


Original Research Article

Comprehensive study of penetrating chest injury in Salem District

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Abstract

Introduction: Penetrating chest injuries may seriously damage the lungs, heart and other thoracic structures. Blunt injuries are most commonly deceleration injuries associated with motor vehicle crashes that result in falls or blows to the chest.

Aim of study: To determine the magnitude and management of patients with chest trauma in a rural setup.

Materials and methods: A study of 50 cases of chest trauma admitted in, Government Mohan Kumaramangalam Medical College Hospital, from 2013-2017. The data collected included the patient's demographic profile; mode, type and severity of chest injuries, management scheme and outcome.

Results: There were 62(79.5%) males and 38 (20.5%) females, giving a male to female ratio of 3.8:1. The age ranged between 5-67 years with a mean of 32.28 years. Blunt injuries constituted the remaining 30(38.46%) and were all as a result of road traffic accidents (RTA). All patients had chest radiographs from which the commonest lesions; simple rib fractures, hemopneumothorax, hemothorax, and pneumothorax were diagnosed. There were none with major vascular or esophageal injuries. The commonest extra-thoracic associated injuries were limb fractures and abdominal injuries

Conclusion: The outcome of thoracic injuries will depend upon the health care provider's knowledge of the physics of the event and the urgency of the diagnosis, as well as the ability to assess and manage all the variables involved. The proper approach to the patient can positively influence the quality of the assessment, the level of cooperation and the long term outcome of care.

Key words

Hemothorax, Hemopneumothorax, Pneumothorax, Penetrating chest injury.

Introduction

The external injury may appear minor, but the impact may cause severe life-threatening internal injuries, such as a ruptured spleen [1]. Penetrating trauma occurs when a foreign body impales or passes through the body tissues as in gunshot wounds or stabbings [2]. Thoracic injuries are the cause of death in 20% to 25% of all trauma victims; injury to the chest wall is found in 45% of these trauma victims [3, 4, 5]. The causes of blunt injuries were attributed to motor vehicle accidents (80%), suicides (20%), falls (8%), homicides (17%) and others (15%) [6]. Chest injury is potentially the most dangerous of all and its management should be a matter of the most extreme urgency. The particular danger of the chest injury is that it threatens the vital transport of oxygen to the tissue in two ways: By hypovolemia from severe bleeding and by trauma to the lung itself [7]. Even this hypoxia is a danger to life; it can adversely influence the outcome of associated brain trauma. At the same time, advancement in anesthesia has offered safety of operation within the chest [8, 9]. In thoracic trauma, primary care is directed to the rapid evaluation of the extent of the injury, estimation of the volume of blood loss and its rapid replacement by intravenous transfusion, the recognition of hypoxia and respiratory distress and its correction by the assurance of a clear airway, full pulmonary expansion and mechanical support of ventilation when necessary [10, 11].

Materials and methods

A study of 100 cases of chest trauma admitted in, Government Mohan Kumaramangalam Medical College Hospital, from 2013-2017. The data collected included the patient's demographic profile; mode, type and severity of chest injuries, management scheme and outcome.

Inclusion criteria: Only those patients who were willing to participate in the study were included. Patients who came to the casualty with chest trauma and associated polytrauma were included

in the study. Medico-legal cases were also included in the study.

Exclusion criteria: Patients not willing to give consent and patients who were discharged.

The diagnosis was by clinical history, physical examination and abnormal chest radiographs at the accident and emergency unit. Chest injuries were considered as both blunt and penetrating affecting the chest wall, pleura, lungs, lower respiratory tract or contents of the chest e.g. esophagus, heart and great vessels. Chest radiograph, complete blood count, serum investigation, blood grouping and crossmatching, ultrasonography of chest and abdomen, computed tomography of the head, other radiological investigation and if required rigid bronchoscopy was done.

Results

There were 62(79.5%) males and 38 (20.5%) females, giving a male to female ratio of 3.8:1. The age ranged between 5-67 years with a mean of 32.28 years. Blunt injuries constituted the remaining 30(38.46%) and were all as a result of road traffic accidents (RTA). All patients had chest radiographs from which the commonest lesions; simple rib fractures, hemopneumothorax, hemothorax, and pneumothorax were diagnosed. There were none with major vascular or oesophageal injuries.

There were 62 males and 16 females, giving a male to female ratio of 3.8:1. The age range was 5-67 years with a mean of 32.28 years. Most the injuries were penetrating 48(61.53%), of these; road traffic accidents were 45, assault cases were 15, low-velocity guns 1, sharp edge tool 15, stab wounds a 10, implement injury 14 (**Table – 1**).

Thirty patients (38.46%) sustained blunt injuries as result of RTA and their commonest problems were rib fractures and pulmonary contusions. All the patients had chest radiographs done; the commonest abnormal findings were rib fractures (10), hemopneumothorax (8), hemothorax (12),

pneumothorax (15) and chest wall wounds in 10 patients (**Table – 2**).

The associated injury was more common in our study. Head injury was observed in 25 cases, the extrathoracic fracture was in 30 patients, abdominal trauma in 40 patients, spine and the associated injury was 5 cases (**Table – 3**).

Table – 1: Mode of chest injury (n=100).

Causes of injury	No of patients
Road traffic accident	45
Assault	15
Low-velocity guns	1
Sharp edge tools	15
Stab Wounds	10
Impalement injury	14

Table – 2: Type of chest injury (n=100).

Types	No of patients
Hemothorax	12
Hemopneumothorax	8
Pneumothorax	15
Diaphragmatic	10
An open sucking chest wound	5
Rib fractures	10
Clavicular fractures	5
Sternal fractures	15
Scapular fractures	10
Chest wall wounds and lacerations	10

Table - 3: Comparison of associated injury in chest trauma patients (n=100).

Series	No of patients
Head injury	25
Extrathoracic fracture	30
Abdominal trauma	40
Spinal injury and other	5
Mortality	0

Wound infection in 15, pneumonia in 10 and empyema thoraces in 15, Intraabdominal complications 22, Atelectasis 8, Septicaemia 1, Urinary tract infection 3, Pericardial effusion 10, Emphysema 3, ARDS 3 (**Table – 4**). Other less frequent but significant complications included

two patients with septicemia, one with atelectasis and two with urinary tract infection (UTI). Isolated chest injuries were found in 36 patients (46.15%) with rib fractures found in all of them. The mean period of closed thoracostomy tube drainage was 10 days. The mean duration of hospital stay was 21 days, excluding those with long bones and pelvic fractures. Both periods were longer in the multiple injured and those with penetrating chest injuries. Two patients died following emergency thoracotomy.

Table – 4: Complication observed in 100 cases after treatment (n=100).

Complications	No of patients
Wound infections	15
Pneumonia	10
Empyema thoracic	15
Intraabdominal complications	22
Atelectasis	8
Septicemia	1
Urinary tract infection	3
Pericardial effusion	10
Emphysema	3
ARDS	3

Discussion

Blunt chest trauma produces 25% of traumatic deaths; these injuries contribute up to 50% of global mortality caused by trauma. Blunt chest trauma is commonly associated with multiple organ damage that favors catastrophic patient outcome [12, 13, 14]. A study with 22,613 patients over 16 years of age, with blunt thoracic trauma (AIS Chest ≥ 2) pulmonary, cardiac, and vascular lesions were found to be predictors of negative outcome while chest wall lesions - except bilateral flail thorax due to multiple costal fractures- will not influence significantly the mortality rate [15]. 75% of the cases are associated with pulmonary contusion, which produces an inflammatory response with the right to left shunts, resulting in severe hypoxia, severe pulmonary restriction with the need of tracheal intubation and pulmonary ventilation [16]. Only 0.07% had a surgical fixation of the

thoracic wall and 8% had epidural analgesia, 44% were placed a pleural catheter, 21% required tracheostomy, 59% required mechanical ventilation, and 82% were in the ICU for an average of 11.7 days. 21% of the patients had complications due to pneumonia, adult respiratory distress syndrome in 14%. It is important to mention that only 7% had sepsis and 16% died [17]. The treatment is based on analgesia, an aggressive pulmonary hygiene including frequent tracheobronchoscopy, pulmonary physiotherapy Surgical fixation in costal rib fractures continues to be controversial [18]. Sánchez-Lloret J, et al. used anatomic plates and intramedullary splints in patients with severe damage level of 28 ± 10 with broken ribs 8.5 ± 2.9 with good results. These authors have stated that patients reached an 84% forced vital capacity at three months and 50% returned to work at six months [19, 20].

Conclusion

Every patient with chest trauma is to be checked for respiratory distress and patency of airway must be maintained before going for other pathology. Some injuries, as in cardiac chamber rupture, thoracic aortic rupture, injuries of the intra thoracic inferior and superior vena cava and delayed recognition of esophageal rupture are associated with high morbidity and mortality rates.

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