



**PROFILE OF TRAUMATIC CHEST INJURY PRESENTING TO TERTIARY CARE
CENTRE IN EASTERN NEPAL**

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Article Received on 04/02/2023

Article Revised on 24/02/2023

Article Accepted on 17/03/2023

ABSTRACT

Background: Chest injury is a major public health problem and is associated with a high risk of mortality. Respiratory complications may necessitate prolonged ventilation and result in death. The chest injury has become a major bulk of trauma cases presenting to our center. Therefore, we studied epidemiological profile and treatment outcomes of these patients presenting to our hospital. **Patients and Methods:** We reviewed our experience with 164 patients with blunt chest injuries who were admitted over a 2-year period from January 2016 to December 2017. We recorded demographic profile, mode of injury, associated injury commonly managed by surgical or conservative methods the frequency and the pattern of chest injury patients, duration of hospital admission, injury mechanism, ventilator support requirement, associated injuries, ICU days, total length of stay (LOS), outcomes, prevalence and incidence of different chest injury patients. **Results:** Mean hospitalization time was 8.03 days. Eleven patients (6.7%) were admitted in the ICU and the mean length of stay was 6 days. 95.2% patients were improved and discharged, 3.0% were referred and 1.8% expired. Out of 164 patients, 38(23.2%) patients received conservative analgesia and tube thoracostomy was done in 137(83.5%) patients. Eight patients were managed with other thoracic procedures and 15(9.1%) were not intervened. Four patients (2.4%) had undergone Open thoracotomy. The number of rib fractures was significantly related with the presence of hemothorax or pneumothorax. **Conclusion:** Thoracic injury is common injury in patients with fall from height and Road traffic accidents. Achieving better results in the treatment of patients with chest wall injury depend on a variety of factors. In case of associated extra thoracic injury, multidisciplinary approach is essential for good outcome. Urgent preventive measures targeting at reducing the occurrence of fall injury and road traffic accident is necessary to reduce the incidence of chest injuries.

KEYWORDS: Blunt trauma; Chest injury; Rib fracture, Hemothorax.

INTRODUCTION

Chest injury is a major public health problem. It compromises 10-15% of all traumas and 25% of death due to trauma occurs because of chest injury. Chest trauma is an important cause of preventable death, especially in young men between the ages of 20 and 30. The injuries are due to auto accidents (particularly motorcycle ones) and intentional injuries, stabbing and gunshot wounds, with variable frequency according to the region studied.^[1-3]

The history of chest trauma is as old as that of man itself. One of the earliest writings of chest trauma is found in the Edwin Smith Surgical Papyrus, written in 3000 BC.^[4]

Over the last century, there has been considerable reduction in the mortality of chest trauma owing to improved perioperative care, availability of positive pressure ventilation, increasing availability of antibiotics,

advent of radiologic techniques, introduction of emergency thoracotomy and improved lung toilet measures etc.^[4,5]

Chest trauma implies trauma to anyone or combination of different thoracic structures, which can arbitrarily be divided into 4 distinct anatomical regions i.e., the chest wall, the pleural space, the lung parenchyma and the mediastinum.^[6]

Trauma is one of the top-ranking causes of accidental or unnatural deaths. Chest trauma is a significant source of morbidity and mortality worldwide.^[7]

Overall, it accounts for 20-25% of all trauma-related deaths and is implicated in an additional 25% of patients, who died from injuries. In most cases, blunt chest trauma is by far the commonest and Road Traffic Accidents (RTAs) account for 70-80 % of such injuries. Firearm

Injuries (FAIs), falls from height, blasts, stabs and various acts of violence are the other causative mechanisms.

The civil unrest over the last few years have brought to our hospital a very large number of chest injury patients due to warfare injury ranging from trauma by simple domestic weapons to high-speed missiles. On the other hand, our hospital still caters to the large number of chest injuries due to fall from height.

The chest injury has become a major bulk of trauma cases presenting to our center second to head injury. Therefore, we studied epidemiological profile and treatment outcomes of these patients presenting to our hospital.

PATIENTS AND METHODS

This retrospective study was conducted at a teaching hospital BPKIHS in Eastern Nepal, where most trauma patients are transferred for treatment. Advanced Trauma Life Support guidelines were used for the initial evaluation. All patients of chest injury irrespective of age, sex and mode of injury presenting to BPKIHS hospital were included in this study.

We reviewed the medical records of all patients in our trauma registry to identify those who underwent chest radiography (CXR) and computed tomography (CT) scans of the thorax for thoracic injury diagnosis on arrival at our ED from January 2016 to December 2017. We recorded demographic profile, mode of injury, associated injury commonly managed by surgical or conservative methods the frequency and the pattern of chest injury patients, duration of hospital admission, injury mechanism, ventilator support requirement, associated injuries, ICU days, total length of stay (LOS), outcomes, prevalence and incidence of different chest injury patients. Because it is a specialized hospital, some

patients with trauma are referred to our hospital after first management was done in the others. Fractures of the bony thorax was especially concerned, additionally injuries other than bony thorax were also considered. All cases were evaluated for the presence or absence of pneumothorax, hemothorax, fractured ribs, flail chest, subcutaneous emphysema, pneumomediastinum, and mediastinal hematoma. Patients were excluded from this study if they had exhibited organ dysfunction or serious disease before injury, experienced an out-of-hospital cardiac arrest, or had incomplete data. After ethical clearance from the Institutional Review Committee of BPKIHS, relevant information for this study were collected from the medical record section. Data will be entered in Microsoft Excel and converted it into Statistical Package for Social Sciences Version Software (SPSS) for statistical analysis. For Descriptive variables, data were summarized using text, frequency distribution tables and also the Pearson chi-square test was used for categorical variables. The value of $P < 0.05$ was considered statistically significant.

RESULT

A total number of 164 patients of thoracic injury were studied. Their ages ranged from 8 to 84 years with a mean of 48.44 years.

In the age group distribution of patients, the most common age group of presentation was between 51-70 years of age with peak age incidence 51-60 years.

There were 139 (84.8%) males and 25 (15.2%) females with the male to female ratio of 5.56:1 with a male predominance in each age group.

The majority of patients 90(54.9%) sustained fall injuries. The remaining 74 (45.1%) patients had other type of injuries as in table 1.

Table 1: Mode of injury.

Mode of injury	Frequency	Percent
Fall injury	90	54.9
Road traffic accident	36	22.0
Physical assault	19	11.6
Animal attack	11	6.7
Penetrating injury	8	4.9
Total	164	100.0

Table 2: Mode of Injury and Mortality cross tabulation.

Mode of injury	Outcome			Total
	Expired	Improved	Referred	
Penetrating injury	0	8	0	8
Animal attack	0	11	0	11
Fall Injury	2	86	2	90
Physical assault	0	18	1	19
Road traffic accident	1	33	2	36
Total	3	156	5	164

Pearson chi-square 3.324 (Insignificant)

The mechanism of injury was not significantly associated with length of hospital stay ($P > 0.05$) and mortality ($P > 0.05$). Fall injury was the most common cause of injuries

affecting 90(54.9%) of patients followed by road traffic accident of 36 (22%). (Table-3)

Table 3: Mode of Injury and Total hospital stay cross tabulation.

Mode of injury	Total hospital stays (days)							Total
	0-5	6-10	11-15	16-20	21-25	26-30	>30	
Penetrating injury	3	4	1	0	0	0	0	8
Animal attack	5	4	2	0	0	0	0	11
Fall injury	28	44	11	3	1	1	2	90
Physical assault	9	6	3	1	0	0	0	19
Road traffic accident	13	15	7	0	1	0	0	36
Total	58	73	24	4	2	1	2	164

In this study, the cause of injury did not significantly affect the outcome of thoracic injury patients in terms of either length of hospital stay ($P > 0.05$) or mortality ($P > 0.05$). Rib fractures, hemothorax, pneumothorax, hemopneumothorax and flail chest were the most common type of injuries accounting for 56.1%, 43.3%, 17.1%, 14.6% and 12.2% respectively.

Associated extra-thoracic injuries were noted in 67.2% of patients, out of which head/neck (17.1%), musculoskeletal injuries (28.7%), abdominal injury

(23.8%) were commonly seen. Subcutaneous emphysema was present in 54.9% of the patients.

Complications were not significantly related with associated extra thoracic injury. All the patients had chest radiographs done; the commonest abnormal findings were rib fractures (56.1%). Ultrasonography chest was done in 61 patients and abnormal findings were detected in 56 patients. CT scan of Chest was done in 8 patients and abnormality detected in 7 patients out of which 3 patients had lung contusion. (Table-4).

Table 4: Associated other injury with complication.

Associated other injury	Complications		Pearson Chi-Square
	Present	Absent	
Head injury	17	11	1.637
Abdominal injury	21	18	7.047
Musculoskeletal injury	35	12	0.444

Out of 164 patients, 38(23.2%) patients received conservative analgesia and tube thoracostomy was done in 137(83.5%) patients. Eight patients were managed

with other thoracic procedures and 15(9.1%) were not intervened. Four patients (2.4%) had undergone Open thoracotomy.

Table 5: Management of the patients.

Management of the patients	Frequency	Percentage
Tube thoracostomy	137	83.5
Open thoracotomy	4	2.4
Other thoracic procedure	8	4.8
No intervention	15	9.1
Total	164	100

115(93.18%) of the patients with either hemothorax, pneumothorax or hemopneumothorax were managed with tube thoracostomy.

Table 6: Type of Injury and intervention.

Injury type	No of cases	Tube thoracostomy
Hemothorax	71	67
Pneumothorax	28	26
Hemopneumothorax	24	22
Total	123	115

Eleven patients (6.7%) were admitted in the ICU and the mean length of stay was 6 days. Out of the 11 patients,

one was referred, one expired and remaining patients improved.

The average duration of hospital stay was 8.03 days with Standard deviation 6.152. The overall hospital stay ranged from a minimum of 1 day to maximum of 60 days.

95.2% patients were improved and discharged, 3.0% were referred and 1.8% expired. The mode of injury and duration of hospital stay had no significant relation to the outcome of the injury.

DISCUSSION

Trauma is a major public health problem. It is the leading cause of death and disability in the first four decades of life and is the third most common cause of death overall. In organized trauma Centre, the outcome of the injury is much better.^[14] In our study majority of patients were of age group 51- 70 years (40.8%). This is comparable to study by V O Adegboye et al.^[15] Majority of patients who sustained injuries were male (84.8%). Similar demographic observation was also reported by other authors.^[16] The reason for male predominance among chest injury patients in this age group is probably that males are more mobile and relatively males are taking outdoor activities. Most patients in this study sustained blunt chest injuries related to fall injury (54.9%) and Road traffic accident (22%) which is comparable to other studies.^[13] The high incidence of blunt chest injuries in this study is explained by the fact that those patients who had blunt chest injuries were mostly involved in fall injury and road traffic accidents due to hilly geographic region and reckless driving over poor-quality roads in this region. The common type of injuries were rib fractures (56.1%), hemothorax (43.3%), pneumothorax (17.1%), hemopneumothorax (14.6%) and lung contusion. These types of injury are comparable with other studies.^[18] In the present study, the mode of injury was insignificant with the length of hospital stay and mortality. This finding reflects the low mortality rate among thoracic injury patients.^[19]

Patients in our study had Musculoskeletal injury followed by Abdominal injury and Head injury as part and parcel of extra thoracic injury. This is in contrast to study by Atri Mohan et al.^[18] where majority of extra thoracic injury were head injury. This difference could be due to the fact that majority of patients in our study sustained fall injuries as a result of which fractures of limbs were commonly seen explaining the associated musculoskeletal injury as the commonest one.

In this paper, the presence of extra thoracic injury didn't significantly affect the outcome of injured patients. This pattern of associated extra-thoracic injuries in this study is in contrast with findings from other studies.^[19] This is because majority of patients in our study sustained musculoskeletal injury in contrast to head injury which could explain the significant difference in mortality as presence of head injury is associated with higher chances of mortality and complications. But it is also true that Associated injuries increase the risk of complications in

patients with chest injuries.^[20] Early recognition and treatment of associated extra-thoracic injuries is important in order to reduce mortality and morbidity associated with thoracic injuries.

The majority of the patients were managed by simple surgical procedure by tube thoracostomy (83.5%). This is in agreement with various authors.^[21,22] Very few numbers of cases (four) had undergone more invasive procedure like open thoracotomy. In thoracotomy, extensive surgery was not required which is supported by many literatures.^[23] This simple procedure can be readily performed in health post level that can be performed by trained medical officer, which is in favors with other studies.^[24]

The overall mean length of hospital stays in this study (8.03days) was lower compared to that reported by Atri et al in India and Monafisa K Lema in Tanzania and in the Nigerian study.^[18,25] The length of hospital stay is an important measure of morbidity. Estimates of length of hospital stay are important for financial reasons, and accurate early estimates facilitate better financial planning by the payers.

Eleven of the patients were treated in ICU in our study. The overall mortality rate in this study was 1.8% which is comparable to that found in Nigeria and in other study but relatively lower than that reported in other studies.^[26,27]

The reason for low mortality rate in the present study is that most of the patients were not severely injured, even when there was an associated extra thoracic injury, it belonged to musculoskeletal type rather than head injury which has comparably better prognosis.

Limitation

Limitation of our study includes small sample size which might not be representative of whole population. The data given to us were not complete such as the time of injury and time of arrival were missing. Furthermore, the X-ray, USG and CT findings were not recorded properly which has been a major hindrance for our study for more in-depth analysis.

CONCLUSION

Thoracic injury is common injury in patients with fall from height and Road traffic accidents. Depending upon the mode of injury, patients can be treated effectively with good outcome. In case of associated extra thoracic injury, multidisciplinary approach is essential for good outcome. Early intervention with tube thoracostomy has been the mainstay in treatment which can be readily performed even in rural settings where tertiary trauma care is absent. Urgent preventive measures targeting at reducing the occurrence of fall injury and road traffic accident is necessary to reduce the incidence of chest injuries.

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