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Original Research Article

Clinical profile and outcome of chest trauma: a four year retrospective analysis at a tertiary care centre

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ABSTRACT

Background: Chest trauma comprises about 10-15% of all traumas and 25% of all deaths from traumatic injury. Chest injuries are cause by blunt mechanisms such as road traffic accidents or penetrating mechanisms such as stab and missile injuries. Traumatic chest injuries are the most common cause of preventive mortality and morbidity.
Methods: A retrospective study of all patients with chest injury presenting to Emergency Department of SKIMS Medical College, Srinagar was done. Records of all the patients were retrieved. A complete data regarding age, gender, mode/type of injury, extra thoracic injuries, mode of management and outcome was gathered.
Results: A total number of 1429 trauma patients presented to AE of which 160 patients (11.2%) had chest trauma. Majority of the patients (51.87%, n=83) were of age group of 21-40 years. A male preponderance was observed. Road traffic accidents were major causes of blunt chest injury, while gunshot injury was the major causes of penetrating chest injuries. Head and neck injuries were the most common associated injuries. Tube thoracostomy was the commonest modality of management (65%) and (28%) patients were managed conservatively. Severity of chest trauma and associated injuries coupled with prompt diagnosis and treatment were important factors in efficient management of chest injuries.
Conclusions: Chest trauma resulting from road traffic accidents remains the major mechanism of injury. Preventive measures aimed at educating the common masses about traffic rules and strictly implementing them is indispensable to reduce the incidence of chest injuries.

Keywords: Chest trauma, Chest injury, Hemothorax, Pneumothorax, Rib fracture

INTRODUCTION

Polytrauma is a serious global health problem. Chest trauma comprises about 10-15% of all trauma admissions and 25% of trauma related deaths are attributed to chest injuries.[1] The cause and pattern of chest injuries vary in different parts of the world because of variations in infrastructure, civil violence, wars, level of crime as well as the applicability of traffic rules and regulations. Rapid unplanned urbanization and advent of high-speed motor vehicles has resulted in enormous increase in the number of traumatic chest injuries all over the world. As chest is a large and exposed portion, it is likely to get traumatized in most of the impact injuries.[2] Thoracic cage houses the most vital organs- heart, lungs and great vessels, therefore trauma to these organs can prove fatal.

Trauma is the leading cause of mortality and morbidity during first four decades of life.[3] The brunt of this is borne by the society as most of the victims are in the most productive phase of life. We have done a study of all victims of chest trauma admitted in our department

from the last four years. The demographic data, pattern of injury, clinical pattern and outcome of these 160 patients were analyzed and computed for various results.

METHODS

A retrospective study of all patients with chest injury presenting to department of accident and emergency, SKIMS Medical college, Srinagar, J & K, India, which is a tertiary care hospital catering to all parts of the state was conducted from 1st January 2015 to 31st December 2018 for a period of four years and a total of 160 patients were included in the study.

Records of all the patients of chest trauma admitted in SKIMS Medical College, accident and emergency department were retrieved from files in Medical records department, SKIMS Medical college and findings were recorded. Besides the records of patients of chest trauma referred to CVTS department of SKIMS for thoracic surgeries were also retrieved. The files were examined with regard to history and clinical examination that was done on the patient at the time of arrival. Each of the trauma patient admitted in the department of surgical accident and emergency had been resuscitated according to latest guidelines of ATLS protocol, using integrated management by a team of specialists including a trauma physician, general surgeon, orthopaedician and an anesthetist. Each patient had been subjected to posteroanterior chest X ray, lateral X ray and chest CT scan was done whenever indicated. Patients were also subjected to extended FAST scan including the scan of chest for detection of traumatic pneumothorax or hemothorax. Associated injuries to the other parts of the body were also recorded from MRD files. Management in the form of chest physiotherapy, tube thoracostomy or thoracotomy was recorded. Outcome of patients was retrospectively recorded as viz a viz duration of ICTD drainage, total duration of hospital stay and complications.

Inclusion criteria

All the patients of chest injury irrespective of their age and sex requiring admission were included in the study.

Exclusion criteria

Severely traumatized patients who expired before the investigation for chest trauma and patients not requiring admission were excluded from the study.

Data collection and analysis

Data collected was entered in a master chart and analyzed using Excel-2019 with the help of medical statistician. Data was summarized in the form of proportions and frequency tables in excel-2019 spreadsheet. Mean, median, mode, standard deviation and histogram were used to summarize the variables. Statistical tests of significance like Chi-square test and Z-test were used whenever necessary. Significance was defined as a P-value of less than 0.05.

RESULTS

During the period of study there were 1429 cases of trauma related admissions out of which 160 were of thoracic trauma, therefore the incidence of chest trauma in our hospital is 11.2%. The results of the studies are in tabulated form.

Table 1: Age wise distribution of patients of chest trauma.

Age group (years)	Number of patients (n)	Percentage (%)
0-10	1	0.62
11-20	3	1.88
21-30	42	26.25
31-40	41	25.62
41-50	34	21.25
51-60	15	9.38
61-70	19	11.88
>71	5	3.12
Total	160	100

Maximum number of patients belonged to the age group of 21-30, which comprised of 26.25% (42 out of 160). The second highest group was between 31-40 years which was 25.62% (41 out of 160). Together the age group between 21-40 years constituted about 51.87% (83 out of 160). This shows young people are more prone to chest injuries. Out of total of 160 patients 132(82.5%) were males and rest 28 (17.5%) were females. Male: female ratio of chest injuries was observed to be 4.71:1. The relatively low incidence (17.5%) can be explained on the basis of the fact that females are less exposed to external environment as compared to males.

Table 2: Occupation distribution of chest trauma patients.

Occupation	No. of patients	Percentage (%)
Driver	28	17.5
Farmer	26	16.25
Industrial worker	25	15.62
Laborer	21	13.12
Student	17	10.62
Housewife	12	7.5
Teacher	10	6.25
Shopkeeper	8	5
Engineer	7	4.38
Tailor	3	1.88
Retired person	2	1.25
Shephard	1	0.63
Total	160	100

From the above table it is evident that maximum incidence of chest injuries is seen in drivers followed by farmers. Least incidence of chest injuries is seen in shepherds.

Table 3: Type of chest trauma.

Type of chest trauma	Number of patients	Percentage (%)
Blunt	146	91.25
Penetrating	14	8.75
Total	160	100

Table 3 shows that blunt trauma is more common than penetrating trauma with ratio of 10.4:1. All of the patients who had penetrating trauma were males. Out of total of 146 patients who had blunt trauma, 118 (82.5%) were males showing males are more prone to blunt as well penetrating trauma to the chest.

Table 4: Mechanism of blunt chest injury.

Cause	Number	Percentage (%)
Road traffic accidents (RTA)	82	56.17
Pedestrian	27	
Driver	18	
Front seat passenger	14	
Bike driver	11	
Pillion passenger	7	
Rear passenger	5	
Fall from height	33	22.60
Assault	20	13.70
Industrial accident	5	3.42
Hit by an animal	4	2.74
Fall of object on chest	2	1.37
Total	146	100

Table 4 shows that RTA (56.17%) is the commonest mechanism of blunt chest injury, followed by fall from height (22.6%). Moreover, Table 4 also shows that pedestrians are more susceptible to blunt trauma chest as a result of RTA as compared to passengers.

Table 5: Mechanism of penetrating chest injury.

Cause	Number	Percentage (%)
Missile injury	9	64.28
Pellet Injury	4	
Bullet Injury	3	
Blast Injury	2	
Stab injury	3	21.43
Animal horn injury	2	14.29
Total	14	100

Table 5 shows that missile injury (64.28%) is the commonest mechanism of penetrating chest injury followed by stab injury (21.43%).

Table 6: Clinical types in chest trauma victims (n=160).

Type of chest injury	Number of patients	Percentage (%)
Rib fracture	125	78.12
Pneumothorax	72	45
Hemothorax	52	32.5
Hemopneumothorax	38	23.75
Lung contusion	30	18.75
Subcutaneous Emphysema	29	18.12
Flail chest	7	4.38
Fracture sternum	5	3.12
Diaphragmatic Injury	2	1.25
Cardiac injury	1	0.62

Table 6 indicates that rib fracture is the commonest type of chest injury (78.12%). Out of the internal thoracic injuries, lung was injured in a significant number of cases leading to pneumothorax in 45%, hemothorax in 32.5%, hemopneumothorax in 23.75% and lung contusion in 18.75%.

Among associated injuries in 160 patients of chest trauma, head and neck injuries (41.25%) were the most common followed by musculoskeletal injuries (23.12%), abdominal injuries in 13.12%, pelvic injuries in 11.88% and spine injury in 5.63% patients. Only 5% of the patients had isolated chest trauma.

Pain and tenderness in the chest wall were the commonest findings seen in 152 (95%) patients followed by breathlessness in 141 (88.12%) as a result of respiratory distress due to pneumothorax/hemothorax and hemoptysis was seen in 3 (1.88%) patients. The most common clinical finding in patients of chest trauma were decreased breath sounds in 122(76.25%), surgical emphysema in 55(34.37%) patients and hypotension in 37(23.12%) patients.

All chest trauma patients were investigated. Chest radiograph was done in all patients of chest trauma as a part of trauma protocol. USG was done selectively in 40.62% patients and CT scan was done in 75% patients of chest trauma.

Table 7 shows the modality of treatment in patients with chest trauma. 46 out of 160 patients (28.75%) needed only conservative management in the form of chest physiotherapy and analgesics, whereas 114 patients needed operative management. Tube thoracotomy was the most common modality of overall management of chest trauma victims (65%).

Table 7: Modality of treatment (n=160).

Modality of treatment	Number of patients	Percentage (%)
Conservative	46	28.75
Tube Thoracostomy	104	65
Thoracotomy	6	3.75
Laparotomy for abdomen pelvis injury	4	2.5
Total	160	100

Table 8: Duration of ICTD (n=104).

Duration of ICTD (days)	Number of patients	Percentage (%)
0-4	2	1.92
4-6	28	26.92
7-9	41	39.42
10-12	20	19.23
13-15	9	8.65
16-18	4	3.86
Total	104	100

In our study maximum number of patients (39.42%) had ICTD kept for 7-9 days.

Table 9: Duration of hospital stay for chest injury.

Duration of hospital stay (days)	Number of patients
1-5	40
6-10	57
11-15	35
16-20	19
21-25	9
Total	160

Average duration of hospital stay was 9.88 days.

Table 10: Mortality in chest trauma patients.

Type of chest trauma	Total patients	Death	Percentage (%)
Blunt	146	20	13.7
Penetrating	14	1	7.14
Stab injury	9	1	7.14
Missile injury	3	0	0
Animal horn injury	2	0	0

Mortality rate following blunt trauma was 13.7% (20 out of 146) while following penetrating trauma it was 7.14% (1 out of 14).

DISCUSSION

During the period of study there were 1429 cases of trauma related admissions out of which 160 were of thoracic trauma, therefore the incidence of chest trauma in our hospital is 11.2%.

Trauma typically affects young males in the productive phase of life. Young males are more prone to chest trauma because of greater exposure to external environmental forces in their daily activities. Maximum number of patients in our study belonged to the age group of 21-30 years, which comprised of 26.25% (42 out of 160). Lema et al conducted a study on pattern and outcome of chest injuries at Bugando Medical Centre in Northwestern Tanzania of 150 patients of chest trauma and found that majority of the patients 36% were in the age group of 21-30 years.[4] Mohta et al also reported 49.55% patients in their study belonged to the same age group (21-40 years). [5] Massaga et al had 43.75% patients from the age group of 30-49 years.[6] The highest incidence in this age group can be attributed to the active lifestyle with highest exposure to the use of automobiles, machinery, assault and sports.

Male predominance was noted in our study with incidence of 82.5%. Male:female ratio of chest injuries was observed to be 4.71:1 in our study. Other studies have also showed similar findings. Lema et al reported a male: female ratio of 3.8:1.[4] Dehgan et al reported a male: female ratio of 3.34:1.[7] The male predominance can be explained on the basis of that females are less exposed to external factors as compared to males.

Most of the patients (91.25%) in our study suffered blunt injuries similar to many other studies. Atri et al in a study on 2571 patients reported that 81.7% victims of chest trauma suffered blunt injuries to chest.[8] Similar findings were reported by Lema et al (72.7%, n=150).[4] Few studies have shown penetrating injuries to be the commonest cause of chest trauma. Nigerian study by Ali et al showed penetrating chest injuries occurring in 61.5% of cases and these were mainly due to civil war and trauma by bandits.[9] In the study by Maxwell et al penetrating injuries accounted for 77% of cases.[10] The predominance of penetrating chest injuries depends on the level of crime and violence in a particular community.

Road traffic accidents is the commonest mechanism of chest injury noted in our study accounting for more than half of all chest injuries (56.17%) and pedestrians were more susceptible to blunt chest injuries as compared to passengers. It has been observed that mechanism of chest injuries varies from country to country and it also varies within the same country. Liman et al reported that 67.79% cases of chest trauma were due to motor vehicle accidents (n=1490).[11] Similar figures were reported by Lema et al (50.7%, n=150) and Dehgan et al (79%, n=3467).[4,7]

In our study gunshot injury (64.28%) is the commonest mechanism of penetrating chest injury followed by stab injury (21.43%). Together gunshot and stab injury account for 85.71% cases of chest trauma. The mechanism of penetrating chest injury depends on the level of civil unrest and crime in a particular community. Afshar et al in a study on evaluation of injuries caused by penetrating chest trauma referred to the emergency room reported that gunshot and stabbing account for the major mechanism of penetrating chest injuries. [12] The incidence changes widely worldwide and it is as high as 95% in countries engaged in war as reported by Veysi et al.[13]

Head and neck injuries (41.25%) were the most common associated injury in chest trauma victims, followed by musculoskeletal injury (23.12%), while only 5% of the patients had isolated chest trauma.

Lema et al reported 33.3% cases of head injury and 26.7% cases of musculoskeletal injuries in their study of 105 cases.[4] Choudhary et al reported 38.46% cases of head injury and 15.4 % cases of skeletal injuries in their study on 52 patients.[14] The associated injuries are related to the cause of injury as road traffic accidents always lead to multiple injuries whereas as assault lead to isolated injuries mostly. [5]

Sirmali et al conducted a retrospective analysis of 1417 cases of thoracic trauma 38.7% patients (n=548) had rib fracture and among the internal thoracic injuries pneumothorax (37.3%), hemothorax (26.8%), hemopneumothorax (15.3%), pulmonary contusion (17.2%), flail chest (5.8%) and isolated subcutaneous emphysema (2.2%) were noted.[15] In our study rib fracture was the commonest type of chest injuries (78.12%) and out of the internal thoracic injuries lung was injured in a significant number of cases leading to only pneumothorax in 45%, hemothorax in 32.5%, hemopneumothorax in 23.75% and lung contusion in 18.75% was observed in close conformity with this study.

Symptomatology of chest injuries varies with the magnitude of chest injury as well as the associated injuries with chest trauma like head injury. In our study pain and tenderness in the chest wall (95%) were the commonest finding followed by breathlessness (88.12%) as a result of respiratory distress due to pneumothorax or hemothorax.

Khan et al in a study on chest trauma management reported that tube thoracostomy was the major modality of management (62%) followed by conservative treatment in a study in 103 patients.[16]

In our study 46 out of patients (28.75%) needed only conservative management in the form of chest physiotherapy and analgesics, whereas 114 patients needed operative management. Tube thoracostomy was the most common modality of overall management of chest trauma victims (65%). Dalal et al reported that 90% patients of thoracic injuries could be managed by tube thoracostomy.[17] Many other studies have shown similar results. Massaga et al reported 56.3% patients had tube thoracostomy done in their study.[6] Same outcome was also reported by Atri et al in a study on 2571 patients of chest trauma.[8]

The average duration of hospital stay in our study was 9.88 days. Novakov et al reported a mean hospital stay duration of 8.7 days in a study on 212 patients of chest trauma.[18] The duration of hospital stay depended on the severity of chest trauma as well as the associated injuries.

Mortality analysis following blunt trauma was 13.7% (20 out of 146) while from penetrating trauma it was 7.14% (1 out of 14) with overall mortality rate of 20.84%. The mortality rate is comparable to other similar studies which have documented mortality rates ranging from 2.2% to 33%.[4,13,21,22] Veysi et al in their study found that overall mortality in blunt chest trauma reached 18.7%, while mortality rate in a study by Lemawas 4.7%.[13,4]

CONCLUSION

Chest trauma resulting from road traffic accidents remains the major mechanism of chest injury. Preventive measures aimed at educating the common masses about the traffic rules and regulations and strictly implementing them is indispensable to reduce the incidence of chest injuries.

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