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Prognostic Factors of Severe Liver Trauma in A Surgical Emergency Critical Care Setting

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Abstract **Original Research Article**

Introduction: Severe liver trauma represents the leading cause of mortality in abdominal injuries. Its management relies on close collaboration among multiple specialists. The aim of this study was to determine the prognostic factors of severe liver trauma by analyzing epidemiological, diagnostic, therapeutic, and outcome data in order to improve patient management strategies. ***Materials and Methods:*** We conducted a retrospective study including 23 cases of severe hepatic trauma admitted to the Surgical Emergency Critical Care Department of Ibn Rochd University Hospital Center in Casablanca over a three-year period (January 2017 to December 2019). ***Results:*** At the end of our study, prognosis was found to depend on several parameters, notably: initial oxygen saturation (SpO_2), initial systolic blood pressure, Glasgow Coma Scale score, use of vasopressors, hemoglobin level at admission, and the presence of massive hemoperitoneum. ***Conclusion:*** Severe hepatic trauma represents a major component of visceral surgical emergencies due to its severity and high mortality rate, requiring multidisciplinary management.

Keywords: Severe liver trauma, Prognostic factors, Multidisciplinary management, Abdominal injuries, Hemodynamic instability, Polytrauma.

I. INTRODUCTION

Severe liver trauma is the leading cause of mortality in abdominal injuries. Its management requires close collaboration between anesthesiologists-intensivists, surgeons, radiologists, and emergency physicians. Currently, non-operative management is recognized as the gold standard for the majority of patients, provided strict selection criteria are respected.

The aim of this study was to identify prognostic factors in severe liver trauma by evaluating epidemiological, diagnostic, therapeutic, and outcome-related data in order to optimize management strategies.

II. MATERIALS AND METHODS

This retrospective study included 23 patients admitted for severe hepatic trauma to the Surgical Emergency Critical Care Department of Ibn Rochd University Hospital Center in Casablanca.

The study period extended over three years (January 2017 to December 2019) and included all patients presenting with severe liver trauma, whether isolated or as part of polytrauma.

III. RESULTS

Severe liver trauma accounted for 3.7% of admissions to the surgical emergency intensive care unit.

The mean age was 34 years (range 17–58 years). There was a clear male predominance (82.6%), compared to 17.4% females. Road traffic accidents accounted for 65% of cases, assaults for 26%, and falls for 9%.

1. Clinical Examination on Admission

Vital signs assessment revealed:

- Hemodynamic instability (systolic blood pressure < 90 mmHg) in six patients,
- Respiratory distress in six patients,
- Neurological impairment in fours patients.

Abdominal examination commonly revealed tenderness, guarding, and abdominal dullness.

In 91% of cases, liver trauma occurred as part of polytrauma. The most frequently associated injuries were thoracic, craniofacial, and limb trauma.

Two trauma severity scores were calculated:

- Mean Injury Severity Score (ISS): 32.12
- Mean Revised Trauma Score (RTS): 6.11

2. Laboratory Findings

Several laboratory abnormalities were identified:

- Hemoglobin < 9 g/dL in 10 patients
- Platelet count < 150,000/mm³ in 9 patients
- Disseminated intravascular coagulation in 1 patient
- Liver function tests were abnormal in all patients, reaching up to 10 times the upper limit of normal in 26% of cases
- Acute functional renal failure was observed in 43% of patients

3. Imaging

Abdominal Ultrasound

Performed in 16 patients, ultrasound revealed hemoperitoneum in all cases. It detected:

- Hepatic lesions in 31%
- Splenic injury in 12%
- Renal injury in 12%

Isolated hemoperitoneum was found in half of the patients.

Abdominal CT Scan

Performed in 20 patients, CT imaging demonstrated hepatic contusions, hematomas, fractures, and one case of retrohepatic inferior vena cava thrombosis. Associated splenic and renal injuries, as well as one pneumoperitoneum, were also identified.

CT scan allowed grading of liver injury according to the Mirvis classification:

- Grade II: 3 patients
- Grade III: 9 patients
- Grade IV: 7 patients
- Grade V: 1 patient

Chest X-ray

Performed in 15 patients:

- Normal in 3 patients
- Pleural effusion was the most frequent abnormality
- Rib fractures and pulmonary contusions were also observed

4. Therapeutic Management

A. Medical Management

All patients received initial resuscitation and fluid replacement.

- Blood transfusion was required in 15 patients.
- Vasopressors were administered in 18 patients with persistent hemodynamic instability despite fluid resuscitation.
- Norepinephrine was the vasopressor of choice (83% of cases).

Clinical course:

- Among the 18 initially unstable patients, 3 stabilized under medical management, whereas 15 required urgent surgery.
- Among the 5 initially stable patients, 3 required delayed surgery due to secondary complications.

B. Surgical Management

- Three patients underwent delayed laparotomy due to clinical, biological, and/or radiological deterioration.
- Fifteen patients required primary laparotomy because of hemodynamic instability on admission.

The most frequently observed intraoperative findings were hemoperitoneum, hepatic contusions, and liver fractures.

5. Outcomes

The mean length of hospital stay was 7 days.

- Favorable outcome in 14 patients:
  - 5 discharged home
  - 9 transferred to another department
- Overall mortality rate: 39%

Mortality was correlated with the identified prognostic factors.

6. Prognostic Factors

Statistical analysis identified six significant prognostic factors:

- Glasgow Coma Scale score
- Initial SpO_2
- Initial systolic blood pressure
- Use of vasopressors
- Hemoglobin level at admission
- Massive hemoperitoneum

IV. DISCUSSION

Severe hepatic trauma is associated with high mortality rates, mainly due to hemorrhagic shock, which was the leading cause of death in our study, and abdominal compartment syndrome leading to multiorgan failure.

The age and sex distribution reflect the accidental etiology of these injuries, with a predominance of young males (mean age 34 years; 82.6% male).

Initial clinical examination is fundamental, serving both as a reference assessment and as a determinant of urgency.

Abdominal ultrasound remains the most accessible and rapid diagnostic tool, allowing early confirmation of hemoperitoneum.

V. CONCLUSION

Surgical management of traumatic liver injuries is associated with significantly higher morbidity and mortality compared with non-operative management. Currently, persistent initial hemodynamic instability associated with a positive FAST examination remains the only absolute indication for immediate surgery.

All other patients should benefit from non-operative management when feasible. Within this strategy, multidisciplinary management—integrating critical care, radiology, and surgery—is essential, allowing timely implementation of rescue interventions whenever required.

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