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A Comparative Study of Non-Operative Vs Surgical Management of Traumatic Liver Injury

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Abstract
***Background:**The aim of this study was to compare operative versus non-operative management of patients with traumatic liver injury.*
***Methods:**From Nov 2022 to Mar 2023, 50 patients were admitted to command hospital, central command, lucknow for liver injuries. All patients were diagnosed using computed tomography (CT). The liver injury was graded in accordance with the American Association for the Surgery of Trauma liver injury scoring scale. Patients were divided into two groups: those who underwent surgery and those treated with non-operative management (NOM). There was a comparison between these two groups concerning the clinical characteristics, grade of liver injury, hemodynamic stability, laboratory findings, and final outcome.*
***Results:**According to the 50 patient records evaluated, 46 (92%) patients were treated with NOM, and 4 (8%) underwent surgery. Patients treated with NOM had significantly fewer severegrade of liver injury. There were significant differences between the two groups for: heartrate, systolic blood pressure, and mean haemoglobin levels at admission; after 6 & 12 hours.*
***Conclusions:**The results of our study suggesta that hemodynamic stability and the following should be considered for deciding the treatment for liver injuries viz. Grade of liver injury, Clinical parameters like systolic blood pressure, heart rate and fall in haemoglobin level.*
***Keywords:** Liver; Abdominal injury; Liver injury; Trauma*

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I. Introduction

The liver is the largest intra-abdominal solid organ and is enclosed anteriorly and laterally by the ribcage. The large size of the liver, its friable parenchyma, its thin capsule, and its relatively fixed position in relation to the spine make the liver particularly prone to blunt injury.[1] The right lobe is injured more commonly than the left, because ofits larger size and proximity to the ribs. Liver trauma is the second most frequent event during an abdominal trauma and is the leading cause of death (20–40 %) in these cases.[2]

There is a paradigm shift in the management of liver trauma due to advancements of diagnostic and therapeutic modalities. About a century ago, Pringle conducted an animal experiment, occluding the PORTAHEPATIS in liver trauma while repairing the injuries. However, application of the same principle in trauma victims led to high mortality. Since 1965, the introduction of diagnostic peritoneal lavage (DPL) hasled to many nontherapeutic laparotomies in previously unsuspected low-grade injuries.[3]

Many injuries that would have been treated operatively a few decades ago are now managed with methods such as angioembolization, serial CT scans, CU monitoring, endoscopic retrogradecholangiopancreatography (ERCP), and laparoscopic evacuation of retained bile/hematoma.[4] While the highest grade injuries may still need operative intervention, many of these are given a trial of watchful waiting if the patient is hemodynamically stable.[5] The present study assessed liver trauma in adult population.

II. Methods

Study area: Department of surgery of a military hospital of the Indian armed forces.
Study design: Prospective cohort study
Study period: Nov 2022- Mar 2023
Study population: The study population comprised of the patients having traumatic liver injury and reported to the hospital as per the following data:

Inclusion criteria:
a. Patients presenting with traumatic liver injury
b. Age>18 y
Exclusion criteria:
a. Age<18 y
b. Patients not giving consents of newer modality of treatment
c. Patients with associated other solid organ injuries
Sample size: Total 50 patients were included in this study.

Method of collection of data:

The medical records were reviewed for 50 patients with traumatic liver injury who were admitted from Nov 2022 to Mar 2023 to Command Hospital, Central Command, Lucknow, U.P. , India. The ethical committees of the ibid stated hospital examined and approved this study. All patients were diagnosed using computed tomography(CT). Liver injury was classified according to the revised liver injury scale (6 grades) of the American Association for the Surgery of Trauma (AAST).

In accordance with their hemodynamic stability, 46 patients(92%) were treated conservatively (NOM group),and 4 patients (8%) underwent surgery (operative groupà). This study compared the severity of liver injury, grade of injury, initial vital signs(heart rate, systolic blood pressure), and laboratory results (haemoglobin). There was also a comparison of the hemodynamic stability according to grade of liver injury. Differences between groups were tested using the chi-square test, Fisher's exact test, and Mann-Whitney test. SPSS V18.0 (IBM Corp; Chicago, Illinois, USA) was used throughout. The statistical significance was set atp-value ＜0.05.

III. Results

Table & Fig 1. Demographic data:

SEX	No. of Patients
MALE	42
FEMALE	8

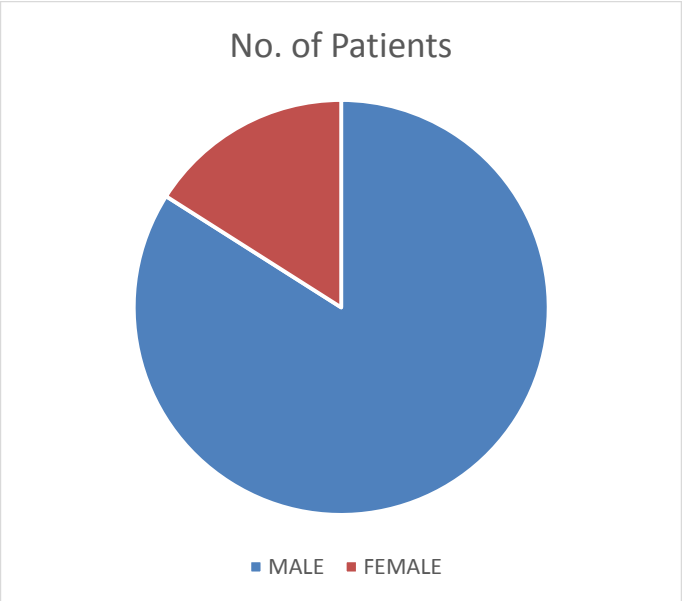


Table & Fig 2. Causes of Liver Injuries:

CAUSE OF INJURY	Numbers
ROAD TRAFFIC ACCIDENT	40
ASSAULT	6
ACCIDENTAL FALL	4

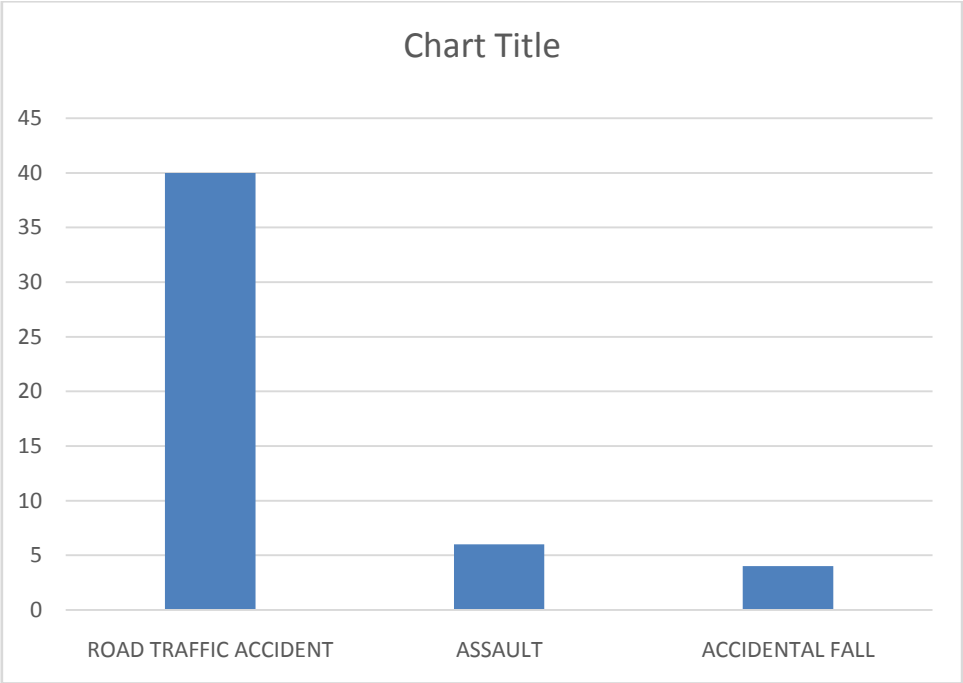


Table &Fig 3. Distribution of grades of liver injury

GRADES OF LIVER INJURY	Numbers
GRADE I	8
GRADE II	18
GRADE III	20
GRADE IV	2
GRADE V	2
GRADE VI	0

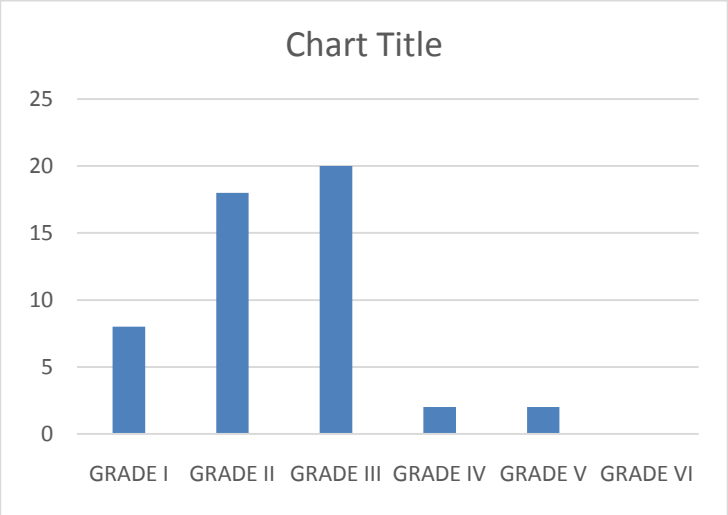


Table & Fig4.

TREATMENT METHOD	Numbers
NON OPERATIVEMANAGEMENT	46
SURGICAL MANAGEMENT	4

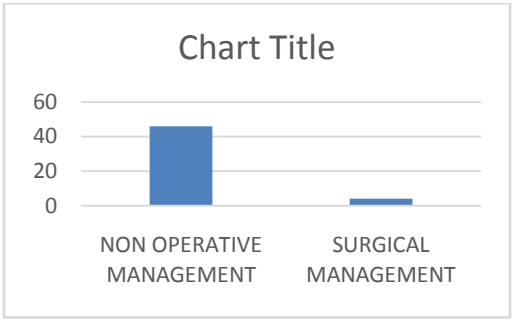


Table & Fig 5. Distribution of sex and mode of management:

SNO	NOMI(92%)	SURGERY(8%)
MALE (92%)	42	4
FEMALE (8%)	4	0

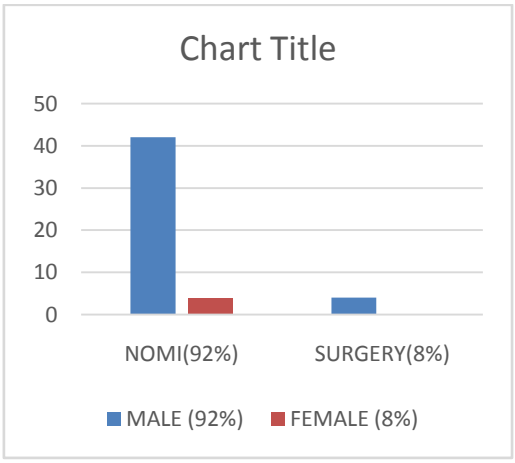


Table 6. Distribution of grades of liver injury and mode of management

GRADES OF LIVER INJURY	NOMI	SURGERY
I-III	44	2
IV-V	2	2

Table & Fig 7. Relationship between the clinical parameters and mode of management with significance

Clinical parameters	NOMI	SURGERY	P Value
Mean HR at admission	90.38±7.64	104.5±0.23	0.031
Mean SBP at admission	116.92±15.32	86.5±2.96	0.05
Mean Hb at admission	13.412±0.28	13.4±0.23	0.93
Mean Hb after 6h	12.984±0.37	12.8±0.44	0.49
Mean Hb after 12h	12.17±0.71	10.3±0.95	0.03

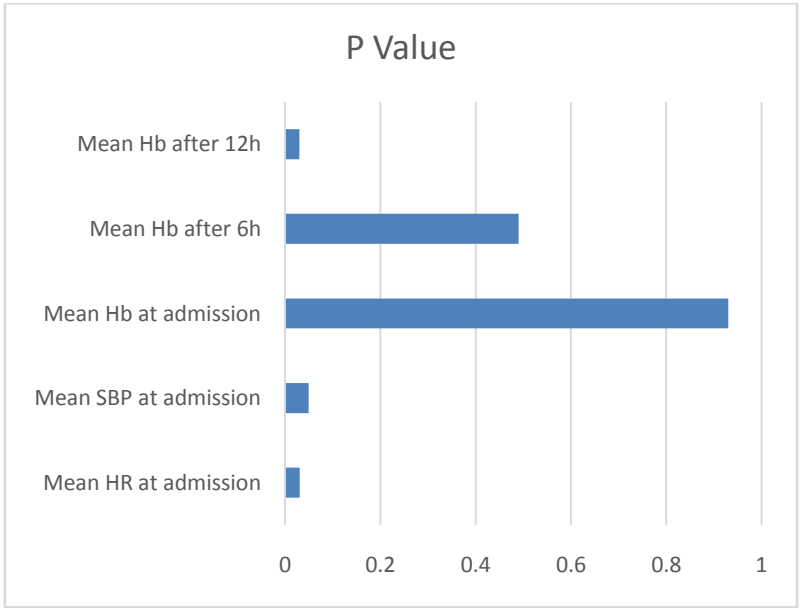
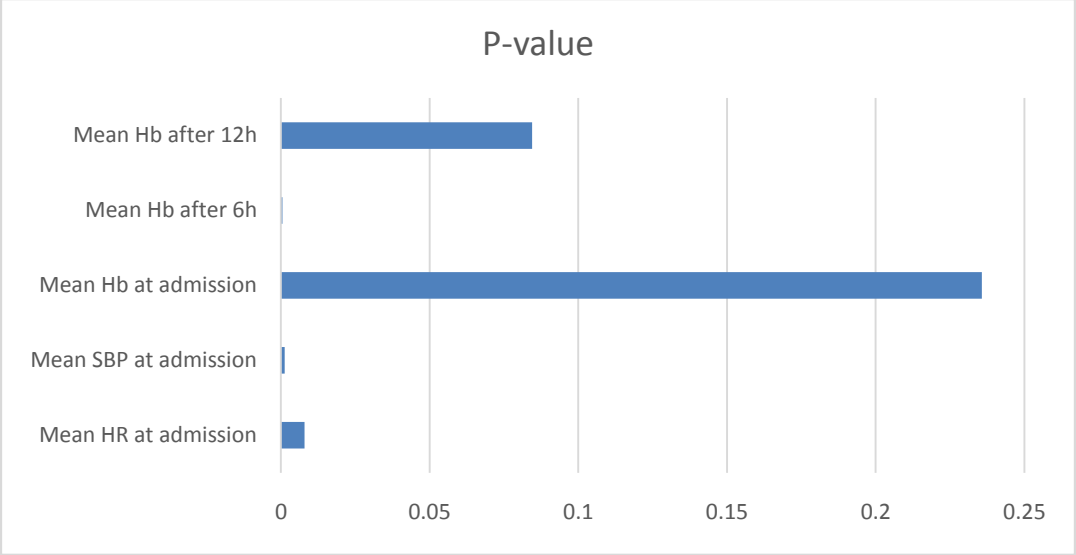


Table & Fig 8.Comparison Of Hemodynamic Stability According to Grades Of Liver Injury

Clinical parameters	Low grade injury(I-III)	High grade injury(IV-V)	P-value
Mean HR at admission	89.54±6.81	100±9.79	0.0079743
Mean SBP at admission	118.91±13.99	94±10.48	0.0013436
Mean Hb at admission	13.43±0.27	13.25±0.26	0.2357383
Mean Hb after 6h	13.03±0.32	12.4±0.32	0.0005701
Mean Hb after 12h	12.31±0.41	10.55±1.20	0.0844742



IV. Discussion

The main cause of traumatic liver injury in the current study was road traffic accidents (80%), which is like other published studies. In a multicenter study of 783 patients, 54% of traumatic liver injuries were caused by traffic accidents.[6] While another study found that traffic accidents were responsible for 72% of traumatic liver injuries.[7]Brammer et al. observed that 67% of liver injury patients were injured by traffic accidents.[8] Males were 92% of those with traumatic liver injuries in this study. A male predominance in this type of injury has been demonstrated in numerous other studies world-wide, including those conducted in the United Kingdom (79%), Scotland (76%),South Africa (81%), and the United States (65%).[9,10,11]

According to the injury grade, 46 of traumatic liver injuries in the current study were low-grade (I, II, or III), a finding like the results of previous studies. Pachter et al. in their study described a predominance of grades I, II, or III injuries (80%). Scollay et al.found that most patients (69%) in Scotland with traumatic liver injury had AIS grade II injuries. NOM is a safe and effective method in the management of hemodynamically stable patients with blunt hepatic injuries. The use of NOM in liver trauma has progressively increased: from 1969 to 1970, no patients were treated with NOM; from 1995 to 1999, however, the percentage had increased to 65%.[12] In the current study, 92% of patients were treated with non-operatively, which is like a study conducted in 2003.[13] The current study showed significant differences in the grade of liver injury between the operative and NOM groups ($p < 0.05$). In the NOM group, 88% of patients had low-grade injuries. Therefore, almost all patients with low-grade liver injuries in this study were treated non-operatively. In contrast, 4% of patients with high-grade injury were treated non operatively.

There are reasons why high-grade liver injury is not well managed by NOM. First, high-grade injury is associated with hemodynamic instability. Second, patients with high-grade injury in the current study had a significantly lower mean systolic blood pressure at admission and reduced mean haemoglobin levels 6&12 hours after. Third, patients with high-grade injury may also have a severe injury to the brain, spleen, kidney, and other organs. Most surgeons determine the treatment of traumatic liver injury according to a patient's hemodynamic status rather than the injury grade. The relationship between the liver injury grade and treatment choice remains controversial.

In a study of 206 patients with liver injury, van der Wilden et al. found that liver injury grade was not significantly different between NOM failure versus success.[14]Zago et al. showed no significant differences in liver injury grade between NOM and operative groups.[15] However, Pachter et al.described that most cases of failed NOM occurred in patients with grades IV or V injuries.Furthermore, there are several studies showing that NOM in high-grade liver injuries may lead to significant morbidity and possible mortality because of liver-related complications.[16,17] Most patients (80%) who failed surgery had grades IV and V liver injuries. Therefore, prompt resuscitation and appropriate surgical management are required to reduce mortality in patients with high-grade injury and significant blood loss. There are currently no definitive guidelines for the treatment choice of traumatic liver injury. Asfar et al. suggested guidelines for the NOM of liver injury. The authors describe a continued need for blood transfusion exceeding 5 units, development of peritoneal signs, unstable vital signs despite resuscitation, and intrahepatic infections.[18]Velmahos et al. identified 4 independent risk factors for NOM failure: presence of a splenic or renal injury, free fluids greater than 300 ml observed on CT, requirement for blood transfusion, and a high-grade liver injury.[19]

It is suggested that when surgeons decide between surgery and NOM in patients with traumatic liver injury, considering the following factors will be helpful: hemodynamic stability; grade of liver injury; amount of blood loss. There were several limitations of this study. This study was retrospective study. We made decisions about the treatment in patients that were not in accordance with the standard clinical protocol.

In this study, we compared the clinical features between NOM and surgical treatment of traumatic liver injury. There were significant differences between the two groups for: grade of liver injury, vital signs,andhaemoglobin levels. Thus, high-grade liver injury is associated with hemodynamic instability. Considering the results of this study, we propose that hemodynamic stability and the following may be helpful when determining the treatment of traumatic liver injury: grade of liver injury and amount of blood loss.

V. Conclusion

The use of various clinical parameters viz systolic blood pressure, heart rate, serial haemoglobin levels and grade of liver injury can help in deciding the course of management for traumatic liver injury. However, these are meant for the tertiary care centre where continuous, rigorous and serial imaging facilities are present.

DECLARATIONS
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