

Case study

Successful Conservative Management of Isolated High-Grade Blunt Renal Trauma: Case Report And Follow Up

ABSTRACT

The management of high-grade renal trauma remains debatable in various education and research centers, especially the cases of patients with stable hemodynamics. This paper reports the case of a 24-year-old man with high-grade renal trauma due to blunt injury in the left flank. The patient had stable hemodynamics and was managed conservatively, followed by three months of post-trauma follow up. In this case, the conservative management has resulted in a satisfactory outcome, confirming that conservative management is an appropriate alternative treatment for patients with similar cases.

Keywords: High-Grade Renal Trauma, Conservative Management, Isolated Renal Trauma

1. INTRODUCTION

Renal trauma dominates 8-10% of abdominal trauma; 80–90% of cases are due to blunt injury^{1,2}. The common mechanism of blunt trauma resulting in renal injury is caused by traffic accidents, falling from heights, violent crime and sports injury². There are five grades of renal trauma based on the level of damage in the cortex, medulla, blood vessels within the kidney, and in the presence of any disruption to the tubular collecting system³. High-grade renal trauma (grade 4 and 5) is rare with an incidence ranging between 1% - 2% of the total number of cases of renal trauma⁴. There is ongoing debate as to whether it is appropriate to run conservative management or explorative surgery management for patients with high-grade renal trauma⁵. There are some considerations in selecting the best management, including the hemodynamic status of the patient and whether this is any damage to other intra-abdominal organs^{2,6}. This paper reports the evaluation of conservative management conducted to in a patient with high-grade renal trauma and stable hemodynamics and followed up three months post trauma.

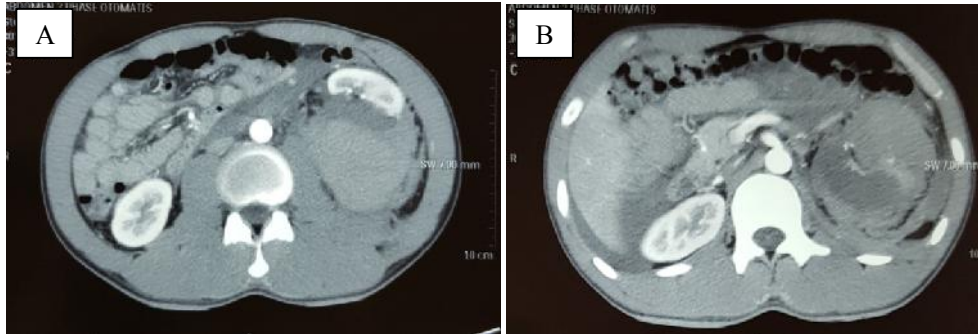
2. PRESENTATION OF CASE

A 24-year-old male patient was rushed to hospital with severe pain in the left flank. The patient was unintentionally kicked by his friend in the left flank while playing football, approximately 4 hours before arrival to the hospital. The patient had also passed blood stained urine 15 minutes after the incident. The patient denied taking any drugs, loss of consciousness, shortness of breath, or nausea and vomiting.

Assessment in the emergency department showed the patient to be hemodynamically stable. He had patent airways, spontaneous breath, was still able talking in full sentences and follow instructions with spontaneous motion in all extremities. There were ecchymoses in the left flank where the patient felt pain. There were no muscular defects in the abdominal regions, blood in the external urethral orifice, nor hematoma in the scrotal. The patient's urine was red and blood was confirmed by the urinalysis following insertion of a size 16 fr Foley catheter. The patient had a blood pressure (BP) of 110/70 mmHg, heart rate of 82beats per minute, respiratory rate 24 times/minute, a temperature of 37.5° Celcius, and oxygen saturation (pO₂) of 99% in room air. Laboratory tests showed a hemoglobin (Hb)

40 13.5 gr/dL, hematocrit 42, leukocytes 23,400 mm³, platelets 264,000 cells/mm³, blood urea (Ur) 53
41 mg/dl, and serum creatinine (Cr) 1,3 mg/dl. Computed Tomography (CT) scan with contrast of the
42 abdominal showed an irregular-shaped enlarged left renal with a non-homogeneous parenchymal
43 structure. A non-homogeneous lesion with an irregular edge in the left renal was also found. The
44 contrast filled the lesion up to the subcapsular area in the upper pole to the middle pole. Based on the
45 clinical and CT scan examination, the patient was diagnosed with grade IV renal trauma according to
46 American Association for the Surgery Trauma (AAST) (Figure 1).

47
48
49



50
51

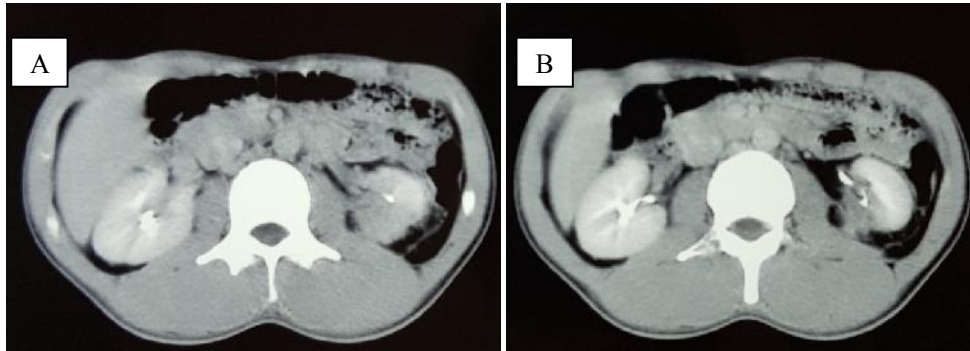
52 **Figure 1:** CT Scan abdomen with contrast was immediately conducted after trauma occurred. 1a)The
53 figure shows grade IV traumatic injury. 1b) The contrast-enhanced in nephrographic phase, showing
54 laceration in the lower extremity of the left renal. Meanwhile, a wide perirenal hematoma is still stuck
55 by renal capsule.

56

57 Further management in the emergency department included: nursing the patient with his head at an
58 incline of 30⁰, insertion of a nasogastric tube, nasal cannula delivering O₂ at 2 L per minute, Ringer
59 lactate fluid given by infusion at 20 drops/min, intravenous ketorolac analgesics 30 mg administered
60 three times per day, intravenous tranexamic acid 500 mg three times a day, and intravenous
61 ceftriaxone 500 mg administered 12 hourly. Serial testing for haemoglobin was conducted every 6
62 hours. On the second day, his Hb declined to 8.1 g/dl, the haemoglobin failed to significantly improve
63 from 8.5 g/dl following a 2x250cc packed red cell (PRC) transfusion of. The patient developed
64 shortness of breath and was transferred to the Intensive Care Unit (ICU). Morphine at
65 5mcg/kgbb/hour dose was substituted as analgesic management. The patient haemoglobin levels
66 were monitored were intensively every hour and his condition improved. A urinalysis showed 80
67 erythrocytes/hpf. On the fourth day, the patient's haemoglobin levels gradually increased on serial
68 haemoglobin testing. Hematuria disappeared on the sixth day of urinalysis testing. The patient was
69 gradually mobilized. Haemoglobin level had increased to 13.5 gr/dL on the seventh day, and the
70 patient was allowed to leave the hospital and he proceeds polyclinic treatment.

71 Three months following treatment the patient no longer complained of any pain and he was able to do
72 normal daily activities. The result of the renal examination showed normal urea and creatinine. A
73 repeat CT scan showed parenchyma scar formation and retraction of injured renal. Improvement
74 showed in the renal anatomy and renal function compared to the initial CT scan (Figure 2).

75



76

77 **Figure 2:** CT Scan abdomen with contrast in three months after the trauma.2a) The size of the left
 78 renal size is still in good condition with a regular surface.2b) Hypodense is identified in the lower
 79 renal extremity which typical of parenchyma scar, while perirenal hematoma is no longer found.

80 **3. DISCUSSION**

81 High-grade renal trauma is rare. The protocols for high-grade renal trauma management remains a
 82 controversy and varies among institutions. The main distinction of high-grade renal trauma therapy is
 83 whether or not the patient is hemodynamically stable. Societe Internationale d'Urologie guidelines
 84 recommend a laparotomy exploration, while European Association of Urology guidelines suggest
 85 performing renal exploration operation if the vessels are affected, whereas American Urological
 86 Association (AUA) proposes conservative management under any condition⁷⁻⁹. The management of
 87 high-grade renal trauma with stable hemodynamic is very controversial, as few cases need
 88 aggressive procedures due to worsening hemodynamic condition¹⁰. Following AUA guideline, the
 89 patient's condition, in this case, was considered stable (Systolic BP > 90 mmHg). Hence, conservative
 90 management could be conducted under strict observation including observations of Hb and blood
 91 pressure levels.

92 Three months after the accident CT scan abdomen with contrast showed a development of fibrous
 93 tissue. Renal anatomy formation which has end-artery blood supply with the segmental pattern has
 94 two different sides, especially in renal trauma cases. On the one hand, when trauma occurs, renal will
 95 have a laceration on its parenchyma. The hematoma that is formed due to bleeding and closed
 96 anatomic structure of retroperitoneal space will become natural pressure for a leaked renal segmental
 97 artery. Whereas, as renal is an end-artery organ, oxygen supply will be obstructed when if laceration
 98 occurs, forming scars in tissues at the end of the recovery process. The figure two shows that the left
 99 renal is retracted, while the enhancement in the lower renal pole is disappearing. Based on theory,
 100 the development of fibrous tissue in renal trauma takes around 2-8 months, resulting in renal atrophy
 101¹¹. A retrospective study by Dunfee *et al*, in six patients suffering from high-grade blunt renal trauma,
 102 showed a development of scar tissue and renal atrophy occurred in all of the patients¹². The long-
 103 term effect of this occurrence might appear in the form of higher blood pressure and deteriorating
 104 renal function. A retrospective study by Tasian *et al*. showed a decline in renal function in long-term,
 105 especially in high-grade renal injury¹³. Chedid *et al*. in a long-term follow-up study reported the
 106 development of hypertension in middle-aged men with renal scarring following blunt renal trauma.
 107 Hence long-term follow up of patients with blunt renal trauma is necessary to detect complications of
 108 renal scarring¹⁴.

109

110 **4. CONCLUSION**

111 Although conservative management and surgical management both have their own protagonists,
 112 conservative management of severe blunt renal trauma is preferred in hemodynamically stable
 113 patients. The success of conservative management in similar cases has been reported by a number
 114 of case studies and meta-analysis research^{1,2,6}. This case shows that conservative management can
 115 be an alternative procedure in handling patient with isolated high-grade blunt renal trauma with stable
 116 hemodynamics.

117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156

CONSENT (WHERE EVER APPLICABLE)

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

REFERENCES

1. Sujenthiran A, Elshout PJ, Veskimae E, et al. Is Nonoperative Management the best first-line option for high grade renal trauma? A Systematic Review. *Eur Urol Focus* 2017;S2405-4609:1-11.
2. Austin J, Rajkumar G. The Diagnosis and management of renal trauma. *Journal Of Clinical Urology* 2018;11:70-6.
3. Shariat SF, Roehrborn CG, Karakiewickz PI, Dhimi G, Stage KH. Evidence-Based validation of the predictive value of the American Association for the Surgery of Trauma Kidney Injury Scale. *J Trauma* 2007;62:933-9.
4. Teh J, Khan M, Liu D, Roberts-Thomson J. Delayed presentation of grade IV renal injury post blunt trauma. *Urology case report* 2018;18:77-8.
5. Bryk DJ, Zhao LC. Guidelines of guideline: a review of urological trauma guidelines *BJU Int* 2016;117:226-34.
6. Buckley JC, McAninch JW. Selective management of isolated and Non-isolated Grade IV renal injuries. *J Urol* 2006;176:2498-502.
7. Serafatinidis E, Kitrey ND, Djakovic N, et al. A Review of the current management of upper urinary tract injuries by the EAU trauma guidelines panel. *Eur Urol* 2015.
8. Summerton DJ, Djakovic N, Kitrey ND, et al. Guideline on Urological Trauma. 2014.
9. Morrey AF, Brandes S, Dugi DD, et al. Urotrauma: AUA GUIDELINE. *J Urol* 2014;192:327-35.
10. Santucci R, McAninich J. Grade IV Renal Injuries: evaluation treatment, and outcome. *World J Surg* 2001;25:1565-72.
11. Gerlaugh R, Demuth W, Rattner W, Murphy J. The Healing of Renal Wounds. *J Urol* 1960;83:529-34.
12. Dunfee BL, Lucey BC, Soto JA. Development of Renal Scars on CT After Abdominal Trauma: Does Grade of Injury Matter? *AJR* 2008;190:1174-9.
13. Tasian G, Aaronson D, McAninch J. Evaluation after major renal injury: correlation with the American Association for the Surgery of Trauma Injury Scale. *Journal of Urology* 2010;183:196-200.
14. Chedid A, Coz SL, Rossignol P, Bobrie G, Herpin D, Plouin P-F. Blunt Renal Trauma-Induced Hypertension: Prevalence, Presentation, and Outcome. *AJH* 2006;19:500-4.