

An Analytical Study on Blunt Trauma to Chest Wall and Its Management -A Prospective Study

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Abstract

Blunt injuries of the chest have a positive correlation with mortality and morbidity¹. Major portion of the blunt injuries is constituted by rib fractures. The mortality and morbidity increases with an increased frequency of rib fractures. This study aimed to determine the pathologies associated with blunt chest trauma and to analyze the accurate identification of patients at high risk for major chest trauma like hemothorax, pneumothorax, for ICD insertion and its associated complications like atelectasis and pneumonia. From June 2018 to October 2020, a prospective study was done among 100 patients using purposive sampling. Patients of all age group with blunt chest wall trauma with documented radiographic evidence of hemothorax or pneumothorax (USG/CT SCAN) were chosen. Data was collected with regards to age, demographic characteristics, socio economic status, detailed history and type of injuries including patient's complaints and duration of complaints. The mean age of the participants is 44.79 years (S.D=15.9 years) ranging between 12-88 years. Majority of the patients were males (n=69, 69%). In 62% of the patients, the indication was pneumothorax, in 33% of the cases, it was hemothorax while in 5%, it is hemopneumothorax. In around 64% of cases, there were nil complications, in 17% of cases; pneumonia was reported, in 15% of cases atelectasis was seen while wrong placement was seen in 4% of the cases. In conclusion, there are three major treatment modalities for chest wall trauma namely surgical rib fixation, epidural analgesia and trans-disciplinary approach. All these approaches are targeted to achieve better hospital outcome, reduce duration of hospital stay, and avoid mortality and morbidity. Multidisciplinary approach to patient care in cases with blunt chest trauma is therefore warranted. Future studies must be done to assess the effectiveness of various approaches like mobilisation, pain management and respiratory care.

Keywords: Blunt trauma, Chest wall injuries, Rib fractures, Prospective Study, Tamil Nadu

Date of Submission: 20-01-2022

Date of Acceptance: 03-02-2022

I. Introduction

Blunt injuries of the chest have a positive correlation with mortality and morbidity¹. Major portion of the blunt injuries is constituted by rib fractures. The mortality and morbidity increases with an increased frequency of rib fractures. More fractures lead to higher incidence of complications^{2,3}. Especially among the elderly, there is a 19% increase in mortality with each additional rib fracture while the risk of developing pneumonia is at 27%^{3,4}. The complications are predominantly respiratory which is a resultant of the rib fractures. The rib fractures leads to mechanical instability and also splinting the thorax leads to reduced ventilation⁵. The complications are significant even with isolated rib fractures especially in the elderly population^{6,7}. Subsequently, it leads to decreased volume of the lung, atelectasis, pneumonia and respiratory failure requiring ventilation and leads to death⁸. Prolonged hospitalisation leads to higher incidence of deep venous thrombosis^{9,10}. The treatment of blunt chest trauma uses analgesia along with surgical management followed by physiotherapy, respiratory care and early mobilisation^{11,12}. Lack of treatment on time leads to long term complications, pulmonary infections, physical impairment, longer duration of hospital stay and increased burden on the healthcare resources¹. Improper pain management also results in poor appetite, improper sleep, cognitive stress, lack of proper mobility and decreased quality of life¹³. This study aimed to determine the pathologies associated with blunt chest trauma and to analyze the accurate identification of patients at high risk

for major chest trauma like hemothorax, pneumothorax, for ICD insertion and its associated complications like atelectasis and pneumonia.

II. Methods

From June 2018 to October 2020, a prospective study was done among 100 patients using purposive sampling. Patients of all age group with blunt chest wall trauma with documented radiographic evidence of hemothorax or pneumothorax (USG/CT SCAN) were chosen. Hemodynamically unstable patients and those with penetrating trauma to the chest were excluded from the study. Data was collected with regards to age, demographic characteristics, socio economic status, detailed history and type of injuries including patient's complaints and duration of complaints. A detailed general examination is done and hemodynamic stability is ensured. The following data was extracted from the patient's history, clinical examination and follow up;

1. Patient selection,
2. Nature and time of accident leading to injury
3. Clinical findings
4. Laboratory investigations
5. USG abdomen findings
6. Diagnostic tests
8. Complications during hospital stay and on subsequent follow up

Patients selected for non-operative/conservative was given bed rest and subjected to clinical examination including hourly pulse rate, blood pressure, respiratory rate and serial clinical examination of abdomen. FAST was used when needed for follow up.

III. Results

Table 1 and Figure 1 show the age distribution of the participants. The mean age of the participants is 44.79 years (S.D=15.9 years) ranging between 12-88 years. Majority of the patients were males (n=69, 69%) while the rest were females (n=31, 31%) [Table 2]. In 62% of the patients, the indication was pneumothorax, in 33% of the cases, it was hemothorax while in 5%, it is hemopneumothorax [Table 3]. In around 64% of cases, there were nil complications, in 17% of cases; pneumonia was reported, in 15% of cases atelectasis was seen while wrong placement was seen in 4% of the cases [Table 4].

Parameters	Age distribution (in years)
Mean	44.79
Median	42.00
Mode	55.0
Std. Deviation	15.98
Minimum	12.0
Maximum	88.0

Table 1: Age distribution of the participants

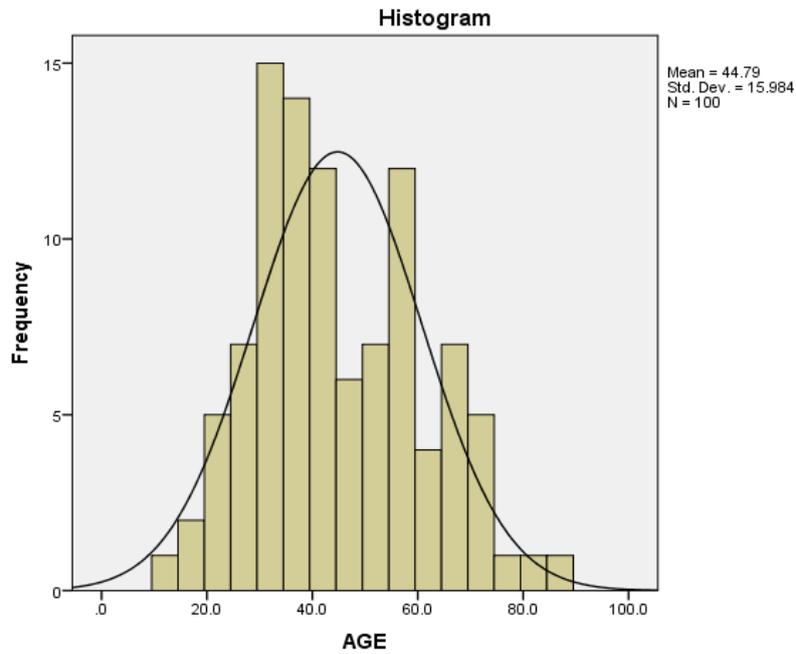


Figure 1: Age distribution of the participants

S.No	Indication	Frequency	Percentage
1	Male	69	69
2	Female	31	31
	Total	100	100

Table 2: Gender distribution of the participants

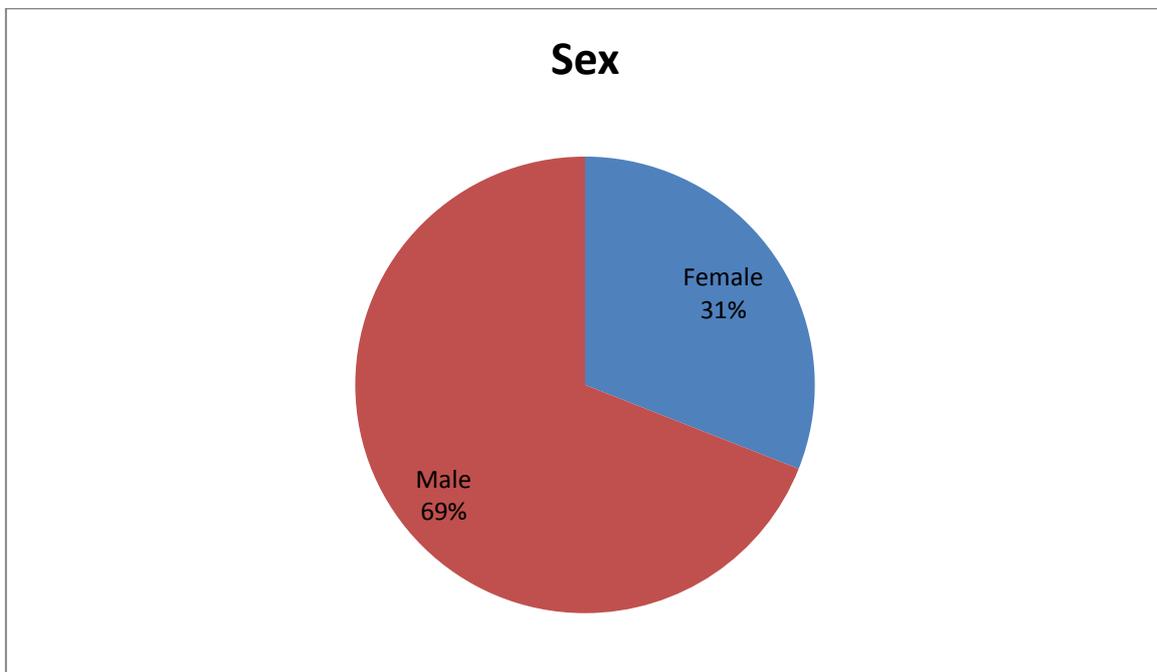


Figure 2: Gender distribution of the participants

S.No	Indication	Frequency	Percentage
1	Pneumothorax	62	62
2	Hemothorax	33	33
3	Hemopneumothorax	5	5
	Total	100	100

Table 3: Indication

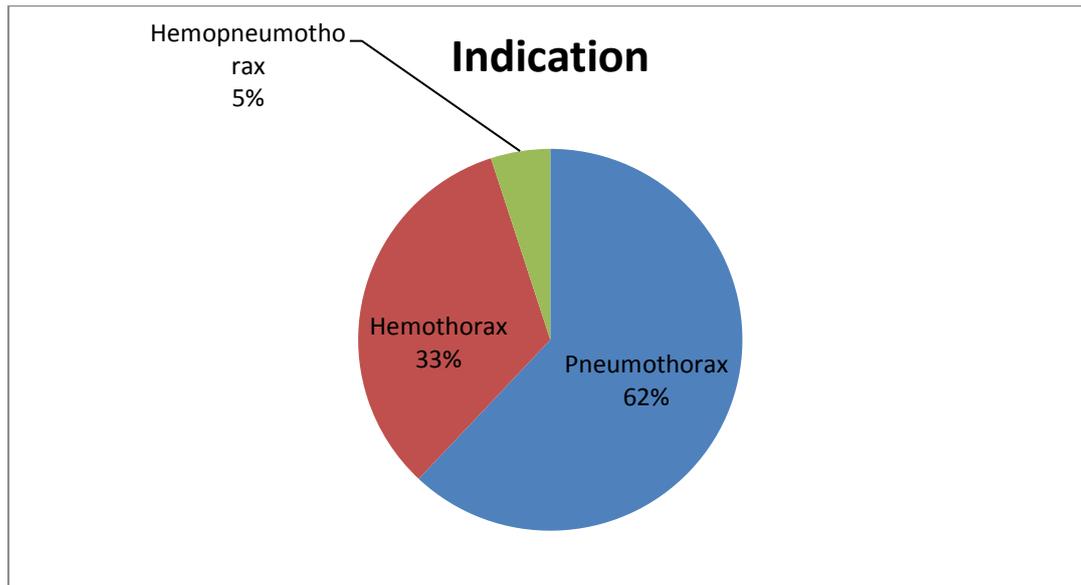


Figure 3: Indication

S.No	Complications	Frequency	Percentage
1	Atelectasis	15	15
2	Pneumonia	17	17
3	Wrong Placement	4	4
4	Nil	64	64
	Total	100	100

Table 4: Complications

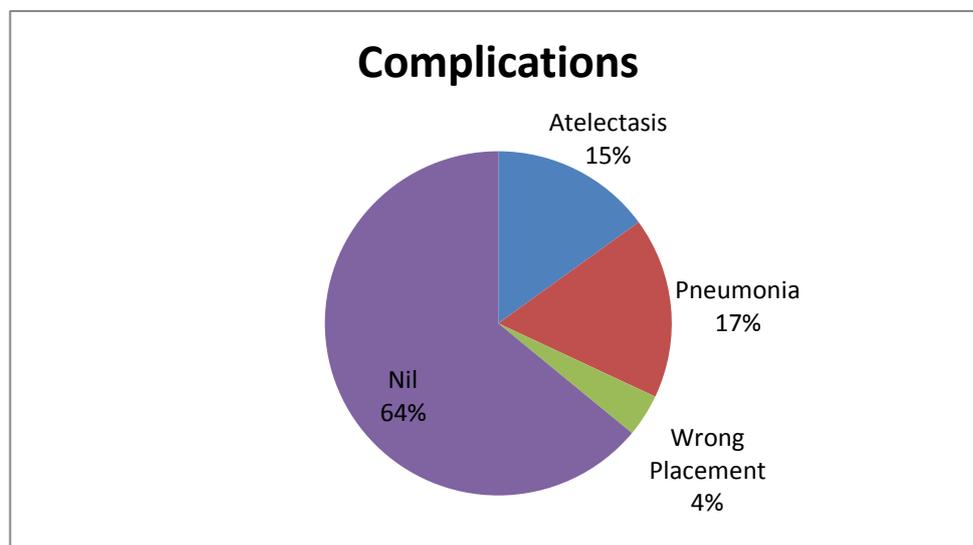


Figure 4: Complications

IV. Discussion

The incidence of non-penetrating chest injuries are common in the general population. The most commonly reported reason for chest wall trauma is road traffic accidents¹⁴. Rib fractures are the most commonly associated pathology in 35-40% of the cases¹⁵. Studies suggest that hospitalisation is required for associated injuries, pulmonary complications and pain control¹⁶. In this study, 62% of the patients had pneumothorax, 33% of the cases had hemothorax and 5%, had hemopneumothorax. In around 17% of cases, pneumonia was reported, in 15% of cases; atelectasis was seen while wrong placement was seen in 4% of the cases. Blunt injuries without complications can be treated in the outpatient department¹⁷. All cases of rib fractures must be reassessed after 48-72 hours of initial assessment. This is due to the fact that pulmonary complications surface late¹⁸. More than two rib fractures is an indicator of severe injury. Studies show that mortality rate is less (0.2%)

in no rib fractures and high in cases with more than two rib fractures (4.7%)¹⁹. Vascular injuries were not reported in our study. Few studies show associated vascular injuries²⁰.

In conclusion, there are three major treatment modalities for chest wall trauma namely surgical rib fixation, epidural analgesia and trans-disciplinary approach. All these approaches are targeted to achieve better hospital outcome, reduce duration of hospital stay, and avoid mortality and morbidity. Multidisciplinary approach to patient care in cases with blunt chest trauma is therefore warranted. Future studies must be done to assess the effectiveness of various approaches like mobilisation, pain management and respiratory care.

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