

Research Article

Clinico-Epidemiological Study of Management of Blunt Trauma Chest in a Tertiary Center

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Abstract

Introduction: Blunt chest trauma denotes injuries to the chest resulting from forceful impact in the absence of penetration, such as those sustained from a blow, fall, or collision. Chest trauma is the leading cause of death from physical trauma after head and spinal cord injury. Thoracic injuries are primary or a contributing cause of about one-fourth of all trauma-related deaths. The mortality rate in these cases is about 10%. Thoracic injuries account approximately 20-25% of deaths due to trauma. 16,000 deaths occur per year in India alone as a result of chest trauma.

Objective: To understand the epidemiological profile of patients reporting to the trauma center of our hospital with blunt thoracic trauma and to ascertain the impact of various etiologies of blunt chest trauma.

Materials and methods: Between January 2023 and April 2024, consecutive patients with blunt thoracic trauma, who presented to the emergency department at Rangaraya Medical College (Kakinada, Andhra Pradesh, India), were reviewed in this retrospective study. Data collected regarding common injury modes, age and gender distribution, pre-hospitalization practices, clinical presentations, associated injuries, severity of injuries, and management options from the hospital record section and these data were analyzed with descriptive statistics.

Results: Majority of the patients were males who were involved in RTA. Presentation was mostly in the form of rib fractures, hemothorax, pneumothorax and flail chest. Most of the patients could be managed conservatively or by inserting an ICD tube and supportive treatment. None required an operative intervention. Mortality was mostly seen only when other systems were involved (CNS, abdominal organs, long bone fractures, spine injuries).

Conclusion: Chest injury is seen commonly in RTA patients. Most of the patients of chest injuries can be managed by symptomatic care and simple life-saving intervention, i.e. intercostal drainage. CT chest is better than chest x-ray in early identification of pneumothorax and must be done if available. With increased RTAs, it is needed to have public awareness regarding road safety measures and educating them about the first aid measures for trauma patients.

Keywords: Blunt Chest Trauma, Thoracic Injuries, Rib Fractures, Hemothorax, Pneumothorax.

INTRODUCTION

Blunt chest trauma denotes injuries to the chest resulting from forceful impact in the absence of penetration, such as those sustained from a blow, fall, or collision.¹

Chest trauma is the leading cause of death from physical trauma after head and spinal cord injury. Thoracic injuries are primary or a contributing cause of about one-fourth of all trauma-related deaths. The mortality rate in these cases is about 10%. Thoracic injuries account approximately 20–25% of deaths due to trauma.² 16,000 deaths occur per year in

India alone as a result of chest trauma. Motor vehicle accidents (MVCs) are a leading cause of blunt trauma chest followed by falls from heights, physical assaults and blunt instrument injuries. With improvements in roads and infrastructure along with growing number of vehicles due to urbanization the incidence of road traffic accidents is on the rise and so is the number of blunt trauma cases.³

Blunt trauma chest can result in Rib fractures, flail chest (multiple fractured ribs), sternal fractures, Pneumothorax, hemothorax, and pulmonary contusion, Tracheobronchial

injuries, esophageal injuries, and injuries to the heart and great vessels.⁴

The injuries resulting from blunt trauma chest can compromise breathing and circulation, leading to severe complications and even death. Accurate identification of a patient at high risk for major chest trauma is essential for regulation of over and under triage within a trauma system. Timely treatment is crucial to minimize complications and improve outcomes. The present study focuses on blunt chest injuries, especially rib fractures and associated injuries, presenting our experience in approaching these patients.⁵

PATIENTS AND METHODS

A study of cases of chest trauma admitted in Government General Hospital Kakinada from 1 January 2023, to 31 December 2023 had been carried out. The study was pertaining to blunt chest trauma. Information was obtained directly from the patient whenever possible and from other witnesses of the accident if available.

Number of Patients

143.

Inclusion Criteria

- All patients with blunt trauma chest were included in the study.

Exclusion Criteria

The following criteria were excluded from the study.

- Penetrating chest injury
- Patients who absconded or left against medical advice.

METHODOLOGY

The study was conducted over the patients admitted from casualty, outpatient department and those who transferred from other wards. After eliciting the proper history and mode of trauma, vitals were regarded and initial airway, breathing, circulation, and deformities were assessed without any delay. After stabilizing vitals, the patients who were diagnosed as blunt trauma chest were assessed properly and sent for lab investigations and X-ray done. Those who were in need of intercostal drain (ICD) such as tension pneumothorax, hemothorax, and flail chest were undergone for procedure after proper written consent. The patients were sent for CT chest as a routine for secondary survey. The reports of X-ray chest and CT chest were analyzed and recorded in pro forma. Those patients who were diagnosed with associated injuries such as head injury,

blunt trauma abdomen, and long bone fracture were also included for the study, but after stabilizing from these associated injuries. Those patients who needed ICD insertion were followed up properly by doing repeat X-ray immediately after ICD insertion and on the 3rd day or as needed and after removal of ICD once patient condition improved. The patients were advised for vigorous chest physiotherapy and their improvement was recorded properly. All these data were recorded meticulously in a pro forma and master chart after systematic tabulation, observation, and analysis was done. Summary and conclusion were drawn after discussion with review of literature.

RESULTS

A total of 1012 trauma patients were admitted, of these 143 patients were selected for the study as per our selection criteria and primarily had chest injury. The incidence of chest trauma in this study was 14.13%.

Out of a total of 143 patients, 61 patients were in the age group of 31-40 years constituting maximum number of cases i.e. 24.80%. The next common decade was the 3rd i.e., age group of 21-30 years with 57 patients. The mean average age was 38.56 years. Majority were males comprising of 84.15% (207 cases) whereas females comprised of 15.85%. The male to female ratio in this study was M:F=5.31:1.

The commonest mode of injury was RTA comprising of 71.14%. Next common cause was assault followed by accidental fall accounting for 14 cases (9.79%) and 14 cases (9.79%) respectively. Animal attack consisted of 7 patients of which 6 were males and 1 female which accounted for 4.89% of total. Of the cases of animal attack, pig attack was common with total of 7 cases followed by bull attack (4 cases) and tiger attack (2 cases). We encountered 2 cases of fire arm injury (Table 1).

Considering the nature of injury as accidental or homicidal, it was observed that patients with accidental injury were the major group, comprising of 74.12% of cases with 70 males and 36 females. The most common mechanism of injury was blunt injury comprising of 93.09%. Blunt force was commonly associated with road traffic accidents. Right side of chest was injured in 54.06% cases, whereas left side in 44.72%. Bilateral injury was encountered in only three cases.

Mode of Injury	No of cases		Total	Percentage
	Male	Female		
Road traffic accidents	70	36	106	74.12
Assault	12	2	14	9.79
Accidental fall	11	3	14	9.79
Animal attack	6	1	7	4.89
Fire arm injury	1	1	2	1.39
Total	100	43	143	100

Table 1: Mode of injury in chest trauma patients

Chest injuries	No of cases	Percentage
Skeletal injuries		
Rib fracture (all)	36	26.83
Rib fracture (1-3)	26	18.70
Rib fracture (>3)	10	6.91
Rib fracture (bilateral)	1	0.81
Flail chest	1	0.41
Clavicle fracture	18	13.82
Scapula fracture	1	0.41
Thoracic spine fracture	2	1.63
Diaphragm	1	0.41
Sternum fracture	1	0.41
Pleural and visceral injuries		
Pneumothorax	4	3.25
Haemothorax	9	7.32
Hemopneumothorax	7	5.70
Tension pneumothorax	1	0.41
Lung contusion	10	8.13
Lung laceration	2	1.63
Tracheobronchial injury	1	0.41
Thoracic vascular injury	1	0.41
Cardiac injury	0	0
Pericardial collection	1	0.41
Oesophageal injury	0	0

Table 2: Different injuries encountered in chest trauma patients

Modality of treatment	No. of cases managed without mechanical ventilation	No. of cases managed with mechanical ventilation	Total	Percentage
Conservative	116	1	117	86.59
Tube thoracostomy only	20	2	22	12.19
Thoracotomy with tube thoracostomy	4	1	5	1.22
Total	140	4	143	100

Table 3: Modality of treatment in chest trauma

VAS Score	No of cases	Pain management with IM/IV analgesic alone	No. of cases requiring ICNB	No. of cases requiring epidural analgesia	Percentage of patient with particular VAS score	Percentage of patients requiring additional ICNB/EA with particular
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						VAS score
0	0	0	0	0	0	0
2	5	5	0	0	3.65	0
4	75	75	0	0	54.08	0
6	60	53	7	0	46.35	6.03
8	1	1	0	0	0.41	100
10	1	1	0	0	0.41	100
Total	143	135	7	0	100	-
Percentage	100	94.40	5.60	-	-	-

Table 4: Pain management in chest trauma

Complications of chest injuries	No of cases	Percentage
Pneumonia	4	2.03
Empyema	1	0.41
Atelectasis	4	2.03
Acute respiratory distress syndrome	1	0.41
Pericardial effusion	1	0.41
Bronchopleural fistula	1	0.41
Haemorrhagic shock	1	0.41
Death	2	1.22

Table 5: Complications of chest trauma

DISCUSSION

Chest trauma are one of the common causes of hospital admissions, disabilities, deaths and socioeconomic losses. Modern civilization has led to its rapidly increasing incidence all over the world. The incidence of chest trauma in this study was 14.13%. Similar incidence of 20% were found in study of Kumar et al. This increasing incidence can be due to improper planning and development which results in the hazards of the modern civilization.⁶

The mean average age is 38.56 years ranging from 8 years to 74 years. Similar observations of mean age were recorded by Shorr et al (36.9 years), Shah et al (35 years) and Kulshrestha et al (34.5 years). The higher incidence (48%) in the age group of 21-40 years can be attributed to the fact that this is the most active period of life with more outdoor activities. The most commonly affected age group with blunt trauma chest belongs to young generation who often indulge in vehicular experimental activity (like over speeding etc) at the same time they comprise the important pillars of economy of country, thus increase in incidences will have great bearing in financial loss to the country.⁷ Males outnumbered females by a huge margin with male comprising of 84.15% and male to female ratio of 5.31:1. Dalal et al had a similar finding with male: female ratio of 5.48:1.7. This preponderance of male can be explained by the fact that males have greater exposure to outdoor activities like driving, industrial

work, labour work as they constitute working and earning member in most of the families, whereas females take the responsibility of household work in our region. Other reason being male are usually more involved in quarrels and fights. With the recent changing trends, this ratio may decrease in future.⁸

RTA was the common cause of chest injury comprising of 71.14% of all other modes of injury. RTA was the most common cause in many other studies as well like Shah et al (76%), Dangi et al (80.9%), Dalal et al (66.67%). This may be explained by the fact that rise in number of RTA due to noncompliance to traffic rules by both driver as well as pedestrians, fatigue of the drivers, alcohol consumption during driving, lack of street lights, poor quality of roads, urbanization, population explosion, and tremendous growth in road transport sector.⁹ Next common cause was assault contributing to 11.79%, comparable to study of Dangi et al (9.52%), followed by accidental fall accounting 11.38%, comparable with study of Shah et al (16%). Animal attack, firearm injury contributed to minority of cases in our study with 5.28% and 0.41% cases respectively, whereas in study of Dalal et al it was reported in 2% and 1.49% respectively. Dangi et al reported firearm injury in 4.76% cases.¹⁰

CONCLUSION

Chest trauma contribute significant to both morbidity and mortality especially in adult

male victims of the road traffic accidents. Thus, early diagnosis and rapid management is of paramount importance in chest injuries. The majority of these cases can be managed conservatively. Tube thoracostomy or thoracotomy may be required in the management of life-threatening injuries. Pain management is most important aspect in management of chest trauma which allows patient for early mobilization and reducing complications of chest injury. Use of intercostal nerve block or epidural analgesia should be done if required for pain relief.

REFERENCES

1. Svennevig, J.L.; Bugge-Asperheim, B.; Geiran, O.R.; Vaage, J.; Pillgram-Larsen, J.; Fjeld, N.B.; Birkeland, S. Prognostic Factors in Blunt Chest Trauma. Analysis of 652 Cases. *Ann.*
2. *Chir. Gynaecol.* 1996, 75, 8-14.
3. Vollrath JT, Schindler CR, Marzi I, Lefering R, Störmann P. Lung failure after polytrauma with concomitant thoracic trauma in the elderly: an analysis from the Trauma Register DGU®. *World Journal of Emergency Surgery.* 2022 Dec;17(1):1-10.
4. Murni, I.K.; Duke, T.; Kinney, S.; Daley, A.J.; Wirawan, M.T.; Soenarto, Y. Risk factors for healthcare-associated infection among children in a low-and middle-income country. *BMC Infect. Dis.* 2022, 22, 406
5. Kozanlı, F. Effect of Presence of Rib Fracture on Mortality and Morbidity in Blunt Thoracic Traumas. *Turk. J. Trauma Emerg. Surg.* 2020, 28, 440-446.
6. Alexander, J.Q.; Gutierrez, C.J.; Mariano, M.C.; Laan, T.V.;Gaspard, D.J.; Carpenter, C.; Stain, S.C. Blunt chest trauma in the elderly patient: How cardiopulmonary disease affects outcome. *Am. Surg.* 2000, 66, 855-857.
7. Chabok, S.Y.; Taklimie, F.R.; Malekpouri, R.; Razzaghi, A. Predicting mortality, hospital length of stay and need for surgery in pediatric trauma patients. *Chin. J. Traumatol.* 2017, 20, 339-342.
8. Kuimi, B.L.B.; Moore, L.; Cissé, B.; Gagné, M.; Lavoie, A.; Bourgeois, G.; Lapointe, J. Influence of access to an integrated trauma system on in-hospital mortality and length of stay. *Injury* 2015, 46, 1257-1261.
9. Moore, L.; Stelfox, H.T.; Turgeon, A.F.; Nathens, A.; Bourgeois, G.; Lapointe, J.; Gagné, M.; Lavoie, A. Hospital Length of Stay After Admission for Traumatic Injury in Canada. *Ann. Surg.* 2014, 260, 179-187.
10. Goiburu, M.E.; Jure Goiburu, M.M.; Bianco, H.; Ruiz Díaz,J.; Alderete, F.; Palacios, M.C.; Cabral, V.; Escobar, D.;López, R.; Waitzberg, D.L. The Impact of Malnutrition on Morbidity, Mortality and Length of Hospital Stay in Trauma Patients. *Nutr. Hosp.* 2006, 21, 604-610.
11. Beshay, M.; Mertzluft, F.; Kottkamp, H.W.; Reymond, M.;Schmid, R.A.; Branscheid, D.; Vordemvenne, T. Analysis of risk factors in thoracic trauma patients with a comparison of a modern trauma centre: A mono-centre study. *World J. Emerg. Surg.* 2020, 15, 45.