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A Two Year Study of Liver Trauma and its Management and Outcome in Karad

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Abstract: ***Introduction: Liver being the largest solid intra-abdominal organ is one of the most frequently involved in blunt, as well as penetrating abdominal trauma. Blunt hepatic injuries significantly outnumber penetrating injuries. Objective: To determine the incidence of liver injury in all patients with abdominal trauma and whether they were managed conservatively or required operative management and outcome of management. Material and Methods: This study was a two year, single centre, prospective observational study, conducted at Krishna institute of medical sciences and research centre, karad, with prior clearance from Medical Ethics Committee. All patients of trauma of any nature, requiring admission were admitted in the trauma unit. The patients presenting in the emergency department with abdominal or lower chest trauma were clinically assessed and investigated for hepatic injury. Results and Conclusions: The total number of patients with abdominal trauma admitted in Krishna medical college and hospital karad, during period of two years from July 2017 to July 2019, was 316. The total number of patients detected to have traumatic liver injury was 50 (15.82%).The total number of patients with hepatic injury requiring operative management within 48 hours of admission was thirty (60%). Whereas the remaining of 20 patients (40%) were treated with conservative management.***

Keywords: blunt trauma abdomen, hemoperitoneum, shock.

1. Introduction

With the turn of 21st century there has been ever increasing demand for urbanization and industrialization. This coupled with rising population and traffic has led to proportional increase in trauma. Since trauma mainly involves the adults and young adults there is loss of productive population, and this has adverse economic and social outcome. Majority deaths occur in the pre-hospital phase(approx. 50%) and early hours of hospitalization(approx. 30%) and remaining percent of mortality occur in later period. With improved pre-hospital care and transport of trauma victims there is increasing number of patients reaching hospital setup early and hence early resuscitation and intervention is of paramount importance in improving the outcome of such patients.

Liver being the largest solid intra-abdominal organ is one of the most frequently involved in blunt, as well as penetrating abdominal trauma. Blunt hepatic injuries significantly outnumber penetrating injuries. Uncontrolled hemorrhage resulting in rapid exsanguination is the most important cause of death in such patients. Mortality is also related to associated injuries, which are more frequently seen after blunt trauma than penetrating trauma, however in high grade liver injuries mortality is related to the injury itself, regardless of the mechanism.

In a study conducted in Mumbai, during the period from Jan 1986 to Dec 1988, mortality from liver trauma was 36.2% (38/105). A similar study in Lahore the mortality was 18%. Over the last several decades, non-operative management of blunt hepatic injuries has been demonstrated, in selective patients, to be both safe and highly successful. Many studies have confirmed that 80% to 90% of all blunt liver injuries may be managed without laparotomy. However, early surgical intervention in hemodynamically unstable patients is lifesaving.

2. Aims and Objectives

1) To determine the incidence of liver injury in all patients with abdominal trauma and grade of injury sustained.
2) To evaluate the incidence patients that required operative intervention and the types of surgery performed on them.
3) To determine incidence of patients with liver trauma who were managed conservatively.
4) To compare the outcome of the patients with liver trauma managed non-operatively versus those managed with operative intervention.

3. Materials and Methods

Ethical Statement: The Study made the standards outlining the declaration of Helsinki and Good Epidemiological practices. This study did not change or modify the laboratory of clinical practices of each centre and differences of practices were kept as they are. The data collection was anonymous and identifiable patient information was not submitted. Individual researchers were responsible for complying with local ethical standards and hospital registration of study.

This study was a two year, single centre, prospective observational study, conducted at Krishna institute of medical sciences and research centre, karad, with prior clearance from Medical Ethics Committee. All patients of trauma of any nature, requiring admission were admitted in the trauma unit. The patients presenting in the emergency department with abdominal or lower chest trauma were clinically assessed and investigated for hepatic injury.

Inclusion Criteria

1) All patients with abdominal trauma, blunt or penetrating; diagnosed to have liver injury on radiological imaging (i.e. CECT)

2) All patients with abdominal trauma, of any nature, undergoing immediate laparotomy and detected to have liver injury intra operatively.

Exclusion Criteria:

Patients with liver trauma, who had cardio-respiratory arrest at casualty and expired before initiating the appropriate treatment, were not included in the study.

All the patients with abdominal trauma were evaluated with on-going resuscitation, as per ATLS guidelines. Primary survey was conducted after securing airway, breathing and circulation. Intravenous access was secured and blood sample collected for grouping, cross-matching and preliminary laboratory investigation. If shock was present, aggressive resuscitation with intravenous fluid and blood was given. Patients were then assessed for other injuries(head, chest, limb and spine) and neurological impairement. Preliminary chest X-rays were taken to rule out associated life threatening thoracic injuries. Urgent sonographic evaluation conducted by senior radiologist and when feasible contrast enhanced CT-scan was done for evaluation of intra-abdominal injury. Abdominal paracentesis performed when indictaed especially in hemodynamically unstable patients.

Stable patients with blunt abdominal trauma and low grade hepatic trauma were managed non-operatively. Patients were monitored with pulse-oximetry, non invasive BP measurement and ECG. Foleys catheterization was required in unstable patients to monitor urine output. Serial evaluation of abdomen and hemodynamic status was done by the surgical team. Intensive intravenous fluid resuscitation was given. Blood transfusions were given as per hemoglobin and hematocrit. Patients with clinical deterioration or worsening hemodynamics were considered for exploratory laparotomy.

The indication of immediate operative intervention in patients with abdominal trauma was as follows:

1) Presence of shock which does not respond to 3 litres of fluid therapy and evidence of hemoperitoneum (on imaging i.e. USG/CECT; or positive abdominal parcentesis)
2) Presence of unequivocal peritoneal signs on abdominal examination.
3) Evidence of associated injuring requiring laparotomy.
4) All patients with penetrating abdominal trauma.

Laparotomy was performed under general anaesthesia. Patients were prepared from the chest to mid-thigh. Midline vertical incision was taken and extended if required uptoxiphisternum or pubic symphysis. Right T extension was done in one patient for right posterior liver laceration. Blood and blood clots evacuated from the abdominal cavity and through examination done in a systematic manner for evidence of injury.

The liver was evaluated for the nature and grade of injury as per American Association for the Surgery of Trauma Organ Scaling Committee. Grade I and II liver injuries with no active bleeding were managed with topical hemostatic agent and drainage. All devitalized liver tissue in high grade liver injuries was debrided, hemostasis achieved with ligatures, electro-thermal cautery and topical hemostatic agents. Suturing was done in grade II or III, using 2-0 polyglactin(vicryl) and cellulose(surgical). Packing was required in high grade liver injury with uncontrolled bleeding especially in patients with high risk for prolonged surgery. Surgical laparotomy pads were placed in perihepatic region to bring about hemostasis. These patients were re-explored after 48 hours for pack removal and reassessment. Left lobectomy was performed in one case of grade V liver trauma with shattered left lobe.

All patients postoperatively were managed in trauma ward or in the ICU, depending on the need for ventilatory support and hemodynamic instability. Patients were evaluated with follow up ultrasonography/CT scan. After discharge patients were followed at outpatient level.

Data was collected, compiled and analysed for the variable parameters. The significance of association for qualitative parameters was measured using chi square test; and for quantitative parameters, using t-test. The p value was calculated and considered significant if <0,05.

4. Observations

The total number of patients with abdominal trauma admitted in Krishna medical college and hospital karad, during period of two years from July 2017 to July 2019, was 316. The total number of patients detected to have traumatic liver injury was 50 (15.82%). The following are the observations made in this study.

Table 1: The age distribution of patients with traumatic liver injury

Age (years)	No. of cases	Percentage
<10	1	2%
10-20	9	18%
20-30	13	26%
30-40	14	28%
40-50	10	20%
50-60	2	4%
>60	1	2%

Table 2: The sex distribution in patients with liver trauma

Sex	No. of cases	Percentage
Male	45	90%
Female	5	10%

Table 3: The type of abdominal injury sustained

Type of injury	No. of cases	Percentage
Blunt	46	92%
Penetrating	4	8%

Table 4: Mechanism of abdominal trauma sustained:

Mechanism of injury	No. of cases	Percentage
Motor vehicular accident	36	72%
Fall	8	16%
Stab	2	4%
Assault	2	4%

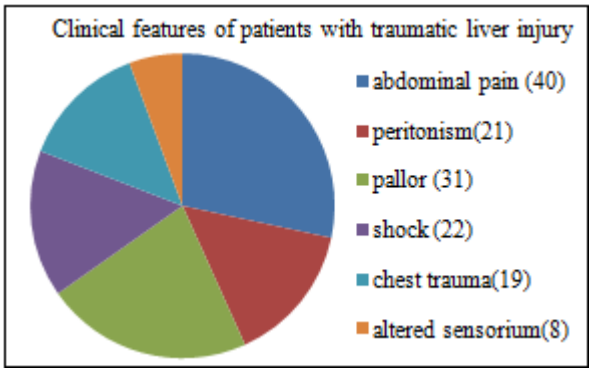

Table 5: The patient distribution as per grades of liver injury

Grade of liver injury	No. of cases	Percentage
I	9	18%
II	17	34%
III	14	28%
IV	8	16%
V	2	4%
VI	0	0%

Table 6: Type of immediate management of patients with liver trauma

Type of management	No. of cases	Percentage
Non operative management	20	40%
Operative	30	60%

Table 7: The indications for surgical intervention in operated patients

Indication for surgery	No. of cases	Percentage
Exploratory	3	10%
Shock with hemoperitoneum	6	20%
Liver laceration +/- shock	13	43.33%
Splenic laceration +/- shock	2	6.67%
Pancreatic laceration	1	3.33%
Bowel perforation	4	13.33%
Diaphragmatic tear	1	3.33%

Table 8: Non operative and operative management as per grade of liver injury

Grade of liver injury	Non operative management	Operative management
I	7(77.8%)	2(22.2%)
II	9 (52.9%)	8(47.1%)
III	4(28.6%)	10(71.4%)
IV	0	8 (100%)
V	0	2(100%)

Table 9: Operative intervention to achieve local hemostasis :Table 9

Operative intervention	Grade of liver injury				
	I	II	III	IV	V
None/ drainage only	1	3	0	0	0
Topical agents only	1	3	1	0	0
Debridement / suturing	0	1	2	3	0
Omentoplasty	0	1	1	0	0
Perihepatic packing	0	0	6	2	0
Debridement / suturing & packing	0	0	0	3	1
Lobectomy	0	0	0	0	1

Table 10: Liver related complications

Liver related complications	No. of cases	Operative group	Non-operative group
Rebleeding/ failure of NOM	2(4%)	2	0
Biloma	3(6%)	2	1
Sub phrenic collection	2(4%)	1	1
Liver abscess	0	-	-
Biliary leak/fistula	0	-	-
Total	7 (14%)	5(16.67%)	2(10%)

Table 11: The elevation of hepatic enzymes (SGOT/SGPT) : Table 11

Grade of liver injury	Percentage
Grade I	45.5%
Grade II	64.7%
Grade III	94.1%
Grade IV	100%
Grade V	100%

Table 12: The relationship of mortality to the nature of trauma : Table 12

Nature of trauma	No. of cases	No. of deaths	Percentage
Blunt	46	7	15.21%
Penetrating	4	0	-

Table 13: The relationship of mortality and clinical presentation

Presentation	No. of cases	No. of deaths	Percentage
Shock	22	6	27.27%
Stable vitals	28	1	3.57%

Table 14: The relationship of mortality to the type of immediate management

Management	No. of cases	No. of deaths	Percentage
Operative	30	6	20%
Non- operative	20	1*	5%

*One death in non-operative group was on account of sepsis, following necrotizing pancreatitis secondary to pancreatic injury.

5. Conclusion

This was a 2 year study of liver trauma and its management and outcome in Karad and was undertaken and completed in Krishna institute of medical science and hospital, Karad. The following conclusion was made from this study,

1) The total number of patients with abdominal injury was 316 out of these a total of 50 patients were detected to have liver injury. The the incidence of liver trauma in the study of population was 15.82%.
2) The total number of patients with hepatic injury requiring operative management within 48 hours of admission was thirty (60%). Whereas the remaining of 20 patients (40%) were treated with conservative management.
3) The most common surgical intervention was perihepatic packing and re-exploration after 48 hours with pack removal, which was performed in 12 patients (40%). Other techniques applied were debridement with hemostatic suturing in 6 patients (20%), omentoplasty in 2 patients (6.7%), and lobectomy in one patient (3.33%). Four patients (13.3%) on laparotomy, who had liver injury, did not require surgical intervention & topical agents were used in 5 patients (16.7%).

4) Shock at presentation was significantly associated with operative intervention than non-operative treatment (p-0.0052).
5) The rate of operative intervention was higher in patients with high grade injuries i.e., more than or equal to grade III, than that of conservative management (p-0.0012).
6) There was no statistically significant difference in the complication rates (p-01475) or hospital stay (p-0.1852) in two groups.
7) The need for blood transfusion was significantly higher in the operative group (p-0.0076) than in non-operative group.
8) Patients with low grade (I,II& III) liver injury had a mortality rate of 7.5%. however, patients with high grade (IV & V) liver injury had a high mortality of 40%.
9) Mortality directly related to traumatic liver injury was 6%

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