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Clinical Profile and Outcome of Chest Trauma in a Tertiary Care Hospital

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Authors' contributions

This work was carried out in collaboration among all authors. Author AG designed the study, performed the statistical analysis, author URD' wrote the protocol and wrote the first draft of the manuscript. Authors AKD, NK and DK managed the analyses of the study. Authors VA and JS managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Chest trauma is an important cause of morbidity and mortality worldwide. Thoracic injuries account for 20-25% of deaths due to trauma. It is a major concern for India, because of high incidence of vehicular accidents and violence. Very few studies have been documented to assess incidence and severity of thoracic trauma. This study focuses on clinical profile and outcome associated with both, blunt and penetrating chest trauma, in our tertiary care hospital.
Methods: All patients with chest trauma cases admitted in surgery emergency over a period of one year were included in the study. Their clinical and radiological profile, severity, management modalities and outcome were noted. Severity of chest injury was calculated by Thoracic Trauma Severity Score (TTSS).

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Results: In our study most common cause of chest trauma was motor vehicle collision. The highest rate of chest injuries was observed in those aged 41–50 years, and most injuries (91.5%) were in adult males. Thoracic trauma in a poly-traumatized patient significantly affects prognosis and treatment strategy. Prompt recognition and diagnosis is essential for efficient care of patients. Higher scores of TTSS are associated with longer hospital stay, higher morbidity and mortality and higher rate of complications. TTSS is a reliable CT-independent classification and can be quickly performed in the emergency room thus assisting in further treatment decisions and improving patient outcome.

Conclusion: Chest trauma is an important public health problem accounting for substantial proportion of all trauma admissions and urgent preventive measures at reducing incidence of RSAs are necessary. TTSS is a reliable CT independent predictor of outcome in chest trauma.

Keywords: Chest trauma; morbidity and mortality; magnitude and management strategies.

1. INTRODUCTION

Trauma constitutes a major health problem in both developed and developing countries and is the leading cause of death worldwide and accounts for almost 12% of the world's burden of disease [1,2]. The importance of chest trauma as a cause of increasing morbidity and mortality cannot be neglected as it accounts for 20-25% of deaths due to trauma and this rate is even higher in the setting of polytrauma [3,4]. The cause as well as the outcome of traumatic injury of the chest varies in different parts of the world but road side accidents (RSAs) remain as the foremost cause of majority of such injuries. Early diagnosis and treatment is life-saving for the life-threatening chest injuries and best managed by early mobilization, aggressive pain control, proper fluid management, chest physiotherapy, intensive care and/or surgical intervention. Despite extensive reports of chest trauma in the literature, systematic quantification of the impact of chest injury severity on the outcome of polytrauma patients is sparse. Chest trauma score, pulmonary contusion score and wegner score are CT dependent scores used in chest trauma. Thoracic Trauma Severity Score (TTSS) is a CT independent scoring system which combines the patient's age, resuscitation parameters, and radiological assessment of the thorax. It has high sensitivity and specificity for prediction of morbidity and mortality [4,5,6]. Worldwide, the mortality rate in chest trauma is variable ranging from about 10% to 60% depending on severity of injury sustained [4,5,6].

2. METHODS

This prospective observational study of 282 patients was carried out in the department of General Surgery at Government Medical College and Hospital32, Chandigarh over a period of one year from January 2018 to January 2019 and analysis of clinical and radiological profile, severity of injury by TTSS and outcome in terms of morbidity and mortality was done. The study enrolled all chest injury patients in trauma on basis of clinical examination and radiological findings, during the prospective study design. Only patients not consenting to the study were excluded. A total of 8137 trauma patients had presented in our hospital who required admission out of which 291(3.6%) patients had thoracic trauma which were either isolated or associated with other injuries. Among these 291 patients, 9 patients took leave against medical advice and were not included in the study.

3. RESULTS

The data was analyzed. Continous data was presented as mean ± SD or median (IQR) and dichotomous data as % age. The distribution of data was tested by Kolmogorov-smirnov test. Data was compared with student t test for normal distributive data and Mann-whitney test for skewed data. The dichotomous data was compared using chi-square test or Fischer extract test where applicable. The mortality or morbidity was compared using normal test of proportions and possible associations were tested using chi-square test of significance. Statistical analysis was done using SPSS software, version 0.2. The mean age of chest trauma patients was 44.47 +/-15.510 years. The youngest patient was 3 year old child was the only pediatric patient in our group other younger patients were five in number with age group of 13,17 and 18 years, and the oldest patients was 90 years old. Out of 282 cases in this study, it was observed that maximum number of 69(24.5%) patients were seen in the age group of 41-50 years. In our study, 258(91.5%) patients were males and 24(8.5%) were females and

mean duration of stay of patients was 7.98 +/- 7.165 days.

Most common mode of chest injury noted in our study was road side accidents in 191(67.7%) patients, followed by fall from height in 54(19.1%) patients, stab in 16(5.7%) patients; assault by blunt object, fall of object on body and attack by stray animal in 6(2.1%) patients each; and gunshot injury in 1(0.4%) patient (Fig. 1). Other rare causes included compression injury by machinery at factory in 1(0.4%) patient and barotrauma by ingestion of high water pressure in 1(0.4%) in 1 patient. Blunt trauma (n=265, 94%) was seen more commonly than the penetrating injuries (n=17, 6%), which included both gunshot and stab injures. Comorbidities were present in 60(21.3%) patients. Most common comorbidity seen in patients was chronic obstructive pulmonary disease (COPD) in 20(7.1%) patients followed by diabetes mellitus (DM) in 12(4.3%) patients. Other comorbidities included hypertension in 15(5.3%) and tuberculosis in 5(1.8%) patients. 8(2.8%) patients had multiple comorbidities. Mean duration of hospital stay in patients with comorbidities (9.3 days) was more than in patients without comorbidities(7.6 days). Also, rate of complications was significantly higher in patients with comorbidities (n=14, 23.3%) than without them (n=27, 12.1%). Mortality rate was also noted more in patients with comorbidities (n=5, 8.3%).

Most common symptom was chest pain in 263(93.3%) patients, followed by dyspnea in 128(45.4%) and cough in 18(6.4%) patients. Most common sign observed was chest tenderness in 241(85.5%) patients followed by decreased breath sounds in 202(71.6%) and tachypnea in 166(58.9%) of the cases (Table 1).

Unilateral injuries (n=132, 81.9%) were more commonly observed than the bilateral injuries (n=51, 41.1%), although there was no significant difference in number of left (n-115, 40.8%) and right (n=116, 41.1%) sided injuries. Most common injury in chest trauma patients was rib fractures seen in 255(90.4%) patients.

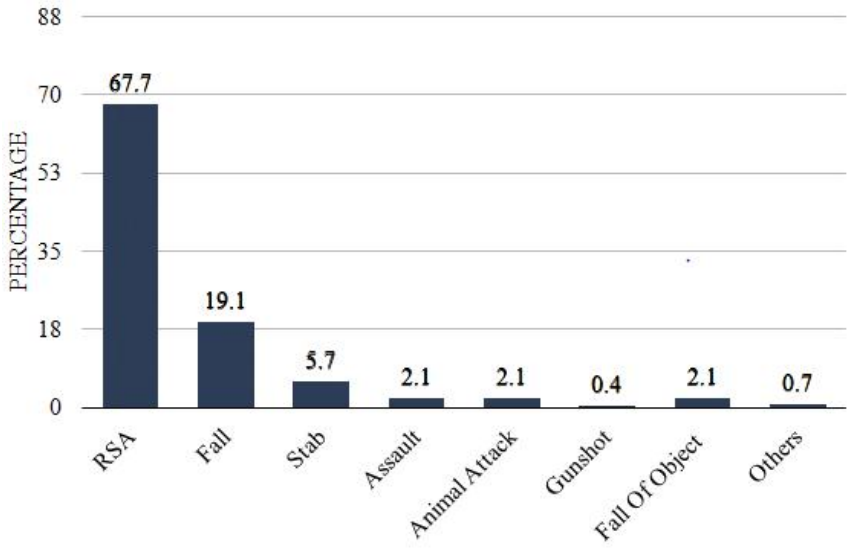

Fig. 1. Etiology of injury

Table 1. Clinical features

	No. of patients	Percentage
Chest Pain	263	93.3
Chest Wall Tenderness	241	85.5
Decreased Pulmonary Sounds	202	71.6
Tachypnea	166	58.9
Dyspnea	128	45.4
Cough	18	6.4

Out of these 255 patients 31 has single rib fractures while 224 patients had multiple rib fracture. Other bony injuries included clavicle fracture in 51(18.1%) patients, scapula fracture in 17(6%) and sternal fracture in 3(1.1%) patients. Most common injury with pleural involvement was haemothorax which was seen in 112(39.7%) patients followed haemo-pneumothorax in 58(20.6%) and pneumothorax in 39(13.8%) patients (Table 2). Surgical emphysema was observed in 96(34%) patients while pneumomedistinum was seen in 14(5%) of the cases. Major airway injury was seen in 3(1.1%) patients out which one patient had complete transection of upper lobe bronchus and required thoracotomy while other 2 patients had only minor rent in trachea and were managed conservatively. Isolated rib fractures were seen in 27(9.6%) patients while isolated pneumothorax was seen in 3(1.1%) patients. Isolated lung contusions was seen in 1(0.4%) patient. Most common soft tissue injury noted was lung contusion in 71(25.2%) patients. Other soft tissue injuries included diaphragmatic injury in 6(2.1%) patients, esophageal injury in 1(0.4%) patient which was caused by barotrauma due to ingestion of high pressure water from hose pipe; and cardiac injury in 2(0.75%) patients. In 2(0.7%) patients there was rupture of internal mammary artery which required ligation by thoracotomy. Out of the 71 patients with lung contusion, 59(83.1%) patients had flail chest, 11(15.5%) patients had rib fractures without flail, and 1 patient had isolated lung contusion. 19(26.8%) patients with lung contusion required ICU admission.

Flail chest was seen in 62(22%) of the patients. Mean duration of hospital stay was 12.6 days in flail chest patients while it was 6.6 days in patients without flail chest and Morbidity and mortality was significantly higher in patients with flail chest (Table 3).

Associated extra thoracic injuries were observed in 144 (51.1%) of the patients (Table 4). Mean length of stay was higher in patients with associated extra thoracic injuries as compared to patients with isolated chest injuries (6.3 days). Mean length of hospital stay was 8.3 in patients with associated head and neck injuries, 10.5 in patients with associated extremity/spine injuries, 10.9 in patients with associated abdominal injuries and 11.9 in cases of polytrauma. Mortality was significantly higher in patients with associated extra thoracic injuries (n= 9, 6.3%) as compared to patients with isolated chest injuries (n= 3, 2.2%).

Table 2. Chest injuries

	No. of patients	Percentage
Haemothorax	112	39.7
Pneumothorax	39	13.8
Haemopneumothorax	58	20.6
Pneumomediastinum	14	5.0
Tension Pneumothorax	0	0
Flail Chest	62	22.0
Airway Injuries	3	1.1
Surgical Emphysema	96	34.0
Lung Contusion	71	25.2
Diaphragm	6	2.1
Esophageal Injuries	1	0.4
Cardiac Injuries	2	0.7
Vascular Injuries	2	0.7

Table 3. Complications and mortality in patients with flail chest

	Patients with flail chest N= 62	Patients without flail chest N=220	P Value
Complications	19(30.6%)	22(10%)	0.000
ICU admission	18(29%)	12(5.5%)	0.000
Mortality	9(14.5%)	3(1.3%)	0.000

Table 4. Associated extra thoracic injuries

Extra thoracic injuries		No. of patients	Percentage
	Head/ neck injuries	50	17.7
Abdominal Injuries	Liver	12	4.3
	Spleen	8	2.8
	Intestinal Perforation	3	1.1
	Renal	3	1.1
	Other(Adrenal,Bladder, Mesentery)	8	2.8
	Total	24	8.5
Extremity Injuries		38	13.5
Spine Injuries		22	7.8
Pelvic Injuries		10	3.5

Chest X-Ray (CXR) was done in 281(99.6%) patients and common findings noted on CXR were rib fractures in 255 patients, clavicular fractures in 51, scapular fractures 17, haemothorax in 107, pneumothorax 39, haemopneumothorax in 58 and lung contusion in 50 patients. Extended focused assessment with sonography in trauma (e fast) was done 108(38.3%) patients and revealed haemothorax in 101 patients while in rest it was normal. CECT chest was done in 60(21.3%) patients. Finding observed on CECT were rib fractures in 56 patients, haemothorax in 20 patients, haemopneumothorax in 33 patients , lung contusion in 31 patients, diaphragm injury in 4 patients, airway injury in 2 patients and esophageal injury in 1 patient. Bronchoscopy was indicated in 8 patients. In 4 patients thick secretions and mucous plugs were aspirated, while airway injury was diagnosed in 3 patients. It was normal in 1 patient.

In 171(60.6%) patients unilateral intercostal drainage (ICD) tube was inserted while bilateral tube thoracostomy was done for 36(12.7%) patients. 75(26.6%) patients were managed conservatively with analgesics and oxygen support without ventilatory intervention. Positive pressure ventilation was required in 42(14.9%) patients out of which 8(2.8%) required non-invasive ventilation by NIV mask while 34(12.1%) required endotracheal intubation.

Tracheostomy was needed in 11(3.9%) patients due to prolonged intubation. 30(10.6%) patients required ICU stay. Other patients with endotracheal intubation were managed with ambu bag ventilation for 1-2 days due to lack of availability of ICU bed and were extubated successfully after improvement in their condition. Thoracotomy was done in 5(1.8%) patients (Fig. 2). Pain relief was achieved primarily by intravenous (I/V) analgesics which was used in 273(96.8%) patients either solely or in combination of other analgesics. Oral analgesics were used in 64(22.7%), intercostal block (ICB) in 20(7.1%), epidural in 16(5.7%), transdermal patch in 11(3.9%) and serratus anterior muscle(SAM) block in 2(0.7%) patients.

Thoracic Trauma Severity Score was divided into 3 groups of scores 0-5, 6-10, and 11-15 as minimum score obtained was 0 and the maximum was 15 in our study. Most of the patients belonged to the score group of 6-10(n=123, 43.6%). 104(36.9%) patients had score of 0-5 while 55(20%) patients had score of 11-15. In blunt trauma chest, TTSS was significantly high as compared to penetrating chest injuries. Out of the 55 patients having TTSS of 11-15, all 55(100%) patients had blunt trauma, while out of 123 patients with TTSS score of 6-10, 122(99.2%) had history of blunt trauma and only 1(0.8%) had history of penetrating trauma. Also there is a significant increase in TTSS in patients with comorbidities. Comorbidities were present in 20(37%) patients with score of 11-15, while they were present in 31(25.2%) with score 6-10 and only in 9(8.7%) patients with score of 0-5. Mean duration of hospital stay was higher in patients with higher TTSS scores. It was 4.70 days in patients with score of 0-5, 8.73 days in patients with score of 6-10 and 12.72 days in patients with score of 11-15. Also, chest pain as measured by numerical pain rating scale, also increased with increase in TTSS although it was not statistically significant. Mean duration of tube thoracostomy was also higher in patients with higher TTSS. It was 4.88 days in patients with score of 0-5, 6.64 days in patients with score of 6-10 and 8.19 days in patients with score of 11-15 (Table 5).

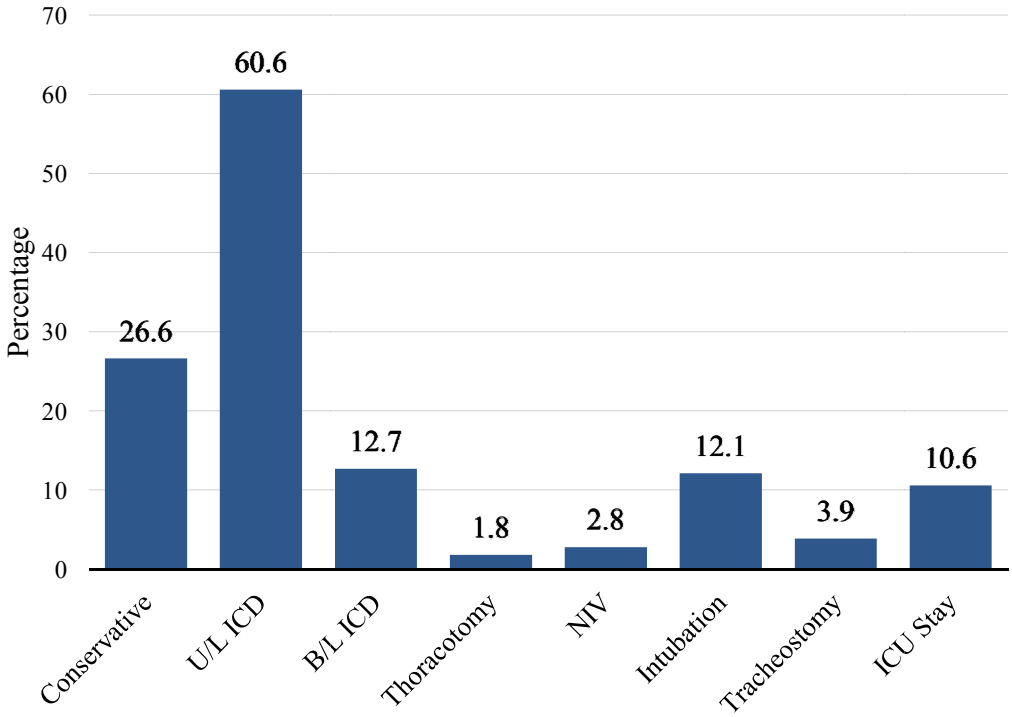

Fig. 2. Management modality

Table 5. Outcome as compared to different thoracic trauma severity scores

S.NO		TTSS			P Value
		0-5 (N=104)	6-10 (N=123)	11-15 (N=55)	
1	Mean Duration Of Hospital Stay(days)	4.70	8.73	12.72	1.000
2	Chest Pain At Admission(NPRS)	5.15	6.50	7.88	1.000
3	Chest Pain At Discharge(NPRS)	1.65	1.81	2.28	0.658
4	Mean Duration Of ICD(days)	4.88	6.64	8.19	0.112
5	Amount Of Blood At Thoracostomy(ml)	130.38	160.00	223.15	0.477
6	Mean Duration Of Intubation(days)	7.40	10.31	9.19	0.820
7	Mean Duration Of ICU Stay(days)	9.25	12.58	9.79	0.836

There were statistically significant differences in the outcome of the patients as per thoracic trauma severity scores. 68(65.4%) patients with 0-5 TTSS and 13(10.6%) with 6-10 TTSS were managed conservatively. 55 patients with 11-15 required tube thoracostomy. 2(1.6%) patients with 6-10 TTSS and 6(11.1%) patients with 11-15 TTSS required non-invasive ventilation while endotracheal intubation was required in 5(4.8%) patients with 0-5 TTSS, 13(10.6%) patients with 6-10 TTSS and 16(29.6%) patients with 11-15 TTSS. Tracheostomy was done in 1(1.0%) patient with 0-5 TTSS, 3(2.4%) patients with 6-10 TTSS and 7(13%) patients with 11-15 TTSS. ICU admission was required in 4(3.8%) patients with 0-5 TTSS, 12(9.6%) patients with 6-10 TTSS and 14(25.5%) patients with 11-15 TTSS (Table 6). Higher complication and mortality rates were noted in patients with higher TTSS (Fig. 3). Complications developed in 2(1.9%) patients with

0-5 TTSS, 18(14.6%) patients with 6-10 TTSS and 21(38.9%) patients with 11-15 TTSS. Mortality was seen in 1(1%) patient with 0-5 TTSS, 4(3.3%) patients with 6-10 TTSS and 7(13%) patients with 11-15 TTSS.

Out of 282 patients, complications were in 41(14.5%) patients. Most common complication observed was atelectasis in 33(11.7%) patients either alone or combined along with other complications of ARDS (n=6, 2.1%), empyema (n=4, 1.4%) or COPD exacerbation (n=4, 1.4%). Complications had an impact on morbidity and mortality of patients. Mean duration of hospital stay (16.8 days) was more than in patients without complications (6.4 days). Also, mortality rate was also noted to be more in patients with complications (n=3, 7.3%) than without them (n=9, 3.7%). 14(34.1%) patients with complications required ICU admission. However, out of 241 patients without complications, only 16(6.6%) patients required ICU admission.

Out of the 30(10.6%) patients who required ICU admission, 19(63.3%) patients had lung contusions, 18(60%) had flail chest, 6(20%) had head injury, 14(46.7%) had respiratory complications like ARDS, COPD exacerbation and atelectasis and 11(36.7%) had associated extra thoracic injuries apart from neurological injury who required general anaesthesia for laparotomy or orthopedic intervention.

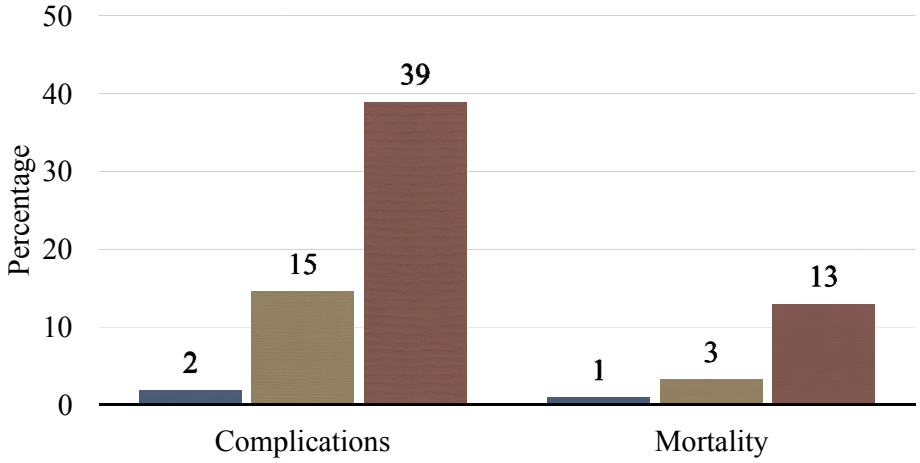

Fig. 3. Comparison of outcome with TTSS

Table 6. Comparison of management and outcome with TTS

S.No.		TTSS			P Value
		0-5 (N=104)	6-10 (N=123)	11-15 (N=55)	
1	Patients Managed Conservatively	68(65.4%)	13(10.6%)	0(0%)	0.000
2	Patients Requiring Tube Thoracostomy	36(34.6%)	110(89.4%)	55(100%)	0.000
3	Patients Requiring NIV	0(0%)	2(1.6%)	6(11.1%)	0.001
4	Patients Requiring Intubation	5(4.8%)	13(10.6%)	16(29.6%)	0.000
5	Patients Requiring ICU Stay	4(3.8%)	12(9.6%)	14(25.5%)	0.000
6	Patients Requiring Tracheostomy	1(1.0%)	3(2.4%)	7(13.0%)	0.001
7	Patients Requiring Thoracotomy	1(1.0%)	2(1.6%)	2(3.6%)	0.876
8	Patients With Complications	2(1.9%)	18(14.6%)	21(38.9%)	0.000
9	Patients With Mortality	1(1.0%)	4(3.3%)	7(13.0%)	0.004

Mean length of hospital stay was higher in patients with ICU admissions (14.6 days) than patients without ICU requirement (6.8 days).

Most of the patients were discharged after improvement (n=263, 93.2%). 4(1.4%) patients empyema were discharged with intercostal tube in situ. Mortality was 4.3% and 3 patients were referred. Mean age was significantly more in blunt trauma patients (45.71 days) than in patients with penetrating injuries (25.18 days). Mean duration of hospital stay was also more in blunt trauma injuries (8.13 days) than penetrating injuries (5.71 days). Mean duration of ICD in situ (6.85 days) and ICU stay (11 days) in blunt trauma patients was more than in patients with penetrating trauma (4.2 days and 6 days respectively). Mean TTSS was significantly higher in blunt trauma patients (7.1) than with penetrating trauma (2.53). Comparison of blunt and penetrating trauma has been shown in Table 7.

4. DISCUSSION

Chest injuries constitute a continuing challenge to the surgeon practicing in developing countries. The extent of thoracic trauma is a risk factor for morbidity and mortality in poly trauma patients. The incidence of chest trauma in our study was 3.6% which was much less as compared to other Indian studies where the incidence is reported to be up to 20%. In this study, the highest rate of chest injuries was observed in 41–50 years age group, and most injuries (91.5%) were in adult males. The observations regarding male predominance are similar to other studies suggesting that males and younger individuals are likely to have more chest injuries because they are more active and mobile, thus increasing the risk of trauma (Table 8).
RSAs were present in 67.7% of the patients in our study. Incidence of RSAs is more in developing countries than developed countries probably due to stricter traffic regulations and higher incidence of fall from height in developed countries.

The incidence of various types of chest injuries is variable worldwide with rib fractures being the most commonly noted injury in more than 50% of the cases, haemothorax in 40-60%, pneumothorax in 20-40% of patients, lung contusion in 17-70%, pneumomediastinum in 10% and great vessel injuries in 0.5-2% patients. Tracheobronchial injuries are rare, occurring in

Table 7. Comparison of blunt and penetrating chest injuries

S. NO.		Mode Of Injury		P Value
		Blunt (N=265)	Penetrating (N=17)	
1	Comorbidities	59(22.3%)	1(5.9%)	0.135
2	Pneumothorax	36(13.6%)	3(17.6%)	0.714
3	Haemothorax	109(41.1%)	3(17.6%)	0.073
4	Haemopnemothorax	52(19.6%)	6(35.3%)	0.121
5	Pneumomediastinum	14(5.3%)	0(0%)	1.000
6	Flail Chest	62(23.4%)	0(0%)	0.029
7	Lung Contusion	69(26.0%)	2(11.8%)	0.255
8	Surgical Emphysema	92(34.7%)	4(23.5%)	0.435
9	Airway Injury	3(1.1%)	0(0%)	1.000
10	Vascular Injury	1(0.4%)	1(5.9%)	0.117
11	Diaphragm Injury	5(1.9%)	1(5.9%)	0.314
12	Oesophageal Injury	1(0.4%)	0(0%)	1.000
13	Cardiac Injury	2(0.8%)	0(0%)	1.000
14	Patients Requiring NIV	8(3.0%)	0(0%)	1.000
15	Patients Requiring Intubation	34(12.8%)	1(5.9%)	0.516
16	Patients Requiring Tracheostomy	11(4.2%)	0(0%)	1.000
17	Patients Requiring Thoracotomy	4(1.5%)	1(5.9%)	0.221
18	Complications	39(14.7%)	2(11.8%)	1.000
19	Discharged	245(92.5%)	17(100.0%)	0.710
20	Discharged With ICD In Situ	4(1.5%)	0(0%)	
21	Referred	3(1.1%)	0(0%)	
22	Mortality	12(4.5%)	0(0%)	

Table 8. Comparison of demographic features of various studies

	Galan et al. [7]	Kulshrestha et al. [8]	Kasabe et al. [9]	Yadollahi et al. [10]	Sharma et al. [11]	Khursheed et al. [12]	Current study 2019
Number	1696	1359	846	7410	314	160	282
Incidence	-	-	17.1%	-	18.2%	11.2%	1.8%
Most common age group (years)	30-40	20-49	31-40	15-40	20-46	21-30	41-50
Male	79%	70.9%	83.3%	74.2%	87.6%	82.5%	91.5%
Female	21%	29.1%	16.7%	25.8%	12.4%	17.5%	8.5%
Mean hospital Stay (days)	8	8.52	8.97	5.66	14.09	9.88	7.98

about 0.2–8% of cases although their prevalence might be higher as most of the patients die at the trauma scene within the first few hours from associated injuries and respiratory distress [13-16]. Like most of the studies, rib fracture was the most common injury observed in our study in 90.4% of the cases. Out of 39 cases of pneumothorax, only 3 patients were managed conservatively while rest of the patients required tube thoracostomy. Sternal fracture was seen in 3 patients, out of which, 2 were managed conservatively and 1 patient was managed with strapping. Out of the 6 Patients with diaphragmatic injury, 5 were caused by blunt trauma and 1 was caused by stab injury. All patients were managed by exploratory laparotomy with primary repair of diaphragmatic rent with either prolene 2-0 or PDS (polydioxanone) 2-0 suture. Lung contusion was present in 71 patients out of which 1 patient was managed conservatively, 2 patients required thoracotomy and the rest required intercostal tube drainage.

There is a wide array of different diagnostic modalities which can be used to aid in decision making. Being the most cost effective and widely used investigation, CXR was done in all patients, however 1 critically injured patient died before any investigation could be done. CECT chest was done to see severity of airway/parenchymal injury or to rule out any other injury. It helped in decision making for further management and identifying patients who needed bronchoscopy for removal of mucous plugs and secretions from airways. A simple universal scoring system like TTSS to assess both the severity of the trauma and for prognostication may help to standardize trauma care [17]. In our study longer hospital stay, higher complication rate, increased requirement of ICU admission and surgical intervention and increased mortality rate were seen in patients with higher TTSS.

In thoracic injuries, attention should be directed to early evaluation of extent of injury, adequate pain relief, prompt resuscitation, administration of I/V fluids and/or blood whenever indicated, oxygen support, airway management, mechanical ventilation and tube thoracostomy when required. Simple chest trauma with less than 3 rib fractures can be managed conservatively by effective intercostal rib block and pain killers. Most of the patients can be managed by tube thoracostomy. It was noted that 26.6% patients were managed conservatively with analgesics, antibiotics, bed rest and oxygen support and 73.4% patients required insertion of intercostal tube.Thoracotomy was required in 5 patients; repair of transected right upper lobe secondary bronchus was done in 1 patient, repair of air leak from contused lung was done in 1 patient, ligation of internal mammary artery in 2 patients and aspiration of blood from pericardial cavity was done in 1 patient with haemopericardium and right atrial hematoma. In Patients having hemoperitoneum with chest trauma, abdominal injury management takes preference in the form of conservative/operative approach in case of splenic/liver tear. Tranexa has its limited role in such cases.

In our study, the most common complication observed was the atelectasis followed by ARDS. These complications were associated increased length of hospital stay which was almost 2.5 times more than in patients without

complications, and increased mortality rates. Higher complication rates were observed in patients with comorbidities and higher severity of injury.

Mortality observed in our study was 4.3%. Out of the 12 patients who died, 8 patients died due to extra thoracic injuries, while among the 4 patients who had severe chest injury, 3 patients had developed fatal respiratory complications of ARDS. Associated injuries like cardiac and oesophageal injuries along with chest trauma had an impact on mortality in our series. Isolated chest trauma with no other major lethal chest organ injuries had no mortality in our series.The variability of mortality rates in different studies can also be attributed to the differences in nature and severity of injuries observed, extra thoracic injuries and major lethal cardiac/oesophageal inuries, complications sustained and availability of ICU care.

5. CONCLUSION

Chest trauma is a major public health problem, however, only a few studies have been conducted to analyze its magnitude profile of patients and management strategies in India. TTSS is a reliable CT independent classification of thoracic trauma and efficient predictor of severity and outcome of chest trauma patients and can be quickly performed in the emergency setting. Other criteria like chest trauma score, wegner score and pulmonary score, which are CT dependent take more time to analyze the severity of injury. Overall outcome of chest injuries largely depends on magnitude and location of concomitant injuries. Creation of dedicated trauma teams and ICU care in emergency set-up can significantly improve the outcome in these patients.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline patients consent and ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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