

Blunt thoracic trauma treatment outcomes- A small center experience

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Abstract

Background: Blunt injury to the chest has a high risk of morbidity and mortality. Road traffic accidents are the major cause of blunt injury to the chest. We aimed to analyze the demographics, mode of injury, radiological findings, injury scores, length of stay and mortality of patients with chest trauma admitted to the cardiothoracic unit at our tertiary care hospital.

Materials and Methods: Retrospective data analysis of 53 patients admitted to the cardiothoracic unit from January 2016 to March 2016 was under taken. All patients with chest injury were included in the study. Patients with major head trauma were excluded. Statistical analysis was done. Variables were expressed as mean \pm standard deviation and percentage.

Results: Mean age of patients were 45.5 \pm 15 years. Only fifteen percent of patients were females. Motor vehicle accidents was the major cause of blunt injury chest (75.7%). Incidence of extra thoracic injuries were 75.5%. Most common injury were rib fractures (85%). 51.5% of patients required intercostal drainage. Length of hospital stay was 9.2 \pm 5.6 days. Average injury severity score (ISS) was 30.63 \pm 16.79.

Conclusions: Majority of patients with blunt injury to the chest require simple techniques of management like intercostal drainage (ICD) which is lifesaving in the emergent setting. ICD and serial radiological monitoring and observation with supportive treatment like analgesia, ventilator support and adequate chest physiotherapy is sufficient in most of the patients. Multi-disciplinary approach with active involvement of other specialties and physiotherapy improves the outcomes for trauma patients.

Keywords: Injury severity score; Polytrauma; Rib fractures; Thoracic injuries

Introduction

Chest injury increases the morbidity and has a negative impact on the economy of the families in the developing world. In polytrauma patients, chest injury is an important component that increases morbidity and mortality^[1]. Blunt thoracic trauma results in injury to the rib cage and the vital organs and structures within it like the mediastinal structures, lungs and the great vessels. Blunt thoracic trauma in patients with polytrauma results in 25% mortality^[1]. In the following study we analyzed the demographics, mechanism of injury, mortality and morbidity in 53 patients with thoracic trauma admitted to Kovai medical center and hospital which is a tertiary care hospital in south India.

Materials and Methods

Retrospective data analysis of 53 patients admitted to our cardiothoracic unit from January 2016 to March 2016 was under taken. Ethical committee approval and consent of participants were not obtained because it was a retrospective observational study. All patients with chest injury who required hospital admission were included in the study. Patients who also had major head injury were excluded. A Chest radiograph anteroposterior view and computed tomography (CT) of the chest was obtained on admission for all patients with blunt thoracic trauma. High resolution CT (HRCT) was done in the setting of emergency or when the serum creatinine levels were elevated. Contrast enhanced CT (CECT) was done in all other patients.

Associated extra thoracic injuries were evaluated and managed by appropriately by the respective specialties. Criteria for admission to intensive care unit (ICU) were high abbreviated injury scores (AIS), elderly patients with multiple comorbidities. Variables like the age, male to female ratio, mechanism of injury, frequency of injuries, duration of ventilation and hospital stay and mortality were analyzed. Continuous variables were expressed as mean \pm standard deviation and discrete variables were expressed as percentage.

Results

53 patients with chest trauma who were admitted from January 2016 to March 2016 were retrospectively analyzed. Road traffic accidents were the major cause for blunt thoracic trauma (84.75%) [Table 1]. The mean age of the patient was 45 years \pm 15(11 to 78 years). Only 15% of the patient were females [Table 2]. 81.8% of patients had major thoracic injuries (AIS \geq 3). The most frequent injury was rib fractures which were present in 84.84% of the patients followed by hemothorax and pneumothorax which were 60.60% and 27.27 % respectively [Table 3]. 52% of patients required intercostal drainage (ICD). 5% of the patient required chest wall stabilization procedure for flail chest. 73% of patients had more than three rib fractures [Table 4]. Most common extra thoracic injury was long bone fractures. The most common extra thoracic surgery performed was open reduction and internal fixation. 15% of the patients came to the emergency

department with shock. 46% of patients were admitted in the intensive care unit. The mean length of stay in the ICU was 4 ± 2 days. Mean length of stay in the hospital was 9 ± 6 days. 44% of patients required invasive ventilation. 55% of patient required noninvasive ventilation. Mortality was 6%. Average injury severity score (ISS) was 30.63 ± 16.79 .

Table 1: Mechanisms of injury

Mechanisms of injury	Incidence
Car passenger injury	48.8%
Motor cycle injury	27.27%
Fall from height	15.15%
Pedestrian injury	9%

Table 2: Demographics

Age	46 ± 14.9 (11 to 78 years)
Male	84.8%
Female	15.2%
Mean length of ICU stay	3.62 ± 2.30 days
Mean length of hospital stay	9.2 ± 5.6 days
Invasive ventilation requirement	44.44%
Noninvasive ventilation requirement	55.55%
Mortality	6.06 %

Table 3: Frequency of injuries

Rib fractures	84.84%
Hemothorax	60.60%
Pneumothorax	27.27%
Lung contusion	24.24%
Flail chest	9.09%
Pneumomediastinum	9.09%
Sternal fractures	6.06%
Thoracic vessel injuries	6.06%
Cardiac injury	3.03%

Table 4: Number of rib fractures

>3	72.72%
≤3	12.12%
None	15.16%
Bilateral rib fractures	18.18%

Discussion

We have demonstrated in our study the outcomes for blunt thoracic trauma in 53 patients. In our study the incidence of road traffic accidents causing blunt thoracic trauma were very high. This is due to the ever rising motor vehicle population and little respect for traffic rules in India. In polytrauma patients, the incidence of major thoracic trauma was very high (81.8%). A prospective study of 1164 patients by Veysi et al. in 2009 analyzed the demographics, mechanism of chest injury and outcomes^[1]. The most common injury was single or multiple rib fractures (33.3%) followed

by lung contusion (15.5%). Simple or tension pneumothorax was 10%. 7% had flail segment, 5% had cardiac or a large vessel injury, 4% had hemothorax and 4% had sternal fractures. The incidence of thoracic trauma in females reported by our study was only 15% is similar to that reported by other Indian studies^[2]. This is due to the fact that use of motor vehicles by females in India is very less compared to that of males and also due to almost nil incidence of drunken driving and night time driving by the female population^[3]. In a study of pattern of chest injuries in fatal vehicular accidents in central India (2012) 100 cases of deaths due to road traffic accidents was studied^[2]. The most vulnerable group was 21-30 years followed by 31-40 years. 4% were less than 10 years. Worst injuries were pedestrian (57%) and motor cycle injuries 20%. 84% were males, 16% were females. 10% had cardiac injury of which 50% of cases had right ventricle laceration. 62% of cases were brought dead^[2]. The incidence of cardiac injury in our study was 3.03%. The low incidence of cardiac injury in thoracic trauma patients is due to the fact that most of these patients die before they reach the hospital.

In our study we used the abbreviated injury score (AIS) and the ISS. The average ISS score was high in our group of patients. Major trauma is commonly defined using an Injury Severity Score (ISS) threshold of 15^[4]. Various trauma scoring systems are available^[5]. Anatomical scales are international classification of the diseases based systems, new injury severity score (NISS), thoracic trauma severity score (TTS), Hannover polytrauma score (PTS) and physiological scores are also available such as acute physiology and chronic health evaluation (APACHE) score and trauma injury severity score (TRISS). Patients with high AIS score have higher ISS and mortality. But AIS score has been extensively debated and an important characteristic of ISS is that it does not always have a linear relationship with mortality^[6].

Management of patients with blunt thoracic trauma is mostly conservative^[7]. Most patients require only intercostal drainage. Scoring system helps in identifying the high risk patients who will require intensive focused treatment protocols. Hildebrand et al. postulated that treatment could be beneficial with more aggressive initial blood transfusion protocols, Kinetic therapy in ICU and prolonged ICU versus HDU therapy^[8]. Studies have shown that patients with severe head, thoracic or chest trauma and patients with high ISS have better chances of survival when the treatment approach of damage control is applied^[9].

Conclusions

Blunt thoracic trauma is a major determinant of mortality and morbidity. Scoring systems help to identify the high risk patients. Multi-disciplinary approach by involving multiple specialties, pain management in the form of epidural analgesia,

paravertebral block, intensive pulmonary rehabilitation and early mobilization by the physiotherapist will help improve patient outcomes. Road traffic accidents being the major cause of blunt thoracic trauma can be prevented by initiatives at the government and society levels by education and imposing strict traffic regulations. Limitations of our study are that it is not a comparative study and had only a small sample size.

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Conflicts of interest: None declared

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