



OUTCOME OF CONSERVATIVE MANAGEMENT OF HEPATIC TRAUMA IN A TERTIARY CARE CENTRE

General Surgery

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ABSTRACT

Background: The conservative treatment of liver trauma has made important progress over the last 10 years at VSSIMSAR, Odisha, India. The percentage of success was 57.8%. The aims of this study were to analyze the conservative treatment of liver trauma and to compare the results with those in the literature. **Methods:** This study was conducted prospectively from October 2018 to November 2020. We analyzed 45 patients admitted to our hospital with liver trauma. Liver injuries were evaluated according to the American Association for the Surgery of Trauma and the World Society of Emergency Surgery classification. **Results:** Out of the 45 patients with liver trauma, 84.4% were male. The main cause of liver trauma was motor vehicle crashes (77.8%). Blunt trauma was the cause of liver injury in 38 cases (84.4%), and penetrating trauma occurred in 7 cases (15.6%). Initially, the decision was to manage 32 cases (71.1%) via the conservative approach. Of these, 26 cases (57.8%) were successfully treated with conservative treatment, while in 6 cases (13.3%), this approach failed. The success rate of conservative treatment by grade of injuries was as follows: grade I (75%), grade II (66.7%), grade III (33.3%), and grade IV (25%). The likelihood of the success of conservative treatment is related to the grades of the liver injury, associated intra-abdominal injuries and complications. **Conclusions:** The likelihood of the success of conservative treatment varies with the grade of liver injury and associated intra-abdominal injuries. Limited hospital resources and the low level of consensus for non-surgical management have a negative impact on the outcome. The main causes of failure are secondary hemorrhage and bile leakage. Multi-disciplinary approach results in better outcome in cases of conservative management of liver trauma.

KEYWORDS

BACKGROUND

Over the decades, there have been incredible ameliorations in management protocols of liver trauma. From operating any case of liver injury awaiting its response to the current trend of non-operative management of liver trauma which is being considered to be the "Gold Standard" - it has been an outstanding journey. More than 4/5th of the entire cases of liver injuries are treated fully without surgical interventions in various studies.^[1-4] In India, the conservative approach to liver injury has made significant progress over the last few decades.^[5] The World Society of Emergency Surgery (WSES) liver trauma classification system considers both the Anatomic American Association for the Surgery of Trauma (AAST) classification and more importantly the hemodynamic status of the patient and the associated injuries.^[6] The trans-abdominal ultrasonography (TAS) is no longer considered as an investigation, rather an extension of the clinical examination which has become a barely essential tool in the emergency department for patients with hemodynamic instability. As of now, computed tomography (CT) is the preferred method in cases of blunt liver trauma in hemodynamically stable patients or in patients those have been stabilized after fluid resuscitation.^[7] The conservative treatment of liver injury can be initiated when there are resources that can monitor the traumatized patient's clinical, biological and radiological parameters precisely and there is a professional collaboration amongst surgeons, intensivists, radiologists with adequate infrastructure. The failure rate of conservative management is somewhat around 15%, often in those having extra-hepatic injuries or penetrating injuries.^[8,9] The objectives of this study were to evaluate the conservative management of liver injuries, the likelihood of success, the causes of delayed laparotomy and to compare the results with those in the previous literature.

METHODS

This is a prospective observational study done between November 2018 and October 2020. All the patients with hepatobiliary trauma who were admitted to Department of General Surgery, VIMSAR, Burla, India were analysed. All the patients of abdominal trauma (both blunt and penetrating) were screened for any liver injury. The patients found to be having liver injury were included in this study. They are then classified according to AAST and WSES classifications via ultrasonography and CT scan. Various demographic, clinical and laboratory parameters were taken into account and analysed.

The modality of treatment to be given to each of the patients was decided based on the set of indicators for exploratory laparotomy (EL) and for conservative treatment. The indicators were presence or absence of (1) hemodynamic stability, (2) peritonitis, (3) active bleeding on CT and (5) injury to hollow viscera (6) evisceration^[10,11] based on the algorithm for the non-operative management of blunt hepatic trauma.^[12]

Based on these criteria 32 patients who met the conditions for conservative treatment were taken into ward/ICU and 13 patients who had indications for immediate laparotomy were operated.

RESULTS

The median age of patients with hepatic trauma was 28 years old (ranging from 18 to 66) with 84.4% male & 15.6% female patients. In our study, 84.4% had blunt trauma to abdomen and 15.6% had penetrating trauma. The causes of hepatic trauma were motor vehicle crashes in 35 cases (77.8%), falls from height in 6 cases (13.3%) and assault in 4 cases (8.9%). 22 patients (48.9%) presented with stable vitals and 23 patients (51.1%) with unstable vitals, out of which 16 patients (35.6%) had their vitals stabilised following resuscitation and 7 patients (15.6%) didn't show any improvement in vitals (table 1). Those 7 patients who did not show improvement in vitals were taken for immediate laparotomy. In our study, 15 patients (33.3%) were transfused with 1 to 4 units of blood, 3 patients (6.67%) were transfused with more than 5 units and, 27(60%) needed no transfusion.

Table no 1

Initial Vitals	No. of Patients	Percent
UNSTABLE	7	15.56
STABLE AFTER FLUID RESUSCITATION	16	35.56
STABLE	22	48.89

The injury frequencies, according to the Couinaud segment, were as follows: I segment (n = 1) 2.22%, II segment (n = 2) 4.44%, III segment (n = 3) 6.67%, IV segment (n = 5) 11.11%, V segment (n = 6) 13.33%, VI segment (n = 8) 17.78%, VII segment (n = 10) 22.22%, and VIII segment (n = 13) 28.89%. The frequency of liver injury according to the WSES were WSES grade I (n = 30) 66.7%, WSES grade II (n = 6) 13.3%, WSES grade III (n = 2) 4.4%, and WSES grade IV (n = 7) 15.6%.

Table no 2

AAST Grade	Total pts	Percentage
I	12	26.67
II	21	46.67
III	6	13.33
IV	4	8.89
V	2	4.44
VI	0	0

Isolated hepatic injuries were detected in 13 cases (28.9%), and combined hepatic injuries were present in 32 cases (71.1%). Hepatic injuries were associated with intra-abdominal hollow organ injuries in 7 cases (15.56%) and with parenchymal injuries in 16 cases (35.56%). Hepatic injuries were associated with extra-abdominal injuries, including the head in 2 cases (4.44%), the thorax and diaphragm in 7 cases (15.56%), and limb fractures in 2 cases (4.44%). Extrahepatic injuries were present in 34 patients which included the stomach (n = 2, 5.88%), small intestine (n = 3, 8.82%), colon (n = 1, 2.94%), the spleen (n = 6, 17.64%), the kidneys (n = 7, 20.59%), the pancreas (n = 1, 2.94%), the diaphragm (n = 2, 2.94%), the CBD (n = 1, 2.94%) and the omentum (n = 1, 3.12%).

In conservative treatment of 32 patients, 26 patients (57.8%) benefitted from successful conservative treatment. Unsuccessful conservative treatment due to further complications was seen in 6 patients (13.3%). In patients with isolated liver injuries, conservative treatment was successful in 10 cases (76.9%). 19 patients underwent laparotomy. An immediate laparotomy was performed in 13 patients (16.4%), a laparotomy for hepatic injury was performed in 10 patients (52.6%), and laparotomy for extra-hepatic injury was performed in 9 patients (47.37%).

DISCUSSION

In our study we found that male to female ratio was 5:1. Beel et al. found that the male to female ratio varies from 15:1.^[14] Approximately 15–20 years ago, all traumatic liver injuries were treated surgically, but in 50–80% of cases, no active bleeding was found.^[15,16] We also found liver injuries with no active bleeding during laparotomy for associated injuries in 57.89% of cases.

In our study, the hemodynamic status was the main criterion in determining the therapeutic approach. Approximately 85% of patients with liver trauma are hemodynamically stable or stabilised after receiving intravenous liquids^[17], which corresponds with the findings in our study i.e. 84.44%. Richardson et al. commented that many experienced surgeons in trauma surgery apply surgical treatment in hemodynamically stable patients and they have concluded that conservative treatment has a positive impact on patient survival.^[18]

Table 6: Success of conservative management according to AAST grade

Grade	S. Buci <i>et al</i> [13]	Our study
I	38.4%	34.7%
II	30.1%	53.9%
III	28.8%	7.7%
IV	2.7%	3.8%
V	0%	0%
VI	0%	0%

During initial presentation the level of hematocrit is a factor to look at, for deciding further management and need of transfusion. In our study we found 24.45% of the patients presented with their hematocrit level below 30. Buci et al reported it to be 8.6%. 44.4% of patients who presented to us had hematocrit more than 37, while the reference group had it more than 70%.^[13]

In hemodynamically stable patients, a helical CT examination with oral and venous contrast was performed to determine the grade of the liver injury, the amount of hemoperitoneum, the presence of pseudo aneurysms, and the presence of other intraperitoneal injuries. Hemoperitoneum was observed in repeated ultrasound examinations, and in some cases, re-evaluation was done via CT scan. Malhotra et al. reports that a large amount of hemoperitoneum (when blood is present in the lateral channels, the perihepatic space, and the Douglas pouch) is a significant risk factor for the failure of conservative treatment.^[19] Due to limited resources for transfusion in our hospital, we interrupted conservative treatment in patients who had a considerable need for transfusion and when the amount of hemoperitoneum was determined

to be progressively increasing. From a group of 32 patients selected for conservative management, 6 patients showed complications that necessitated surgery. Another 13 patients underwent immediate laparotomy due to the following indications: hemodynamic instability, associated intra-abdominal injuries, and penetrating trauma. 10 patients out of a total of 19 who were operated were having no active bleeding at the time of surgery, resulting in non therapeutic laparotomy; of these, no second laparotomy was performed in any of the patients and all survived.

In our study, we found that wounds caused by sharp tools had an incidence of 15.56%. This percentage was significant and contributed to a reduction in the number of patients managed conservatively. Diagnostic peritoneal lavage (DPL) is another valid tool to determine the presence or nature of intra-peritoneal fluids. We used this procedure in a few cases. DPL, described by Root in 1965, remains an important tool in the hands of surgeons, especially in the absence of minimally invasive equipment. DPL has a very high sensibility and specificity rate for intra-peritoneal injuries (95 and 99% respectively). However, this procedure is associated with complications in 0.8–1.7% of cases.^[23]

Table 7: The causes of failure of conservative treatment

Complications	Reference group	Study group
Secondary hemorrhage	3.4%	4.4%
Biliary peritonitis	2.3%	4.4%
Intrahepatic bilioma	1.1%	2.2%
Extrahepatic bilioma	2.3%	4.4%
Hollow organ injuries	2.3%	0%
Liver compartment syndrome	1.1%	0%
Gangrenous cholecystitis	2.3%	0%
Peritoneal inflammatory syndrome	2.3%	8.9%
Total	17.2%	24.3%

Our study showed that conservative treatment turned out to be successful in 57.78% of patients with combined hepatic trauma and in 76.92% of patients with isolated hepatic trauma. These percentages recorded in studies elsewhere vary between 87 to 98% in hemodynamically stable patients. In our study it is 81.25%. It is our view that these differences are related to two factors: (1) a low level of consensus for conservative management and (2) limited hospital resources (limited interventional radiology procedures). Conservative treatment failed in 18.75% of cases. In some studies, it has been reported that in conservative management of liver trauma the failure rate is between 10 and 25%.^[24,25] Injuries that were grade III or worse added substantially to the failure of conservative management. We had only 1 patient (25%) with grade IV liver injury that was successfully managed conservatively. Malhotra et al. found that in 14% of patients with grade IV injuries and 22.6% of patients with grade V injuries, conservative treatment was not successful, and the failure rate in patients with grades I, II, and III injuries was 3–7 and 5%.^[19]

The likelihood of the success of conservative treatment had a significant correlation with the grade of liver injury. The failure of the conservative treatment was often attributed to the deterioration of hemodynamic parameters, bile leakage, and the presence of overlapping septic complications. Durham et al. and Hammond et al. have reported that secondary hemorrhage occurs in less than 5% of cases treated conservatively.^[26,27] We observed that the failure of conservative treatment due to secondary haemorrhage occurred in 3.8% of cases. Buckman et al. showed that bile leakage can occur in 3–20% of patients who are managed conservatively.^[28,29]

Subcapsular hematoma should be surgically treated only for two reasons: (1) to increase the value of ALT and AST and (2) if the patient has Budd-Chiari syndrome, stated by some studies.^[32,33] In our study, only one patient underwent surgical intervention due to expanding hematoma. None of the patient developed increased ALT or AST serially or had Budd-Chiari syndrome. The incidence of failure of conservative treatment due to associated intra-abdominal injuries has been reported to be between 0.5 and 3.5%^[12,34], whereas in our study, the failure rate with associated intra-abdominal injuries was 6.25%. This may be due to low sample size in our study.

CONCLUSIONS

The likelihood of the success of conservative treatment varies with the grade of liver injury and associated intra-abdominal injuries. Limited hospital resources and the low level of consensus for non- surgical

management have a negative impact on the outcome. The main causes of failure are secondary hemorrhage and bile leakage. Multi-disciplinary approach results in better outcome in cases of conservative management of liver trauma.

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