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Original Research Article

Management Modalities of Isolated Liver Injury in Blunt Abdominal Trauma: A Comparative Study

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Abstract

Aim: The objective of the present study was to analyze the effectiveness and morbidity and mortality of both non-operative management as well as operative management of liver injury patients admitted to the hospital.

Methods: The present study was conducted in the Department of General Surgery, Fort U Mediemergency hospital, Patna, Bihar, India and 50 patients of isolated liver injury due to blunt abdominal injury were included.

Results: In this series, the majority of the patients (46%) belonged to 21-30 years age group, followed by 11-20 (20%) and 31-40 years age group (16%). The majority of patients were male 88% whereas female patients were only 12%. In present series, most of the liver injuries due to blunt trauma abdomen were minor type (grade I, II and III), they are (90%) of the total blunt liver injuries, major injuries (grade IV, V and VI were seen in (10%) cases of blunt liver trauma. In present series, in the present series, the majority of the blunt liver injuries were grade II (40%), 1 (26%) and III (20%) injuries followed by grade IV (12%) and V injury (2%) have the lowest incidence. All 43 (86%) patients with AAST grade I, II and III were successfully managed conservatively and only 1 (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, 48 (96%) patient discharge and 2 (4%) patients 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: Blunt abdominal trauma, Conservative management, Isolated liver injury

Introduction

The liver is the most frequently injured organ in blunt abdominal trauma [1], occurring in approximately 1-8% of cases. Roughly 85-90% of blunt hepatic traumas are treated with a non-operative approach. The published rate of successful non-operative management of patients with isolated blunt liver injury is 91.5% for grade I and II, 79% for grade III, 72.8% for grade IV, and 62.6% for grade V injuries. 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. [2]

Imaging is the cornerstone of assessment in hemodynamically stable blunt abdominal trauma patients and has greatly contributed to the shift from surgical treatment to non-operative management. [3] A focused assessment sonography for trauma (FAST) exam is typically performed during the secondary survey in the trauma bay, and computed tomography (CT) often immediately follows in a stable patient. FAST exam is indicated for blunt or penetrating trauma and undifferentiated shock and/or hypotension. [4] The technological advancement in the automobile industry has greatly contributed to the world, but sometimes priority given to speed over safety. Motor vehicle accident (MVA) is now ranked fourth in order among the leading cause of death in person less than 30 years of age. MVA is responsible for more deaths than all other illnesses put together. They are the commonest cause of non-penetrating abdominal trauma. [5]

Blunt liver injury is usually not evident and is often missed. 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 and many studies published.[6-9] Current practice of either non-operative management (NOM) usually depends on the liver injury scale. -10] Non-operative management of liver injury first reported in 1972 and is the cornerstone in the management of liver injury in last five decades. [11-12] Initially skeptical but now NOM is standard of care with aim of obtaining a reduction in morbidity and mortality. [13,14] Surgery is also limited to limited debridement, selective vascular ligation and perihepatic packing. [15,16]

India, where more than 70% of its population dwells in villages and where very few trauma care centers are available has one of the highest accident rates in the world. As abdominal injuries are mainly seen in young and economically productive individual it is essential to develop effective trauma care systems so that many innocent lives may be salvaged. 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.

The objective of the present study was to analyze the effectiveness and morbidity and mortality of both non-operative management as well as operative management of liver injury patients admitted to the hospital.

Materials and Methods

The present study was conducted in the Department of General Surgery, Fort U Mediemergency hospital, Patna, Bihar, India for one year and 50 patients of isolated liver injury due to blunt abdominal injury were included.

Inclusion criteria

Both sexes with isolated liver injury due to blunt abdominal trauma with or without associated injury were included

Exclusion criteria

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

Data were collected from the medical record section and entered into the proforma.

Methodology

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 50 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 focussed 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.

Results

Table 1: Age and gender distribution

Age group (in years)	N	%
1-10	4	8
11-20	10	20
21-30	23	46
31-40	8	16
41-50	2	4
>50	3	6
Gender		
Male	44	88
Female	6	12

In this series, the majority of the patients (46%) belonged to 21-30 years age group, followed by 11-20 (20%) and 31-40 years age group (16%). The majority of patients were male 88% whereas female patients were only 12%.

Table 2: Mechanism of injury and Symptoms and signs

Mechanism of injury	N	%
MVA	40	80
Falls from a height	10	20
Symptoms and signs		

Abdominal pain	50	100
Abdominal tenderness	50	100
Abdominal guarding 6 20	10	20
Abdominal rigidity	0	0
Abdominal distension	20	40
Tachycardia (pulse >100/min)	25	50
Hypotension (SBP <90 mm of Hg)	5	10

MVA was responsible for 80% of blunt abdominal trauma cases, while fall from height accounted for 20% of cases. Majority of the patients presented with abdominal pain (100%) and abdominal tenderness (100%).

Table 3: Associated injuries

Associated injuries	N	%
Head injury	6	12
Chest injury	7	14
Extremity or pelvic injury	8	16
No associate injury	29	58

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 7 cases of chest injury of which 1 case of rib fractures with considerable amount of hemopneumothorax which was managed by insertion water-sealed intercostal drainage tube. 8 cases of fracture of extremities were managed by the orthopedic surgery department. All case-patients with head injury were managed conservatively with neurosurgery consultation.

Table 4: Assessment of grade of liver injury

Grade of liver injury	N	%
Minor injury (grade I, II and III)	45	90
Major injury (grade IV, V and VI)	5	10

In present series, most of the liver injuries due to blunt trauma abdomen were minor type (grade I, II and III), they are (90%) of the total blunt liver injuries, major injuries (grade IV, V and VI were seen in (10%) 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	13	26	0	0
II	20	40	0	0
III	10	20	0	0
IV	6	12	0	0
V	0	0	1	2
VI	0	0	0	0

In present series, in the present series, the majority of the blunt liver injuries were grade II (40%), 1 (26%) and III (20%) injuries followed by grade IV (12%) and V injury (2%) have the lowest incidence. All 43 (86%) patients with AAST grade I, II

and III were successfully managed conservatively and only 1 (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	48	96
Expired	2	4

In the present study, 48 (96%) patient discharge and 2 (4%) patients expired.

Discussion

The predominant cause of blunt hepatic trauma is due to motor vehicle accidents. Signs and symptoms can vary, but hepatic injuries can present with right upper quadrant pain and peritoneal symptoms, which include rebound, rigidity, and voluntary guarding. Liver enzymes may be elevated secondary to injury or a pre-existing condition, such as alcoholism and fatty liver to name a few. [17] Management of hepatic injury has transitioned from surgical to non-operative, largely due to the efficiency and accuracy of imaging modalities. Patients who are hemodynamically unstable, have evidence of peritoneal signs, or are found to have a positive FAST exam undergo immediate laparotomy.

In the present study, 88% of patients were male whereas 12% of patients were female. In another study Bernardo et al (n=143) majority (83.6%) of patients were males. [18] 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 and Croce et al with most injuries due to road traffic accidents. [12,19] Vehicular accidents occur more frequently because every year there is increase in number of vehicles on road, poor maintenance of road, general public and drivers not following the rules and regulations, nonuse of seat belts, helmets, airbags in vehicles and lack of motivation and education in general-assault due to hit or by animal also is significant mode of trauma in rural parts of the country were run over or goring by a bullock is quite common.

Focused assessment with sonography for trauma (FAST) has become an initial screening tool and extension of physical examination in all patients with intraabdominal trauma. It has a sensitivity to detect intraabdominal fluid but it is relatively insensitive for parenchymal injuries and retroperitoneal hemorrhage. Several well-conducted prospective observational studies found this technique to be sensitive (79-100%) and specific (95.6-100%), particularly in hemodynamically compromised patients. [20,21] In this study minor liver injury (grade I. II and III) accounts for 86% of all patients while major liver injury (grade IV, V and V) accounts for 14%. This is comparable with other studies as demonstrated by Norman et al, Croce et al and Bernardo et.al. [18,19,22]

The surgical options for the management of blunt liver injuries depend on the type of injury to the subscapular, intrahepatic parenchymal injuries. Surgery includes a wide range of temporary and definitive surgical procedure. Direct suture ligation of the parenchymal bleeding vessel, perihepatic packing, hepatorrhaphy repair of venous injury under vascular isolation. The present study shows that conservative

management is feasible even for higher grade blunt liver injuries.

CECT abdomen is currently the standard of investigation modalities for the stable patient of isolated liver injury due to blunt abdominal injury. [23,24] Hoff et al reported the sensitivity of 92-97% and a specificity of 98.7% in diagnosing the liver injury. [25] Active extravasation of contrast media during CT scan of the abdomen is evidence of acute bleeding from either the parenchyma of the liver or from the major hepatic veins. Fang et al reported 75% of patients with hemodynamically unstable with contrast extravasation to require operative management. [26] In the present study, liver injury was diagnosed accurately by CECT of the abdomen in 100% of cases as compared to USG which had a positivity of 92% in diagnosing liver injuries.

Conclusion

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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