

Study of Liver and Spleen Injuries in Cases of Blunt Abdominal Trauma

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ABSTRACT

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

Method: It was a cross sectional study and conducted at the Department of Surgery DHQ Hospital Sahiwal from December 2013 to June 2014. Total 150 cases of blunt abdominal trauma were included in this study. Findings of each case upon exploratory laparotomy were entered on a pre-designed proforma.

Results: Total 150 cases of blunt abdominal trauma were selected for this study. Mean age of the cases was 32.65±8.44 years. Male cases were 108(72%) and female cases were 42(28%). Liver and spleen were injured in 83(55.33%) and 102(68%) cases respectively. Liver injuries were significantly associated with age but spleen injuries were not significantly associated with age. There is also insignificant association of gender with liver and spleen injuries were found.

Conclusion: Results of this study reveals that males were more commonly victim of blunt abdominal trauma as compare to females. But insignificant difference between the male and female cases for frequency of spleen and liver injuries was detected. Results of this study also reveals that younger age group was more commonly affected by the blunt abdominal trauma as compare to older age group and it was also observed the liver injuries were significantly associated with age of the cases.

Keywords: Blunt abdominal trauma; laparotomy; rib; mortality, liver, spleen.

INTRODUCTION

Trauma is defined as injury to the body by interchange with energy of environment that is beyond body's resilience.¹ All over the world trauma is a main reason for morbidity and is responsible for 10% mortality in age of under 50 years.² 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 health².

Due to large surface area, abdomen is among the most commonly injured region of the body³. 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^{4,5}.

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^{6,7}. 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 column⁸.

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.⁹ Splenic injury occurs from direct blunt trauma; the spleen is often injured by direct energy applied to the overlying ribs (9th to 11th ribs)⁸.

Injury of liver is the common most intra-abdominal solid organ injury correlated with rib fracture (40%), followed by spleen injury (23%)⁸. The number of intra-abdominal solid organ injuries needs emergency operations is markedly higher in cases with fractures of more than 6 rib,¹⁰ reaching up to 51%¹¹.

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 number of victims of blunt abdominal trauma has increased in our setup. So a study is planned to determine the frequency and grading of liver & spleen injuries following blunt abdominal trauma presenting to a tertiary care hospital.

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MATERIAL AND METHOD

This cross sectional study was conducted at the Department of Surgery DHQ Hospital Sahiwal from December 2013 to June 2014. Permission was taken from institutional review committee and an informed written consent was taken from every patient. Total 150 cases with 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.

Cases managed non-operatively, cases suffering from 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. Exploratory laparotomy was performed in all cases and findings in term of liver and spleen injures and their grades were entered in pre-designed proforma. Liver and spleen injuries were labeled when on exploratory laparotomy bleeding, hematoma or wound is seen on the surface of liver or spleen. Grading of the liver and spleen injuries was done according to classification devised by Organ Injury Scaling Committee of the American Association for the Surgery of Trauma. Demographic profile of the cases was also noted.

All the collected was analyzed by using SPSS version Mean and SD was calculated for numerical data and categorical data was presented as frequencies and percentages.

RESULTS

Total 150 cases of blunt abdominal trauma were selected for this study. Mean age of the cases was 32.65±8.44 years. Out of 150 cases, liver injury was

noted in 83(55.33%) cases and spleen injury was noted in 102(68%) cases (Table 1).

Among the 83 cases of liver injury, Grade-I injury was noted in 30(36.14%) cases followed by Grade-II in 23(27.71%), Grade-III in 19(22.89%), Grade-IV in 8(9.64%) and Grade-V injury was noted in 3(3.62%) cases.

Out of 102 cases with spleen injury, Grade-I, Grade-II, Grade-III, Grade-IV and Grade-V injury was noted in 34(33.33%), 20(19.61%), 25(24.51%), 20 (19.61%) and 3(3.5%) cases. Male cases were 108(72%) and female cases were 42(28%). Liver and spleen injury was found in 65(60.19%) and 75(69.44%) male cases and 18(42.86%) and 27(64.29%) female cases respectively. Statistically insignificant (P=0.068, 0.563) association of gender with liver injury and spleen injury was noted (Table 2).

All the selected cases were divided into two age groups, age group 17-34 years and age group 35-50 years. Total 97(64.67%) cases belonged to age group 17-34 years and 53 (35.33%) cases belonged to age group 35-50 years. Liver was found in injured in 60 (61.86%) cases and 23(43.4%) cases in age group 17-34 years and 35-50 years. Spleen was found injured in 68(69.32%) cases and 34(66.13%) cases in age group 17-34 years and age group 35-50 years. Statistically significant (P=0.039) association of age with liver injury was noted but insignificant (P=0.469) association of age with spleen injury was noted (Table 3).

Table 1: Frequencies for injury of liver and spleen (n = 150)

Injury of organ	Liver injury	Spleen injury
Yes	83(55.33%)	102(68%)
No	67(44.67%)	48(32%)

Table 2: Association of Gender with liver and spleen injury

Gender	Liver injury		Total	Spleen injury		Total
	Yes	No		Yes	No	
Male	65(60.19%)	43(39.81%)	108(72%)	75(69.44%)	33(30.56%)	108(72%)
Female	18(42.86%)	24 (57.14%)	42(28%)	27(64.2%9)	15(35.71%)	42(28%)
Total	83(55.33%)	67(44.67%)	150	102 (68)	48(32%)	150
P value	0.068			0.563		

Table 3: Association of age with liver and spleen injury

Age grou0	Liver injury		Total	Spleen injury		Total
	Yes	No		Yes	No	
17-34 Years	60(61.86%)	37(38.14%)	97(64.67%)	68(69.32%)	29(30.68%)	97(64.67%)
35-50 Years	23(43.4%)	30(56.6%)	53(35.33%)	34(66.13%)	19(33.87%)	53 (35.33%)
Total	83(55.33%)	67(44.67%)	150	102(68%)	48(32%)	150
P. value	0.039			0.469		

DISCUSSION

Blunt abdominal trauma is a well-known cause of mortality and morbidity in people of any age¹². 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 attention¹³.

Blunt trauma secondary to motor vehicle accident, motor cycle accidents, falls, assaults and pedestrians struck remain the most frequent mechanisms of abdominal injury¹⁴.

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 exploration¹⁵.

In our study males were more commonly affected by blunt abdominal trauma as compare to females (72% vs 28%). Similar findings were reported by Gad et al¹⁶. In present study minimum age of the cases was 17 years and maximum age was 50 years and maximum incidence was observed in age group 17-34 years. Frick et al also found maximum cases of blunt abdominal trauma in age group of 20-29 years¹⁷. Mean age of the cases was 32.65±8.44 years which is in agreement with mean age (27 years) of the cases of blunt abdominal trauma reported in the study of Mufti et al¹⁸.

In our study 55.33% cases of blunt abdominal trauma found with liver injury which is comparable with studies of Mohamed et al⁵ and Memon et al¹⁹. They reported liver injuries in cases of blunt abdominal trauma as 47.9% and 53.12%. In a study by Raza et al, liver injury was found in 13.2% cases, most of the patients (58.8%) had grade III liver injuries. These findings were not comparable with our study²⁰. In another study by Aman et al, the incidence of liver injury was 28.57% which is also in contrast with this study²¹.

In our study out 83 cases of liver injury, Grade-I injury was noted in 30(36.14%) cases followed by Grade-II in 23(27.71%), Grade-III in 19(22.89%), Grade-IV in 8(9.64%) and Grade-V injury was noted in 3 (3.62%) cases. Similarly Saaiq et al reported grade-I liver injury in 32.7% cases, grade-II in 36.2% cases, grade-III in 25.6% cases and grade-IV injury was noted in 6.1% cases²².

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^{18,23}.

In our study, spleen injury was found in 68% cases. Raza et al²⁰, Najfi et al²⁴ and Ghazanfar et al²⁵ observed spleen injury in 29.8%, 18.5% and 23% cases. These findings were not comparable with findings of our study.

In present study, out of 102 cases with spleen injury, Grade-I, Grade-II, Grade-III, Grade-IV and Grade-V injury was noted in 34(33.33%), 20(19.61%), 25(24.51%), 20(19.61%) and 3(3.5%) cases. In one study of Renzulli et al, grades of spleen injury were grade-I in 20.9%, grade-II in 25.2%, grade-III in 29.1%, grade-IV in 20.4% and grade-V in 4.4%²⁶. These results were not similar with my study due to many reasons. Most important one is that the patient number and different age group of victims.

CONCLUSION

Results of this study reveals that males were more commonly victim of blunt abdominal trauma as compare to females. But insignificant difference between the male and female cases for frequency of spleen and liver injuries was detected. Results of this study also reveals that younger age group was more commonly affected by the blunt abdominal trauma as compare to older age group and liver injuries were significantly associated with age of the cases.

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