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Original Article

Autopsy Study of Pattern of Splenic Injuries

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ABSTRACT

The spleen is the most frequently injured organ in blunt abdominal trauma, and a missed splenic injury is the most common cause of preventable death in trauma patients. The purpose of this study was to investigate the prevalence of spleen injuries in non-surviving patients with abdominal trauma by evaluating the compiled autopsy study data. Abbreviated Injury Scale is used to determine the severity of splenic injuries. In the present study, 18.8% of victims belong to third decade and 29.7% of victims belong to fourth decade. Women were less involved than men with a ratio of 1:3.5. In our study, the vast majority of patients, 54 (84%), sustained blunt injuries and the remaining, 10 (16%), patients had penetrating injuries. Since the spleen is highly vascular and friable having immense immunological and haematological importance, timely diagnosis and management of splenic injuries goes a long way in improving the mortality and morbidity rates in trauma cases.

Keywords: Blunt and penetrating abdominal trauma, Splenic injuries

INTRODUCTION

rauma is the leading cause of morbidity and mortality in the world. Following the head and extremities, the abdomen is the third most commonly injured anatomic region. Abdominal trauma can be associated with significant morbidity and may have a mortality rate as high as 8.5%. Abdominal trauma is responsible for 10% of all trauma deaths. Motor-vehicle crashes and auto/pedestrian accidents are responsible for half to three quarters of blunt abdominal injury, while assaults and falls make up the majority of the remainder[1].

In blunt force abdominal trauma, the spleen and liver are the most commonly injured organs, with a mortality rate of roughly 8.5%. Almost two-thirds of injuries occur in males, with a peak incidence in patients between ages 14 and 30 years[2].

The spleen is the most frequently injured organ in blunt abdominal trauma, and a missed splenic injury is the most common cause of preventable death in trauma patients. It is a friable and highly vascular organ holding 25% of the body's lymphoid tissue and has both haematological and immunological functions. Globally, splenic injuries accounts for 25% of all solid abdominal organ injuries and the mortality rate associated with splenic trauma is reported to be between 7 and 18%[3,4,5,6].

Road traffic accidents (RTAs) are the commonest cause of blunt splenic injuries in civilian practice accounting for up to 80-90% in some studies and are especially common in teenagers and young adults[7,8].

Penetrating abdominal trauma has a slightly higher mortality rate, depending on the mechanism of injury. It ranges up to about 12%, and is responsible for more than a one-third of urban trauma centre admissions and 12% of rural trauma centre admissions. Gunshot and stab wounds combine to cause 95% of penetrating abdominal injuries. Penetrating abdominal injuries have a significantly

higher morbidity rate than blunt trauma, with the most serious morbidities arising from wound site infections and development of intra-abdominal abscesses[1].

AIMS AND OBJECTIVE

The purpose of this study was to investigate the prevalence of spleen injuries in non-surviving patients with abdominal trauma by evaluating the compiled autopsy study data.

MATERIALS AND METHODS

In this study, all the spleen injuries in abdominal trauma cases that were brought for post-mortem examination at mortuary of Adichunchanagiri Institute of Medical Sciences, Mandya District, Karnataka, India, between 1 January 2007 to 31 December 2011 have been studied. The ethical clearence and permission from institutional ethics committee and review board have been obtained.

Abbreviated Injury Scale is used to determine the severity of splenic injuries.

Grade	Injury description	
I	Haematoma	Subcapsular, <10% surface area
	Laceration	Capsular tear, <1 cm parenchymal depth
II	Haematoma	Subcapsular, 10-50% surface area intraparenchymal, <5 cm diameter
	Laceration	1-3 cm Parenchymal depth not involving a parenchymal vessel
III	Haematoma	Subcapsular, >50% surface area or expanding. Ruptured subcapsular or parenchymal haematoma. Intraparencymal haematoma >5 cm
	Laceration	>3 cm Parenchymal depth or involving trabecular vessels
IV	Laceration	Laceration of segmental or hilar vessels producing major devascularisation (>25% of spleen)
V	Laceration	Completely shattered spleen
	Vascular	Hilar vascular injury, which devascularised spleen

Advance one grade for multiple injuries to same organ up to Grade III.

RESULTS

In the present study, 18.8% of victims belong to third decade and 29.7% of victims belong to fourth decade. Women were less involved than men with a ratio of 1:3.5.

The victims in most of the cases sustained road traffic accidental injuries (48 cases; 75%) followed by fall from height (12 cases; 18.8%).

Table 1: Age and sex-wise distribution of cases

Age (years)	Male	Female	Total	
			No.	%
1-10	02	03	05	7.8
11-20	07	00	07	10.9
21-30	11	01	12	18.8
31-40	15	04	19	29.7
41-50	07	02	09	14.0
51-60	03	02	05	7.8
61-70	02	01	03	4.7
71-80	03	01	04	6.3
Total	**50**	**14**	**64**	**100**

Table 2: Cause-wise distribution of cases

Cause	Number	Percentage (%)
Blunt injury to abdomen		
RTA	**40**	**62.5**
Motorcyclists	22	34.3
Passengers	12	18.8
Pedestrian	06	9.4
Fall from height	**12**	**18.8**
Animal hit	**02**	**3.0**
Penetrating injury to abdomen		
RTA	**08**	**12.5**
Motorcyclists	06	9.4
Passengers	01	1.6
Pedestrian	01	1.6
Animal hit	**01**	**1.6**
Assault	**01**	**1.6**
Total	**64**	**100**

Table 3: Severity of splenic injuries

Grade	No. of cases	Percentage (%)
I	04	6.4
II	12	18.6
III	21	32.8
IV	24	37.5
V	03	4.7
Total	**64**	**100**

Maximum number of victims had grade IV splenic injuries (37.5%) followed by grade III (32.8%).

DISCUSSION

During the study period, a total of 64 patients with splenic injuries were studied. Most of the victims belong to third and fourth decades. Fifty (78%) patients were males and fourteen (22%) were females with a male to female ratio of 3.5:1.

In places where women's mobility is traditionally restricted, men may spend substantially more time in moving vehicles than women, and among all groups other than among the small economic elite, men are more likely to own cars than women. Men are also more likely to be employed as drivers and mechanics in cars and trucks, including drivers of long-haul vehicles, which may mean spending several days and nights in the vehicle. Males, therefore, have a higher exposure to the risk of traffic injuries. Among men aged 15-44 years, road traffic injuries are the leading cause of trauma-related deaths[9].

In our study, the vast majority of 54 (84%) patients sustained blunt injuries and the remaining 10 (16%) patients had penetrating injuries.

According to a study done in Scotland, 672 (1.3%) patients (530 males, 142 females) with splenic trauma were identified; of them, 579 (86.2%) had blunt trauma and 93 (13.8%) had penetrating trauma[10].

In our study, RTAs were the most common cause of injury accounting for 48 (75%) patients. A total of 48 (75%) of RTAs were related to motorcycle injuries affecting motorcyclists 28 (43%), passengers 13 (20 %) and pedestrian 7 (11%) cases. Other causes were fall from height, animal hit and assault in 12 (18.8 %), 3 (4.6 %) and 1 (1.6%) cases, respectively.

One review from the National Pediatric Trauma Registry by Cooper *et al*. reported that 8% of patients (total=25,301) had abdominal injuries. Eighty-three percent of those injuries were from blunt mechanisms. Automobile-related injuries accounted for 59% of those injuries. Similar reviews from adult trauma databases reflect that blunt trauma is the leading cause of intra-abdominal injury and that MVC is Motor vehicle crashes the leading mode of injury. Blunt injuries account for approximately two-thirds of all injuries[11].

In our study, isolated splenic injuries occurred in 34 (53%) patients, while 30 (47%) patients had multiple injuries. Splenic injuries were graded as follows. Four (6.2%) patients presented with grade I, twelve (18.8%) grade II, twenty-one (32.8%) grade III, twenty-four (37.5%) grade IV and three (4.7%) patients had grade V.

According to a five-year review of splenic injuries in the University of Benin Teaching Hospital, Benin City, Nigeria, done by Ohanaka *et al*., splenic injuries were graded in severity from grades one to five based on the organ injury scaling. Injuries in three (10%) cases were grade 1, five (17%) grade 2, seven (23%) grade 3, four (20%) grade 4 and nine (30%) grade 5[12].

According to a study done in Bugando Medical Centre in northwestern Tanzania**,** splenic injuries were graded as follows: 4 (3.4%) patients presented with grade I, 15 (12.7%) grade II, 46 (39.0%) grade III, 45 (38.1%) grade IV and 5 (4.2%) patients had grade V. The grade was not established in three (2.5%) patients. They observed that total number of cases in grade III and above was significantly higher than with lower grades of injuries (P=0.002)[13].

According to a study done in Turkey showed 71.28% of grade IV splenic injuries[14].

CONCLUSION

Trauma is the leading cause of mortality and morbidity around the world. Blunt force traumas to the abdomen are commonly caused by road traffic accidents, whereas penetrating abdominal traumas results predominantly from stab wounds and gunshot wounds. Spleen is the most frequently injured organ in blunt abdominal trauma and a missed splenic injury is the most common cause of preventable deaths from abdominal traumas. Since the spleen is highly vascular and friable having immense immunological and haematological importance, timely diagnosis and management of splenic injuries goes a long way in improving the mortality and morbidity rates in trauma cases. Since males, especially the mobile and the economically productive age group, are predominantly involved in high-velocity motor vehicle accidents leading to splenic injuries and death, it becomes all the more important on part of the government and citizens in general to work cohesively to prevent splenic injury-associated trauma deaths. Urgent measures targeting at reducing the incidence of road traffic and pedestrian accidents should be initiated like improving the quality of road infrastructure, establishment of dedicated trauma centres at frequent points along the highways, adequate pre-hospital care coupled with an efficient ambulance tracking

and transportation facilities greatly helps in reducing the incidence of trauma-related deaths. Implementation of effective traffic management protocols and enforcement of motor vehicle rules by imposing strong penalties to offenders will greatly help in bringing down the incidences of alcohol (drunken driving) and rash/negligent driving disasters.

REFERENCES

1. Jansen JO, Yule SR, Loudon MA. Investigation of blunt abdominal trauma. BMJ 2008; 336: 938-42.
2. Cigdem MK, Onen A, Siga M, Otcu S. Selective nonoperative management of penetrating abdominal injuries in children. J Trauma 2009; 67: 1284-6.
3. Javed NQ, Zahid AQ, Parkash A, Abdul SM. Gun-shot perforation of gut and associated injuries. Pak J Surg 2001; 6: 21-3.
4. Ayub H. Assessment of blunt abdominal trauma. J Ayub Med Coll Abbottabad 1997; 9: 27-8.
5. Khan A. Stab wounds abdomen: An experience with 105 laparotomies. J Ayub Med Coll Abbottabad 1999; 11: 6-8.
6. Potoka DA, Schall LC, Gardner MJ, Stafford PW, Peitzman AB, Ford HR. Impact of pediatric trauma centers on mortality in a statewide system. J Trauma 2000; 49: 237-45.
7. Upadhyaya P, Simpson JS. Splenic trauma in children. Surg Gynecol Obstet 1968;126:781-90.
8. Knudson MM, Maull KI. Nonoperative management of solid organ injuries. Past, present, and future. Surg Clin North Am 1999; 79: 1357-71.
9. Hofman K, Primack A, Keusch, G and Hrynkow S. Addressing the growing burden of trauma and injury in low-and middle-income countries. Am J Public Health 2005; 95(1): 13-17.
10. Brady RR, Bandari M, Kerssens JJ, Paterson-Brown S, Parks RW. Splenic trauma in Scotland: demographics and outcomes. World J Surg 2007; 31(11): 2111-6.
11. Cooper A, Barlow B, DiScala C, String D. Mortality and truncal injury: the pediatric perspective. J Pediatr Surg 1994; 29(1): 33-8.
12. Ohanaka EC, Osime U, Okonkwo CE. A five year review of splenic injuries in the University of Benin Teaching Hospital, Benin City, Nigeria. West Afr J Med 2001; 20(1): 48-51.
13. Phillipo LC, Joseph BM, Geofrey G, *et al*. Splenic injuries at Bugando Medical Centre in northwestern Tanzania: a tertiary hospital experience. *BMC Res Notes* 2012; 5:59 doi: 10.1186/1756-0500-5-59.
14. Najeeb SJ, Thoalfikar HB. Management of Traumatic Ruptured Spleen. Iraqi Medical J 2010; 56: 25-31.