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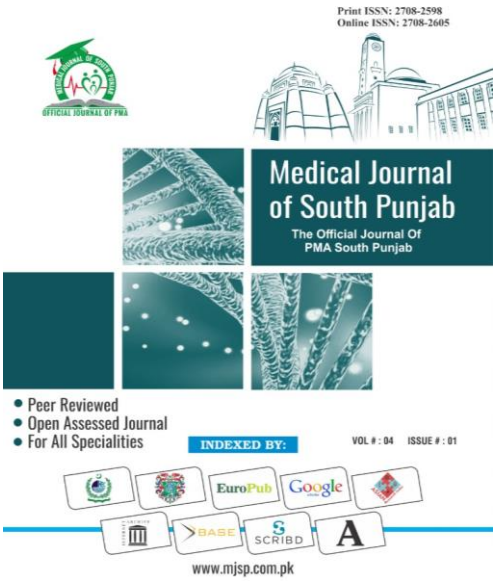

Management of Liver Injury after Blunt Trauma Abdomen

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Authors and Affiliation:

Abdul Manan[1*],Ashar Ahmad Khan[2], Irfan Ahmad[3], Abdul Qadir[4], Muhammad Usman[5], Saim Athar[6]

[1,3,4,5] Nishtar Hospital, Multan, Pakistan
[2,6]Multan Medical and Dental Collage, Multan, Pakistan
[*]Corresponding Author Email: drmanan2001@yahoo.com

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Original Article

Management of liver Injury after blunt trauma abdomen

Abdul Manan[1*],Ashar Ahmad Khan[2], Irfan Ahmad[3], Abdul Qadir[4], Muhammad Usman[5], Saim Athar[6]
[1,3,4,5] Nishtar Hospital, Multan, Pakistan
[2,6]Multan Medical and Dental Collage, Multan, Pakistan
[*]Corresponding Author Email: drmanan2001@yahoo.com

ABSTRACT

Objective: *The present study aimed* to *investigate the better management plan for liver injury after blunt trauma abdomen according the latest classification system.*

Methods: *This prospective study was conducted at department of general surgery Nishtar hospital Multan from 31st July 2022 to 30th June 2023 in one year duration. A total of 70 patients with liver injury diagnosed intraoperatively or by CT scan were enrolled in the study. Main variables of study were Moore score, Mirvis score, mechanism of injury, organ affected and type of injury according to classification. SPSS version 23 was used for data analysis.*

Results: *Frontal car accident was the most common trauma mechanisms in type A patients 51.6% and complex traffic accident was the most common trauma mechanisms in type B patients 38.5%. High-energy trauma in type A and type B patients was 80.6% and 89.7% patients respectively. Further, demographic and baseline characteristics of type A and B patients were almost equal, (p>0.010).*

Conclusion: *The management of liver injury has shift towards a more individualized approach depending on the localized disruption of parenchyma (damage to the liver tissue) and may correlate with the trauma mechanism. Type of injury is the correlation with necessity of surgical management.*

Keywords: *Liver injury Blunt abdominal trauma, mechanism, classification Trauma*

1. INTRODUCTION

Liver injuries are often caused by on road accidents, accounting for around 70% of cases[1]. When dealing with polytrauma patients who have experienced abdominal trauma (open or blunt), the liver is the abdominal organ most commonly injured. Abdominal injuries occur in about 31% of polytrauma patients, and among these cases, liver injuries are present in around 16% of patients[2]. Uncontrolled bleeding is identified as the primary cause of death in cases involving liver injuries, and this type of bleeding is associated with a high mortality rate of 54%. This highlights the critical nature of addressing bleeding and providing appropriate medical interventions promptly to improve patient outcomes[3].

Management of traumatic liver injuries has evolved over the years. In the past, surgical treatment was often considered the standard approach for various types of trauma-related liver injuries[4]. However, advancements in medical technology, improved understanding of trauma management, and the development of less invasive techniques have led to changes in the management of traumatic liver injuries[5]. In recent years, non-operative management (NOM) has gained prominence as an alternative to immediate surgery in certain cases of liver trauma. Non-operative management involves closely monitoring the patient's condition, providing supportive care, and utilizing interventional radiology techniques when appropriate[6].

Factors that have contributed to the shift towards non-operative management include advancement in imaging technology, hemodynamic stability or no sign of ongoing stability, interventional radiology like angiography and embolization and involvement of minimally invasive surgery like laparoscopy and robotic surgery[7]. The Moore score, also known as the Organ Injury Scale (OIS) of the American Association for Surgery of Trauma (AAST), is a widely accepted scoring system used to classify traumatic liver injuries[8]. This scoring system helps in assessing the severity of liver injuries and guiding treatment decisions. The Moore score is based on the AAST's

Organ Injury Scale, which was published in 1989[8].

.AAST Organ Injury Scale for liver injuries graded as Minor injury involving a small hematoma or laceration without major parenchymal involvement grade I. More significant laceration or hematoma with partial involvement of the liver parenchyma but without major vascular injury grade II[9]. Deep laceration involving a substantial portion of the liver, potentially with active bleeding labeled as grade III. Severe laceration with involvement of major blood vessels within the liver labeled as grade IV. Completely shattered or devascularized liver grade V and Injury resulting in liver avulsion grade VI[10].

2. METHODOLOGY

Study was conducted at department of general surgery Nishtar hospital Multan from 31st July 2022 to 30th June 2023 in one year duration. Study was approved by hospital ethical board [No. 3142] after complete investigation and clarification of study purpose. Sample size was calculated by using 95% confidence interval, 80% study power and mortality after liver trauma 25%. Patients with liver injury diagnosed intraoperatively or by CT scan, either gender and age 16-60 years were included in the study.

Patients who have experienced trauma are admitted to the emergency room for immediate evaluation and treatment. The trauma surgeon on call conducts the first physical examination of the patients. This examination likely includes assessing the patient's overall condition, vital signs, and initial observations about the extent of injuries. Vitally unstable patients were advised abdominal ultrasound, for patients who are stable in terms of their hemodynamic status (their cardiovascular system is functioning adequately), a CT scan is performed. Patients are either critical, unstable, or become unstable during diagnostic procedures, and when there's evidence of intraabdominal fluid, they are immediately transferred to the operating room without any further investigation and explorative laparotomy was performed. After surgery or conservative treatment, patients are transferred to the intensive

care unit (ICU) where they receive ongoing resuscitation and therapy as needed. Close monitoring was done with blood tests, ultrasound and physical assessment. If further injury or other complication was observed, multidisciplinary approach was adopted.

Overall data was expressed as percentages and mean differences for categorical and numerical values. IBM SPSS was used for data entry and analysis.

3. RESULTS

Seventy patients were included in our study both genders with mean age 40.88±6.65 years. There were 57 (81.4%) males and 13 (18.6%) females. The mean moore and mivis score of the patients was 2.66±0.25 and 2.53±0.26, respectively. Conservative treatment was done on 8 (11.4%) patients. The mean stay in ICU and hospital of the patients was 12.12±1.31 days and 18.67±1.09 days, respectively. Further, 19 (27.1%) patients were died. (Table. I).

Table-I: Demographic and baseline characteristics of the study patients

Variable	Frequency (%)	Mean ± S.D
Sex		
Male	57 (81.4%)	-
Female	13 (18.6%)	-
Age (years)		40.88±6.65
Moore score		2.66±0.25
Mirvis score		2.53±0.26
Conservative treatment	8 (11.4%)	
ICU stay (days)		12.12±1.31
Hospital stay (days)		18.67±1.09
Mortality	19 (27.1%)	

In our study, there were 31 (44.3%) patients included in type A and 39 (55.7%) patients included in type B. Bone fracture was the most common 38 (97.4%) in type B patients as compare to type A patients 14 (45.2%), ($p<0.001$). Except bone fracture, the distribution of effected organs in type A and type B patients was almost equal, ($p>0.010$). (Table. II).

Frontal car accident was the most common trauma mechanisms in type A patients 16 (51.6%) and complex traffic accident was the most common trauma mechanisms in type B

patients 15 (38.5%). Whereas, high-energy trauma in type A and type B patients was 25 (80.6%) and 35 (89.7%) patients, respectively. (Figure. I & II).

Further, demographic and baseline characteristics of type A and type B patients were almost equal, (p>0.010). (Table. III).

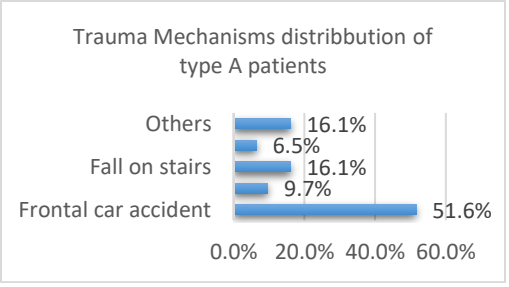
Table-II: Effected organ distribution of type A, B patients

Organ effected	Type		p-value
	A N (%)	B N (%)	
Bone fracture	14 (45.2)	38 (97.4)	<0.001
Thorax	17 (54.8)	25 (64.1)	0.432
Head/face	11 (35.5)	12 (30.8)	0.677
Lung	12 (30.8)	21 (53.9)	0.208
Kidney	3 (9.7)	5 (12.8)	0.681
Spleen	11 (35.5)	9 (23.1)	0.254
Stomach	5 (16.1)	1 (2.6)	0.044
Bowel	10 (32.3)	5 (12.8)	0.049
Pancreas	11 (35.5)	10 (25.6)	0.372
Aorta	4 (12.9)	4 (10.3)	0.730
Soft tissue	19 (61.3)	21 (53.8)	0.532
Brain	13 (41.9)	22 (56.4)	0.229

Table-III: Demographic and baseline characteristics of type A and type B patients

Variable	Type		p-value
	A N (%)	B N (%)	
Sex			
Male	24 (77.4)	33 (84.6)	0.442
Female	7 (22.6)	6 (15.4)	
Age (years)	40.35±6.24	41.31±6.75	0.546
Moore score	2.73±0.21	2.62±0.27	0.066
Mirvis score	2.53±0.28	2.52±0.22	0.903
Conservative treatment	3 (9.7)	5 (12.8)	0.681
ICU stay (days)	11.84±1.31	12.35±1.28	0.101
Hospital stay (days)	18.77±0.95	19.58±1.41	0.390
Mortality	10 (32.3)	9 (23.1)	0.391
Morbidity	8 (25.8)	16 (41.0)	0.183

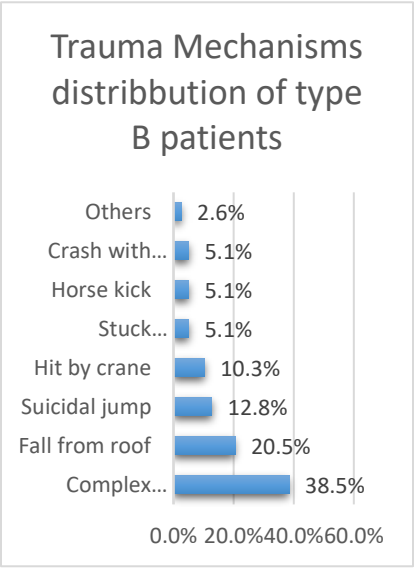
Fig-1: Trauma Mechanism in Type A Patients



4. DISCUSSION

This study includes patients of liver injury with modified classification as type A injuries are typically associated with frontal impacts, such as those occurring in frontal car accidents. These impacts can result in severe injury to the left liver lobe, specifically affecting segments II, III, IVa, and IVb[11]. Additionally, these injuries develop along the falciform ligament and required urgent surgical intervention to control bleeding and significant blood loss.

Fig-2: Trauma Mechanism in Type B Patients



Our study observed no significant association between age, gender and type of injury. In another study conducted by Matthes et al[12] also observed similar finding that association between age, gender and type of injury is having no significance. Another study was conducted by Slotta et al[13] on traumatic liver injury and its management goals, at the end of study it was reported that management plan of a patients with liver injury vary according to his mechanism of injury and type of injury after standard classification especially in blunt abdominal trauma cases.

Our study specially focuses on conservative management of patients after liver trauma. In a study Norman et al[14] stated about eighty percent of blunt trauma patients need conservative treatment, suggests that a significant proportion of patients with blunt liver trauma can be successfully treated without surgery. In a study by Ahmad et al[15] concluded that non operative management of patients is successful in both high and low grade injuries if patient is hemodynamically stable.

American Association for Surgery of Trauma Organ Injury

Scale (AAST-OIS), the Moore score, and the Mirvis score, are important tools used in the assessment and grading of liver injuries[16]. These systems help healthcare professionals evaluate the severity of liver trauma and guide treatment decisions. Number of studies reported that better outcomes can be obtained after liver trauma if managed conservatively both in high grade and low grade injuries[17,18].

But controversies are still there, Pachter et al[19] conducted a study and reported that non-operative management of blunt hepatic injuries can indeed be a viable and effective treatment approach in hemodynamically stable patients, regardless of the hemoperitoneum and grade of injury. Similar findings were described by Farnell et al[20] that there is no association among grade of injury and management plan, hemodynamically unstable, hemoperitoneum, and high grade injury should be managed operatively.

5. CONCLUSION

The management of liver injury has shift towards a more individualized approach depending on the localized disruption of parenchymal (damage to liver tissue) and may correlate with the trauma mechanism. Type of injury is the correlation with necessity of surgical management.

Practical Implications: Study focused on an important clinical situation that needs immediate response from doctor side. Study will be helpful in early recognition of injury type in blunt trauma patients and their plan of treatment.

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