

**EXPERIENCE WITH CHEST TRAUMA: ANALYSIS OF 400 CASES**Rajendra Prasad Potlabathini<sup>1</sup>, Arun Kanala<sup>2</sup><sup>1</sup>Associate Professor, Department of Cardiothoracic Surgery, Osmania Medical College and Osmania General Hospital, Hyderabad, Telangana.<sup>2</sup>Assistant Professor, Department of Cardiothoracic Surgery, Osmania Medical College and Osmania General Hospital, Hyderabad, Telangana.**ABSTRACT****INTRODUCTION**

There is an increase in traumatic chest injuries in the present days due to increase in road traffic accidents and violence in various forms. Chest trauma cases are usually associated with other injuries also. The most common being head injury, which also incidentally is the most common cause of death in many patients. Complete evaluation of the patient and early intervention can reduce the mortality and morbidity.

**AIMS**

To analyse 400 consecutive cases of chest trauma based on the cause of injury, the type of injury, associated injuries and method of intervention.

**MATERIALS AND METHODS**

The present study is a prospective study. All the cases referred to the Department of Cardiothoracic Surgery, which required hospital admission and intervention were selected for the study.

**RESULTS**

The total number of cases with injuries registered in our hospital in two and a half years were 45,341 out of which 400 cases (0.88%) were traumatic chest injuries. There were 374 (93.5%) adults and 26 (6.5%) children. There were 379 (94.7%) males and only 21 (5.2%) females. Male patients were more as compared to females, the ratio being 18:1. Maximum number of cases 135 (93.7%) were seen in the 21-30 years age group followed by the 31-40 years age group, 110 (27.5%) cases. The mode of trauma was blunt injury in 364 (91%) cases and penetrating type of injury in 36 (9%) cases. The causes of chest trauma were road traffic accidents in 187 cases (46.7%), violence in 170 cases (42.5%) and miscellaneous causes in 52 cases (13%). Associated injuries observed were 265 cases (66.5%) cases. The most common was head injury seen in 73 cases (18.2%) cases. Intervention was done in 331 cases (82.75%). Out of 400 cases, 22 cases (5.5%) had death.

**CONCLUSIONS**

Motor vehicle accidents are the most common cause of traumatic chest injuries. Early arrival to the hospital improves the chances of survival. Patients already in shock at the time of arrival to hospital have poor prognosis.

**KEYWORDS**

Chest Trauma, Head Injury, Penetrating Injuries, Interventions.

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**INTRODUCTION:** Trauma continues to be a major public health problem worldwide as it is associated with high morbidity and mortality both in developed and developing countries. Trauma also reported to be the leading cause of death, hospitalisation and long-term disabilities in the first four decades of life. Thoracic trauma comprises 10-15% of all traumas.

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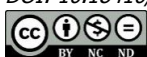
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Thoracic trauma directly accounts for approximately 25% of trauma-related mortality and is a contributing factor in another 25%. Fortunately, over 80% of injuries can be managed nonoperatively utilising tube thoracostomy, appropriate analgesia and aggressive respiratory therapy. The World Health Organisation (WHO) documented over 300,000 deaths in 2008 (9% of all world deaths). There is an increase in traumatic chest injuries in the present days due to increase in road traffic accidents and violence in various forms. Chest trauma cases are usually associated with other injuries also. The most common being head injury, which also incidentally is the most common cause of death in many patients. Complete evaluation of the patient and early intervention can reduce the mortality and morbidity. At the same time, the knowledge about when to



intervene and when to adopt an observation approach is also important.

To analyse 400 consecutive cases of chest trauma based on the cause of injury, the type of injury, associated injuries and method of intervention.

**MATERIALS AND METHODS:** The present study was a prospective study conducted in the Department of Cardiothoracic Surgery at Osmania General Hospital, Hyderabad, over a period of two and a half years from August 2011 to January 2014. All the cases referred to the Department of Cardiothoracic Surgery, which required hospital admission and intervention were selected for the study. The injured patients were first triaged by a specialist in emergency medicine in the emergency department. Patients were then referred to the thoracic surgeon if needed. Patients with poor condition or those with flail chest were admitted to the ICU and mechanical ventilation was used for respiratory deficiency or severe neurotrauma. All patients had analgesics and mucolytic treatment provided with respiratory physiotherapy. Thoracotomy indications were: initial chest tube output >1500 mL or hourly output >200 mL for 4 hours, haemopericardium, prolonged air leakage, radiologic or endoscopic indicators of injury in oesophagus, trachea and bronchi, heart and great vessels. Data was noted according to the patient demographics, the cause of injury, the type of injury, organs/systems involved, the time between the trauma and arrival to the hospital, the presence or absence of alcohol intake prior to the trauma and miscellaneous data such as requirement for blood transfusions and ventilator support.

**RESULTS:** The total number of cases with injuries registered in our hospital in two and a half years were 45,341 out of which 400 cases (0.88%) were traumatic chest injuries. There were 374 (93.5%) adults and 26 (6.5%) children. There were 379 (94.7%) males and only 21 (5.2%) females. Male patients were more as compared to females, the ratio being 18:1.

Age in Years	Number of Cases	Percentage (%)
0-10	14	3.5
11-20	36	9.0
21-30	135	33.7
31-40	110	27.5
41-50	65	16.2
51-60	25	6.2
61-70	15	3.7
<b>Total</b>	<b>400</b>	<b>100%</b>

**Table 1: Age Wise Distribution of Chest Injuries**

Maximum number of cases 135 (933.7%) were seen in the 21-30 years age group followed by the 31-40 years age group, 110 (27.5%) cases. The mode of trauma was blunt injury in 364 (91%) cases and penetrating type of injury in 36 (9%) cases.

Cause	Number of Cases	Percentage (%)
<b>Road traffic accidents</b>		
Two wheelers	97	24.2
Heavy vehicles (Buses, Trucks)	53	13.2
Light vehicles (Cars, Jeeps)	37	9.2
<b>Violence</b>		
Stab injuries	36	9
Assault	124	31
Gunshot	1	0.2
<b>Miscellaneous</b>		
Blast injuries	2	0.5
Fall from height	36	9
Run over by vehicle (Bullock cart, Tractor)	14	3.5
<b>Total</b>	<b>400</b>	<b>100</b>

**Table 2: Causes of Chest Trauma**

The causes of chest trauma were road traffic accidents in 187 cases (46.7%), violence in 170 cases (42.5%) and miscellaneous causes in 52 cases (13%).

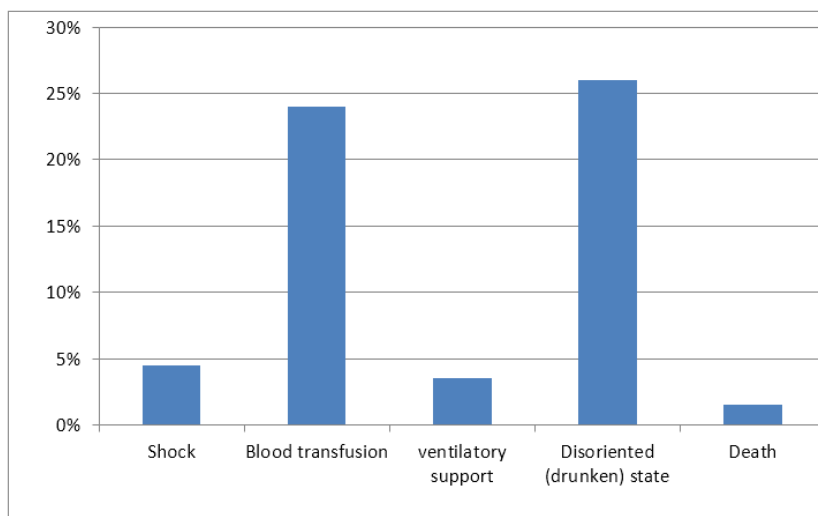
Type of Injury	Number of Cases	Percentage (%)
Soft tissue injury	39	9.75
Multiple rib fractures	53	13.5
Subcutaneous emphysema	46	11.5
Mediastinal emphysema	3	0.75
Haemothorax	98	24.5
Pneumothorax	32	8
Haemopneumothorax	16	4
Flail chest	18	4.5
Sucking wounds	4	1
Lung injury	3	0.75
Heart injury	3	0.75
Mandible fracture	12	3
Diaphragmatic injuries	16	4
Blunt chest injuries	57	14.2
<b>Total</b>	<b>400</b>	<b>100%</b>

**Table 3: Types of Chest Injuries**

Associated injuries observed were 265 cases (66.5%) cases. The most common was head injury seen in 73 cases (18.2%) cases, orthopaedic injury in 17 (4.2%) cases, clavicular fractures in 28 (7%) cases, scapular fractures in 12 (3%) cases, dorsal spine injuries in 14 (3.5%) cases, abdominal injuries in 98 (24.5%) cases, stomach and small bowel injuries 6 (1.5%) cases, liver injuries in 4 (1%) cases, vascular injuries in 6 (1.5%) cases and splenic injuries in 7 (1.7%) cases.

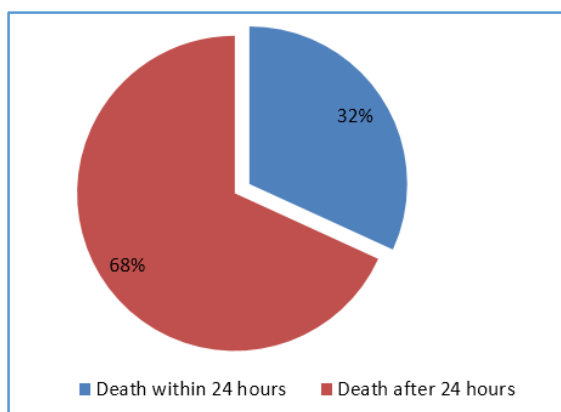
Type of Intervention	Number of Cases	Percentage (%)
ICTD left chest	45	11.25
ICTD right chest	76	19
ICTD bilateral	27	6.75
Total ICTD	148	37
Thoracotomy	3	0.75
Laparotomy	24	6
Thoracotomy and laparotomy	5	1.25
Tracheostomy	3	0.75
<b>Total</b>	<b>331</b>	<b>82.75%</b>

**Table 4: Intervention Done**



**Fig. 1: Data collected in the patients**

The state of shock, present in 18 cases (4.5%), Blood transfusion requirement was seen in 96 cases (24%), ventilatory support was required in 14 cases (3.5%), death occurred in 6 cases (1.5%) inspite the ventilator support. A total of 112 cases (26%) were in the drunken state when they were brought to the hospital. Majority of the patients 360 cases (90%) reached the hospital within two hours.



**Fig. 2: Pie diagram related with hours of death**

Out of 400 cases, 22 cases (5.5%) had death due to sepsis and other associated injuries. Death within 24 hours occurred in 7 patients (31.8%), and death after 24 hours occurred in 15 patients (68.1%).

**DISCUSSION:** Traumatic chest injuries are usually seen on an emergency basis and are the result of various causes. Most common causes are road traffic accidents, blunt injury, domestic or nondomestic violence, fall from heights, etc. Traumatic chest injuries can be penetrating or non-penetrating blunt kind of injuries. Regional differences depending on countries are present such as in some war affected regions (Iraq); violence, gun fire, bullet injuries are more common and these are seen as major public health problems.<sup>[1]</sup> In our study, we had 170 cases (42.5%), which were due to violence and also two cases (0.5%), which were due to blast injuries. In earlier times, penetrating chest injuries were common in the people directly involved in battles. In present days, the same population is faced with more of combination blast injuries. Such injuries are more serious as they use IEDs. The resultant injuries are more severe and involve multiple systems leading to increased mortality.

The mortality in Vietnam for example has increased from 3% to 12%. The people killed-in-action rate has reduced over the years. The mortality has increased in those who survived the first injuries, but subsequently died due to wound complications. Such is the effect of present day war injuries. Not only the military personnel, but the civilian population is also at risk for such injuries. Half of all thoracic injuries that occurred in the battle front on the Global War on Terror have occurred in the civilian population.<sup>[2]</sup> This also increases the load on hospitals and is an economic

burden on the countries especially when the resources are already poor such as in war affected countries.

In a study reported by Martinez et al,<sup>[3]</sup> the most frequent causes of trauma were falls (57.9%) and motor vehicle accidents (15.1%). This study group consisted very senior age patients and hence more incidence of falls leading to traumatic rib fractures and contusions. Chest trauma ranks third behind head and extremity trauma in major accidents in the United States. The motor vehicle accident is the most common aetiology (70 per cent).<sup>[4]</sup> In the present study, road traffic accidents (road traffic accidents) contributed to chest trauma in 187 cases (46.7%) whereas pedestrians who were hit by moving vehicles were 14 (3.5%). Motor vehicle accidents not only cause trauma to chest, but also a significant number of such cases sustain head injury and multiple system injuries. In our study, we encountered 73 cases (18.2%) who also had concomitant head injury. Most of them had met with two-wheeler accidents. In the study reported by Chaturvedi et al,<sup>[5]</sup> incidence of deaths due to two-wheeler RTAs in Indore, India, was 45.67% and in pedestrians, it was 33.33%.

They attributed such high incidence to bad traffic patterns, ignorance about traffic rules and possibly due to lack of advanced facilities in the hospitals. In our study, the maximum number of cases were seen in the third and fourth decades and also most of the patients were males. These findings are similar to the findings of Chaturvedi et al.<sup>[5]</sup> This is due to the increased outdoor activities of the males, which puts them at more risk. In our study, there was a single case (0.25%) of Gunshot Wound (GSW) injury. Ammons et al<sup>[6]</sup> reported that in non-penetrating thoracic GSWs and stab wounds an approach of observation can be adopted. In their study, patients were observed for 6 hours and a repeat chest x-ray revealed 7% cases having delayed pneumothorax. Hospitalisation was avoided in 86% of patients treated according to their protocol. Hence, it is important to assess correctly as to which patients need urgent intervention and which group can be kept under observation.

In our study, paediatric population was also present. Cases in the 0-10 year's age group were 14 (3.5%). Paediatric thoracic injuries are less frequent as compared to adults. Paediatric anatomy and physiology are somewhat different and may cause difficulty in management. Sometimes, rare injuries may remain undiagnosed in children like cardiac injury, etc. because these are rare as such.<sup>[7]</sup> The number of patients in our study above 60 years were 15 (3.75%). As the age increases, comorbidities also increase, thereby increasing the complications. Especially, when chronic obstructive pulmonary disease or conditions which necessitate anticoagulation therapy are present, the risk is more significant. Such patients may require readmittance.<sup>[3]</sup>

In the present study, diaphragmatic injuries were present in 16 cases (4%). In a study by Beal et al,<sup>[8]</sup> diaphragmatic rupture was missed on initial evaluation in 69% cases. They are difficult to diagnose and chest x-ray is often nondiagnostic. As exploratory laparotomy was

performed in most of the patients, the diaphragmatic ruptures could be picked up.

The authors advocate aggressive approach in severely injured patients so as not to miss any lesions. In our study, 3 cases (0.75%) had sustained myocardial injuries. In a study by Fabian et al,<sup>[9]</sup> 40% of those with apparent chest trauma had myocardial contusions. Surgical procedures under general anaesthesia were performed in 66% of the patient's positive for myocardial contusions. None of the patients developed any arrhythmias under general anaesthesia. In the present study, intervention was done in 331 (82.75%) patients. Rest were managed by observation. As reported by Mattox et al<sup>[4]</sup> within the thorax, the chest wall itself is the most often injured. Many of these injuries are of moderate severity and do not require surgical intervention. They recommended careful surveillance of chest trauma patients so as to identify problem cases as soon as possible and to institute corrective treatment.<sup>[4]</sup>

Emergency room thoracotomy is effective in the treatment of penetrating thoracic injuries, but its benefit in penetrating injuries below the diaphragm is not established. Penetrating wounds of the abdomen generally fare badly.<sup>[10]</sup>

Tube thoracostomy is often a lifesaving procedure and easy to perform. Etoch et al reported a complication rate of 21% in 600 tube thoracostomies.<sup>[11]</sup> Grande et al<sup>[12]</sup> have given algorithms for correct airway management. They have also concluded that a truly complete decision tree is very difficult because each patient is different from the other. In the present study, 360 (90%) patients were brought to the hospital within two hours, which helped in early intervention and better prognosis. Total deaths were 22 (5.5%) and most of these patients were already in shock when they arrived at the hospital. The state of shock was already present in 18 cases (4.5%) patients and all of them died.

**CONCLUSIONS:** Motor vehicle accidents are the most common cause of traumatic chest injuries. Increasing traffic and speed have increased the frequency of motor vehicle accidents. Early arrival to the hospital improves the chances of survival. Patients already in shock at the time of arrival to hospital have poor prognosis.

## REFERENCES

1. Hussein AM. A review of 277 cases of patients with chest trauma in the medical city teaching complex. The Iraqi Postgraduate Medical Journal 2014;13(4):599-605.
2. Popper BW, Gifford SM. Wartime thoracic injury: perspectives in modern warfare. Ann Thorac Surg 2010;89(4):1032-1035.
3. Martinez ARJ, Voth HA, Fernandez MC, et al. Evolution and complications of chest trauma. Arch Bronchopneumol 2013;49(5):177-180.
4. LoCicero J, Mattox KL. Epidemiology of chest trauma. Surg Clin North Am 1989;69(1):15-19.
5. Chaturvedi RK, Mishra A, Chaturvedi P. Pattern of head injuries in fatal road traffic accidents in Indore region, MP. JEMDS 2014;3(21):5645-5651.

6. Ammons MA, Moore EE, Rosen P. Role of the observation unit in the management of thoracic trauma. *J Emerg Med* 1986;4(4):279-282.
7. David B, Mark S. Pediatric thoracic trauma. *Critical Care Medicine* 2002;30(11):S409-S415.
8. Beal SL, McKennan M. Blunt diaphragm rupture: a morbid injury. *Arch Surg* 1988;123(7):828-832.
9. Fabian TC, Mangiante EC, Patterson CR, et al. Myocardial contusion in blunt trauma: clinical characteristics, means of diagnosis, and implications for patient management. *J trauma* 1988;28(1):50-57.
10. Bodai BI, Smith JP, Ward RE, et al. Emergency thoracotomy in the management of trauma. *JAMA* 1983;249(14):1891-1896.
11. Etoch SW, Bar-Natan MF, Miller FB. Tube thoracostomy. Factors related to complications. *Arch Surg* 1995;30(5):521-525.
12. Grande CM, Stene JK, Bernhard WN. Airway management: considerations in the trauma patient. *Crit Care Clin* 1990;6(1):37-59.