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ORIGINAL ARTICLE

Management and Outcome of Liver Trauma in Jinnah Hospital Lahore

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ABSTRACT

Background: Liver injury is the most commonly encountered trauma among all abdominal traumas. It is associated with high morbidity and mortality. The choice of treatment for such injury depends on the type as well as severity of injury.

Objective: To determine the outcome in terms of (success and complications) of managing liver trauma either conservatively or with operative management.

Methodology: 62 patients with liver trauma (blunt or penetrating) who presented in the surgical emergency department of Jinnah Hospital, Lahore were enrolled in the study. Detailed history, clinical examination and radiological examination of all patients were carried out using CT scan. Depending on the grade of injury and type of trauma patients were managed either conservatively or by operating them. Success of treatment and its outcomes were noted down.

Results: The results revealed that the mean age of the patients was 40.1±11.74, mean diastolic blood pressure was 62.34±14.36, mean systolic blood pressure was 105.2±11.41, mean pulse rate was 92.37±19.06, mean respiratory rate was 19.8±5.353 and mean number of fresh frozen plasma (FFPs) infused were 2.8±0.81. Conservative management was carried out in 42 (67.7%) patients and operative management was carried out in 20 (32.3%). Out of these, conservative management was successful in 35 (56.5%) patients and operative management was successful in 18 (29%) patients. Common complications seen were intra-abdominal sepsis in 24.2%, bile leakage 14.5%, recurrent hemorrhage 6.5%, coagulopathy 3.2% and death 4.8%.

Conclusion: Conservative management of liver trauma is highly successful and is associated with less complications and unless needed must be adapted and operative management should only be carried out in patients who have injury to liver of such an extent that cannot be managed conservatively.

Keywords: Liver injury, Blunt trauma, Penetrating trauma, Conservative management, Outcome

INTRODUCTION

Globally, the leading cause of disability and mortality is trauma1. Of all abdomen related traumas, the most commonly injured organ is liver that is around 35-45%[1]. Frequent complications that are encountered after liver trauma are breathing difficulties, excessive bleeding, infection and bile fluid leakage[2]. The injury to liver is often life threatening and may be caused by both blunt as well as penetrating trauma[3].

The surgical management of trauma to liver has changed fundamentally over the last two decades. It has been seen that majority of the bleeding that occurs because of the injuries sustained by the liver spontaneously stop4. Additionally, utilization of computed tomography has increased because of availability and cost effectiveness5. Due to this, the trend of management has shifted towards a more conservative approach rather than operating patients who have undergone hepatic injury and are stable hemodynamically[6].

Some patients with hepatic injury may need operative management, initially as part of their resuscitation measure or due to failed conservative management7. Previous studies showed that patients with liver trauma who had to undergo a surgery had to face a lot of complications such as hypothermia, acidosis and coagulopathy[1,3,4]. This can be overcome by utilization of advanced surgical procedures and providing good critical care to the patients[5,6].

The choice of treatment for liver trauma depends on the characteristics of patients individually and overall condition of the patient clinically8. The outcome of treatment depends on the severity of trauma that has occurred to the liver[3,5].

A lot of international research has been carried out on different management techniques for dealing with liver trauma. However, the data in Pakistan is scarce. So the rationale of current study was to determine the outcome (in terms of success and complications) of managing liver trauma either conservatively or with operative management. This study will help in providing data about a better approach for dealing with such life threatening situation that is associated with a better outcome and thus will help in reducing morbidity and mortality by providing early intervention.

MATERIAL AND METHODS

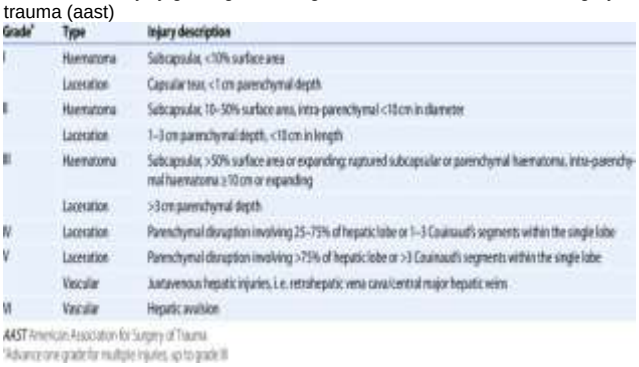
It was a prospective observational study. The study was carried out in the Surgery Department of Jinnah Hospital, Lahore from 1st April, 2020 till 30th September, 2020. 62 patients who fulfilled the inclusion criteria were enrolled in the study after taking written informed consent from all the patients or their relatives and taking ethical approval from the Review board of the institution.

The inclusion criteria included both male and female patients, aged 18-60 years, who had liver trauma either penetrating or blunt. Patients who previously had a liver disease such as cirrhosis of liver, hepatic tumor or hepatitis, patients with previous history of liver surgery or those who sustained multiple injuries involving other organs were excluded from the study.

All patients enrolled in the study were admitted in the department through Surgical Emergency. Demographic assessment, detailed history and clinical examination was carried out and findings were noted down. Patients were evaluated for hemodynamic stability and the need for early resuscitation measures. IV line was secured. Input and output as well as vitals monitoring was carried out in all patients. Baseline investigations were carried out and all patients were subjected to CT scan to decide for the management plan. Liver injury was graded according to American Association of Surgery for Trauma (AAST) (table 1). Patients who were hemodynamically stable (defined as blood pressure >90/60mm Hg and heart rate between 60-100 beats per minutes), encountered blunt injuries of grade III or less and those with penetrating injury of grade I and II were managed conservatively in the ward, whereas all who were unstable hemodynamically (defined as blood pressure <90/60mm Hg and heart rate >100 beats per minutes) as well as those who presented with penetrating injury of grade III or more, blunt trauma of grade IV and above, generalized peritonitis and those with continuous bleeding who required multiple transfusions were managed by doing laparotomy. Those patients who had failed attempt of treatment done conservatively, were referred for laparotomy too. Details of surgical management were also noted down. All patients were infused 2-4 fresh frozen plasmas (FFPs). Outcome in terms

of success of the technique used for managing liver trauma and complications were assessed.

Table 1: Liver injury grading according to american association for surgery of trauma (aast)



Grade*	Type	Injury description
I	Haematoma	Subcapsular, <10% surface area
	Laceration	Capsular tear, <1 cm parenchymal depth
II	Haematoma	Subcapsular, 10–50% surface area; intra-parenchymal <10 cm in diameter
	Laceration	1–3 cm parenchymal depth, <10 cm in length
III	Haematoma	Subcapsular, >50% surface area or expanding; ruptured subcapsular or parenchymal haematoma; intra-parenchymal haematoma ≥10 cm or expanding
	Laceration	>3 cm parenchymal depth
IV	Laceration	Parenchymal disruption involving 25–75% of hepatic lobe or 1–3 Couinaud's segments within the single lobe
V	Laceration	Parenchymal disruption involving >75% of hepatic lobe or >3 Couinaud's segments within the single lobe
	Vascular	Juxtavenous hepatic injuries; i.e. retrohepatic vena cava/central major hepatic veins
VI	Vascular	Hepatic avulsion

AAST American Association for Surgery of Trauma
*Advance one grade for multiple injuries, up to grade III

Data was analyzed using SPSS version 24.0. Quantitative data such as age, blood pressure, pulse and respiratory rate and number of Fresh frozen plasma infused were presented as mean and standard deviation. Qualitative data such as mode of injury, type of injury, gender, hemodynamic status, liver injury grading, type of management and outcomes in terms of success and complications were labelled as frequency and percentages.

Data was stratified for age, gender, type of injury sustained, hemodynamic status and grade of liver injury. Post-stratification chi square test was applied to deal with effect modifiers and a p-value of ≤0.05 was considered as significant.

RESULTS

The results revealed that the mean age of the patients was 40.1±11.74, mean diastolic blood pressure was 62.34±14.36, mean systolic blood pressure was 105.2±11.41, mean pulse rate was 92.37±19.06, mean respiratory rate was 19.8±5.353 and mean number of fresh frozen plasma (FFPs) infused were 2.8±0.81 (table 2). The frequencies and percentages of qualitative variables is shown in table 3.

Conservative management was carried out in 42 (67.7%) patients and operative management was carried out in 20 (32.3%). Out of these, conservative management was successful in 35 (56.5%) patients and operative management was successful in 18 (29%) patients.

Among patients who were managed conservatively, 10 (16.1%) had intra-abdominal sepsis, 4 (6.5%) had bile leakage, recurrent hemorrhage was present in 4 (6.5%), coagulopathy was present in 2 (3.2%), death occurred in 2 (3.2%) and no complications were present in 20 (32.3%). Among the patients who were operated, the frequent complications encountered were intra-abdominal sepsis in 5 (8.1%), bile leakage in 5 (8.1%) and death occurred in 1 (1.6%). No complications were seen in 9 (14.5%) patients who were operated.

Table 2: Mean and standard deviation for quantitative variables

	N-62
Quantitative variables	Mean and standard deviation
Age	40.1±11.74
Diastolic Blood Pressure	62.34±14.36
Systolic Blood Pressure	105.2±11.41
Pulse Rate	92.37±19.06
Respiratory Rate	19.8±5.353
Number of FFPS Infused	2.8±0.81

Table 3: Frequency of mode of injury of the patients

Qualitative Variables		N=62 Frequency %age
Age groups	Young age (18-30 year)	13 (21%)
	Early middle age (31-45 years)	31 (50%)
	Late middle age (46-60) years	13 (21%)
Gender	Male	46 (74.2%)
	Female	16 (25.8%)
Mode of injury	Road Traffic Accident	29 (46.8%)
	Fall	12 (19.4%)
	Sports Injury	9 (14.5%)
	Stab Wounds	6 (9.7%)
	Gunshot Wounds	4 (6.5%)
	Crush / Industrial injury	2 (3.2%)
Types of injury	Blunt injury	52 (83.9%)
	Penetrating injury	10 (16.1%)
Hemodynamic stability	Stable	42 (67.7%)
	Unstable	20 (32.3%)
Grades of liver injury	I	17 (27.4%)
	II	18 (29%)
	III	7 (11.3%)
	IV	9 (14.5%)
	V	8 (12.9%)
	VI	3 (4.8%)
Types of management	Operative	20 (32.3%)
	Conservative	42 (67.7%)
Success rate	Successful	53 (85.5%)
	Operative management	18 (29%)
	Conservative management	35 (56.5%)
Complications	None	29 (46.8%)
	Intra-abdominal sepsis	15 (24.2%)
	Bile leakage	9 (14.5%)
	Recurrent hemorrhage	4 (6.5%)
	Coagulopathy	2 (3.2%)
	Death	3 (4.8%)

DISCUSSION

Abdominal organ that is injured most frequently is the liver[1]. Despite the fact that its position in the abdomen is protected well, still it is highly vulnerable to trauma[2]. The management of injury to liver is dependent on the condition of the patient, his diagnosis, the need for transfusion and the complications that develop[3]. Non-operative management of injuries to liver has been supported widely. In a study it was shown to be the management of choice in 60% of patients who had injuries to liver ranging from low to high grade[5]. The use of conservative management has even extended to injuries that are penetrating in nature.

In the current study, all patients were assessed for hemodynamic stability and need for resuscitative measures. All hemodynamically stable patients were managed conservatively and all who were unstable were managed through operative measures. Penetrating injuries were present in 10 (16.1%) patients and blunt trauma history was present in 52 (83.9%). Majority of the patients were of early middle age i.e. between 31 to 45 years old and were males i.e. 74.2%. Hemodynamic stability was present in 3 (4.8%) patients with penetrating injury and 39 (62.9%) patients with blunt injury, whereas, 7 (11.3%) patients with penetrating injury were unstable and 13 (21%) with blunt injury were unstable. All patients underwent examination using CT scan of the abdomen to determine right stage of injury to the liver and to further help in the decision making regarding management of these patients. Conservative management was done in 3 (4.8%) of patients who had penetrating injury and in 39 (62.9%) patients with blunt injury. Operative management was carried out in 7 (11.3%) of the patients with penetrating injury and 13 (21%) patients with blunt injury. The current study revealed that conservative management was carried out in majority of the patients with a good outcome. Operative management was effective too and the overall rate of mortality was less with operative management compared to conservative management as shown by rate of 1.6% vs 3.2% respectively.

Various studies conducted retrospectively have been published which evaluated the success of conservative management of liver injury, and yielded that it is 95% of the patients. In a study conducted prospectively on 136 patients who had blunt trauma to liver, Croce MA et al. found that only 24 patients needed laparotomy as an emergency measure. Out of 112

patients who were conservatively managed, the rate of failed management was observed in 11%[1]. No difference between the two groups were found in terms of hemodynamic status and length of stay in the hospital, however, patients who were managed conservatively needed less number of transfusions of blood and had fewer abdominal complications. Our current study revealed that majority of the patients needed 2 transfusions of fresh frozen plasma whether managed conservatively or by operation.

The rate of complications were similar in both groups in our study.

Depending on the condition of patients, both management have shown to be effective and are associated with less complications. The current study had certain limitations. Firstly, it was carried out in a single center so the results cannot be generalized. Secondly the sample size was small and cannot be considered to be whole population representation. Thirdly, the effect of comorbid medical illness was not evaluated for any effect on the outcomes. Lastly, the predictors effecting the outcomes were not assessed.

CONCLUSION

Injury to the liver is associated with high morbidity and mortality if not diagnosed and managed promptly. Conservative management has high success rate and low rate of complications and should be considered the management of choice in patients who are hemodynamically stable. However, operative management yielded high success rate in patients who were hemodynamically unstable and had less complications. CT scan must be carried out in all patients presenting with liver trauma in order to make quick decision regarding further management thus reducing overall morbidity and mortality associated with this condition.

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