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

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### Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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Case Study

## 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.*

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## 1. INTRODUCTION

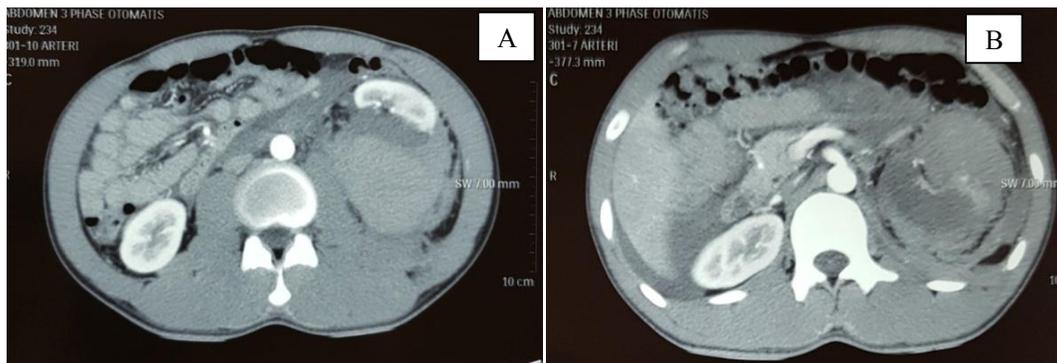
Renal trauma dominates 8-10% of abdominal trauma; 80–90% of cases are due to blunt injury [1]. The common mechanism of blunt trauma resulting in renal injury is caused by traffic accidents, falling from heights, violent crime and sports injury [2]. There are five grades of renal trauma based on the level of damage in the cortex, medulla, blood vessels within the kidney, and in the presence of any disruption to the tubular collecting system [3]. 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 trauma [4]. There is ongoing debate as to whether it is appropriate to run conservative management or explorative surgery management for patients with high-grade renal trauma [5]. 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 at 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 (pO<sub>2</sub>) of 99% in room air. Laboratory tests showed a hemoglobin (Hb) 13.5 gr/dL, hematocrit 42, leukocytes 23,400 mm<sup>3</sup>, platelets 264,000 cells/mm<sup>3</sup>, blood urea (Ur) 53 mg/dl, and serum creatinine (Cr) 1,3 mg/dl. Computed Tomography (CT) scan with contrast of the abdominal showed an irregular-shaped enlarged left renal with a non-homogeneous parenchymal structure. A non-homogeneous lesion with an irregular edge in the left renal was also found. The contrast filled the lesion up to the subcapsular area in the upper pole to the middle pole. Based on the clinical and CT scan examination, the patient was diagnosed with grade IV renal trauma according to American Association for the Surgery Trauma (AAST) (Fig. 1).



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

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

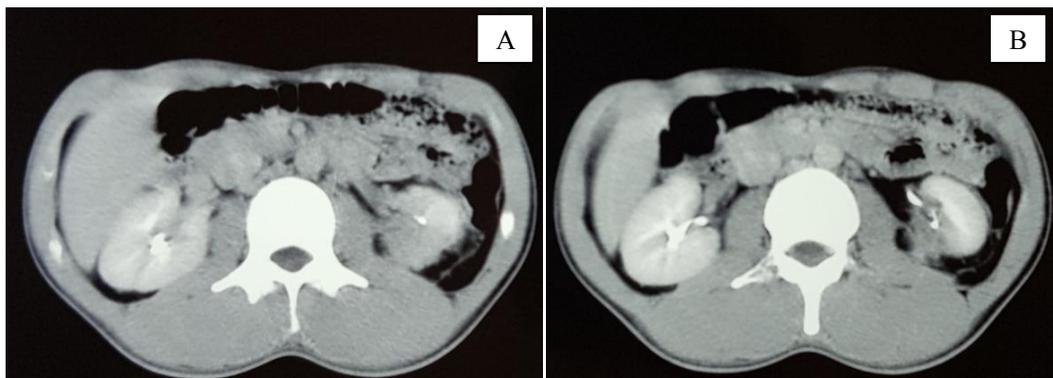
Three months following treatment the patient no longer complained of any pain and he was able to do normal daily activities. The result of the renal examination showed normal urea and creatinine. A repeat CT scan showed

parenchyma scar formation and retraction of injured renal. Improvement showed in the renal anatomy and renal function compared to the initial CT scan (Fig. 2).

### 3. DISCUSSION

High-grade renal trauma is rare. The protocols for high-grade renal trauma management remains a controversy and varies among institutions. The main distinction of high-grade renal trauma therapy is whether or not the patient is hemodynamically stable. Societe Internationale d'Urologie guidelines recommend a laparotomy exploration, while European Association of Urology guidelines suggest performing renal exploration operation if the vessels are affected, whereas American Urological Association (AUA) proposes conservative management under any condition [7-9]. The management of high-grade renal trauma with stable hemodynamic is very controversial, a few cases need aggressive procedures due to worsening hemodynamic condition [10]. Following AUA guideline, the patient's condition, in this case, was considered stable (Systolic BP > 90 mmHg). Hence, conservative management could be conducted under strict observation including observations of Hb and blood pressure levels.

Three months after the accident CT scan abdomen with contrast showed a development of fibrous tissue. Renal anatomy formation which has end-artery blood supply with the segmental pattern has two different sides, especially in renal trauma cases. On the one hand, when trauma



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

occurs, renal will have a laceration on its parenchyma. The hematoma that is formed due to bleeding and closed anatomic structure of retroperitoneal space will become natural pressure for a leaked renal segmental artery. Whereas, as renal is an end-artery organ, oxygen supply will be obstructed when if laceration occurs, forming scars in tissues at the end of the recovery process. The figure two shows that the left renal is retracted, while the enhancement in the lower renal pole is disappearing. Based on theory, the development of fibrous tissue in renal trauma takes around 2-8 months, resulting in renal atrophy [11]. A retrospective study by Dunfee et al., in six patients suffering from high-grade blunt renal trauma, showed a development of scar tissue and renal atrophy occurred in all of the patients [12]. The long-term effect of this occurrence might appear in the form of higher blood pressure and deteriorating renal function. A retrospective study by Tasian et al. showed a decline in renal function in long-term, especially in high-grade renal injury [13]. Chedid et al. in a long-term follow-up study reported the development of hypertension in middle-aged men with renal scarring following blunt renal trauma. Hence long-term follow up of patients with blunt renal trauma is necessary to detect complications of renal scarring [14].

#### 4. CONCLUSION

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

#### CONSENT

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.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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