ABSTRACT

Aim: To determine the frequency and grades of liver and spleen injuries on exploratory laparotomy following blunt abdominal trauma.

Study design: Cross sectional study

Duration & place of study: Dept. of Surgery, B V Hospital, Bahawalpur from Dec. 2013 to June 2014.

Methods: Total 183 patients with blunt trauma was included in this study. Findings of each case upon exploratory laparotomy were entered on a pre-designed proforma.

Results: This study consisted of 183 cases of blunt abdominal trauma with mean age as 31.05±9.25 years. Out of 183 patients, 136(74.3%) were male and 47(25.7%) were female. Liver and spleen injuries were found in 96(52.5%) patients and 121(66.1%) patients respectively. Out of 96 patients with liver injuries, grades of liver injury were as grade I in 38 (20.8%), grade II 29(15.8%), grade III 24(13.1%), grade IV 3(1.6%) and grade V 2(1.1%) patients. Out of 121 patients with spleen injuries, grade I in 40(21.9%), grade II in 24(13.1%), grade III in 27(14.8%), grade IV in 24(13.1%) and grade V in 6 (3.3%) patients.

Conclusion: In cases with abdominal injury, most common type of trauma was blunt trauma. Male are more victims as compare to female and younger age group was the most affected age group. Among the cases of blunt trauma, the common injured organ was spleen as compare to liver and most of the cases was with grad I and grade III spleen injury.

Keywords: Blunt abdominal trauma; focused assessment with sonography for trauma;.

INTRODUCTION

Trauma is defined as injury to the body by interchange with energy of environment that is beyond body's resilience. Trauma deaths continue to burden society regardless of the progress in strategies to affect a decrease. All over the world trauma is a main reason for morbidity of the patients and is responsible for 10% mortality specially in people under the age of 50 years. Injury is responsible for 14% of all the disability-adjusted life years (DALY’s), especially due to the population of trauma comprise of young people without any pre-existing morbidity, making the trauma as valuable source of costs related to health.

Abdomen is among the commonly injured regions of the body due to large surface area. The spleen and liver were the most frequent organs involved in cases of blunt abdominal trauma with haemoperitoneum, especially in 2nd & 3rd decades of life. Liver injuries were found in 47.9% and spleen injuries in 61.7% patients of blunt abdominal trauma undergoing laparotomy. Among the injuries of liver mostly were grade I as 42.8% followed by grade II as 28.35% and grade III as 22.85%. Grade I splenic injuries were found in 31.34% patients followed by grade II in 19.40%, grade III in 23.88%, grade IV in 20.90% and grade V in 4.48% patients. Mortality after blunt liver and splenic injury was high (12%)3.

The liver is the largest solid abdominal organ in the body, weighing approximately 1500 grams. It sits in the upper right abdominal cavity below the diaphragm, shielded by the rib cage. The majority of injuries to the liver occur as a result of blunt injury. As liver is solid, compressive forces can easily burst its substance when compressed between the force and the rib cage or vertebral column.

Spleen is present in the left hypochondrium of abdomen between stomach and the diaphragm under the lower ribs with its long axis with the 10th rib. Splenic injury occurs from direct blunt trauma; the spleen is often injured by direct energy applied to the overlying ribs (9th to 11th ribs). Injury of liver is the common most intra-abdominal solid organ injury correlated with rib fracture (40%), followed by spleen injury (23%). The number of intra-abdominal solid organ injuries needs emergency operations is markedly higher in cases with fractures of more than 6 rib, reaching up to 51%.

In our surgical unit, trauma constitutes one of the most common reasons for emergency hospital admission. Due to mechanization leading to increase in number of road side accidents caused by 2-
wheelers on roads, the figure of victims of blunt trauma abdomen has increased in our setup. Most of the locally published literature regarding blunt trauma abdomen consists of retrospective studies which contain small and inadequate sample sizes. Therefore, a cross-sectional study with adequate sample size is proposed to determine the frequency and grading of liver & spleen following blunt trauma abdomen presenting to a tertiary care hospital.

MATERIAL AND METHODS

This cross-sectional study was conducted at the Department of Surgery Bahawal Victoria Hospital, Bahawalpur from December 2013 to June 2014. Permission was taken from institutional review committee and an informed written consent was taken from every patient. Total 183 patients age range from 16 years to 50 years, both male or female presenting with history of blunt trauma abdomen with hemodynamic instability (Pulse >100 beats/min, SBP <90mmHg) and/or intra-abdominal hemorrhage (seen on abdominal sonography) and undergoing exploratory laparotomy were included in this study.

Patients managed non-operatively. Patients suffering any kind of penetrating abdominal injury, natural disaster injuries and stampede injuries and moribund patients who are ASA-4 and above were excluded from the study. Findings of each case upon exploratory laparotomy were entered on a pre-designed proforma attached to the patient's file during the operative procedure. Case sheets of the admitted patients were screened for various variables such as age and gender of the patients and operative findings. Injuries involving liver and spleen were noted on that proforma. Liver and spleen injuries were labeled when on exploratory laparotomy bleeding, hematoma or wound is seen on the surface of liver or spleen. It was further graded according to classification devised by Organ Injury Scaling Committee of the American Association for the Surgery of Trauma.

All the data were entered in SPSS version 16 and analyzed. Mean and standard deviations were calculated for quantitative variables and frequencies and percentages were calculated for categorical data. Effect modifiers were controlled by stratification of data with reference to age and gender. Chi-square test was applied to see the effect of these on outcome variables. P-value ≤0.05 was taken as significant.

RESULTS

Total 183 cases fulfilling the inclusion/exclusion criteria were enrolled to study the frequency and grades of liver and spleen injuries on exploratory laparotomy following blunt abdominal trauma. Mean age of the patients was 31.05±9.25 years. Gender distribution of the patients was done which showed that 136(74.3%) were male and 47(25.7%) were female. Age distribution of trauma patients was done. Age group 1(17-33 years) and age group 2 (34-49 years) were made. Age group 1 consisted on 113(61.7%) pts and age group 2 consisted on 70(38.7%) pts (Table 1).

Table 1: Frequencies for age and gender (n=183)

<table>
<thead>
<tr>
<th>Age group</th>
<th>n</th>
<th>Gender</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-33</td>
<td>113(61.7)</td>
<td>Male</td>
<td>136(74.3)</td>
</tr>
<tr>
<td>34-49</td>
<td>70(38.3)</td>
<td>Female</td>
<td>47(25.7)</td>
</tr>
</tbody>
</table>

Out of 183 patients of blunt trauma, liver and spleen injuries were found in 96(52.5%) and 121(66.1%) patients respectively (Table 2). Grading of liver injury was done, Grade-I injury was found in 38(20.8%) patients, Grade-II injury in 29(15.8%) pts, Grade-III injury 24(13.1%) pts Grade-IV injury in 3(1.6%) pts and Grade-V injury was found in 2(1.1%) patients.

Table 2: Frequency of injury of liver and spleen (n=183)

<table>
<thead>
<tr>
<th>Injury of organ</th>
<th>Liver injury</th>
<th>Spleen injury</th>
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<tbody>
<tr>
<td>Yes</td>
<td>96(52.5%)</td>
<td>121(66.1%)</td>
</tr>
<tr>
<td>No</td>
<td>87(47.5%)</td>
<td>62(33.9%)</td>
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</tbody>
</table>

Grading for spleen injury was also done and Grade-I spleen injury was found in 40(21.9%) patients, Grade-II injury in 24(13.1%) patients, Grade-III injury in 27(14.8%) patients, Grade-IV injury in 24(13.1%) patients and Grade-V injury was found in 6(3.3%) patients (Fig. 1 & 2).

Fig. 1: Grades of liver injury

Fig. 2
Stratification for gender was done for the patients with liver and spleen injury. Out of 136 (74.3%) male patients, liver injury was found in 73 (53.7%) patients and spleen was found in 93 (68.4%). Out of 47 (25.7%) female patients, liver injury was found in 23 (49%) patients and spleen injury was found in 28 (60%). Insignificant association of gender with organ injury (liver and spleen) was found. P value 0.61 and 0.28.

Stratification for age was done for patients with liver and spleen injury and two group was made age group 1 consisted on patients having age from 17-33 years and age group 2 consisted on patients having age from 34-49 years. In age group 1, there were 113 (61.7%) patients and liver and spleen injury was found in 61 (54%) patients and 76 (67.3%) patients respectively. In age group 2, there were 70 (50%) patients and liver injury was found in 35 (50%) patients spleen injury was found in 45 (64.3%). Insignificant association of age was found organ injury (liver and spleen) P value 0.64 and 0.74. (Table 4)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Liver injury</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No.</td>
</tr>
<tr>
<td>Male</td>
<td>73 (53.7%)</td>
<td>63 (46.3%)</td>
</tr>
<tr>
<td>Female</td>
<td>23 (49%)</td>
<td>24 (51%)</td>
</tr>
<tr>
<td>Total</td>
<td>96 (52.5%)</td>
<td>87 (47.5%)</td>
</tr>
<tr>
<td>P value</td>
<td>0.61</td>
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</table>

<table>
<thead>
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<th>Age group</th>
<th>Liver injury</th>
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</tr>
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<tbody>
<tr>
<td></td>
<td>Yes</td>
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</tr>
<tr>
<td>17-33 Years Age Group 1</td>
<td>61 (54%)</td>
<td>52 (46%)</td>
</tr>
<tr>
<td>34-49 Years Age Group 2</td>
<td>35 (50%)</td>
<td>35 (50%)</td>
</tr>
<tr>
<td>Total</td>
<td>96 (52.5%)</td>
<td>87 (47.5%)</td>
</tr>
<tr>
<td>P value</td>
<td>0.64</td>
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**DISCUSSION**

Blunt abdominal trauma is a well-known cause of mortality and morbidity in people of any age. Evaluating the intra-abdominal injury pathology is not a simple job as many of them remain concealed during initial period. Most of the time associated injuries particularly of limbs and head and neck potentially to be taken as first to look and attaining the treating physician or surgeon attention.

Blunt trauma secondary to motor vehicle accident, motor cycle accidents, falls, assaults and pedestrians struck remain the most frequent mechanisms of abdominal injury.

The clinical evaluation of abdomen by means of physical examination is inadequate to identify intra-abdominal injuries. So several diagnostic modalities evolved during the past three decades, including diagnostic peritoneal lavage, ultrasound, CT and laparoscopy all of them with advantages, disadvantages and limitations. Approximately 25% of all trauma victims will require an abdominal exploration.

In our study, male are more common (74.3%) victims of blunt trauma abdomen as compare to female, which correlates with the study of Gad MA et al. In our study, minimum age was 17 years and maximum age was 49 years. Maximum incidence was observed in the age group 1 (17-33 years) followed by age group 2 (34 to 49 years) of age. The mean age was 34.8 yrs. In the study by Frick EJ Jr et al, maximum incidence was observed in the age
group of 20-29 yrs. Another study by Mutti TS et al mean age of patients of blunt trauma was 27 years which is in contrast with this study.\(^7\)

In our study liver injuries was found in 52.5% patients which is comparable with the study by Mohamed AA et al which was reported liver injuries in blunt trauma as 47.9%.\(^8\) In one study by Memon et al reported liver injury in patients of blunt trauma as 53.12% which is in agreement with my study.\(^9\) In a study by Raza M et al, out of trauma patients liver injury was found in (13.2%), most of the patients (56.8%) had grade III liver injuries. These findings were not comparable with my study.\(^10\) In one study by Aman Z et al, the incidence of liver injury was 28.57% which is in contrast with this study.\(^11\)

In our study grades of liver injury were as grade I 32.7%, grade II 36.2%, grade III 25.6% and grade IV injury was 6.1%.\(^12\)

Our study showed liver blunt trauma was common 61.7% in age group 17-33 years. In one study by M Swarnkar et al, out of 826 patients of blunt abdomen trauma, Most of the injuries were seen in 11-40 year age group (64.06%). These findings were comparable with my study.\(^13\)

Although protected under the bony ribcage, the spleen remains amongst the vulnerable organ sustaining injury from amongst the abdominal trauma patients in all age groups. It is a friable and highly vascular organ holding 25% of the body's lymphoid tissue and has both haematological and immunological functions.\(^14\)

In our study blunt spleen injury was found in 66.1% patients. Raza M et al observed spleen injury in 29.8% patients.\(^15\) These findings were not comparable without study.

In other studies like Najfi et al and Ghazanfar et al, splenic injuries were 18.5% and 23% respectively.\(^16\)\(^17\) It is possible that their results differ from my study because their studies included less number of patients.

In present study grades of spleen injury were grade I 21.9%, grade II 13.1%, grade III 14.8, grade IV 13.8% and grade V 3.3%. In study of Renzulli P, grades of spleen injury were grade 1 in 20.9%, grade 2 in 25.2%, grade 3 in 29.1%, grade 4 in 20.4% and grade 5 in 4.4%.\(^18\) These results were not similar with my study due to many reasons. Most important one is the patient number and different age group of victims.

**CONCLUSIONS**

Blunt trauma was the commonest type of abdominal injury. Male are more victims as compare to female and younger age group was the most affected age group. Spleen was found to be the most common organ injured among patients with blunt trauma as compare to liver and most of splenic injuries were grade I and III.

**REFERENCES**


