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Original research article

The clinicoetiological features of patients with chest trauma: A hospital based prospective study

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Abstract

Background: Chest trauma is one of the common and important component of polytrauma. Thoracic trauma is a common cause of significant disability and mortality, the leading cause of death from physical trauma after head and spinal cord injury. The mortality rate is about 10%.[1] Thoracic injuries account for 20-25% of deaths due to trauma. The present study was conducted with the aim to determine the clinicoetiological features of patients with chest trauma.

Materials and Methods: The present study was conducted at Ananta Medical College and hospital, from May 2020 to September 2022. The study enrolled both blunt and penetrating chest trauma patients. Chest radiograph, complete blood count, serum investigation, blood grouping and cross matching, ultrasonography of chest and abdomen, computed tomography of thorax, other radiological investigation and if required rigid bronchoscopy was done. The time of injury, mechanisms of injury, and evidence of associated injury to other systems (e.g., loss of consciousness), are all salient features of an adequate clinical history. All the data thus obtained was arranged in a tabulated form and analysed using SPSS software. Data was expressed as percentage of total.

Results: Incidence of chest trauma related to total admission to casualty was 8.33%. In our study, out of 100 cases 90 were males and 10 females. The frequency of vehicular accident in 76% of patients, fall from height in 16%, injury due to violence in 3% and 2% of injuries were due to animals. In our study of 100 cases of blunt chest trauma, 50 patients had associated injury like head injury in 10% cases. In our series out of 100 cases, 70 presented with chest pain at the site of injury, 35 cases having respiratory distress, 4 cases presented with shock(systolic B.P.<90mm of Hg) and symptoms of shock.

Conclusion: Chest trauma is major and serious type of injury following vehicular accident. There were 76% of cases due to vehicular accident followed by fall from height in 16%, assault in 3%, animal injury and injury by falling objects constitute 3% cases of chest trauma. Intercostal tube drainage with under water seal is an acceptable and safe management for patient having pneumothorax, haemothorax, or haemopneumothorax.

Keywords: Chest trauma, vehicular, tomography, shock

Introduction

Chest trauma is a serious injury of the chest. Thoracic trauma is a common cause of significant disability and mortality, the leading cause of death from physical trauma after head and spinal cord injury. Thoracic injuries are the primary or a contributing cause of about a quarter of all trauma related deaths. The mortality rate is about 10% [1]. Thoracic injuries account for 20-25% of deaths due to trauma. Approximately 16,000 deaths per year in the India alone are attributable to chest trauma [2]. Radiological Investigations like chest xray, CT scan Thorax and abdomen, Chest/Abdominal ultrasound plays very important role in diagnosing thoracic trauma. In thoracic trauma primary care is directed to rapid evaluation of extent of injury, estimation of volume of blood loss and its rapid replacement by intravenous transfusion, the recognition of hypoxia and respiratory distress and its correction by assurance of a clear airway, full pulmonary expansion and mechanical support of ventilation when necessary. Morgagni in middle of 18th Century showed that blood in the pericardium compressed the heart and embarrassed its movements. Kussmaul described the classic physical signs of pericardial tamponade [3], Haemothorax and pneumothroax. Kussumaul in 1868 was the first person to do direct examination of upper esophagus. In 1960 Graffith, recognized that severe crushed injury of chest have been associated with high mortality rate and this was mainly due to injury to major blood vessels and

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bleeding. Multiple ribs fracture may cause flail chest which can be managed by intermittent positive pressure ventilation as used by Avery-et-al. Results of treatment by this method have been published by Nicholl *et al*. [4]. The present study was conducted with the aim to determine the clinicoetiological features of patients with chest trauma.

Materials and Methods

The present study was conducted at Ananta Medical College and hospital, from May 2020 to September 2022. The study enrolled both blunt and penetrating chest trauma patients. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from the subjects in their vernacular language. Initial emergency workup of a patient with multiple injuries began with the ABCs of trauma, with appropriate intervention taken for each step. Chest radiograph, complete blood count, serum investigation, blood grouping and cross matching, ultrasonography of chest and abdomen, computed tomography of thorax, other radiological investigation and if required rigid bronchoscopy was done. The cases were rapidly assessed for seriousness and detailed history taken later on after managing the Primary Emergency for shock and Respiratory distress. The time of injury, mechanisms of injury, and evidence of associated injury to other systems (e.g., loss of consciousness), are all salient features of an adequate clinical history. Information was obtained directly from the patient whenever possible and from other witness to the accident if available. The cases were followed at least for 3 months and some cases were followed for 6 to 8 months according to necessity and post mortem examination was carried out in most of the cases that expired, to elucidate the cause of death. All the data thus obtained was arranged in a tabulated form and analysed using SPSS software. Data was expressed as percentage of total.

Results

Incidence of chest trauma related to total admission to casualty was 8.33%. In our study, out of 100 cases 90 were males and 10 females.

Table 1 shows the age distribution of the subjects. The age in patients in our study varies from 9 years to 75 years. The majority of patients were 31-40 years. The patient's age falls between 9 years to 75years. 52% of patients were in age group 21-40 years and in age group 21-50 years there were 70% of patients. There were only two patients below age of 10 years.

Table 1: Age distribution of subjects with chest trauma

Age in years	Number of Patient		Percentage
	Blunt	Penetrating	
0-10 yrs.	2	0	2%
11-20 yrs.	6	1	7%
21-30 yrs.	21	1	22%
31-40 yrs.	28	2	30%
41-50 yrs.	17	1	18%
51-60 yrs.	13	0	13%
61-70 yrs.	6	0	6%
71-80- yrs.	2	0	2%

Table 2 shows the etiological factors associated with chest trauma. The frequency of vehicular accident in 76% of patients, fall from height in 16%, injury due to violence in 3% and 2% of injuries were due to animals. Remaining 3% of patients got injured due to house or of roof collapse or falling of load. Out of 5 cases of penetrating chest injury 3 was due to vehicular accident, one was due to violence and other was due to animal injury.

Table 2: Etiological factors of chest trauma

Etiology	Number of cases		Percentage
	Blunt	Penetrating	
Vehicular Accident	73	3	76%
Violence	2	1	3%
Fall From Height	16	0	16%
Animal Injury	1	1	2%
Falling Of Roof	3	0	3%

Graph 1 shows the related injuries amongst the subjects. In our study of 100 cases of blunt chest trauma, 50 patients had associated injury like head injury in 10% cases. Abdominal injury in 11% of cases. Injury to extremities in 22% cases. Injury to spine in 3% cases and injury to pelvis in 4% of cases.

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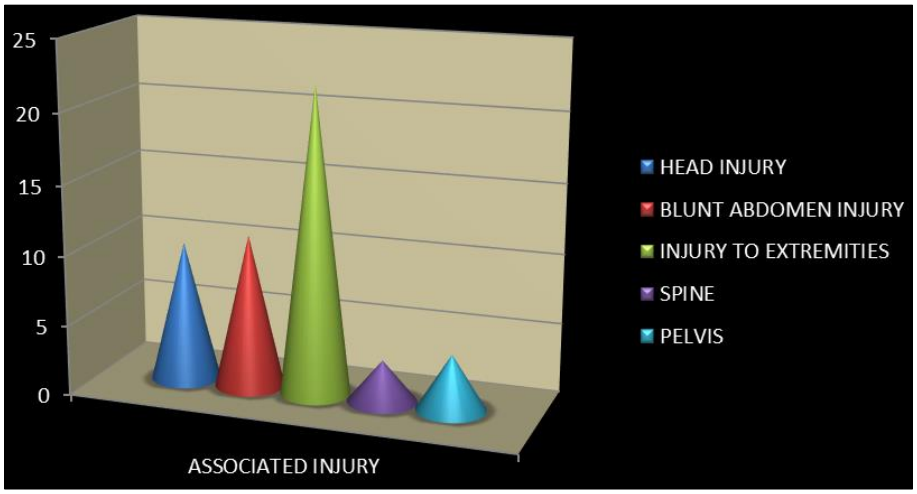

Graph 1: Associated injuries amongst chest trauma patients

Table 3 shows the mode of presentation amongst chest trauma patients. In our series out of 100 cases, 70 presented with chest pain at the site of injury, 35 cases having respiratory distress, 4 cases presented with shock (systolic B.P.<90mm of Hg) and symptoms of shock. 3 patients presented with history of unconsciousness and vomiting was found in 3 patients.

Table 3: Mode of presentation in chest trauma patients

Mode of Presentation	Number of Cases		Percentage
	Blunt	Penetrating	
Chest Pain	65	5	70%
Respiratory Distress	31	4	35%
Haemoptysis	2	2	4%
Shock	7	4	11%
Vomiting	3	0	3%
Unconsciousness	3	0	3%

Table 4 shows the signs and symptoms amongst the subjects. Out of 100 cases of chest trauma, 70 were having pain and tenderness over chest, 35 patients were having respiratory distress, 5 patients had unequal chest movements, and 23 patients had surgical emphysema. Diminished or absent air entry was found in 54% of patients, 20% of patients had tracheal shift on either side, 17 patients had paradoxical chest movements and 11 patients presented with signs of shock. 24 patients had pallor and external marks were found in 82% of patients. In no patients bowel sounds were heard in chest.

Table 4: Signs and symptoms observed in chest trauma patients

Clinical Findings and Symptoms	Number of Cases		Percentage
	Blunt	Penetrating	
Pain and Tenderness	66	4	70%
Tracheal Shifting	20	0	20%
Subcutaneous Emphysema	22	1	23%
Decreased Air Entry	52	2	54%
Paradoxical Chest Movement	16	1	17%
Respiratory Distress	31	4	35%
Shock	7	4	11%
Pallor	22	2	24%
External Mark of Injury	79	3	82%

Discussion

Chest trauma is responsible for one fourth of all death in the United States and another 25 to 50 percent [1] Chest trauma contributes significantly to the lethal outcome. Even though the relative contribution of chest injury to the mortality after trauma victims who have reached to the hospital ward is small [2]. The study conducted by Shorr R.M. Crittenden in 1982, 1984 at MIEMESS shock trauma center, the chest trauma forms 9.5% of all the traumatic cases (515 out of 5378). They also state that the chest trauma is directly responsible for 25% of all traumatic deaths that occurs annually [5]. Chest trauma forms 8.33% of total number of traumatic cases admitted to this institution during the same period. The study conducted at All India Institute of Medical Sciences by P. Kulshrestha and A. Sampath Kumar (January-1983 and July-1985) showed that chest trauma constitutes 5.3% of all trauma patients (236/4434) where a blunt

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chest trauma constitutes 3.35% of all trauma patients (149/4434) [6]. In our study, age of patient varies from 9 years to 75 years. Majority of patient (52%) were in age group 21-40 years, whereas about (70%) of patient were in age group 21 to 50 years, there were only 2 patients below age of 10 years and only 2 patients above the age of 70 years. Robert M Shorr and Michel Cristtenden in their study at MIEMSS shock trauma center found the mean age of the affected patient to be 36.9 years [5]. P. Kulshrestha and A. Sampathkumar in their study at AIIMS found the median age of effected chest trauma patient was 34.5 years (range 5 to 73), one third of all the patients belong to the age group 20-29 years [6]. Ramussen and Brynitz at Bispebjerg Hospital, Denmark, found the median age in their series was 50 years and one third were in age group 61-70 years [7]. According to P. Kulshrestha and Sampathkumar, 31% of chest injuries and minor injury and it can be treated conservatively [6]. In study carried out by Stumm J.T. and Perry J.F. from 1974-1984, in 56% there was injury on left side, in 39% it was n right side and in 5% it was on both sides [3]. Chest wall contusion is rarely a cause of major morbidity or mortality, but this frequently becomes a clue to severe life threatening underlying emergencies, so contusion of chest wall should never be taken lightly and all possible investigation should be done to unearth the other severe forms of injuries [8]. The mortality associated with first rib fracture is higher as it is frequently associated with injury to vital structures at thoracic inlet and so increased incidences of disruption of neurovascular structures [9]. Ozen *et al.* noted 4.1% mortality in patients with chest trauma that had been treated conservatively [10]. In a study by Traub *et al.* [11], in alert patients without evidence of chest wall tenderness, reduced air-entry or abnormal respiratory effort, selective use of CT chest scanning as a screening tool could be adopted. Sufficient trauma to the chest can result in injury to the bony thorax and soft tissues of the chest wall, increasing patient morbidity and mortality [12].

Conclusion

Chest trauma is major and serious type of injury following vehicular accident. They contribute significant to both mortality and morbidity but with concepts about management becoming increasing clear, there is declining mortality rate. Intercostal tube drainage with under water seal is an acceptable and safe management for patient having pneumothorax, haemothorax, or haemopneumothorax. There were 76% of cases due to vehicular accident followed by fall from height in 16%, assault in 3%, animal injury and injury by falling objects constitute 3% cases of chest trauma.

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