

CLINICAL STUDY OF TRAUMATIC CHEST INJURIES AND THEIR MANAGEMENT IN A TERTIARY CARE HOSPITAL

Surgery

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ABSTRACT

Introduction: Chest trauma contributes to major accidental injuries in India. It is one of the most common causes of significant disability and mortality. Thoracic injuries are found to be one of the primary contributory factors of majority of trauma related deaths, accounting for 20-25% of deaths due to trauma. Therefore this study was conducted to analyze the clinical behavior, management and the outcome of chest trauma at a Tertiary care centre.

Methods: This is a prospective hospital based study of all patients presenting with chest injury at a tertiary care center over a period of 1 year. Demographic profile, mechanism of injury, associated injury etc. are recorded and compared with published literature.

Result: The present clinical study is based on 70 cases of thoracic trauma in which there is male predominance, mechanism of injury was blunt trauma in majority of cases (80%) of which Road Traffic Accident (RTA) comprised of 60% cases, followed by physical assault 18.5%. Rib fracture was the most common chest injury seen in 68.6% cases while abdominal, visceral, head injury and fracture of upper or lower limb were commonly found associated chest injury. Tube Thoracostomy (Intercostal water seal drainage) was mainstay of treatment in 54 patients (77.1% cases), while Thoracotomy was performed in 7 cases (10% cases). The overall complication was 19.3% and the average hospital stay was 8.9 days while death occurred in 3 cases.

Conclusion: The present study reflects chest injuries has emerged as an important topic in the domain of trauma surgeons and form a sizable numbers of patients admitted to the hospital. Thoracic injuries can be readily diagnosed in emergency department by clinical evaluation and majority require simple surgical procedures to prevent immediate mortality and long-term morbidity.

KEYWORDS

Chest trauma, Thoracotomy, Blunt trauma, Rib fracture.

INTRODUCTION:

Thoracic injuries are found to be the primary or a contributing cause of about a quarter of all trauma related deaths. It directly accounts for 20-25% of deaths due to trauma. Most patients who sustain thoracic trauma can be treated by simple emergency room (ER) procedures, which are within the capabilities of most of the emergency healthcare workers¹. Chest injuries contribute to around 10 % of total trauma-related deaths and 15 % of loss of disability adjusted life years (DALYS) and they are the second leading cause of death in pediatric trauma². Any thoracic injury no matter how minor, must be considered grave until proven otherwise because it is a dire emergency if not treated promptly often leads to rapid death. In thoracic trauma, primary care is directed to the 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. The vast majorities of chest trauma patients are successfully managed by intercostal tube drainage and do not require thoracotomy³⁻⁶. In view of ever increasing incidents of chest injuries, a clinical study of this problem has been taken up to analyze the clinical spectrum, different types of chest injuries, management and outcome of chest trauma received and managed at a Tertiary care center India.

METHOD:

Our study is prospective observational study of all chest trauma patients admitted in general surgery, CTVS and Orthopaedics departments of AMCH from March 2020 till February 2021. Patients who were brought dead or in a state of cardiac arrest were excluded from the study. A detailed clinical evaluation was done in all patients which includes primary and secondary survey, radiological investigations, biochemical parameters and emergency room procedures. All thoracic and associated injuries were adequately documented. This study was followed up throughout the treatment period to assess mortality and morbidity. Appropriate statistical methods were applied using descriptive statistics.

RESULTS:

A total of 70 cases were studied, of which 64 were male and 6 female. 61 patients underwent surgical intervention and 9 patients were treated conservatively. 4 patients died during the course of the treatment. Most of the cases of this study were in 3rd-4th decade of their lives (81.4%). The mean age of the patients included in the study was 31.3 years.

There was male preponderance, male:female=10.6:1. In this study there were 56 cases of blunt trauma (80%), followed by penetrating injury comprising of 14 cases (20%). Most common mode of injury was RTA (42 cases, i.e., 60%) followed by physical assault either due to blunt or penetrating injury (13 cases, i.e., 18.5%) and fall from height (9 cases, i.e., 12.8%).

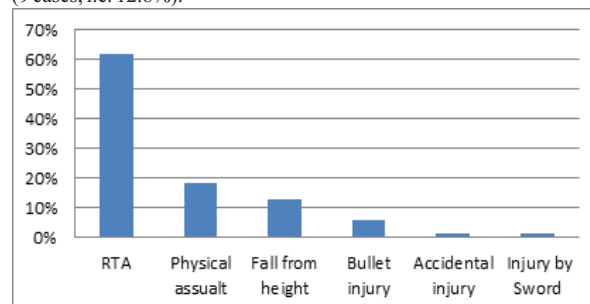


Figure 1: Bar Diagram Showing Different Injury Types

Other significant causes were bullet injury in 5 cases (7.1%) and accidental injury in 1 case (1.4%). Among the blunt trauma cases, 42 (60%) were accounted for RTA followed by 7 (12%) each due to physical assault and fall from height.

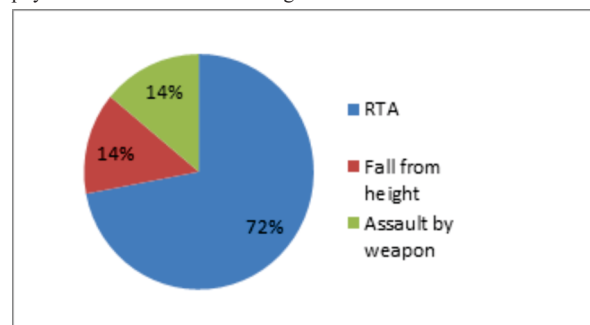


Figure 2: Pie Diagram Showing Incidence Of Blunt Chest Trauma

Among the 14 cases (20%) of penetrating injury, 6 cases (42.8%) were caused by physical assault, 5 cases (35.7%) were caused by bullet

injury, 2 cases (14.2%) were due to fall from height and 1 case (7.1%) was caused by assault with a sharp sword.

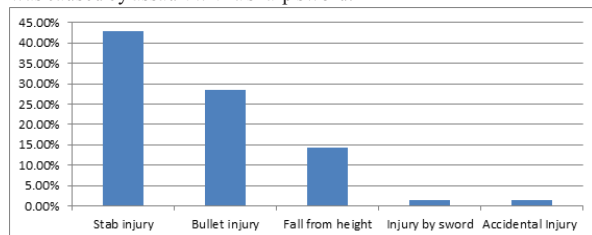


Fig.3: Bar Diagram Showing Incidence Of Penetrating Chest Injury

In the present study, apart from history of trauma, most common complaints that the patients presented with are Chest pain (100% cases), Respiratory difficulty (87.1%), Cough with or without Haemoptysis (27.3%). The incidence of the signs encountered in the present study are paradoxical movement (2.2%), Haemothorax (48.6%), Pneumothorax (21.4%), Haemo-pneumothorax (30%) and Surgical emphysema (22.8%). Among the patients with associated injuries, there were 5 cases of head injury which were diagnosed both clinically and radiologically and they were victims of RTA. 4 patients sustained abdominal injuries along with chest injuries. Fracture of bones of upper limb was seen in 2 cases and fracture of lower limb bone was seen in 1 case. In 2 cases, clavicle fracture and in 1 case sternal fracture were seen. Multiple cut injury over the body was present in 2 cases. Multiple soft tissue injury which included minor abrasions and contusions were present in 6 cases.

Chest X-ray and CT Thorax were the main diagnostic tool to investigate chest injury after initial clinical assessment and resuscitation. Chest X-ray showed 48 cases (68.6%) of fracture rib out of 70 cases. There were 34 cases of Haemothorax, 15 cases of Pneumothorax and 21 cases of Haemo-pneumothorax and 7 cases with pulmonary contusion. Ultrasound and NECT head were done in suspected cases of abdominal and head injuries.

Intercostal Water Seal Drainage (ICWSD) was carried out in 54 patients (77.1%). Out of this 54 patients, 20 had Haemothorax, 13 had Pneumothorax and 21 had Haemo-pneumothorax. In 38 patients chest tube was inserted in the casualty department because of diminished air entry. Most of the drainage tubes were kept for an average of 4.5 days (2-10 days). Thoracotomy had to be performed in 7 cases, 4 of which had previous ICWSD done before. 10 patients of this study were managed conservatively (14.3%). Intercostal needle aspiration was not used as treatment modality but as a diagnostic modality in doubtful cases.

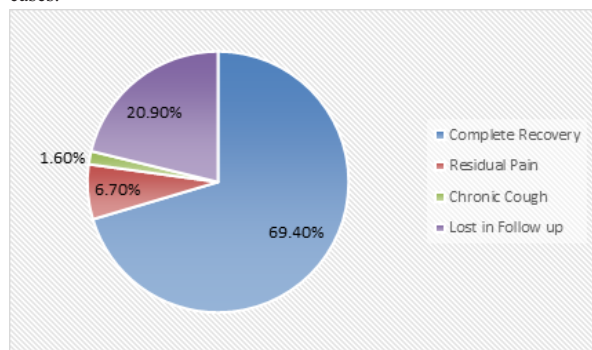


Fig.4: Pie Diagram Showing Incidences Of Recovery

Complications in the form of empyema was found in 3 cases of chest injury with haemothorax, 1 of which had undergone thoracotomy and decortications for pleural thickening and 1 who was treated by ICWSD. Superficial wound infection at the site of the insertion of chest tube was detected in 13 cases of ICWSD patients. Infection along incision line was after exploratory laparotomy was encountered in 3 cases. Thus overall complication rate was 19.3%. Death occurred in 4 patients (5.7%). All the cases were male, 2 of whom sustained injuries in RTA with Haemothorax and 2 had associated head injury. Patients were discharged when they were found clinically and radiologically fit. One patient left the hospital against advice before completion of treatment. Of the remaining 69 patients, 21 cases were discharged on the first week of admission (30.4%). 40 patients were discharged on 2nd

week (57.9%), 7 patients discharged in 3rd week (10.1%), 1 patient was discharged in the 4th week (1.4%). The average hospital stay was 8.9 days. The discharged patients were followed up during study period. Out of 46 patients who came for follow up, 41 patients completely recovered, 4 patients had persistent chest pain which was treated with analgesics, 1 patient had chronic cough and was treated with antibiotics. Rest 23 cases were lost in follow up.

DISCUSSION:

The present work is a clinical study of 70 cases of chest injury admitted in General surgery CTVS and Orthopaedic department of AMCH from March 2020 till February 2021. A thorough literature suggests that Road traffic accidents are leading cause of chest trauma in majority of cases^{4,6}. In this present study also RTA was the leading cause of injury to the chest and the second most common mode of injury was physical assault. The male preponderance of chest injury and vulnerability of the people in the age group of 10 to 50 was reported by Gautam (1981)⁷ (85%) and Maria Singla (1987)⁸ (80%). In our study, rib fractures were the most common injury which is in accordance with the published literature^{11,13,14}. We observed that 48.50% of patients had Haemothorax in our study and 63% of them were associated with rib fracture. This is consistent with the available data in literature^{11,12}. There were 34 cases of Haemothorax (48.50%), 15 cases of Pneumothorax (21.40%) and 21 cases of Haemo-pneumothorax (30%) and 7 cases with pulmonary contusion (10%). Simal M et al (2003)²⁰ in their analysis of rib fractures reported Pneumothorax, Haemothorax, Haemo-pneumothorax and Pulmonary contusion to be 37.25%, 26.8%, 15.3% and 17.2% respectively. Head injury has been described as the most common associated injury²⁵. In this present study also head injury was found to be the most common associated injuries followed by abdominal visceral injury. Other commonly associated injuries were multiple soft tissue injury followed by extremity fracture of both upper or lower limbs, fracture clavicle, multiple cut injury and Facio-maxillary injuries. Shorr and colleagues found associated injuries in more than 75% of thoracic trauma patients¹⁰. Tube thoracostomy was the mainstay of treatment for the majority of patients (77.1%). This can be compared with S. Dalal et al (2008) and Kulshrestha et al (1998)²¹ in their analysis reported ICWSD required 73.4% and 60% respectively. Thoracotomy had to be performed in 7 cases (10%), four of which previous intercostal water seal drainage done before. Richardson observed that less than 5% of patients sustaining blunt chest trauma had indications for thoracotomy¹⁷. Ten patients in this study were managed conservatively (14.2%). Average duration of chest tube was 4.5 days in a study by Locurto et al¹⁸. In our study also the mean duration of ICD was 4.5 days. Complications in the form of empyema was found in 3 cases of chest injury with Haemothorax, 1 of which had undergone Thoracotomy and decortications for pleural thickening and 1 who was treated by ICWSD. Perry and Galaway (1965) and Rapport et al (1955)¹⁶ felt that associated injuries are responsible for the formidable list of complications and have great influence of survival following chest injury. Death occurred in 4 patients (5.7%). All the cases were male, 2 of whom sustained injuries in RTA with haemothorax and 2 had associated head injury. In a study by Acosta et al. mortality rate was 9.3% and respiratory failure was the most common reason for mortality¹⁹. In a recent study by Lema et al., the overall mortality rate was 4.7%, which is relatively lower than that reported in other studies in the literature²⁰.

CONCLUSION

The present study reflects that chest injuries have emerged as an important topic in the domain of trauma surgeons and form a sizable number of patients admitted to the hospital. Road traffic accidents accounted for majority of the cases of chest trauma. This study emphasizes that majority of chest injuries can be effectively managed with careful initial assessment and simple emergency surgical procedures with thorough clinical examination, close monitoring, investigations and appropriate management of associated injuries.

Presence of associated injuries at the time of admission was found to be major determining factors in the morbidity and mortality. After a major injury, the victims very often succumb to it either at the site of accident or during transportation. So the key to improve the outcome after chest injury lies in the primary care at the site of accident and rapid transportation of the victims to a nearby hospital with adequate facilities.

Multidisciplinary approach in the management of these patients, especially in extreme age groups, is life saving and significantly decreases the morbidity and mortality.

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