

Prevalence of Chest Trauma at an Apex Institute of North India: A Retrospective Study

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Citation

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Abstract

Thoracic trauma forms one of the major parts of multiple trauma and is responsible for significant mortality and morbidity specially at younger ages. We carried out a retrospective study to assess the general spectrum of chest injury patients at PGIMS Rohtak in one year. Clinical details of the patients were recorded from their case sheets and were analysed with reference to their age, sex, mode of injury, severity of injury, treatment employed, etc. The majority of the patients could be managed by simple inter-costal drainage and thoracotomy was required only in few patients.

INTRODUCTION

Trauma is the leading cause of mortality and disability, especially during the productive age, and is the third most common cause of death. ¹ Accidents which are unexpected and unplanned events are becoming the major epidemic of the present century. The number of accidental deaths in India is even higher than in the Western World. ¹ Thoracic trauma contributes heavily to these figures besides head injury, abdominal injury and orthopedic injuries. Approximately one quarter of civilian trauma deaths are caused by thoracic trauma and many of these deaths can be prevented by prompt diagnosis and correct management. ² In spite of the high mortality rates, about 90% of the patients with life-threatening thoracic injuries can be managed by a simple intervention like drainage of the pleural space by tube thoracostomy. ³

We carried out a retrospective study to see the total number of chest injury patients, their mode and severity of injury, etc., in the last year at PGIMS Rohtak.

METHODS

Particulars of all patients with chest trauma who required hospitalisation in the last year were recorded and analysed. A patient was labeled as a case of chest injury when he was having injury to the chest associated with fractured ribs with or without haemopneumothorax or injury to the chest with haemopneumothorax even without fractured ribs. A total number of 402 patients were admitted with chest injuries in all the six surgical units of PGIMS Rohtak in the last year.

Details of all these patients were entered in the study from their records with specific reference to age, sex, mode of injury, severity of injury, number of ribs fractured, treatment employed and final outcome.

RESULTS

A total of 1408 patients were admitted to various surgical units of PGIMS Rohtak following trauma in the last year. Out of these, 402 patients were admitted primarily because of chest injury. The rest of the patients were having head injury, abdominal injury or other injuries.

Out of a total of 402 patients, the maximum (139) was in the age group of 21-30 years and the next common decade was the 4th i.e., 31-40 years, with 98 patients. So more than half of all the patients were in the 3rd and 4th decade of life and the incidence was low for very young and very old patients. There were 340 male and 62 female patients. Blunt trauma was responsible for the injury in 351 patients and 51 patients sustained chest injury after penetrating trauma. In blunt trauma, road-side accidents was the commonest cause (268 patients), others being fall from height, assault, etc. (Table I).

Figure 1

Table 1: Mode of Injury

| Blunt Trauma (n=351) | | Penetrating Trauma (n=51) | |
|-----------------------|-----|---------------------------|----|
| Road-side accidents | 268 | Stab | 45 |
| Fall from height | 20 | Gun shot | 6 |
| Assault | 55 | | |
| Animal related causes | 8 | | |

The right side was involved in 211 and the left side in 140 patients with blunt injury, while in penetrating injuries, the right side was affected in 15 and the left side in 36 cases.

Single rib fracture was evident on x-ray in 40 patients, two fractured ribs were seen in 61 patients and in 210 patients there were multiple ribs fractured. In 31 patients, multiple rib fractures were also associated with flail chest. In 50 cases there was no evidence of fractured ribs on x-ray but still they developed either pneumothorax or haemopneumothorax.

Regarding treatment profile, no active treatment was required in 90 cases with either one or two rib fractures on x-rays without any haemopneumothorax. Intercostal drainage was required in 295 patients and thoracotomy was essential in 17 patients (Table II).

Figure 2

Table 2: Treatment Profile

| Treatment Modality | No. of Patients (n=402) |
|------------------------|-------------------------|
| ▪ No Active Treatment | 90 |
| ▪ Intercostal drainage | 295 |
| ▪ Thoracotomy | 17 |

Ventilatory support to maintain O₂ saturation was needed in 27 patients. Out of these 27 patients, ventilatory support was needed in 17 patients because of flail chest and in 10 patients after thoracotomy.

Various indications of thoracotomy are shown in Table III.

Figure 3

Table 3: Indications of thoracotomy

| Indications | No. of Patients |
|------------------------|-----------------|
| ▪ Massive bleeding | 9 |
| ▪ Ruptured bronchus | 2 |
| ▪ Cardiac tamponade | 1 |
| ▪ Diaphragmatic hernia | 3 |
| ▪ Others | 2 |

In the majority of patients i.e., in 295 cases, tube thoracostomy was the main treatment employed. Initially, we were treating these cases by simple intercostal drainage (i.e., 198 patients) and they required tube drainage for 2-9 days. And lately we have started applying negative suction to the drainage system (i.e., 97 patients) requiring intercostal drainage for 2-6 days.

If we analyse the final outcome of all the chest injury patients (402), 343 patients were discharged in satisfactory condition within 7-10 days, while hospital stay was prolonged in 36 patients because of some complications of ICD and 23 patients could not be saved despite adequate and aggressive treatment. Complications seen after ICD were residual haemothorax, recurrent pneumothorax and empyema (Table IV).

Figure 4

Table 4: Complications of ICD

| Complications | No. of Patients (n=36) | Treatment Employed |
|--------------------------|------------------------|-----------------------------|
| ▪ Residual haemothorax | 21 patients | |
| | - 17 | USG-guided aspiration |
| | - 04 | Repeat ICD |
| ▪ Recurrent pneumothorax | 5 patients | |
| | - 04 | Conservative |
| | - 01 | Repeat ICD |
| ▪ Empyema | 10 patients | |
| | - 05 | Prolonged ICD |
| | - 05 | Thoracotomy & Decortication |

Out of 10 patients with empyema, 5 were treated by prolonged ICD and the remaining 5 developed chronic empyema with thickened pleura requiring thoracotomy with decortication.

Out of 23 patients who expired, 12 were having multiple fractured ribs (7 of them were also having associated abdominal injury) and 10 patients were having flail chest. One patient died after thoracotomy in the postoperative period. Thoracotomy was required for massive bronchus injury in this patient, which was repaired but the patient developed an air leak 5 days after the operation and ultimately died because of ARDS (Table V).

Figure 5

Table 5: Final Outcome

| Final Result | No. of Patients |
|-----------------|-------------------------|
| ▪ Discharged | 343 |
| ▪ Complications | 36 |
| ▪ Deaths | 23 |
| | * 12 – Multiple ribs # |
| | * 10 – Flail chest |
| | * 1 – After thoracotomy |

DISCUSSION

Trauma is the leading cause of mortality and morbidity during the first four decades of life, and one of the commonest causes of death. In our series, about one quarter of civilian trauma was constituted by thoracic trauma which is consistent with the literature.² More than half of the patients were in the 3rd and 4th decades of life and the incidence was low in very young and very old patients. The higher incidence in young age was due to the fact that this is the most active period of life. The higher percentage of younger age group patients in the present study is comparable to studies of Muckart and Locurto et al.^{4,5} Males outnumbered females by a huge margin because of their greater exposure to outdoor activities like drivers, industrial workers and labourers etc. These findings were comparable to findings of other studies.⁵

Blunt trauma, mainly road-side accidents formed the most common cause of chest injury, followed by blunt assault, stab by knives and falls etc. Increased automobile traffic and ever increasing population together with intentional or unintentional ignorance of traffic rules account for the predominance of road-side accidents producing chest trauma. These findings were in accordance with the studies of Helling and Mattox, in which road accidents constituted the maximum number of cases.^{6,7} The right side of the chest was involved commonly after blunt injury while left side involvement was more common after penetrating injuries, which is consistent with assault by a right-handed assailant. Muckart et al. have observed a similar finding in which 61% of stab wounds occurred in the left pleural cavity.⁴

In our study, the majority of patients (210) had fractures of more than two ribs and additionally 31 patients had flail chest; 101 patients had fracture of either one or two ribs and most of them could be managed by just observation with check x-ray of the chest after 24 hours of injury. With single or two rib fractures the incidence of pneumothorax/haemothorax is not as high but there is increasing likelihood of this complication as the number of fractured ribs increases.⁸ Flail chest was present in 31 patients in our series which was consistent with Pate who described flail chest occurring in about 10 percent of chest trauma patients.⁹

Regarding treatment profile, intercostal drainage was required in 295 patients and thoracotomy was needed in 17 patients only. Various indications of thoracotomy were as per Table III. The commonest indication was massive bleeding, following ICD. Earlier we were carrying out chest drainage by simple underwater seal drainage but recently we have started applying negative suction to the pleural drainage system. Out of 295 patients, 198 patients were treated by simple I.C. drainage. Time taken for full expansion of the lung and removal of the chest tube was 2-9 days in Group A and 2-6 days in Group B. So the chest tube was required for a lesser duration in Group B patients. In a study by Locurto, the chest tube was kept for an average 4.5 days with simple underwater seal drainage.¹⁰

Residual haemothorax was the commonest complication in our series, 17 of which were treated by simple aspiration while the remaining 4 required repeat ICD. Drummond observed residual haemothorax in about 15% of patients with haemopneumothorax where simple ICD was done.¹¹ Empyema was seen in 10 patients, 5 of which were treated by prolonged ICD and the remaining 5 developed chronic empyema with thickened pleura requiring thoracotomy and decortication later on. The incidence of empyema has been reported about 2 to 3 percent in patients with chest injury requiring tube thoracostomy in various studies.^{6,12} None of the patients in our series had diaphragmatic, hepatic, stomach or splenic injury during this procedure. The reason was that in all the patients, tube thoracostomy was done in the 5th intercostal space in the midaxillary line with proper technique.

Overall, there were 23 deaths in the series, with mostly patients having multiple fractures with flail chest and in some patients there were associated abdominal injuries. The mortality rate after severe chest injury was comparable with

other studies reported in the literature.¹²

After comprehensive review of the present study, it is concluded that:

- Chest injury occurs in a significant number of trauma patients and commonly affected victims are males of productive age.
- The majority of these patients can be managed by simple intervention i.e., intercostal drainage and only less than 10% require thoracotomy.
- For ICD, results of negative suction pleural drainage are better as compared to simple underwater seal drainage.

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