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SUCCESSFUL NON-OPERATIVE MANAGEMENT OF A PATIENT WITH GRADE IV RIGHT RENAL TRAUMA ASSOCIATED WITH HEPATIC AND RIGHT ADRENAL TRAUMA – A CASE REPORT

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Abstract: *In case of a traumatic event, preservation of the injured renal and kidney function represents the goal of non-operative management (NOM) of renal trauma. The substantial benefits of non-operative management for minor blunt renal injury have already been clearly described in current literature, but its value for major blunt and penetrating renal injuries are still under debate and not clearly highlighted. We hereby fully report a case of a 64 years old male patient with a history of a thoraco-abdominal blunt trauma, victim of aggression caused by a blunt object, which resulted in grade IV injury of the right kidney and associated grade II hepatic injury and right adrenal injury – grading according to the American Association for the Surgery of Trauma (AAST) injury scale guidelines – evaluated through contrast enhanced emergency CT imaging. The patient was hemodynamically stable upon admission to the Emergency Department of Clinical Emergency County Hospital of Brașov, Romania. Non-operative management strategy was chosen, therefore constant and close monitorization and follow-up CT examinations were performed. The patient was subsequently discharged after 8 days, with no further complications reported.*

Key words: *renal trauma, AAST injury scale, hepatic trauma, adrenal trauma, CT, non-operative management, conservative treatment.*

1. Introduction

Renal trauma is defined as a posttraumatic parenchymal defect with haemorrhage or extravasation of blood and/or urine, resulting from direct, blunt,

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penetrating, and iatrogenic injury [1 – 3].

Renal injuries account for approximately 10% of abdominal trauma.[1,4] Pre-existing renal pathology such as horseshoe kidney, renal ptosis, renal cysts, increase the incidence of kidney injuries [1], [4].

The most renal injuries are minor [1]. The wide spectrum of renal injuries includes the following:

- ✓ superficial contusions;
- ✓ parenchymal haematomas;
- ✓ laceration;
- ✓ haemorrhage;
- ✓ pseudoaneurysm;
- ✓ renal pedicle avulsion;
- ✓ arterio-venous fistula;
- ✓ renal artery thrombosis, transection or dissection [1–3].

High grade blunt and penetrating renal injuries in most cases (80%) are associated with multiorgan injuries [1].

CT imaging modality represents the mainstay for imaging diagnosis of renal injuries. CT multiphase protocol study includes a non-contrast phase. after that to assess the vascular injury we use an arterial phase, to assess parenchymal lesions we use a venous phase and a delayed phases is used to evaluate bleeding and collecting system injuries [1]. Non-operative treatment is nowadays the golden standard. The most important condition for initiating a non-operative management is hemodynamic stability. In some cases, surgical interventions are still the way to solve complex abdominal trauma [4–7]. Therefore, for a safe approach it is necessary to quickly determine whether to initiate non-operative or surgical treatment in order to obtain optimal outcome [4].

The non-operative management is currently the golden standard for both renal and kidney trauma. The main criteria for choosing a non-operative treatment is the hemodynamic stability. If the patient is hemodynamic unstable or with signs of peritoneal irritation, surgical treatment remains the only safe option. [7]

The aim of the current manuscript is to show that non-operative management is a safe option even in patients with multiple injuries. The non-operative treatment of parenchymal visceral lesions in polytraumatized patients can only be performed in hospitals that currently treat severe trauma and that have a 24-hour/day laboratory, computed tomography and a surgeon with experience in trauma.

2. Case Report

We fully illustrate a case of a 64-years-old man, victim of aggression caused by a blunt object, who was immediately transferred to the Emergency Department of Clinical Emergency County Hospital of Braşov, Romania, approximately 24 hours after the incident. At presentation the patient accused severe pain in the right hemithorax and in the right flank and important macroscopic hematuria. The general status of the patient was altered, but he remained conscious with a Glasgow Coma Scale of 15.

Furthermore, clinical examination revealed a small hematoma on the right flank and macroscopic hematuria, suggesting a renal trauma. The abdomen was painless, but with an extreme pain at the palpation of the right lumbar area. The patient was hemodynamically stable, with a heart rate (HR) of 92 bpm and blood pressure (BP) of 160/80 mmHg, oxygen saturation on room air 97%. No other additional medical history was reported. The patient was not known with any other

renal pathology (pre-existing or acquired).

Therefore, the presumptive clinical diagnosis based on the clinical exam was right renal laceration, retroperitoneal hematoma and hepatic contusion. The patient was transferred to the Critical Care Unit for a careful observation.

Modified biochemical parameters:

- ✓ Sodium = 30 mmol/L;
- ✓ Hemoglobin = 13 g/dl;
- ✓ Leucocytes = 10,09 x 103 u/L;
- ✓ Seric Creatinine = 1,49 mg/dL;
- ✓ Aspartate aminotransferase-474 u/L;
- ✓ Alanine transaminase - 614 u/L;
- ✓ Total Bilirubin = 1,25 mg/dl.

Urine sediment examination showed red blood cells, rare epithelium cells and rare leukocytes. After urinary catheterization the urinary output was 600 ml with macroscopic hematuria.

Emergency contrast-enhanced CT scan was performed, following the CT Protocol: unenhanced phase, arterial phase, venous phase, delayed phase at 3 minutes and delayed phase at 7 minutes.

CT imaging revealed the following posttraumatic imaging aspects:

- ✓ shattered right kidney with irregular parenchymal disruption and laceration involving > 70-75%, predominantly medio-renally and in the inferior pole, associated with a 42 mm perirenal hematoma in the inferior kidney pole (illustrated in Figure 1 – marked with the blue arrows); no imaging signs of major active bleeding were noted.

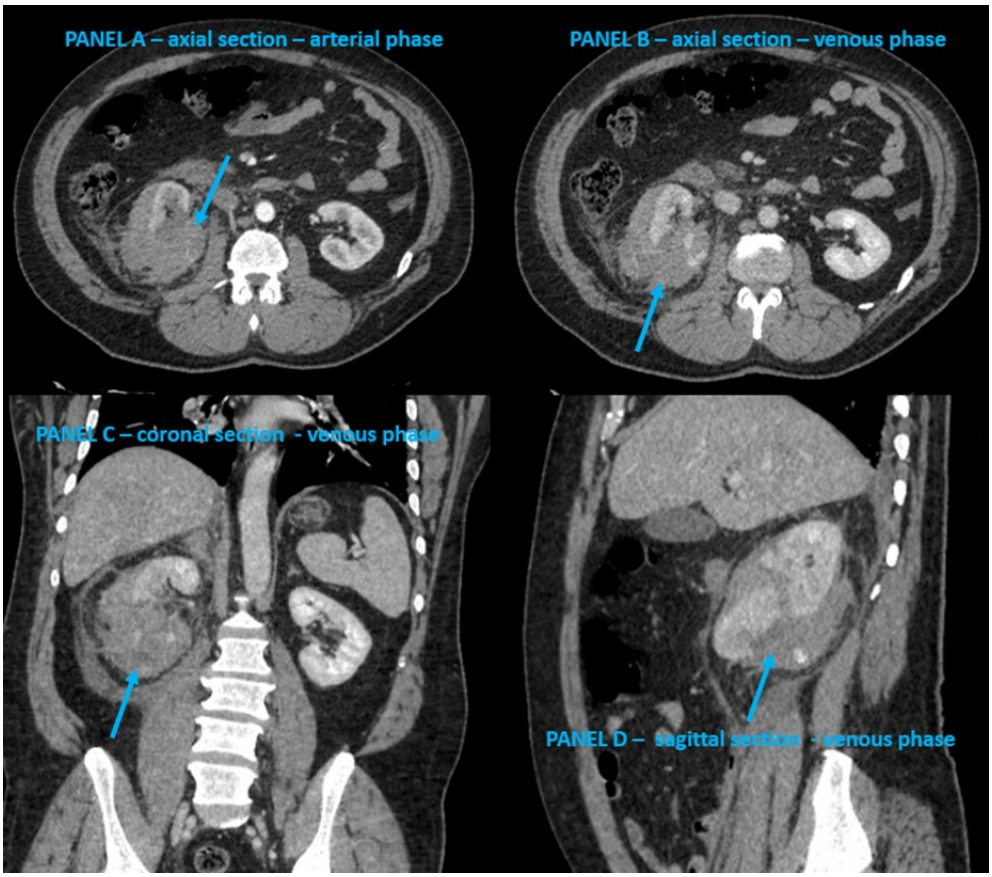


Fig. 1. *Multiplanar CT acquisitions*

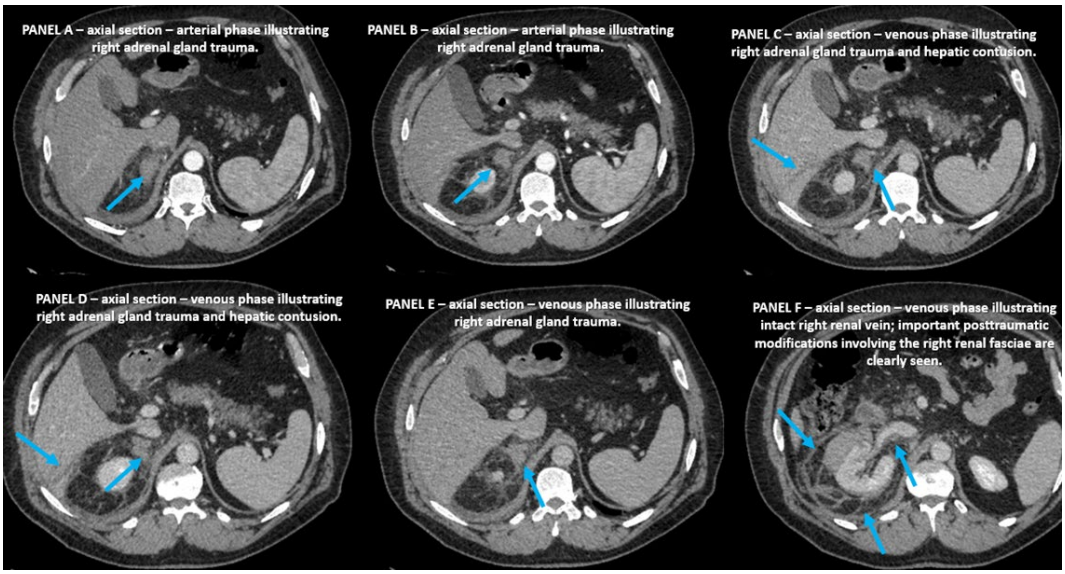


Fig. 2. *Multiplanar CT acquisitions clearly illustrating kidney trauma grade IV*

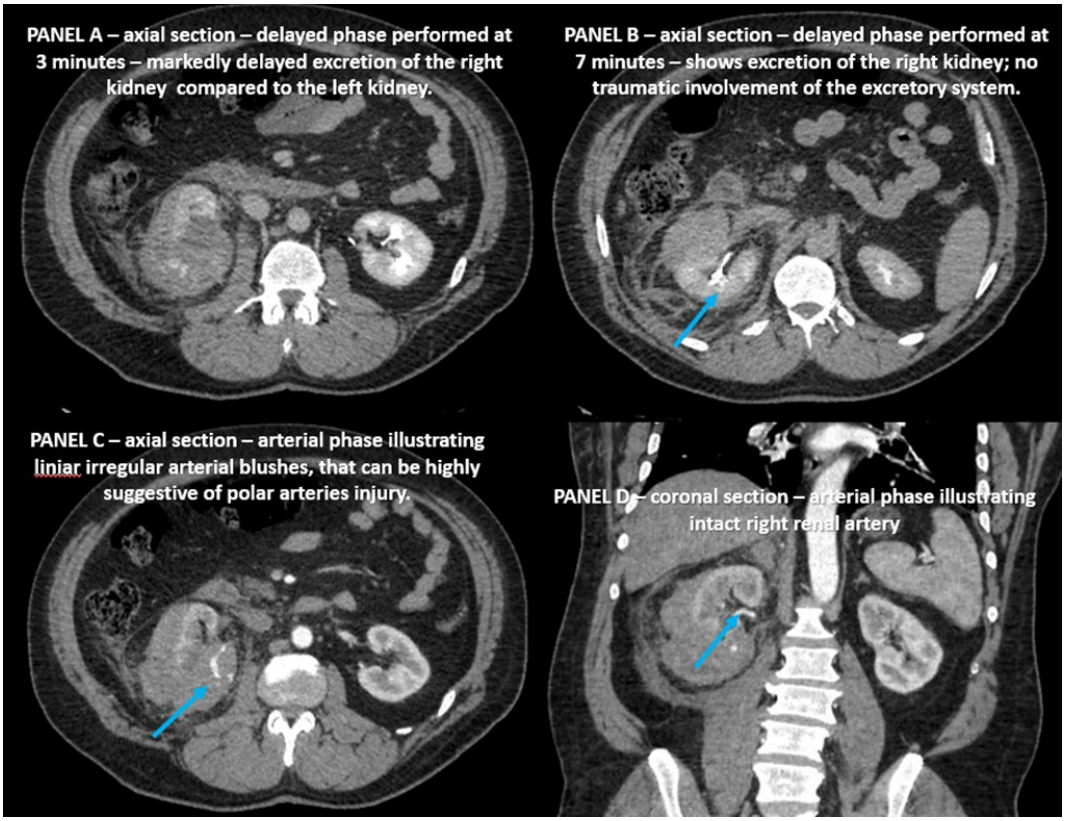


Fig.3. *CT - kidney trauma, hepatic contusion and adrenal trauma*

- ✓ the right renal pelvis and the right ureter are intact; delayed secretion and excretion of the right kidney is observed;
- ✓ small microbleeding areas that can be suggestive of injury of polar renal arteries or small arterial ramifications are noted in Figure 2;
- ✓ the right renal injury was classified as grade IV renal trauma according to AAST guidelines of renal injury scale.
- ✓ grade II hepatic injury in the right lobe, involving the VI, VII, VIII segments (according to AAST hepatic injury grading scale) – illustrated in Figure 3, with minimum associated hemo-peritoneum in the right iliac fossa and in the Douglas sac.
- ✓ right adrenal rupture with subsequent hematoma – illustrated in Figure 3.
- ✓ multiple right ribs fracture – IV, V, VI, VII, VIII are also noted.

All clinical and paraclinical aspects taken into account and the presence of hemodynamical stability of the patient, the decision to transfer the patient to the Intensive Care Unit for closer observation and conservative treatment is initiated.

Patients with hemodynamical instability, usually develop complications, making them suitable for operative/surgical management. Contrast-enhanced CT examination is needed in order to calculate the ISS grade.

The ISS (Injury Severity Score) is calculated based on the AIS (Abbreviated Injury Scale) scores by squaring the top three most damage body regions and then summing them up (Table 1).

ISS calculation *Table 1*

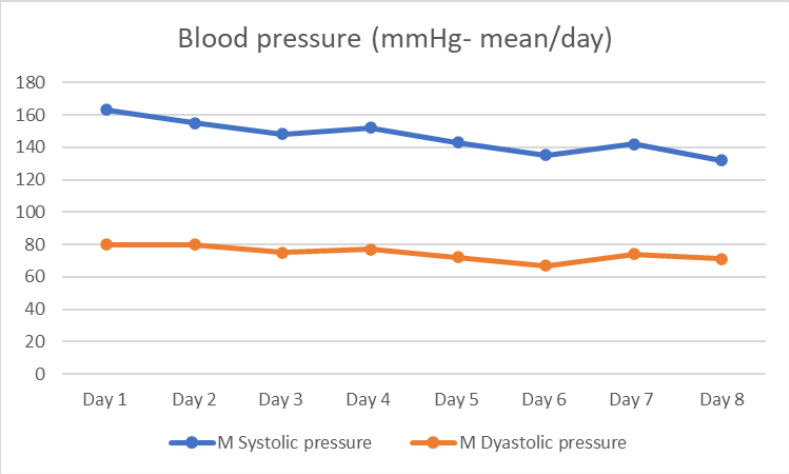
Body region	Injury description	AIS	Square AIS
Head and neck	–	0	0
Face-	–	0	0
Chest	Multiple rib fractures	2	4
Abdomen	Shattered kidney	4	16
Extremity		0	0
External		0	0

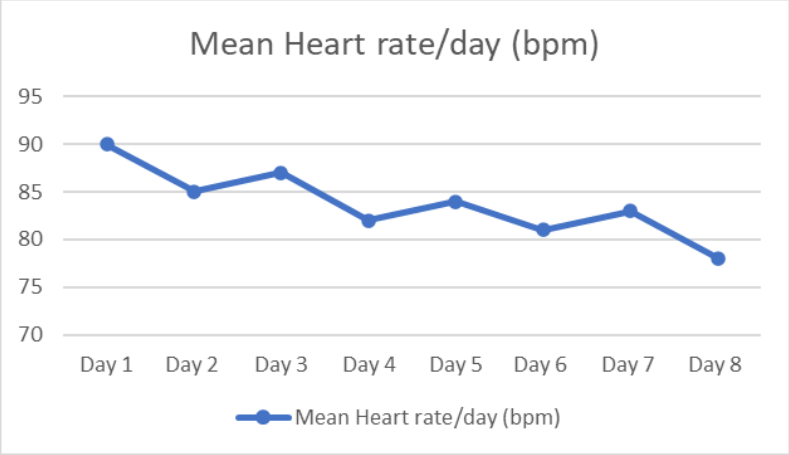
ISS = 20

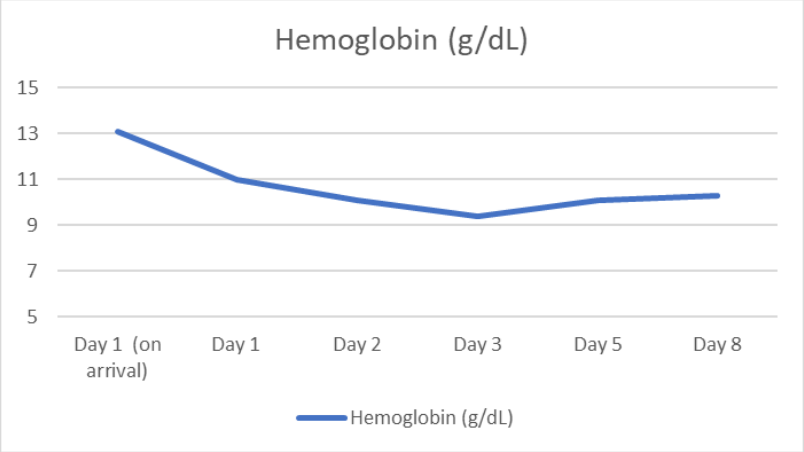
ISS score [5]	
1–8 points	Minor injury
9–15 points	Moderate injury
16–24 points	Serious injury
25–49 points	Severe injury
50-74 points	Critical injury
75 points	Maximum injury

The ISS score classified this trauma as serious, therefore a non-operative management was suitable in this case.

The patient remained hemodynamically stable, therefore we decided to implement non-operative management for all lesions (renal, suprarenal, hepatic). This includes a permanent, careful and detailed monitorization of HR, BP and periodically Hb measurements. In case of hemodynamic instability, the OM should be implemented immediately.







First 3 days the blood pressure and and from day 4 measurements every 6 heart rate were continuously measured

hours were made. The patient remained haemodynamically stable during the entire hospitalization period; the HR fluctuated but with a decreased trend towards 78 bpm.

The slight fluctuation of BP and HR, with maximum value in the first day, on arrival, was mainly due to the abdominal and chest pain.

During hospitalization, the patient remained hemodynamically stable, without any significant changes of Hb levels. In day 3 the patient received one unit of packed red blood cells (RBC). In the discharge day the patient had a value of Hb of 10.3 g/dL.

During hospitalization, the patient received the following medication:

- ✓ Ringer's solution – 1500 ml/day;
- ✓ Glucose 5% - 1000 mL/day;
- ✓ Haemostatics – Tranexamic acid 1g IV (on arrival);
- ✓ Anticoagulant therapy – Fraxiparine 40mg SC /24h (from day 2);
- ✓ Antibiotic therapy - Ceftriaxone 1g IV /12h;
- ✓ Analgesic – Paracetamol 1000mg/100mL IV /12h, Acupan 20 mg/2mL IV /12h.

The patient was discharged from hospital on the eight day, haemodynamically stable. At the 7 day follow up, the patient was reassessed in the outpatient clinic and the patient was haemodynamically stable, without any pain or other problems.

3. Discussion

The conservative treatment of patients with closed abdominal trauma, even with important lesions of the parenchymal organs, but hemodynamically stable, has become the therapeutic standard. This was possible due to the technological progress in the field of imaging, the development of new methods of interventional radiology and the current possibilities of reanimation and intensive therapy [8], [11].

Non-operative treatment is currently the golden standard under conditions of hemodynamic stability and the absence of deep penetrating wounds or signs of peritoneal irritation. Surgical interventions are still the way to solve serious abdominal trauma, ranging from bleeding control to extensive radical interventions [9], [15].

The liver is the second interested organ in case of abdominal trauma, but at the same time is also the main cause of mortality by this type of injuries. Paraclinical diagnosis of liver lesions involves abdominal ultrasound, which is usually the first exploration performed in immediate emergency in case of patients abdominally traumatized [11], [12].

The Surgical treatment is reserved for extensive lesions with the presence of hemodynamic instability or for the treatment of coexisting complications.

The conservative treatment of patients with hepatic injury, even with important lesions of the parenchyma, can safely be chosen, only if the patient remains hemodynamically stable [13], [14].

Failure of conservative treatment does not increase the mortality and morbidity

of the patient, if the patient is treated in adequate hospital with an immediate access to an operating room.

Non-operative management significantly reduces the percentage of unnecessary nephrectomies, reduce the rate of post-surgical complications and the number of days of hospitalization [16 –18].

Furthermore, high grade renal injuries should always receive prophylactic antibiotics, because the use of antibiotics therapy decreased the need of nephrectomy due to sepsis and infectious complication [18], [19].

The conservative attitude was indisputably a major progress in the treatment of polytraumatized patients. The particularity of this case represents the multiple lesions of three organs (liver, right kidney and right adrenal gland), all treated conservatively. [20]

The management of closed abdominal trauma has undergone important changes in recent years. The non-operative management (NOM) of abdominal visceral injuries is one of the most important changes that occurred in the care of the traumatized patients during the last decades [21], [22].

Modern means of investigation (CT, ultrasound) help in the diagnosis of lesions that are suited for non-operative treatment. At this moment there is only one indication that indisputably requires emergency laparotomy: hemodynamically unstable patients. [22]

Also, simultaneous lesions involving several parenchymal organs does not contraindicate non-operative treatment [22].

4. Conclusion

Based on our research, we strongly believe that conservative treatment is appropriate and indicated in grade III and IV renal trauma, in hemodynamic stable patients, involving close monitorization of the following parameters, such as: HR, BP, Hb, serum creatinine, blood urea nitrogen, INR and follow up imaging (Echography, CT).

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