's medical records. She had been admitted following a motor vehicle accident and underwent emergent laparotomy for a AAST-OIS Grade IV hepatic laceration. The physicians at the other center commented that the left kidney appeared normal on both CT imaging and during the operation.

## Discussion

Historically, trauma surgeons have opted for surgical management of penetrating renal injuries. Yet, modern evidence suggests that nonoperative approaches are possible even in high grade injuries. According to the American Urological Association, observation is recommended for hemodynamically stable patients regardless of AAST grade [1]. An initial CT scan may be obtained for objective injury grading. Associated injuries may necessitate laparotomy, however, the European Association of Urology Trauma Guidelines state that, "stable hematomas detected during exploration for associated injuries should not be opened" [5]. Selective nonoperative management (SNOM) of penetrating renal injuries can minimize the frequency of negative exploratory laparotomies and avoid unnecessary nephrectomy [4]. Surgical exploration, for any reason, increases the risk of nephrectomy up to 64% in patients with stable renal injuries [5]. Not only does SNOM avoid this risk, it also results in fewer complications, shorter in-patient stays, and lower mortality [2]. This is likely due to a combination of factors: tamponade effect of Gerota's fascia, containment of hematoma in the retroperitoneal space, and an abundant blood supply to promote healing [4]. Repeat CT imaging is recommended at 48-72 hours post-injury to confirm absence of hematoma expansion and evaluate for developing perinephric abscesses [1].

## Conclusion

Although surgical exploration has been the traditional approach in penetrating abdominal injury, selective non-operative management of renal trauma should be employed in clinically and hemodynamically stable patients. An initial CT scan should be obtained for injury grading and can be used as a comparison in repeat imaging. In stable hematomas, this approach minimizes the risk of a negative surgical exploration without increasing mortality or morbidity.

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