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Original Research Article

A Retrospective Evaluation of the Management Modalities and Outcome of Isolated Liver Injury in Blunt Abdominal Trauma: An Observational Study

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Abstract

Aim: The aim of the present study was to assess the management modalities of isolated liver injury in blunt abdominal trauma.

Methods: A retrospective study of 100 patients of isolated liver injury due to blunt abdominal injury conducted at the Department of General Surgery for the period of 2 years.

Results: In this series, the majority of the patients (45%) belonged to 21-30 years age group, followed by 11-20 (18%) and 31-40 years age group (15%). The majority of patients were male 88% whereas female patients were only 10%. MVA was responsible for 84% of blunt abdominal trauma cases, while fall from height accounted for 16% of cases. Majority of the patients presented with abdominal pain (100%) and abdominal tenderness (100%). There were 12 cases of chest injury. 15 cases of fracture of extremities were managed by the orthopedic surgery department. In present series, most of the liver injuries due to blunt trauma abdomen were minor type (grade I, II and III), they are (92%) of the total blunt liver injuries, major injuries (grade IV, V and VI were seen in (8%) cases of blunt liver trauma. In present series, in the present series, the majority of the blunt liver injuries were grade II (38%), 1 (26%) and III (22%) injuries followed by grade IV (15%) and V injury (2%) have the lowest incidence. In the present study, 95 (95%) patient discharge and 2 (4%) patient expired.

Conclusion: Isolated liver injury is common in the blunt abdominal trauma patient. Most of the patients with the liver injury with hemodynamically stable treated conservatively. Only a few of them require surgical management if they are hemodynamically unstable.

Keywords: liver injury, blunt abdominal trauma, management modalities

Introduction

The liver is a well-protected organ behind the rib cage, in spite of that protection liver is the second most common organ injured due to blunt abdominal injury. [1] The liver is one of the most frequently injured organs in abdominal trauma. [2,3] The anterior location in the abdominal cavity and fragile parenchyma with easily disrupted Glisson's capsule make this organ vulnerable to injury. Liver trauma occurs in ranges front 1% to 8% of patients hospitalized for trauma and in 8 to 10% of all patients with abdominal trauma. Blunt force is responsible for 70 to 80% of liver trauma. [4] Liver trauma can occur as a result of falls from a height, assault and sports injuries. [5] Rapid resuscitation is necessary to save the unstable but salvageable patient with liver trauma. During the last decades, there has been a change in treatment protocols for isolated liver injury. [5-7]

There is a paradigm shift in the management of liver trauma due to advancements of diagnostic and therapeutic modalities. Because of this shift towards non-operative management, there have been increased rates of complications, with a rise in morbidity rate to 7%. Delayed hemorrhage is the most common complication of non-operative treatment and generally occurs in the first 72 hours following the traumatic incident. [8]

Promising outcomes of non-operative management (NOM), have shifted the definitive treatment of these injuries from operative management (OM) to NOM. [9,10] Higher grade injuries to the liver can be conserved if the patient is hemodynamically stable. [11,12] NOM is based on the understanding that an injury which appears severe may not necessarily exsanguinate and haemostasis does occur naturally, at least in some cases. NOM is now possible because of multidetector computerised

tomography (CT) scan, intervention radiology and intensive care. monitoring along with a paradigm shift in the concept of haemostasis. [13] This has decreased the mortality and morbidity in patients with high-grade liver trauma. OM of liver injury is only considered for those who are hemodynamically unstable or if NOM fails. [11]

The aim of the present study was to assess the management modalities of isolated liver injury in blunt abdominal trauma.

Materials and Methods

A retrospective study of 100 patients of isolated liver injury due to blunt abdominal injury conducted at the Department of General Surgery, Netaji Subhas Medical College and Hospital, Bihta, Patna, Bihar, India for the period of 2 years. The medical record of the patients with isolated liver injury was extracted.

Inclusion criteria 100 patients aged between 18-60 years of both sex with isolated liver injury due to blunt abdominal trauma with or without associated injury.

Exclusion criteria

Those patients who had associated intra-abdominal injuries, penetrating injuries and head injury patient with GCS <13 were excluded in this study. Method of collection of data

Data were collected from the medical record section and entered into the proforma. All the patients were with isolated liver injury due to blunt abdominal injury included in the study all the relevant information extracted from the case paper noted in proforma. This includes demographic data, mechanism of injury, clinical examination and investigation laboratory as well radiological recorded. Postoperative follow up was done to not for complication.

All 100 patients were first attended by the emergency trauma center of our hospital, where vitals were recorded. Followed by the patient were resuscitated according to ATLS guidelines, following which the patients were subjected to radiological investigation with focused assessment sonography for trauma (FAST) in hemodynamically unstable patients and contrast enhanced computed tomography (CECT) abdomen in hemodynamically stable patients. All injuries were classified according to the American Association for the Surgery of Trauma (AAST).

Hemodynamically stability defined as systolic blood pressure (SBP) more than 90 mm of Hg after adequate resuscitation (1-2 litre of intravenous fluid within 1 hr). Criteria for NOM were hemodynamically stable patient with simple hepatic injury (grade I, II and III); absence of signs of peritonitis; no suspicion of other intraabdominal injuries on imaging studies. NOM includes monitoring of the patient in ICU or in wards; monitoring of vitals, urine output; intravenous fluids and intravenous antibiotics; serial hemoglobin and serial hematocrit measurement; review ultrasonography of the abdomen or CECT abdomen.

Failure of non-operative management and indication of surgery during observation includes hemodynamically unstable patient during the observation; major hepatic injuries with a hemodynamically unstable patient; signs of peritonitis; progressive expansion of hematoma or hemoperitoneum on radiological examination. Hemodynamically unstable patient at presentation and after resuscitation according to ATLS guidelines immediately shifted for Surgery.

Statistical analysis

After the completion of data collection, data entry was done into the Excel data file. Data analysis was done by Epi_info version 6.04 software.

Table 1: Liver injury scale (revision 1994) [14]

Grade	Injury description
I	Hematoma: Subcapsular <10% of surfacearea Laceration: Capsular tear, <1 cm depth
II	Hematoma: Subcapsular, 10-50% surfacearea intraparenchymal <10 cm Laceration: 1-3 cm parenchymal depth,<10cm length
III	Hematoma: Subcapsular >50% surface areaexpanding, ruptured subcapsular or parenchymal hematoma Laceration : >3 cm parenchymal depth
IV	Laceration: Parenchymal disruption involving 25%-75% of hepatic lobe or 1-3 couinaud's segments within a single lobe
V	Laceration: Parenchymal disruptioninvolving >75% of hepatic lobe or >3 couinaud's segments within a single lobe Vascular: Juxtahepatic venous injuries i.e. retrohepatic venacava or major hepatic veins
VI	Vascular: Hepatic avulsion

Results

Table 1: Age and gender distribution

Age group (in years)	N	%
1-10	10	10
11-20	18	18
21-30	45	45
31-40	15	15
41-50	4	4
>50	8	8
Gender		
Male	90	90
Female	10	10

In this series, the majority of the patients (45%) belonged to 21-30 years age group, followed by 11-20 (18%) and 31-40 years age group (15%). The majority of patients were male 88% whereas female patients were only 10%.

Table 2: Mechanism of injury and Symptoms and signs

Mechanism of injury	N	%
MVA	84	84
Falls from a height	16	16
Symptoms and signs		
Abdominal pain	100	100
Abdominal tenderness	100	100
Abdominal guarding	22	22
Abdominal rigidity	0	0
Abdominal distension	42	42
Tachycardia (pulse >100/min)	52	52
Hypotension (SBP <90 mm of Hg)	11	11

MVA was responsible for 84% of blunt abdominal trauma cases, while fall from height accounted for 16% of cases. Majority of the patients presented with abdominal pain (100%) and abdominal tenderness (100%).

Table 3: Associated injuries

Associated injuries	N	%
Head injury	10	10
Chest injury	12	12
Extremity or pelvic injury	15	15
No associate injury	63	63

The common extra abdominal injuries were chest injuries including rib fractures, pneumothorax, and lung contusion, extremity fractures including pelvic fractures and head injuries including subarachnoid hemorrhage, extradural and subdural hematoma, brain contusion, depressed or non-depressed skull fractures of these associated injuries, there were 12 cases of chest injury. 15 cases of fracture of extremities were managed by the orthopedic surgery department.

Table 4: Assessment of grade of liver injury

Grade of liver injury	N	%
Minor injury (grade I, II and III)	92	92
Major injury (grade IV, V and VI)	8	8

In present series, most of the liver injuries due to blunt trauma abdomen were minor type (grade I, II and III), they are (92%) of the total blunt liver injuries, major injuries (grade IV, V and VI were seen in (8%) cases of blunt liver trauma.

Table 5: Liver injury scale and its relation with management modalities

Liver injury scale	Conservative management		Operative management	
	N	%	N	%
I	25	25	0	0
II	38	38	0	0
III	22	22	0	0
IV	15	15	0	0
V	0	0	2	2
VI	0	0	0	0

In present series, in the present series, the majority of the blunt liver injuries were grade II (38%), 1 (26%) and III (22%) injuries followed by grade IV (15%) and V injury (2%) have the lowest incidence. All patients with AAST grade I, II and III were successfully managed conservatively and only 2 (2%) patients of blunt liver trauma were managed by surgical intervention. That patient had grade V liver injury and associate head injury.

Table 6: Outcome

Outcome	N	%
Discharge	95	95
Expired	5	5

In the present study, 95 (95%) patient discharge and 2 (4%) patient expired.

Discussion

For blunt hepatic trauma (BHT), that attitude has been profoundly but gradually transformed beginning in the 1970's, moving toward avoidance of emergency laparotomy whenever possible. This approach has been supported by the contribution of contrast-enhanced CT. [15] This dogma was also upended by the concept of abbreviated laparotomy (damage control) where control of active liver bleeding is obtained by perihepatic packing(PHP); this practice has transformed the management of most severe BHT when hemodynamic instability imposes the need for an emergency surgical response. [16-18]

A 2008 study by Tinkoff et al [19] showed that 86.3% of hepatic injuries are now managed without operative intervention. These issues were first addressed by the Eastern Association for the Surgery of Trauma (EAST) in the Practice Management Guidelines for Non-operative Management of Blunt Injury to the Liver and Spleen published online in 2003. [20] In this series, the majority of the patients (45%) belonged to 21-30 years age group, followed by 11-20 (18%) and 31-40 years age group (15%). The majority of patients were male 88% whereas female patients were only 10%. In the study Bernardo et al [21] (n=143) majority (83.6%) of patients were males. Typically, biliary complications present in a more delayed fashion for patients with high-grade injuries. [22] Biliary duct disruptions with associated bilomas, bile peritonitis, biliary leaks, and biliary sepsis occur in approximately 3.2% of all hepatic trauma patients and contribute significantly to the morbidity associated with hepatic injuries. [23] Biliary leaks are more common in higher-grade injuries, and most patients will develop clinical symptoms such as a systemic inflammatory response, sepsis, an elevation in serum bilirubin levels, or worsening abdominal pain. Hepatobiliary iminodiacetic acid scans have been shown to be nearly 100% sensitive and specific for diagnosing bile duct leaks after liver injury. [24]

MVA was responsible for 84% of blunt abdominal trauma cases, while fall from height accounted for 16% of cases. Vehicular accident was the commonest mode of injury in case of blunt trauma followed by fall from height Trauma mostly observed is contusion, which in its greatest proportion is caused by road traffic accidents and falls from height: the presence of signs of intoxication was not assessed, which would be related with traffic accidents. Similar results have been published in other studies Bernardo et al [21] and Croce et al [25] with most injuries due to road traffic accidents. Majority of the patients presented with abdominal pain (100%) and abdominal tenderness (100%). The common extra abdominal injuries were chest injuries including rib fractures, pneumothorax, and lung contusion, extremity fractures including pelvic fractures and head injuries including subarachnoid hemorrhage, extradural and subdural hematoma, brain contusion, depressed or non-depressed skull fractures of these associated injuries, there were 12 cases of chest injury. 15 cases of fracture of extremities were managed by the orthopedic surgery department. In present series, most of the liver injuries due to blunt trauma abdomen were minor type (grade I, II and III), they are (92%) of the total blunt liver injuries, major injuries (grade IV, V and VI were seen in (8%) cases of blunt liver trauma. Nonoperative management of hepatic injuries should only be considered for

patients who are hemodynamically stable and have an absence of peritoneal signs and in an environment that has the capability for monitoring, serial clinical evaluations, and facilities for urgent laparotomy. Nonoperative management of blunt hepatic injury consists of a period of in hospital/ ICU observation/monitoring, serial abdominal examinations, serial hematocrit measurements, and a period of immobility (bed rest/post discharge restricted activity). What remains unclear in the literature is the duration and frequency required of all of these interventions. [26] St Peter et al [27] showed that an abbreviated trauma protocol with overnight bed rest for Grades I and II injuries and two nights for higher-grades could be safely used for patients with blunt hepatic injuries.

In present series, in the present series, the majority of the blunt liver injuries were grade II (38%), 1 (26%) and III (22%) injuries followed by grade IV (15%) and V injury (2%) have the lowest incidence. All patients with AAST grade I, II and III were successfully managed conservatively and only 2 (2%) patients of blunt liver trauma were managed by surgical intervention. That patient had grade V liver injury and associate head injury. In the present study, 95 (95%) patient discharge and 2 (4%) patient expired.

Conclusion

Isolated liver injury is common in the blunt abdominal trauma patient. Most of the patients with the liver injury with hemodynamically stable treated conservatively. Only a few of them require surgical management if they are hemodynamically unstable. The most common cause for blunt liver injury is road traffic accidents for which FAST of abdomen is first valuable investigation but CECT is the investigation of choice because of its accuracy. A majority of all the patients with minor and major liver injuries can be managed conservatively and surgical exploration is required only in hemodynamically unstable patients with severe associated injuries.

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