

Pattern of Abdominal Organ Injuries in Non-Fatal Blunt Trauma

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ABSTRACT

Aim: To analyze the pattern of abdominal organ injuries in non-fatal cases of blunt trauma with respect to their epidemiological, medico-legal and clinic-pathological aspects.

Study design: Retrospective study.

Place & duration of study: Department to Surgery, Services Hospital from January, 2013 to December, 2013.

Methods: This included 50 non-fatal cases from age group excluding children (<12years) but including both sex having history of blunt injuries of the abdomen brought through emergency.

Results: Majority of victims were young adult males (92%) between 20-29 years of age group (36%). Road traffic accidents (84%) were the most common cause of blunt trauma abdomen comprising mostly of two wheeler occupants (52.3%). External injuries on the abdomen were found in 89.13% of cases. The most common abdominal organ injured was liver (36%) among solid organs and small bowel (32%) among hollow organs. Majority of cases were accidental (92%).

Keywords: Blunt trauma, non-fatal, abdominal organ injuries, road traffic accidents.

INTRODUCTION

Blunt trauma refers to physical trauma caused to a body part, either by impact, injury or physical assault. The abdomen is the third common region of the body injured in civilian trauma¹. Blunt abdominal trauma constitutes about 75% of all cases of blunt trauma². Motor vehicle accidents are a major cause of both internal and external wounds. It is estimated that by the year 2020, injuries from road traffic accidents will be the third most common cause of disability worldwide and the second most common cause in the developing world³. In Pakistan, one person becomes the victim of this man made catastrophe in less than five minutes⁴.

The underlying mechanisms for injury to intra-abdominal organs are compression and deceleration⁵. The former occurs as a result of direct blow, such as a kick or punch, or compression against a rigid object such as steering wheel. This force may deform a hollow organ thus increasing its intra-luminal pressure, causing rupture. When the blunt force exceeds the tensile strength and elasticity of an internal organ, laceration of internal organ may occur in the absence of any surface tear⁶.

Abdomen is considered as a mystery box both by the surgeons and the physicians as any intraperitoneal organ may be ruptured without superficial evidence of trauma.⁷ Sometimes exact

injury is revealed only when abdomen is opened either during operation by the surgeon or during autopsy by the autopsy surgeon.

All patients after blunt trauma to the abdomen should be carefully examined by an experienced practitioner for any signs of visceral rupture to avoid charge of negligence.

MATERIALS AND METHODS

This retrospective study was conducted in Surgical Unit-IV of Services hospital, Lahore from January 2013 to December 2013. A total of 50 non-fatal cases of blunt trauma abdomen above 12 years of age who presented through emergency department to Surgical Unit- IV of Services hospital were included in the study. Cases under 12 years of age and those who did not survive were excluded. Data was collected by thorough review of the medicolegal registers and case files including the operation notes. All the findings pertinent to age, gender, cause, date of incident, manner of infliction of injuries, site of external and internal injuries were recorded on a predesigned printed pro forma. Data thus collected was tabulated and statistically analyzed on SPSS version 17.

RESULTS

Highest number of cases of blunt trauma occurred in age group 20-29 years 18(36%) followed by 10-19 years 14(28%) and 30-39 years 8(16%) respectively. Age groups 40-49 years and 60-69 years showed equal incidence 4(8%) while age group 50-59 years 2(4%) was the least affected as shown in fig.1. Males

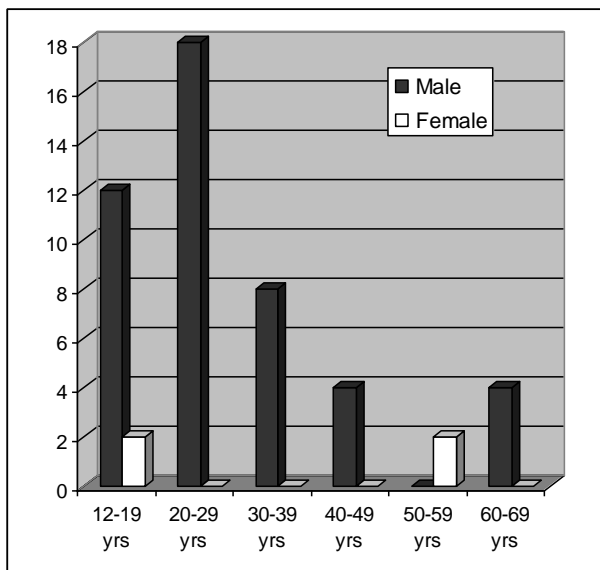
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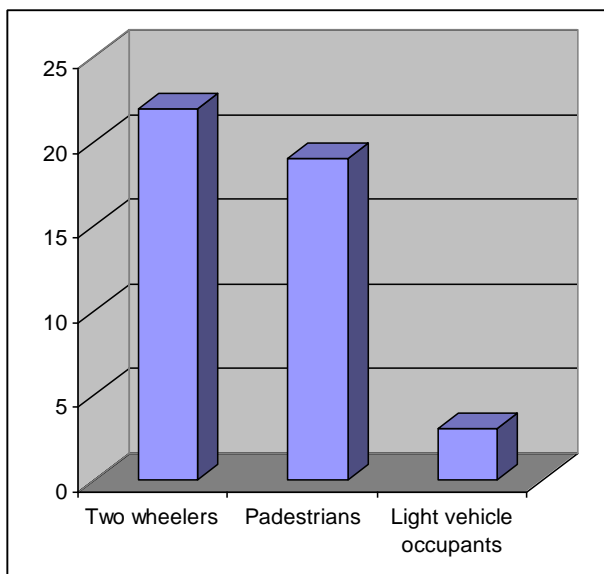
49(92%) outnumbered the females 4(8%) as victims of blunt abdominal trauma with ratio 11.5:1 (Fig.1).

Fig. 1: Distribution of victims according to age and gender



Most common cause of blunt abdominal trauma was road traffic accidents 42(84%) followed by abdominal blows 4(8%) while fall from heights and crushing injury were the least common 2(4%) as shown in table 1. Among road traffic accident cases, majority of the victims were two wheeler occupants 22(52.3%) followed by pedestrians 19(45.2%) whereas light vehicle occupants were involved in only 3 casualties (7.1%) as shown in fig.2

Fig.2: Profile of road traffic accident victims



Out of 50 cases of blunt injury abdomen, 89.13% cases had visible signs of external injury either on anterior and posterior aspect of abdomen or both. On the other hand, 10.87% cases did not show any sign of external injuries on the abdomen despite underlying visceral injuries. Among abdominal organs, liver was most commonly injured in 18 cases (36%). Spleen and small intestine both showed same incidence 16(32%) while kidneys' injury was reported in 10 cases (20%) and stomach injury in 4 cases (8%) respectively. Gall bladder was injured in only 2 cases registering 4% frequency (Tables 2-6)

Table 1: Causes of blunt injuries of abdomen (n=50)

Causes of blunt injuries of abdomen	n
Road traffic accidents	42(84%)
Fall from height	2(4%)
Direct impact e.g., kick, punch, lathi	4(8%)
Crushing injury e.g. stampede	2(4%)

Table 2: Blunt injuries of liver (n=16)

Internal organs	n	%age
Liver	6	33.3
Liver, spleen, small intestine	2	11.1
Liver, small intestine	2	11.1
Liver, spleen ,kidney	2	9.3
Liver , kidney	4	22
Liver, kidney, gall bladder	2	11.1

Table 3: Blunt injuries of Spleen (n=16)

Internal organs	n	%age
Spleen	6	4
Spleen, liver, small intestine	2	10.6
Spleen, liver, kidney	2	36
Spleen ,kidney	2	9.3
Spleen, liver, small intestine	4	32

Table 4: Blunt injuries of Small Intestine (n=16)

Internal organs	n	%age
Small intestine	6	37.5
Small intestine, spleen, liver	2	12.5
Small intestine, spleen	2	12.5
Small intestine, liver, spleen	2	12.5
Spleen, liver, small intestine	4	25

Table 5: Blunt injuries of kidney (n=10)

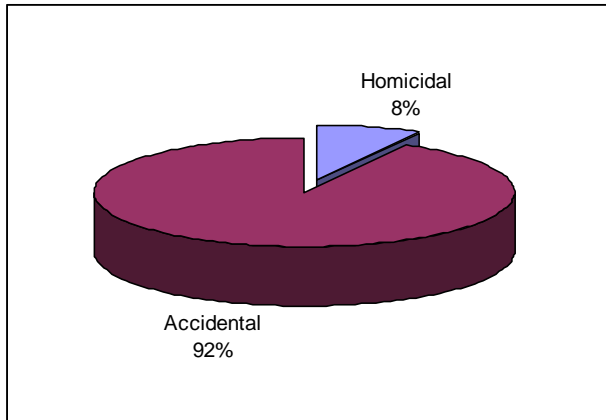
Internal organs	n	%age
Kidney, liver, spleen	2	20
Kidney, liver, gall bladder	2	20
Kidney, spleen	2	20
Kidney, liver	4	40

Table 6: Blunt injuries of Stomach (n=4)

Internal organs	n	%age
Stomach	2	50
Stomach, diaphragm	2	50

Out of 50 cases, 92% (46) were accidental and the rest were homicidal 8% (4). No suicidal cases were recorded (Fig.3)

Fig. 3: Manner of injuries



DISCUSSION

Visceral injuries of the abdomen following blunt trauma present a great medico-legal problem to the forensic experts as grave visceral injury may be present in the absence of external injuries on the abdomen. In our study, the most vulnerable age group was 20–29 years (36%) followed by 12–19 years (28%) with very few cases in the age group 50–59 years (4%) as is shown in Table 1. This is in accordance with study by Khichi et al (2012)⁸ who reported the highest incidence in 21–30 years (40%) followed by 11–20 years (21.1%). Similar observation of predominance of young age group were made by Jagannatha et al (25%)⁹ and Somashekhar et al (45.83%)¹⁰. Singh et al⁷ noted that maximum number cases of blunt trauma abdomen belonged to age group 20–29 years but the second commonest age group was 30–39 years thus partially agreeing with our findings. The greater elasticity of tissues in young age tolerate trauma better than the less resilient or fixed tissue of older people and this accounts for the difference in significant intra-abdominal injury following blunt trauma in youth and old age¹¹.

Our study showed male predominance of the victims (92%) with male to female ratio 11.5:1 which is also observed by other authors^{7,8,9,10,12,13}. This male predilection is due to the fact that adult males are the earning members of the family and are most exposed to the outdoor activities in contrast to females who tend to stay at home engaged in household chores.

The commonest cause of blunt injuries of abdomen was road traffic accidents with next common cause being direct impact by blunt objects.

Very few cases were due to fall from height and crush injuries. Hanumantha et al¹³ and Simpson¹⁴ were of the same opinion, that accidental crush injuries due to motor vehicles were more common. It can be said that the increase in population and vehicle leading to increased congestion on the roads can be directly related to the number of road traffic accidents.

External injuries were present in 89.13% cases while in 10.87% cases no external injuries were found despite underlying visceral injuries. Simpson¹⁴ has the same opinion that in some cases there is no external abdominal injury although there are deep seated injuries of abdominal viscerae.

Our research showed that the two wheeler occupants (52.3%) were the commonest victims of road traffic accidents followed by pedestrians (45.2%). Our findings are in agreement with the studies by Jha et al¹⁵ and Jain et al¹⁶. On the contrary, other studies reported an increased incidence of injuries in pedestrians^{17,18}. These findings can be attributed to the involvement of younger age group who use two wheelers as a more common mode of transport.

Among solid organs, liver (36%) was most affected by blunt trauma as compared to spleen (32%) and kidneys (20%). This is because liver is the largest of all organs and more anteriorly placed, thus more susceptible to injury by blunt trauma. The perforations of intestines were more common (32%) as compared to stomach (8%) and gall bladder (4%) amongst the hollow organs, as was observed by other authors as well^{8,13}.

Liver was commonest organ injured in 36% cases all due to road traffic accidents. Similar highest incidence of liver injury in blunt trauma was noted by Singh et al⁷ and Hanumantha et al¹³ who had reported 67% and 32.6% incidence in their respective studies.

Splenic injury was found in 32% cases. Singh et al⁷ reported splenic injury in 30.91% of cases and Khichi et al⁸ in 20% of cases thus supporting our findings. Out of 16 cases, 14 cases were due to injury sustained in road traffic accidents while two cases were due to fall from height.

Injury to intestine was found in 32% cases all due to road traffic crashes. This incidence was 25% in the study of Jagannatha et al⁹ consistent with our findings. However, Gosh et al¹⁹ found that overall, the commonest organ injured in blunt trauma was small bowel (30.7%) in contrast to liver in our study.

The incidence of injury to kidney was 20% in agreement with Khichi et al (16.3%)⁸, Jagannatha et al (16.7%)⁹ and Somashekhar et al (17.4%)¹⁰. On the other hand, Shetty et al²⁰ argued that kidneys (23%) was the most commonly involved abdominal organ. The cause was road traffic accidents in all cases.

Stomach was found injured in 8% comparable to Singh et al (10.09%)⁷.

Khichi et al (3.6%)⁸ and Hanumantha et al (4.08%)¹³ had almost same observations. Half of cases were due to direct blow to the abdomen and other half due to crushing injury.

Gall Bladder was found injured in 4% cases whereas the incidence of gall bladder reported by Singh et al⁷ was 7.07%. The cause was road traffic accidents. No injury to urinary bladder was found in our study but it was injured in 5% and 5.4% cases in studies by Singh et al⁷ and Kichi et al⁸ respectively. Accidental cases (92%) were most common among blunt injury of abdomen that was also reported by Simpson¹⁴.

CONCLUSION

1. Males (92%) more commonly sustain abdominal visceral injuries than females (8%)
2. Road traffic accidents (84%) are the most common cause of blunt trauma abdomen.
3. In road traffic crashes, most of the victims who sustain abdominal injuries are two wheeler occupants (52.3%) followed by pedestrians External injuries on the abdomen are found in 89.13% of cases whereas no external injury is present in 10.87% of cases despite underlying visceral injury.
4. The most common abdominal solid organ injured is liver (36%) followed by spleen (32%) and kidneys (20%) in descending order of frequency.
5. Among hollow organs, small bowel (32%) is the most commonly injured organ in blunt trauma as compared to stomach (8%) and gall bladder (4%).
6. Cases of accidental injury (92%) show the highest incidence. There are very few homicidal cases (8%) while no suicidal cases are noted.

RECOMMENDATION

- A detailed history should be taken from patients who present with blunt trauma abdomen in emergency to determine the cause of trauma.
- There should be a high index of suspicion for visceral injuries even in cases of apparently trivial abdominal trauma.
- Effective transport facilities should be provided for timely transfer of patient to hospitals with designated trauma centers.
- The risk stratification in the susceptible population and the study of nature of offending agent in road traffic accidents can help the authorities in implementing safety measures and providing better health care facilities on roads.

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