

Etiology and Management of Blunt Liver Trauma in a Tertiary Care Hospital

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ABSTRACT

Objective: The increasing prevalence of bullet injuries and road traffic accidents poses significant challenges for the improvement in trauma management especially blunt liver trauma due to its location and being a high vascular organ. The present study aimed to determine the etiology and management of blunt liver trauma.

Study Design: A cross-sectional study

Place and Duration of Study: This study was conducted at the Department of General Surgery, Saidu Group of Teaching Hospitals Saidu Sharif Swat, (SGTH) from February 2022 to September 2022.

Methods: Patients presented with various injuries were examined and detail history was taken regarding the types of injuries and comorbid status. Head to toe examination was done. HBsAg and HCV and HIV status, Urea, creatinine and Random Blood Sugar Level (RBS), X-ray erect abdomen/ lateral decubitus position, Ultrasound abdomen, Peritoneal aspiration, and CT scan were performed on each patients. SPSS version 27 was used for data analysis.

Results: The overall mean age was 40.82 ± 6.82 years. Age-wise distribution of patients were as follows: 136 (54.2%) in 10-25 years, 60 (25.4%) in 26-40 years, and 40 (16.9%) in 41-55 years. There were 144 (61%) males and 92 (39%) females. Road traffic accident (RTA) was the most prevalent mechanism of injury found in 98 (41.5%) cases, followed by fall from height 76 (32.2%), physical assault 38 (16.1%), and Sport's injury 24 (10.2%) cases. The incidence of successful conservation management was 77.1% (n=182). The mortality rate was 36.4% (n=86).

Conclusion: The present study observed that the severity of blunt liver trauma had significant association with probability of successful conservative management. Limited hospital resources and a lack of consensus on traditional treatment methods adversely affected success.

Key Words: Blunt liver trauma, etiology, management

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INTRODUCTION

The liver, which stands out in the abdominal cavity, is the largest and strongest organ and exhibits a strong posture. This highly vascularized organ comprises more than 25% of the body's lymphatic system and plays a dual role in hematological and immune functions. Liver injury in abdominal trauma is the secondary event occurs frequently, contributing significantly to 20% to 40% of deaths in affected patients, and the consequences of road traffic accidents (RTA)^[1].

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Approximately 30% of liver injuries are associated with penetrating substances, while in Pakistan, the incidence varies. From 15% to 20% are associated with mild trauma to the gastrointestinal tract^[2]. In developed countries, abdominal trauma accounts for 20% of traumatic liver injuries, while 30% are due to gunshot wounds and 40% are due to stab wounds^[3]. Notably, in the liver injuries, 50% of internal injuries have no bleeding complications, necessitating laparotomy. The interventions are relatively easy to manage, including anticoagulants and sutures to prevent liver injury but the subset of higher liver injury presents significant management challenges, leading to an increased risk of death^[4]. The incidence of different complications associated with liver trauma was 64% cases^[5]. None of the liver trauma cases showed an association with other anatomic injuries, which accounted for 0%.

With modern imaging and comprehensive studies of the liver, important strategies have been developed to reshape the way, the liver injury is managed. Surgical management poses a significant challenge for consumptive surgeon's liver injury management^[6]. Different surgical techniques come into play, such as simple liver resection, anatomical resection, direct suture closure, hemostatic measures combined with liver donation. The surgical technique chosen depends

on the type of liver injury and severity, and by the knowledge of the experienced surgeons in the field^[7]. Moderate injury usually results in two main types of ruptures of the liver; those with intact liver capsule and those with hemoperitoneum. Ruptures that do not injure the capsule, results in hematoma (sub capsular). In severe traumatic cases, as in an explosion, the liver may completely shatter. Shock rating systems have been developed to address this, and ongoing efforts are underway to standardize the use of liver shock management. Non-operative management (NOM) offers significant advantages, especially to reduce the need for major surgery. This approach helps to reduce the risks and complications associated with surgery, reducing the burden on healthcare resources and financial costs^[8,9]. Additionally, elective surgery allows latter return to work and longer recovery time, resulting in longer hospital stay in blunt liver injury^[10]. There is paucity of data regarding the causes and management of blunt liver trauma in local setting. Therefore, the present study aimed to determine the etiology and management of blunt liver trauma.

METHODS

This cross-sectional study was carried out on 236 trauma patients in the Department of General Surgery, Saidu Group of Teaching Hospitals, Saidu Sharif Swat (SGTH, a tertiary Care Hospital) from February 2022 to September 2022. Patients presented with various injuries were examined and detail history was taken regarding the types of injuries and comorbid status. Head to toe examination was done. HBsAg, HCV and HIV status, Urea, creatinine, RBS, X-ray erect abdomen/ lateral decubitus position, Ultrasound abdomen, Peritoneal aspiration, and CT scan in stable patients were different routinely investigation done on each patient. Demographic data such as age and gender, details history, and baseline details were recorded. A mid-section laparotomy was performed, and intraoperative observations were made to assess the severity of liver injury. Stable patients were monitored conservatively, including abdominal ultrasound and CT imaging. Patients with a collection volume of approximately 500 ml are also eligible for conservative management.

Descriptive statistics was done using SPSS version 27. Frequencies and simple percentages were calculated for qualitative variables and mean were calculated for quantitative variables, chi-square tests were used for analysis association with provisional mortality grade wounds. P-values were considered significant > 0.05.

RESULTS

The overall mean age was 40.82±6.82 years. Age-wise distribution of patients were as follows: 136 (54.2%) in 10-25 years, 60 (25.4%) in 26-40 years, and 40 (16.9%) in 41-55 years as shown in Table-I. There were 144

(61%) males and 92 (39%) females. Road traffic accident (RTA) was the most prevalent mechanism of injury, found in 98 (41.5%) cases followed by fall from height 76 (32.2%), physical assault 38 (16.1%), and Sport’s injury 24 (10.2%) cases. The incidence of successful conservative management was 77.1% (n=182). The mortality rate was 36.4% (n=86). Different grades of liver injuries are demonstrated in Figure-1. Clinical details are presented in Table-II. Types of injuries are illustrated in Figure-2. Figure-3 depicts the different types of procedures performed in blunt liver trauma. Post-operative complications are demonstrated in Figure-4.

Table No. 1: Demographic details of patients

Variables	N (%)
Age (years)	40.82±6.82
Age Group (years)	
10-25	136 (54.2%)
26-40	60 (25.4%)
41-55	40 (16.9%)
Gender	
Male	144 (61%)
Female	92 (39%)

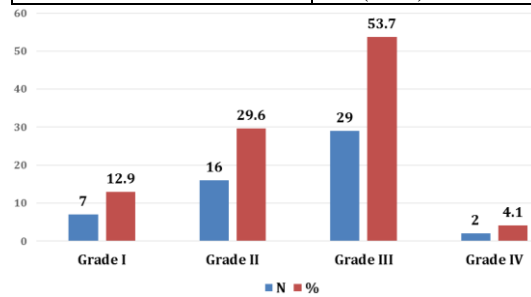


Figure No. 1: Different grades of blunt liver injuries (N=54)

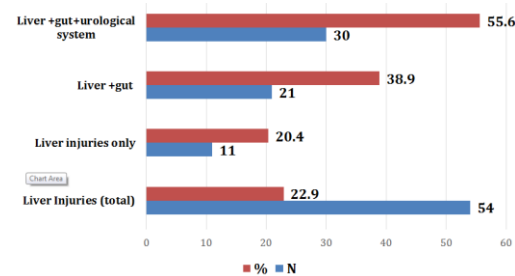


Figure No. 2: Types of injuries

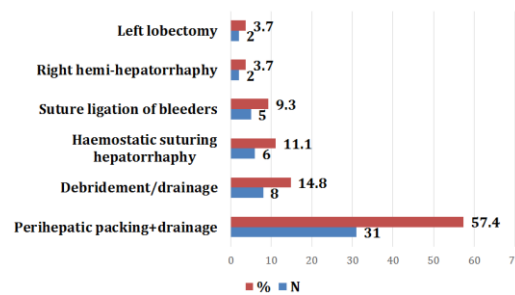


Figure No. 3: types of procedures performed in blunt liver trauma

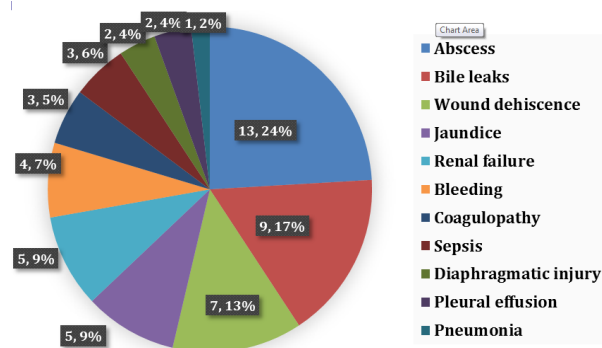


Figure No. 4: Post-operative complications of liver Trauma.

Table No. 2: Clinical details

Clinical characteristics	N (%)
Sources	
Road traffic accident	98 (41.5%)
Fall from height	76 (32.2%)
Physical's assault	38 (16.1%)
Sport's injury	24 (10.2%)
Condition at arrival	
Stable	10 (18.5%)
Shock responding rapidly	17 (31.5%)
Shock responding slowly	29 (53.7%)
Treatment option	
Conservative	12 (22.2%)
Active	42 (77.8%)

DISCUSSION

The present study mainly focused on the etiology and management of blunt live trauma and reported that severity of blunt liver trauma had significant association with probability of successful conservative management. The liver, a vital and vascular organ, is located in the upper part of the abdominal cavity, protected by the ribs. Difficulties in protecting the liver and particular location pose challenges to laparotomies for liver injury, sometimes requiring a wide incision in the chest for adequate exposure. Complications in the management of bleeding livers and unstable patients has led to damage-control surgery. Patients with liver injury can be treated informally, and standards for such monitoring include contrast-enhanced CT scanning. Ultrasound-guided aspiration can be used to address any observed collections or bile leakage. Surgery is necessary when there is poor response to conservative means and extensive areas of necrosis are present in the liver. Definitive conservation by embolization is an appropriate option for those who demonstrate free-flow of contrast on CT but remain clinically stable.

According to Azizuddin Ali et al.,^[11] males formed the majority in 364 cases, with a male-to-female ratio of 5:1, covering the age range from 20 to 60 years. Accordingly, our study found a 61% males and 39% females. Notably, a large proportion of young men were

affected, possibly due to their involvement in outdoor activities, largely because compared to women of the same age. In our study, we found that mild abdominal trauma prevailed as the main cause of liver injury, often leading to liver damage. This is consistent with the findings of various other studies, where it is suggested that mild abdominal trauma as the most common cause related to liver injury^[12-15]; Supporting Tarchouli, et al.^[16] highlighted the high mortality rate in patients who experienced uncomplicated abdominal trauma, reinforcing the importance of this type of trauma in terms of severity and potential outcome.

La Russa et al.^[17] reported that twenty percent of individuals developing rounded abdomen had liver damage. In our study, we observed a male to female ratio of 1.57:1. Another study by Yadav et al^[18] found that the gender difference was more pronounced with 15:1 ratio, favoring males. All acute liver lesions were treated surgically, even when active bleeding was not evident, in 50-80% of cases^[19,20]. Among similar injuries, our study revealed examples of hepatic lesions that did not consistently bleed during laparotomy. In our study, the most important determinant of treatment option was the hemodynamic status of the patient.

The severity of liver damage correlates significantly with the likelihood of success in conservative treatment. A coefficient of 2.6 was recorded for injury rate, indicating that as injury rate increased the probability of obtaining effective conservative treatment. Typically, conservative treatment demonstrate an effect in the presence of deteriorating blood vessels, circulatory issues, and septic complications. Secondary bleeding is known to occur in less than 5% of conservatively managed patients, according to Ordoñez et al. and Lee et al.^[21, 22]. In our study, conservative treatment failed in 3% of cases due to late bleeding. Consistent with the findings of Brooks et al. and Albano et al. Biliary proliferation was observed in 3-20% of conservatively treated patients^[23, 24].

Lin et al.^[25] found that 79% of patients with liver injury had infiltrating blunt trauma, and several other authors reported that blunt trauma was the most common cause of liver injury^[26, 27]. In a study conducted by Ibrahim et al^[28] a high mortality rate was recorded. Although several authors have reported that blunt trauma is the major cause of liver injury, our series deviates from this trend, suggesting that penetrating trauma (firearms) is the most common cause of liver injury.

CONCLUSION

The present study observed that the severity of blunt liver trauma had significant association with probability of successful conservative management. Limited hospital resources and a lack of consensus on traditional treatment methods adversely affected success. A short-term mortality rate of liver injury patients was associated with injuries classified as grades IV and V.

Author's Contribution:

Concept & Design of Study: Uzma
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 Data Analysis: Saif Ur Rahman
 Revisiting Critically: Uzma, Shamsheer Ali
 Final Approval of version: Uzma

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