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Liver injuries in blunt abdominal trauma

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***Abstract*---**Background and Aim: Liver trauma can occur as a result of fall from height, vehicular accidents,bull gore injury, assault and in sports injuries . The present study was conducted to identify the etiology, modes of presentation, diagnostic modalities, and validity of grading systems and to analyze the different modalities of management and final outcome in patients of liver trauma due to blunt abdominal injuries. Materials & Methods: Over a 36-month period, 30 hemodynamically stable patients with blunt hepatic were evaluated prospectively. ISS was used to assess the extent of overall injury. Hepatic injuries were graded using AAST grading for solid organ injuries. Frequent measurement of vitals and estimation of hemoglobin and hematocrit was done. Results: Patients with AAST grade IV splenic injury, massive hemoperitoneum and increased transfusion requirements were associated with a higher risk of failing conservative management. Initial pulse rate, systolic blood pressure, ISS and hemoglobin did not appear to influence the outcome of the study. There were no deaths reported in the study. Conclusion: On the basis of the present investigation, it can be concluded that conservative management of blunt splenic and/or hepatic injury is safe and effective in a carefully chosen set of patients. Contrast enhanced CT scan of the abdomen is the imaging modality of choice in the work-up of these patients. The presence of massive hemoperitoneum, AAST grade IV splenic injury on CT was associated

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with a higher risk of NOM failure. The initial pulse, systolic blood pressure, hemoglobin, ISS did not impact the outcome of the study.

***Keywords*---**blunt trauma, liver damage, road traffic accident, injury severity score.

Introduction

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 accidents rate in the world. As abdominal injuries are mainly seen in young and economically productive individuals, it is essential to develop effective trauma care systems so that many innocent lives may be salvaged.[1, 2] Abdominal trauma results in injuries to vital visceral organs such as the liver, spleen, small bowel, kidneys, bladder, colon, diaphragm and pancreas. Blunt force is responsible for 70 to 80% of liver trauma[3].

Liver trauma can occur as a result of fall from height, vehicular accidents,bull gore injury, assault and in sports injuries[4]. 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. Accurate diagnosis and avoidance of needless surgery is an important goal of evaluation of these patients.[5]

Most avoidable deaths result from failure to resuscitate and operate on surgically correctable associated injuries especially to head, thorax and extremities. New techniques and diagnostic tools available are important in the management of blunt liver trauma. These improved methods, however, still depend on experience and clinical judgment for application and determination of the best care for the injured patient. The knowledge in the management of blunt liver injury is progressively increasing due to the in-patient data gathered from different parts of the world.[6]

The present study was conducted to identify the etiology, modes of presentation, diagnostic modalities, and validity of grading systems and to analyze the different modalities of management and final outcome in patients of liver trauma due to blunt abdominal injuries.

Materials and Methods

A Observational Cross Sectional Combined Retrospective and Prospective study of 30 patients of Liver injuries in Blunt abdominal trauma was conducted in the Department of General Surgery at General Hospital & Medical College; during January 2009 to November 2014. Prior approval for the study was obtained from the Scientific and Ethical Review Committee of Medical College and General Hospital.

Inclusion Criteria

All patients with liver injury in blunt abdominal trauma diagnosed by Ultrasonography or CT scan irrespective of age and sex.

Exclusion Criteria

Patients with liver injury due to penetrating injuries of abdomen.

Methods of Collection of Data

Data were collected from the patients by entering in a specially prepared proforma. This included the demographic data including age, sex and mode and time of accident leading to the injury, detailed clinical history, clinical examination and investigations: laboratory and radiological of all patients of Blunt liver trauma who were admitted. Post operative follow up was done to note for complications.

- After initial resuscitation of the blunt abdominal trauma all patients were admitted in SSG hospital.
- History was taken regarding time of injury, Mode of injury and Mechanism of injury, Position of patient at the time of injury, Direction of impact (Front, Back, Laterally, Oblique).
- Detailed history of abdominal pain, abdominal distension, nausea, vomiting, unconsciousness, hemetemesis, breathlessness, fever and associated injury were noted.
- History of Diabetes Mellitus, hypertension, ischemic heart disease, jaundice, Tuberculosis or any surgery in past were noted.
- In female - Menstrual history, Obstetric history were noted.
- Personal history regarding appetite, bladder and bowel frequencies and addiction were also noted.
- In General examination, level of consciousness, temperature, pulse, respiratory rate, and blood pressure were recorded. Pallor and cyanosis were noted.
- In local examination site of injury, number of wounds, Abrasion/Bruise/Haematoma and active bleeding as well as associated injuries like head injury, chest injury, fracture limbs/spine/pelvis were noted.
- In local examination abdomen was inspected for distension and any external mark of injury; palpated for any tenderness, guarding or rigidity; auscultated for bowel sound.
- In systemic examination, Respiratory system, cardiovascular and central nervous system examination were noted.
- Patients were investigated in the form of:
  - Complete blood count
  - Blood urea, S. creatinine, Random Blood Sugar
  - Blood grouping and cross matching.
  - Then Ultrasonography of abdomen and chest and X-ray abdomen standing were done.

- If vital signs of patient were found stable other related radiological investigations were done according to site of injury, CT scanning was done for patients with definite clinical or sonographic evidence of blunt abdominal injury.
- All injuries were graded as per AAST (American Association for the Surgery of Trauma) Grade of Injury in Blunt Liver Trauma
- All the patients showing evidences of liver injury on either USG or CECT were included in the study and followed up to discharge from hospital.

Results

Blunt abdominal trauma is most commonly observed in the young. It can be attributed to the increased incidence of RTAs in this group. There were no patients in the study who were older than 70 years. Patients who were older than 55 years accounted for 9% of the study population. Historically, RTAs and hence blunt abdominal injuries have been more common in males. The same trends were observed in the present study. With 22 of the 30 [90.5%] of all patients, men were diagnosed with blunt liver; 3 times more commonly than women. There was no significant statistical correlation between the sex of the patient and the outcome.

Road traffic accident was the most common mode of injury in our study reflecting the trends observed in many other studies. They accounted for almost 86% of all patients with blunt abdominal trauma. There are multitudes of reasons for the occurrences of RTA. Driving under the influence of alcohol, not following traffic rules are the most important. Fall from height was the second most common mechanism of injury. This is more commonly seen in construction workers. In our study, almost 49% of patients had an initial systolic BP of 100 - 109 mm Hg. However, many patients who had long bone fractures, hemo/pneumothorax, head injury also presented with a low systolic BP. Hence, systolic blood pressure at presentation does not reflect on the outcome of NOM. As with pulse rate, associated extra-abdominal injuries tend to act as confounding factors.

It is highly necessary to diagnose other extra-abdominal injuries in a poly trauma patient. In our study, 36% of patients had isolated liver injuries. About 20% of patients had associated thoracic injury in the form of rib fractures, hemo or pneumothorax. Head injury was present in about 7% of patients. Pelvic or long bone fractures were present in about 32% of patients. Injury Severity Score [ISS] is used to clinically divide patients on their injury severity. Higher the score, higher is the injury severity. In our study, the most commonly observed scores were less than 20. A total of 10 patients had an ISS of more than 40. There were no patients with ISS > 61.

All blunt hepatic injuries that presented to our institutes during the study period were successfully managed. In our study, Grade 2 was the most common, accounting for 45% of hepatic injuries and 9% of all blunt abdominal trauma patients. There were no patients with injury severity of greater than grade 4. There was no significant correlation between the grade of the injury and the outcome. But this may be because of small sample size of the current study and requires further evaluation.

Table 1: The Injury Severity Score

Score	No. of patients
0 – 20	18
21 – 40	2
41 – 60	10
> 61	0

Table 2: AAST grading of hepatic injury

ASST Grade	Patients
Nil	0
Grade 1	4
Grade 2	22
Grade 3	4
Grade 4	2
Grade 5	0
Grade 6	0

Discussion

Trauma, as already explained earlier, is the most common cause of death and disability during the first four decades of life. Road traffic accident, which is the most common cause of blunt abdominal trauma, is also most common in the first four decades of life.[7] Most published studies dealing with blunt abdominal solid organ injury quote a mean age of <40 years. In our study, the mean age was 31 years. Almost 72% of all our patients were aged <40 years. There were 3 patients who were older than 55 years.

As with other studies road traffic accident was, by far, the most common mechanism of injury, accounting for almost 80% of all patients. Assault with a blunt weapon was the second most common mode of injury overall [14.3%] but was the most common cause among women [50%]. Fall from height was the third most common mode of injury. These findings are in line with most other studies dealing with blunt abdominal trauma. There were no significant differences between the two groups in terms of mode of injury. Also, mode of injury did not seem to affect the outcome of the study.

Unless very severe, most blunt abdominal injuries are not immediately life threatening. The trauma surgeon has to do a primary survey to rule out immediately life-threatening causes. Amongst the commonly associated injuries, other extra abdominal injuries including skin and soft tissue injury was the most common, present in more than half of all patients. The study conducted by Velmahos et al[8] ranked thoracic injury as most common. This however, is dependent on the mechanism and severity of trauma and is bound to vary from study to study. In our study, 21% patients had pelvic or extremity fractures and only 7% patients had associated head injury. Patients with other intra-abdominal injuries were excluded from the study.

Injury Severity Score [ISS] is a very commonly used trauma score which is helpful assessing the overall damage to the body. In our study, NOM failure group had significantly higher ISS scores compared to NOM success group.[9, 10] This may have been due to severity of overall trauma which increases the risk of other associated injuries. In the study published by Fernandes et al, the difference between the groups is less marked. Raza et al also reported a similar pattern. This needs further study with a larger sample size.

Because this is a study within a stipulated time, the sample size was not ample enough. The efficacy of NOM of higher grade hepatic injury, a matter of much debate, could not be addressed. The NOM failure group was not sufficiently large enough to make definitive conclusions about the factors predicting the failure of NOM.

Conclusion

On the basis of the present investigation, it can be concluded that conservative management of blunt splenic and/or hepatic injury is safe and effective in a carefully chosen set of patients. Contrast enhanced CT scan of the abdomen is the imaging modality of choice in the work-up of these patients. The presence of massive hemoperitoneum, AAST grade IV splenic injury on CT was associated with a higher risk of NOM failure. The initial pulse, systolic blood pressure, hemoglobin, ISS did not impact the outcome of the study.

Conflict of Interest: none
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