



Original Research Article

Blunt Trauma Cases and Injury Severity Score: A Postmortem Study

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ABSTRACT

Background: Examination and evaluation of the injuries in various types of blunt trauma along with assessment of injury severity score (ISS) can predict the morbidity or mortality to some extent. The study aims at assessing injury severity score in fatal blunt trauma cases.

Materials and methods: 200 (two hundred) blunt trauma cases brought for medico-legal autopsies were examined. Relevant history and hospital records of the victims were assessed before medicolegal autopsies. For the establishment of ISS, the injuries were ranked on a scale of 1 to 6 as per AIS (Abbreviated Injury Scale).

Results: Males in the age groups of 21-30 years were the commonest victims (M:F=5.6:1). The commonest form of blunt trauma was vehicular accident (89.5%) followed by assault by blunt weapon (4%). Majority of the victims (61%) died in the hospital, while 32.5% died on the spot. The spot-death victims had a mean ISS score of 69.83. Mean ISS was lower in those victims who survived more than 1 to 7 days (mean ISS=29). The commonest cause of death was head injury (43%) followed by haemorrhagic shock (24%).

Conclusion: Some of the blunt trauma victims with a low ISS died on reaching the hospital because they could not be transported immediately and could not receive life saving management in time. Substantial importance of the relationship between ISS and survival period cannot be ignored, rendering immense value in the management of the blunt trauma cases.

Key words: Blunt trauma, vehicular accident, assault, injury severity score

INTRODUCTION

Injuries caused due to blunt trauma are mostly as a result of road traffic accident (RTA), assault, by fall of heavy object and fall from height; the degree and type of injury differ depending on the force and nature of impact. It is a known fact that RTA has always been a leading cause of blunt trauma throughout the world, and injuries as a result of accidents have

potentially serious consequences resulting in disability, morbidity or mortality. Worldwide, the number of people killed in road traffic accidents each year is estimated at 1.2 million, while the number of injured could be as high as 50 million. ^[1] In India, over 80,000 persons die in the traffic crashes annually, over 1.2 million injured seriously and about 3,00,000 disabled permanently. ^[2] Apart from road traffic accidents, in an

unanticipated fight or assault, blunt trauma is common as blunt weapons are some of the most easily available weapons. On the other hand, falls from height are responsible for many serious and fatal blunt trauma cases, which are commonly seen in elderly and in workers as an occupational hazard. Blunt trauma may also be sustained many a times due to application of pressure by heavy objects as seen in landslide, building collapse, stampede, etc.

Characterization and documentation of injury severity are requirements not only for the evaluation of trauma systems and development of initiative in injury control but also for assessment of short-term survival period among the trauma victims. [3] Introduced by Baker et al, [4] the Injury Severity Score (ISS) is a means of summarizing multiple injuries in a single patient. The ISS is defined as the sum of squares of the highest Abbreviated Injury Scale (AIS) grade in the 3 most severely injured body regions and ranges from 1-75.

Examination of injury in various types of blunt trauma along with trauma score assessment can predict the morbidity or mortality due to blunt trauma to some extent.

Hence, the present study has been undertaken to assess the injury severity score in fatal blunt trauma cases brought for medico-legal postmortem examination to a tertiary health care teaching Institute in north east India.

MATERIALS & METHODS

Study design: Descriptive study

Setting: A tertiary health care teaching Institute in north east India

Materials

200 (two hundred) blunt trauma cases brought for medico-legal autopsies to the mortuary of the Institute were examined during a period of 2 years i.e. from September 2012 to August 2014.

Inclusion Criteria:

- A) All the fatal cases due to blunt trauma were considered for this study.
- B) All those cases of injuries, which were hospitalized following blunt trauma and subsequently succumbed to their injuries, were also included in this study.

Exclusion Criteria:

- A) Decomposed bodies and those cases where the nature of sustenance of injury was not known were not included in the study.

Written informed consents were obtained from the relatives of the victims and approval from the Institutional Ethical Committee was sought.

Methods:

Particulars of the victims and the relevant history were obtained in detail from the investigating police officer and relatives. The hospital records of the victims who did not die at the spot and survived for sometime were thoroughly assessed. A meticulous postmortem examination was carried out and the external and internal findings on the body were recorded.

For the establishment of injury severity score (ISS), the injuries were ranked on a scale of 1 to 6 as per AIS (Abbreviated Injury Scale) [4] as follows:-

<u>AIS Score</u>	<u>Injury</u>
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

Each injury is assigned an Abbreviated Injury Scale (AIS) score and is allocated to one of six body regions i.e.

1. Head and neck injuries - include any injury of the cervical spine, cervical spinal cord, skull, brain and ears.

2. Face injuries - include mouth, eye, nose and facial bone injuries.
3. Chest injuries - include injuries to all of the internal chest cavity organs, the diaphragm, thoracic spine and rib cage.
4. Abdominal injuries - include injuries to all of the internal abdominal organs, the pelvis and the lumbar spine.
5. Extremities injuries - include all sprains, fractures, amputations and dislocations.
6. External injuries - include all contusions, abrasions and lacerations independent of their location.

For the calculation of the ISS, only the highest AIS score in each body region is used. The 3 most severely injured body regions have their score squared and added

together to produce the ISS score which ranges from 1 to 75. If the victim has any injury with an AIS value of 6, the ISS is assigned a value of 75.

The data obtained were analysed using Statistical Package for Social Sciences (SPSS Inc. Chicago, IL, USA) Windows based version 16.0 and descriptive statistics was used to find out the mean, percentage and frequencies.

RESULTS

Out of the total 200 blunt trauma cases, 85% were males and 15% were females (5.6: 1) as shown in Fig 1. Male victims in the age group of 21-30 years (19.50%), followed by the age group of 31-40 years (16%) were the commonest victims of blunt trauma. (Table No. 1).

Table No. 1. Age and sex wise distribution of cases

Sl. No.	Age Group in Years	Males		Females		Total	(%)
		No	P.C. (%)	N0	P.C. (%)		
1	0-10	8	4.00	1	0.50	9	4.50
2	11-20	24	12.00	4	2.00	28	14.00
3	21-30	39	19.50	5	2.50	44	22.00
4	31-40	32	16.00	7	3.50	39	19.50
5	41-50	30	15.00	2	1.00	32	16.00
6	51-60	22	11.00	4	2.00	26	13.00
7	61-70	9	4.50	5	2.50	14	7.00
8	71-80	6	3.00	2	1.00	8	4.00
Total		170	85.00	30	15.00	200	100.00

The commonest cause of blunt trauma was vehicular accident accounting for 89.50%. Other causes included assault by blunt weapon (4%), fall from height (4%). The remaining cases were hit by fall of heavy objects (2%), and injured by rolling mill (machinery) in 1 case (Table No. 2).

Table No. 2. Causes of blunt trauma

Sl. No.	Type	No	(%)
1	Vehicular Accident	179	89.50
2	Assault by Blunt Weapon	8	4.00
3	Hit by fall of Heavy objects (boulders & trees)	4	2.00
4	Fall from Height	8	4.00
5	Rolling Mill (Machinery)	1	0.50
Total		200	100.00

Majority of the victims of blunt trauma i.e. 122 (61%) died in the hospital, while 65 (32.5%) cases died on the spot. 9 (4.5%) died on the way to hospital and 4 (2%) died at residence without medical intervention (Fig. 1).

It was found that in victims with low ISS (21-30 and 31-40 ISS score ranges), survival period was more as compared to the victims with high ISS (51-60 to 71-75). The spot death victims had a mean ISS score of 69.83, victims who died within 1 hour showed mean ISS of 39.58. Mean ISS was lower in those victims who survived more

than 1 to 7 days with mean ISS of 29 and the victim who survived more than 1 week had an ISS of 20 (Table No. 3).

Various causes of death following blunt trauma are given in the Fig 2. The commonest cause of death observed was head injury (43%), followed by haemorrhagic shock (24%) and haemorrhagic shock in combination with head injury (20.5%) cases. Deaths due to injury to vital organs were seen in 22 (11%) cases. Cardiac tamponade was the cause of death in 2 cases, while 1 victim who survived for more than 1 week died due to peritonitis combined with head injury during the course of treatment in hospital.

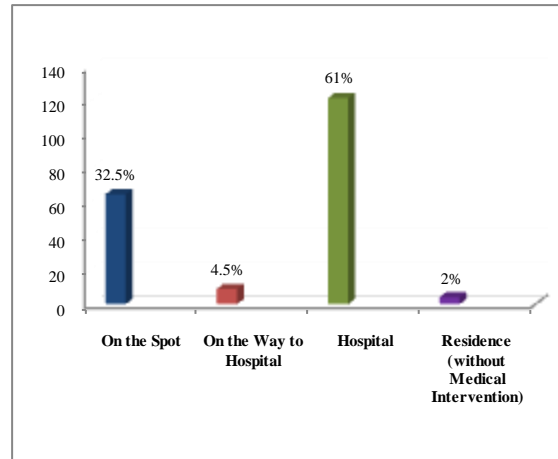


Fig. 1. Showing the place of death

Table No. 3. Survival period in relation to Injury severity score

Sl No.	ISS	SURVIVAL PERIOD							
		Spot	<1 Hr	>1-2 Hrs	>2-6 Hrs	>6-12 Hrs	>12-24 Hrs	>1-7 Days	>1-2 Wks
1	0-10	0	0	0	0	0	0	0	0
2	11-20	0	0	0	1	0	0	1	1
3	21-30	0	15	9	13	4	13	8	0
4	31-40	2	12	11	6	6	2	4	0
5	41-50	5	8	8	6	0	0	0	0
6	51-60	5	2	1	0	0	0	0	0
7	61-70	0	1	0	0	0	0	0	0
8	71-75	53	3	0	0	0	0	0	0
Total		65	41	29	26	10	15	13	1
Mean ISS		69.83	39.58	36.44	32.88	32.70	29.26	29.00	20.00

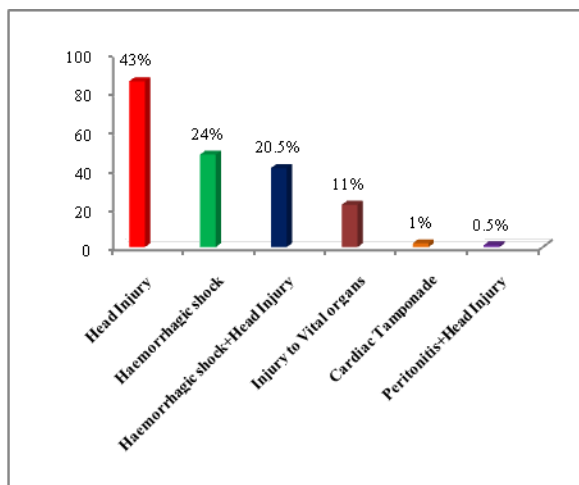


Fig. 2. Showing the causes of death

DISCUSSION

Blunt trauma in various forms, is the main factor of mortality in cases brought for medicolegal autopsies. In this study, the peak incidence of blunt trauma was observed in the age group 21-30 years, followed by the age group 31-40 years. Similar findings were observed by Chandra et al, [5] Singh and Dhatarwal, [6] and Gupta et al. [6] The considerable number of cases in the age group of 21-30 years may be due to the fact that these age groups are in the most active and productive period of life and people in this period of life tend to take many risks and as a result make themselves vulnerable to many unforeseen events, accidents and injuries.

Majority of the cases were males and constituted 85% of the cases as compared to

females who were only 15. This male preponderance was consistent with the study observed by Brainard et al [8] who found that the majority of the victims were men (72%). Guirguis et al [9] also found in their study of trauma outcome analysis that the majority of patients (72%) were male. The reason for this male dominance may be due to the fact that males are more exposed to outdoor activities in this part of the world and their tendency to resort to physical violence.

Chandra et al [5] observed that out of 3227 medico-legal autopsies, 49.76% cases were due to vehicular accidents. Schmitz et al [10] also analyzed 160 autopsies and observed that road traffic accidents comprised of 72.5% cases. In the present study also, majority of the blunt trauma cases were due to vehicular accidents (89.50%). Similar findings were also reported by Ameh et al [11] and Honnungar et al. [12] Blunt trauma due to assault, were found to be only 4% in the present study and weapons used by the assailants were usually easily available ones such as a stick or a stone. Similar findings were also reported by Murphy, [13] where some weapons used during assaults were “weapons of opportunity” seized in the course of the incidents.

In the present study, 65 victims (32.50%) died on the spot, whereas the remaining 135 cases (67.50%) survived for a certain period of time. Majority of the cases who died within 1 hour and 2 hours took almost 45 to 50 minutes to reach the hospital from the place of incident and died soon after arrival at the hospital, while 9 cases (4.50%) died on the way to the hospital. This suggests the fact that these victims required the emergency medical and paramedical care services on the spot and rapid transportation system from the place of incident to the hospital. Similar findings were reported by Meera Th and Nabachandra H [14] in an earlier study. Interestingly, Daly and Thomas [14] observed

that the majority of deaths due to chest injury (79%) and multiple injuries (70%) occurred before arrival at a hospital, whereas the majority of deaths due to head injury (63%) occurred after admission. In the present study, the majority of the cases of spot deaths had associated head injuries. This is in accordance with the study by Vock et al, [16] who observed that in 3/4th of the 424 cases of blunt abdominal trauma, 96.6% suffered from severe extra-abdominal secondary injuries which, in 72% of the cases, occurred as craniocerebral traumas frequently determining the *quoad vitam* prognosis.

Brainard et al [8] observed in his study of injury profiles in pedestrian motor vehicle trauma, that the average Injury Severity Score (ISS) among all patients was 20; however, it was significantly higher (46) in non survivors. Anderson et al [17] analyzed 390 trauma cases (95% blunt) with Injury Severity Score (ISS) greater than 12. They identified 61 missed injuries (Abbreviated Injury Scale, AIS>1) in 54 victims (13.8%) of which three were intra-abdominal injuries. In the present study, it was observed that victims with low ISS survived longer than victims with higher ISS. This is in accordance with the findings observed by Nikolic et al. [18] These variations in survival period with ISS can be of significance in the assessment and management of the blunt trauma cases. Moreover, it can also be established whether the death was actually due to trauma or complication of the trauma; whether it was preventable; whether there was any negligence in the management of the case, etc.

In the present study, the most common cause of death was due to head injury, which was observed in 86 (43%) cases. Similar findings were observed by Honnungar et al [12] and Sahdev et al [18] and this could be explained by the fact that head is the most vulnerable part of the body which once injured is very dangerous with uncertain prognosis. Haemorrhagic shock was the cause of death in 24% of the cases. This is in concurrence

with the findings of Ndiaya et al. [19] Some workers [21,22] observed that haemothorax is a frequent finding in blunt thoracic injuries and this is consistent with the findings in the present study. Haemorrhagic shock combined with head injury was the cause of death in 20.5% of the cases. Similar findings were also observed by Brainard et al, [8] Vock et al [16] and Segers et al. [22]

Peritonitis combined with head injury was the cause of death in 1 (0.5%) case in the present study. The victim died more than 1 week after hospitalization while being treated for the head injury. However, the abdominal organ injuries were not properly managed despite surgical intervention, which indicates that there is inadequacy in the management of such cases and the outcome of which could have been preventable. Similar findings were made by Sahdev et al [18] who observed that 23% of the deaths felt preventable and 41% possibly preventable, whereas Nicolic et al [18] opined that the autopsy of injured persons who survived trauma can point to the most frequent injury complications, clinical diagnosis and preventable deaths.

CONCLUSION

Vehicular accidents form the most common mode of blunt injury to the body. Some of the blunt trauma victims with a low ISS died on the way to hospital because they could not be transported to the hospital immediately and could not receive life saving management on time, which emphasize the need of emergency medical and paramedical care and service on the spot and rapid transportation from the place of incident to the hospital. Moreover, substantial importance of the relationship between ISS and survival period cannot be ignored, rendering immense value in the management of the blunt trauma cases, which in turn can serve as a tool to assess

the quality of management and care to these victims.

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