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Epidemilogical Analysis of Thoracic Trauma Outcomes at A Tertiary Care Center in North Central Rajasthan

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Abstract

Introduction: Thoracic trauma is a leading cause of morbidity and mortality all across the world. Current study was conducted to study the incidence of thoracic trauma, various etiological factors, type of thoracic trauma, various investigations, management of thoracic trauma, morbidity and mortality in thoracic trauma.

Methods: A prospective observational study was conducted at Trauma center in Department of General Surgery, Sardar Patel Medical College, Bikaner in 150 patients primarily admitted for thoracic trauma from November 1, 2020 to October 31, 2022. All cases were managed in Emergency Department with history noted, clinical examination performed and initial management done as per ATLS guidelines. Definitive management done according to clinical and radiological investigations. Final outcome (death/discharge) was noted with discharged patients were followed for one month.

Results: Most common affected group was male of 3rd-4th decade, with mean age of 37.67 years and male: female ratio of 4.6:1. Road traffic accident (RTA) was the commonest cause (60.0%), followed by assault (21.43%) and fall from height (13.57%) among blunt force which was the most common mechanism (93.33%). Rib fracture was present in 90.67%, followed by pneumothorax (62.%), hemothorax (56%) and hemopneumothorax (48%). All patients were managed conservatively with tube thoracostomy done in 32% cases. Mortality rate was 11.33%. Average length of hospital stay was 8.91 days.

Conclusions: Thoracic trauma commonly affects young males with RTA causing significant morbidity and mortality. Most of patients can be treated conservatively.

Keywords: Trauma, Thorax, Thoracotomy, Thoracostomy , Chest Tube, Pneumothorax , Hemothorax

Introduction

Thoracic trauma is a leading cause of morbidity and mortality all across the world. Chest trauma ranks third behind head and extremity trauma in major accidents in USA.[1] Approximately, 16,000 deaths per year in India alone are a result of chest trauma. Chest trauma contributes to major accidental injuries in India, due to increased incidence of vehicular accidents (6% of global vehicular accidents).[2] Chest trauma commonly affects young males.[3]

After stabilization of patient, X-Ray chest is first investigation in suspected chest injury and thoracic ultrasonography may be implemented in the focused assessment sonography in trauma (FAST) to diagnose pleural effusion, pneumothorax or pericardial effusion.[4]

Blunt trauma commonly results in chest wall injuries like rib fractures and pleural rupture; which may cause derangements in the flow of air, blood, or both.

Outcome predictors are road traffic accidents, hemodynamic status upon arrival, GCS upon arrival, ICU admission, ventilator use, and complications of therapy.[5]

Morbidity and mortality can be prevented by timely initial resuscitation and correct diagnosis as well as management. About 25% of traumatic deaths results from chest injuries, yet more than 85% of chest injuries undergoing hospital evaluation are appropriately managed with no more than a closed tube thoracotomy while only few will require thoracotomy.[6]

Available data is inadequate about proportion or overall burden of these injuries in most of the developing countries including ours.

Therefore, the present study was conducted in patients admitted at Trauma centre, in Department of General Surgery, Sardar Patel Medical College, Bikaner to study the incidence of thoracic trauma, various etiological factors, type of thoracic trauma, various investigations and their significance in thoracic trauma, management of thoracic trauma, morbidity and mortality in thoracic trauma.

Methods

The present study was a prospective observational study conducted Trauma centre in Department of General Surgery, Sardar Patel Medical College, Bikaner. The study was initiated after obtaining approval from the institutional ethics committee and department of surgery. The study included 150 patients primarily admitted for chest trauma from November 1, 2020 to October 31, 2022. All cases were immediately attended in the emergency department with history noted, clinical examination performed and initial management done as per ATLS guidelines. Radiological, blood investigations done and subsequent management done according to clinical and radiological findings. Additional workup like blood grouping and cross matching arterial blood gas, ultrasonography of chest and abdomen, computed tomography or other radiological investigation as and when required were done and recorded. Both blunt and penetrating chest trauma were taken into consideration. Final outcome(death/discharge) was noted, with discharged patients were followed for one month. Participants were selected based from the following selection criteria.

Inclusion criteria

All the patients of thoracic trauma irrespective of their age and sex requiring admission were included in study.

Exclusion criteria

Severely traumatized patients who expired before investigation for chest trauma, and patients not requiringadmission were excluded from the study.

Data was collected in case record form and analyzed in Microsoft excel worksheet version 2016. Descriptive statistics for quantitative variables was represented as average and mean. Qualitative variables were represented as frequency and percentages.

Results

Overall trauma related admissions in our hospital during the period of study was 5123 out of which 872 were ofthoracic trauma, therefore the overall incidence of chest trauma in our hospital was 17.02 %. During study period,total 150 patients of thoracic trauma were studied.

The most commonly affected individuals were in age group of 31-40 years (28.67%) followed by 21-30 years (26%) and 41-60 years (22.67%). The mean age of the patient was 37.67 years.

Males (82%) were affected more than females (18%). Male to female ratio observed in our study is 4.6: 1.

Blunt trauma (93.3%) to the thorax was more common than penetrating thoracic trauma (6.7%). Road traffic accident (60%) was the most common mechanism of blunt chest trauma followed by assault (21.4%) while stab injury (70%) was the commonest mechanism of penetrating chest injury.(Table 1)

Chest radiograph was done in all patients enrolled in our study. On chest radiographs rib fractures were detected in 96 (64%) patients, haemothorax in 56 (37.3%) patients, and pneumothorax in 54 (36%) patients In 76 (50.7%) patients chest radiograph was normal but thoracic injury was suspected. They were subjected to CT- scan thorax which showed rib fracture in 72 (48%) patients, haemothorax in 48 (32%) patients and pneumothorax in 56 (37.3%) patients. USG thorax was done in 48 (32%) patients which helped in detection of haemothorax in only 9 (6%)patients. The following table shows that rib fracture (69.3%) was the most common type of injury seen in our study which was followed by pneumothorax (62%) and haemothorax (48%). (Table 2)

Associated injuries were present in 40.25% patients. Head injury (57.3%) was the commonest associated injury detected in our patients of chest trauma. Skeletal injury (36%) was the second most common associate injury detected followed by abdominal injury (13.3%). Spinal injury (8.7%) was the least common associated injury seenin our study.

In our study 100% of patients were managed conservatively among which intercostal drainage tube (ICDT) was placed in 32% patients which was the commonest procedure, while no thoracotomy was done (Table 3).

Fromabove table it is evident that the mean duration of hospital stay was 8.91 days. Duration of hospital stay is a surrogate indicator of morbidity.

In our study 17 out of 150 patients died i.e. mortality was 11.3%. Out of 140 patients of blunt chest injuries 16 patients succumbed to death i.e. 11.4% of blunt chest traumas. While 1 out of 10 patients died in penetrating chest injury group in our study i.e. 10% of penetrating thoracic traumas.

Discussion

Among 5123 trauma related admissions in our hospital during the period of study, 872 had thoracic trauma, therefore incidence of thoracic trauma in our hospital was 17.02%. Which is higher than 9.3% thoracic traumareported in Atri et al.[8] study.

Maximum number of patients in our study were between 31 to 40 years, making 28.7 % of all chest trauma patients. Similar findings were observed in Atri et al.[8] and Pasha et al.[11] studies. While in Lema et al.[7] and Choudhary et al.[10] study most commonly affected age group was 21-30 years. The mean age of 37.3 years in our study was comparable with Atri et al.[8] (34.4 years), Pasha et al.[11](39.7 years), Lema et al.[7], (32.17 years) and Choudhary et al.[10] (39 years) studies.

Male predominance in our study by 4.6 : 1 was also reported in Atri et al.[8](3.69 : 1), Pasha et al.[11] (4.5 : 1), Lema et al.[7](3.8 : 1) and Choudhary et al.[10] (5.5 : 1) studies.

In our study blunt trauma (93.3%) was more common than penetrating trauma (6.7%). Similar findings were also observed in Atri et al.[8], Pasha et al.[11], Lema et al.[7] studies where blunt trauma constituted major share of thoracic trauma incidents.

Road traffic accident (RTA) was overall the commonest (56%) mechanism of thoracic trauma noted in our study which was in accordance with various other studies. Atri et al.[8], Pasha et al.[11], Lema et al.[7] and Choudhary et al.[10] independently reported incidence of road traffic accidents ranging from more than 50% to 84% of total thoracic trauma cases. In our study 60% of blunt traumas were due to RTAs, which caused more than 80% blunt traumas in Atri et al.[8] study. Stab injuries were the reason for 70% of penetrating thoracic traumas in ours as well as Atri et al.[8] study.

Chest X-ray was done in all patients suspected of thoracic trauma in ours as well as Lema et al.[7] study. While 94% patients were subjected to chest X-ray in Atri et al.[8] study. This was because chest radiographs are the most easily accessible, affordable and available and reasonably sensitive investigation for chest traumas. We did USG thorax in 32% patients. CT scan thorax being very sensitive for traumatic pathologies of chest, 50.7% patients were subjected to CT scan thorax in our study while it was done in 24% patients in Atri et al.[8] study.

In our study most common injury diagnosed in thorax was rib fracture (90.67%) followed by pneumothorax (62%). Rib fractures were seen in 60% patients in Atri et al.[8], 76% in Pasha et al[11] and 29% in Choudhary et al.[11] studies which is similar to diagnoses in our study.

In our study, head and neck injury was the commonest (57.3%) associated injury detected. Lema et al.[7] also reported 33.3% head injuries and similarly Choudhary et al.[10] found head injuries in 38.5% cases. In Al-Koudmani et al[9] and Pasha et al[11] study skeletal injuries were the most common associated injuries detected. In our study 100% of patients were managed conservatively among which intercostal drainage tube (ICDT) was placed in 32% patients. Similar findings were also observed in Atri et al.[8],

Pasha et al.[11], Lema et al.[7] and Choudhary et al.[10] studies where most patients were managed conservatively. Incidence of ICDT placement ranged from 19.2% to 48.4% in above mentioned studies. In Atri et al[8] study 6.7% of patients and in Pasha et al.[11] study 2.2 % of patients required thoracotomy, while no thoracotomy was done in our study as well as Choudhary et al.[10] series. This may be because of small sample size in our study.

The mean duration of hospital stay in our study was 8.9 days. The mean duration of hospital stay in Pasha et al.[78],Lema et al.[68] series was more than 12 days. While it was less than 7 days in Atri et al[8] and Al-Koudmani et al[9] studies. Duration of hospital stay indicates morbidity.

In our study the mortality rate was 11.3%. The mortality rate in Atri et al[8] study was 12.1%. While

mortality rate in Pasha et al[11], Lema et al[7] and Al-Koudmani et al[9] study was less than 6.5%.

Legend Tables & Figures

Table 1: Mechanism of injury in chest trauma patients.

Mechanism	Number	Percentage
	Blunt trauma (n=140)	
Road traffic accidents (RTA)	84	60%
Assault	30	21.43%
Fall from height	19	13.57%
Hit by bull	4	2.86%
Fall of object on chest	3	2.14%
	Penetrating trauma (n=10)	
Stab	7	70%
Bull horn injury	3	30%
Firearm injury	0	0%

Table 2: Types of chest injuries detected in our study

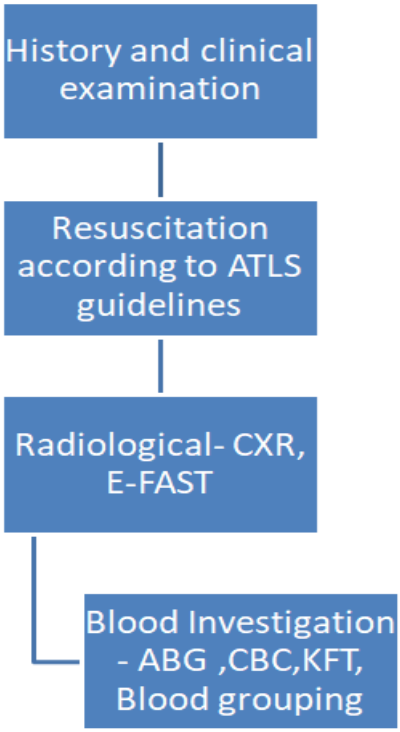
Types of chest injuries	Number of patients(n=150)	Percentage
Rib fracture	104	90.67%
Pneumothorax	93	62%
Hemothorax	84	56%
Hemopneumothorax	72	48%
Lung contusion	59	39.33%
Subcutaneous emphysema	32	21.33%
Flail chest	24	16%
Fracture sternum	14	9.33%

Table 3: Duration of hospital stay for thoracic trauma(n=149)

Duration of hospital stay	Number of patients	Mean hospital stay
1-5	42	8.91 days
6-10	55	
11-15	38	
16-20	12	
21-25	2	
Total	149	

(1 patient out of 150 patients was died within 2 hrs of admission, hence not included in the above table.)

Figure 1:



Conclusion

Thoracic trauma is a cause of both morbidity and mortality especially in young male patients of the road traffic accidents. Thus, early diagnosis and rapid management is important in chest traumas. Chest radiograph should be done in all cases while CT scan thorax being more sensitive has a definite role in the diagnosis of chest trauma. Most common injury is rib fracture followed by pneumothorax and hemothorax. The majority of these cases can be managed conservatively. Tube thoracostomy or thoracotomy may be required in the management of life-threatening injuries. Presence of other associated injuries increases morbidity and mortality in chest trauma patients, so these should be adequately managed.

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