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RESEARCH ARTICLE
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CAUSES AND MANAGEMENT OF BLUNT LIVER TRAUMA IN A TERTIARY CARE HOSPITAL

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Abstract

Objectives: The purpose of this research is to assess the management strategies and outcomes of blunt liver trauma (BLT) and determine the patients' management and prognosis by analyzing the admission patterns of patients in a tertiary care hospital in Pakistan and assessing the treatment methods used and the factors that affected the recovery of the patients.

Materials and Methods: A retrospective cohort study was undertaken on 120 patients who suffered from BLT. Medical records were used in this study to obtain details in terms of demographics, mechanisms of injury, management, and outcome. They stipulated the inclusion criteria which included parents who were 18 years and above diagnosed with BLT but excluded those who had head and spinal injuries and pediatric patients.

Results: Patients were mostly male with a mean age of 32.5 years. Road traffic accidents were the most common cause of injury with 65%. In the survey, nonsurgical management was effective in 85 percent of the instances, whereas surgery was necessary for severe injuries. The overall rate of recovery is very favorable with minimal complication and mortality reported.

Conclusion: In most situations, conservative measures are used in the treatment of BLT, with surgery required only for complicated injury. It's evident that indicates that early diagnosis and chemotherapy are critical for the health of patients with breast cancer.

Keywords: Blunt liver trauma, non-operative management, road traffic accidents, surgical intervention, trauma care, liver injury.

INTRODUCTION

Blunt liver trauma (BLT) is one of the most common injuries observed in the trauma population and more specifically, blunt liver trauma (BLT) is part of blunt abdominal trauma (BAT). Thus, the liver is the largest solid internal organ in the body, prone to injuries in conditions like road traffic accidents, falls, or physical violence. In most instances, BLT occurs in scenarios involving direct, blunt

abdominal injury that produces a range of injuries that may include simple bruises, lacerations, hemorrhages, and, at times, liver failure (1). Being among the main causes of morbidity and mortality, the management of BLT remains a crucial problem for trauma surgeons, who have Figure 4 to turn to for guidance on how to approach this question responsibly and effectively.

BLT is sorted depending on the level of injury, and, in most cases, the degree is confirmed through imaging technology such as ultrasound and CT scans. In grading the severity of liver injuries, the Organ Injury Scale (OIS), which is pioneered by the American Association for the Surgery of Trauma (AAST), is employed, ranging from Grade I, which refers to minor contusions, to Grade VI that represents liver avulsion or catastrophic haemorrhage (2). The management of BLT is essentially shaped by the extent of the injury and the clinical condition of the patient during presentation. Depending on the severity and presentation, there is a plethora of management strategies, from simple observation to laparotomy or liver resection in cases of profound hemorrhage or life-threatening injuries (3).

In tertiary care centers, more trauma patients are being managed, and hence, there is more focus on implementing the new imaging technologies and multifaceted management for BLT. Imaging has a prominent place, as early and improved diagnosis enables having more individualized management treatment plans, which, in turn, may decrease dependence on surgical interventions. Due to various reasons, the role of non-operative management has risen in the past few years, especially for those patients with stable vital signs and low-grade injuries (4). This needs regular follow-up of the patient with imaging studies in order to watch out for deterioration of the liver status. Thus, there is an implication that non-operative management has the advantages of shorter hospital stays and less morbidity as well as health care costs than operations (5).

In addition to the proper physiological treatment of liver injuries, there has been much discussion on the role that liver enzymes play in the diagnosis of blunt liver trauma and the assessment of the degree of the trauma. Aspartate transaminase (AST), alanine transaminase (ALT), and bilirubin, which are the common abnormal liver enzymes are helpful to clinicians in the management of the conditions in the treatment process (6). While isolated liver enzymes are not definitive in diagnosing liver trauma, they are adjuncts to imaging studies and clinical examination in determining the grade of injury.

Various scholars have considered it necessary to incorporate structure in the approach to designing BLT within tertiary care institutions. For instance, Sinha et al. (2020) aimed to assess the survival of liver trauma patients through a multicenter cohort by exploring urban university hospitals in India. It was demonstrated that non-operative management could be successfully applied in more than 70% of traumatology patients, and minimal rates of complications were also observed, which confirms the tendencies toward more conservative treatment approaches (7). Moreover, Alanezi et al. (2024) also observed outcomes from a tertiary care center and also highlighted a good response to conservative management in most of the patients, including observation and monitoring of the ununited fractures (8).

Even though non-operative management is quite effective in many instances, some patients with high-grade injuries, especially those who have active hemorrhage or liver laceration, may need surgical intervention. The traditional ways of managing bleeding in the liver include opening up the abdominal cavity through laparotomy, liver packing, or even taking out a part of the liver, known as partial hepatectomy. The decision to operate is based on the hemodynamic status, other associated injuries, or the degree of hepatic injury (9). However, surgery involves certain risks like infection, Sepsis, and the likelihood of heparin-induced liver injury in the postoperative period (10).

However, other associated injuries that may be found in cases of blunt abdominal trauma may further complicate the management of BLT. The other structures that may be affected include the spleen, kidneys, and intestine, thereby requiring additional medical management, and the overall clinical picture becomes more complicated (11). The outcome of these polytrauma patients improves significantly when managed by a multidisciplinary team that comprises trauma surgeons, intensivists, and radiologists. For example, when the biliary system is involved, the treatment plan might require certain changes due to concerns of bile leakage or injury to the biliary tree (12).

CT Scan, MRI, and other enhancing diagnostic techniques have made BLT diagnosis more efficient as well as providing better management. Zakaria et al. (2020) confirm the role of CT in determining the severity of liver trauma, where it was noted that CT scans can help in assessing the severity of the situation and plan for the management (13). Additionally, injuries that are unrelated to the cause of the specific trauma may be present, and their identification may be enhanced by CT scans and, therefore, support the comprehensive management of patients with trauma.

Nevertheless, the management of BLT remains a very active area of research as the strategies for treating the disease remain the subject of discussion, especially in the developing world. Patient characteristics such as the patient's age, associated diseases, and the existence of adequate treatment facilities play an important role in determining the effect of the treatment process and should be taken into account when developing management tactics. This means that more prospective studies are required for the enhancement of treatment models and optimal management of blunt liver injury in several clinical scenarios.

Finally, blunt liver injury is still associated with high mortality and continues to be a challenge in the management of trauma patients. Specificity in diagnosing the injury, the right approach in assessing the severity of the injury, and the appropriate management approach are critical in enhancing the results. The trend has shifted toward non-operative treatments for most cases, while surgery may still be required for high-grade injuries. This article also intends to discuss BLT in detail, including etiology, clinical staging, treatment plan, and various other factors concerning BLT as observed in a tertiary care hospital in Pakistan, depending on the documented literature and experience.

Objective: This study aims to explore the causes, clinical presentation, management strategies, and outcomes of blunt liver trauma (BLT) in patients admitted to a tertiary care hospital in Pakistan. The study seeks to establish the best possible treatment and intervention plans and thus help enhance patient care and trauma management procedures.

MATERIALS AND METHODS

Study Design: a cross-sectional study.

Study setting: This study was carried out at Chaudhry M Akram Teaching Hospital, Azra Naheed Medical College, Lahore, Pakistan, where trauma patients are treated in large numbers.

Duration of the study: The study spanned a year, from the month of January 2023 to December 2023.

Inclusion Criteria

It included patients with BLT confirmed clinically upon history taking, laboratory findings, and radiological imaging. The study targeted both male and female patients 18 years and above. It included patients not only who were admitted for non-surgical management but also those who needed surgical intervention for BLT. Inclusion of all ages facilitated a thorough understanding of the different management strategies used in blunt liver trauma including both non-operative and operative management.

Exclusion Criteria

Patients with isolated head or spinal injuries were omitted from the study because the chief interest here was abdominal injury, especially liver injury. Furthermore, patients below 18 years were also not included in this study because liver injury in children may not be handled in the same way as adult patients. The study also excluded all cases where the patients' records were incomplete, or the imaging reports' records were missing as this would distort the true picture of the injury severity and the management protocol followed. These exclusion criteria helped to limit the candidate population and make it possible to generalize the outcomes toward adults with liver injury.

Methods

This study involved patients who were admitted to the Chaudhry M Akram Teaching Hospital, Azra Naheed Medical College, Lahore, Pakistan, diagnosed with blunt liver trauma from January 2023 to

December 2023, as identified from their medical records. Patients' characteristics such as age and sex, clinical signs, imaging (CT scans, ultrasound), and Lab results (liver enzymes) were analyzed. The severity of liver injury was assessed using the Organ Injury Scale (OIS). Concerning the treatment, recorded data included NOM (monitoring, observation, and supportive care) and surgeries (laparotomy, liver packing, or resection). The results measured by the respective scales included the ability to recover, complications, length of hospital stay, and mortality. The patients were classified according to the severity of their injury, and an analysis of variance was carried out to assess injury grade, treatment, and results. Descriptive statistics were used to analyze and compare management and results to highlight significant trends.

RESULTS

The study recruited one hundred and twenty patients who had been diagnosed with blunt liver trauma (BLT). Out of these patients, a significant proportion was male (80%; n=96), whereas only 20% (n=24) were female. The average age of the patients was 32.5 years, with the youngest patient being 18 years and the oldest patient being 65 years. This represents an overwhelmingly young adult population, a fact that is in concordance with the trauma population. Road traffic accidents were reported in over half the cases (65%, n=78) among the patients, signifying it as the most acknowledged route of injury. The second most common type of injury incidence was attributed to falls, which accounted for 20% (n=24) of the total cases, and physical assault scored 15% (n=18). These deductions affirm road traffic accidents as the main causes of BLT in developed countries as well as developing countries.

The distribution of liver injury severity as per the Organ Injury Scale (OIS) revealed that a majority of the children experienced mild to moderate liver injury. Seventy patients had Grade I injuries (58.3%) and 30 patients had Grade II injuries (25%). Other serious injuries like Grade III (15.8%, n=19) and Grade IV injuries (0.8%, n=1) were less in number. No patients had a Grade V injury.

Table 1: Distribution of Liver Injury Severity

Injury Severity	Number of Patients (n)	Percentage (%)
Grade I	70	58.3%
Grade II	30	25%
Grade III	19	15.8%
Grade IV	1	0.8%
Grade V	0	0%

BLT therapeutic options were divided into two categories: non-operative management (NOM) and surgical interventions. Eighty percent (80 %) of the patients were treated non-operatively, and they were observed and supported in recovering without undergoing surgery. This group included most of the patients with the working diagnosis of Grade I and II injuries. The remaining 20% (n=24) needed surgery because of more severe conditions, hemodynamic instability, or the presence of concomitant injuries to the spleen or bowel. Out of all the patients who underwent surgery, 16 (66.7%) patients received exploratory laparotomy with liver packing, while 6 (25%) required partial hepatectomy. Two patients (8.3%) required liver resection as they presented with massive bleeding.

Table 2: Management of Blunt Liver Trauma

Treatment Method	Number of Patients (n)	Percentage (%)
Non-Operative Management	96	80%
Surgical Intervention	24	20%
- Exploratory Laparotomy	16	66.7%
- Hepatectomy	6	25%
- Liver Resection	2	8.3%

The results were assessed according to the rate of recovery, postoperative complications, and mortality rate. One hundred and ten of the 120 patients (91.7%) who received the experimental treatment were discharged with no severe adverse effects. Five patients had liver abscesses, three patients developed bile leakage, and two had postoperative infections. Injury mortality was found in 2 patients (1.7%), and both were Grade IV with surgical interventions. The average days in the hospital with patients who had non-operative management was 5.2 days, while that of patients who underwent operative management was 8.4 days.
Table 3 summarizes the outcomes:

Table 3: Patient Outcomes

Outcome	Number of Patients (n)	Percentage (%)
Full Recovery	110	91.7%
Complications	10	8.3%
- Liver Abscess	5	50%
- Bile Leakage	3	30%
- Post-Operative Infection	2	20%
Mortality	2	1.7%

Finally, the majority of blunt liver trauma in this study were low to moderate instances, and the majority of the patients were treated non-operatively with good results. However, such severe cases called for surgery, and there were side effects like liver abscess and bile leakage, but the mortality rate remained low.

Discussion: Blunt liver injury (BLI) remains an important cause of high mortality and morbidity in traumatic patients, particularly in Level I trauma centers. The objectives of this study were to determine the risk factors of patients with BLT, the signs and symptoms in the early stages of the disease, what treatment options were employed, and the outcomes of the patients in a teaching hospital in Pakistan. The presented study is helpful for realizing the effectiveness of the current management approaches and the need for improvement while diagnosing and treating them.
The survey shows that the leading reason for BLT was RTAs, which accounted for 65 percent of the cases. This goes contrary to other studies conducted in developed and developing countries where RTAs are the leading cause of trauma injuries, particularly in the abdomen due to blunt forces (1, 4). Based on the current situation, inadequate road and pavement, low or no awareness of road safety among the public, and continually increasing traffic jams are the main causes of RTAs in Pakistan. Possible prevention and control measures that have been adopted in an endeavor to decrease incidences of traffic accidents, including police crackdowns on traffic violations and initiatives on awareness creation on traffic hazards, may help lower incidences of BLT in the future.
In this study, most of the patients were young adults, and their mean age was 32.5 years. The above demographic distribution is consistent with worldwide studies done on blunt abdominal trauma, which has shown that this type of injury is more common among the young and active male population (1, 5, 6). This age group is more prone to dangerous behavior like driving and physical combats than other age groups and, hence, more prone to injuries of a traumatic nature. The gender distribution, where 80% were male patients, is in concordance with other trauma studies that show an increased incidence of trauma in males attributed to male's involvement in risky activities (7, 8).
From this study, the level of BLT was found to be mild to moderate, mainly because 58.3% of the cases accounted for Grade I as per OIS. Grade II injuries were also reported in 25% of the patients. Grade III and Grade IV were less frequent and accounted for 16.6% of cases. These results are consistent with other similar studies, which showed that blunt trauma caused a relatively higher number of mild to moderate liver injuries compared to other studies. Additionally, it is imperative to note that the management of such injuries is well correlated to the severity and characteristics of the

injury. From the patients, 80% of the patients with low to moderate degree of hurt were managed conservatively and it supports the author and other researchers involved in this study that low-grade liver injury can be managed conservatively in a large extend (10, 11).

The majority of patients with stable low-grade blunt liver injuries are being managed conservatively, which is non-operative management. Specifically, the most significant percentage of the patients, eighty percent, fell under the conservative management category, which entails monitoring the patients without invasive treatment or surgery and only providing supportive measures. This is in concordance with other studies, which have also found that NOM can present with favorable results where there is mild to moderate hepatic involvement, including other intra-abdominal injuries (9, 12). The benefits recorded in the management of NOM can be attributed to an enhanced capacity in diagnostic techniques and imaging to indicate the level of liver injury and help in decision-making, including computed tomography and ultrasound. The majority of Grade I and Grade II patients did not undergo operative interventions, as only a few of the patients would actually require surgical interventions due to associated injuries or clinical instability.

While for Grade III and above liver injuries, patients required surgery. Among the patients, 20% underwent surgery, which is less as compared to some other studies, where 30-40% of the patients with liver trauma needed a surgical procedure (13, 14). The types of surgical therapies included were different and were subdivided into explorative laparotomies and liver packings, which were the most frequent ones. Liver resection was essential in a few cases where there was extensive involvement and bleeding. Surgery, although it carries more mortality, cannot be ruled out in cases of patients with severe liver injury, especially when there is recurrent bleeding or other abdominal organ involvement (9,14).

The prognosis for the patients in this trial was relatively good, with 91.7% of them recovering. The overall complication rate was 8.3%, and the major complications were liver abscess in 50% of cases, biliary leak in 30% of cases, and postoperative infections in 20% of the cases. These complications are similar to those observed in other research studies that indicate that liver abscesses and bile leakage are the most common complications in cases of liver trauma (1, 6, 15). The infrequency of complications in this study can be explained by the fact that almost all the patients in this study group received conservative treatments, which have less potential for complications in surgeries. Nevertheless, when surgery is necessary, the risk of complications rises. Therefore, early and accurate evaluation of the severity of liver injury is crucial to avoid surgical management.

In this study, the mortality rate was 1.7%, which is quite low compared to another study where mortality rates of severe liver trauma can range from 5-10% (9, 12). In this study, the two patients who had died both had Grade IV injuries to the liver, and these are serious injuries that are likely to lead to a patient's death due to the severity of the liver injuries and the likelihood of continuous bleeding. Outcomes in BLT are associated with injury severity, the presence of other injuries, and the time required for definitive care (1, 9). The identification of severe liver injuries and proper resuscitation, as well as surgery when needed, are important principles that lead to patient survival.

Length of hospital stay was also considered as another outcome measure in this study. For the patients who were managed conservatively, the mean hospital stay was 5.2 days and for patients who underwent surgery, the mean hospital stay was 8.4 days. This difference is in line with other studies which showed that general surgical patients have longer hospital stays because of post-operative monitoring and recovery (12,15).

Thus, this study concludes that blunt liver trauma is a major source of morbidity in a tertiary care center in Pakistan, where RTAs are the leading cause of injury. Most of the patients with minor to moderate injury to the liver can be treated easily, but the patients in the severe category can often need surgery. The general outcome is satisfactory, and It is a less deadly disease accompanied by few dangerous complications. However, poor diagnosis and inadequate early treatment significantly impact patients. Prospective manner-seeking research examining BLT patients, the results of their functional improvement, and changes in quality of life could give beneficial information about the current management behaviors.

CONCLUSION

Blunt liver injury has always been an issue of concern within traumas where road traffic accidents stand as the commonest cause. The study was evident in the fact that most blunt liver trauma patients in a tertiary care hospital in Pakistan were young and physically active, and most of the affected individuals were males. Non-operative management (NOM) was thus found to be best suited for patients with mild to moderate liver injuries and boasted excellent results. For lesions, surgical procedures were performed in extreme cases, and only a few patients in this study underwent operations. The general prognosis was good, with a high percentage of patients making complete recovery and low mortality reported. However, adverse effects, including liver abscess bile leakage, were observed in the studies but were reported more in cases that underwent surgical intervention. Key postoperative include early detection, prompt treatment, and close observation in management to enhance the patient's prognosis. This study supports prior works suggesting that most spinal cord injuries can indeed be managed conservatively with surgical intervention only in severe cases.

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