Management of Blunt Chest Injury

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ABSTRACT

BACKGROUND

Blunt chest injury is the most common thoracic injury. Although majority of the blunt chest injuries are benign, it can also result in many intrathoracic complications which requires prompt diagnosis and appropriate treatment. Injuries to the thoracic cavity or its contents require urgent intervention as a life-saving measure.

METHODS

This is a prospective observational study of 324 patients with blunt chest injuries from January 2015 to December 2018 in Regional Institute of Medical Sciences, Imphal. All patients with blunt chest injuries admitted in the Surgery ward and Orthopaedic ward with or without associated injuries were included in this study. Patients with penetrating chest injuries and patients with rib fracture who were not admitted in the ward were excluded from this study. Chest drain output of more than 1000 ml (at the initial drain), persistent air leak, and diaphragmatic rupture were considered as an indication for thoracotomy. Patients with minimal haemothorax or pneumothorax were managed conservatively with closed monitoring of vitals and follow up CT scan of the chest during the hospital stay.

RESULTS

A total of 324 patients (M=271, F=53) with blunt chest injuries were prospectively analysed. Mean age was 29 years (range 18 – 82 years). Majority of the patients were in the age group of 21 to 40 years comprising 177 (54.6%) patients (Table I). Road traffic accident (RTA) was the most common cause of blunt chest injuries comprising 88.9%. Rib fracture with or without associated haemothorax or pneumothorax was the most common injury (87.1%). This was followed by haemothorax (60.2%) and haemopneumothorax (5.9%). 11 (3.4%) patients presented with flail chest with varying amount of bilateral haemothorax. Traumatic asphyxia was the least common injury in patients with blunt chest injuries.

CONCLUSIONS

Blunt chest injuries carry a high morbidity and mortality risk if not managed with appropriate and urgent treatment. Tube thoracostomy is the main procedure performed in any chest injury. High index of suspicion is required for any intrathoracic organ involvement in management of chest injuries due to blunt trauma. Early decisions to perform surgical intervention can improve outcomes for patients with severe thoracic injury unnecessary.

KEYWORDS

Blunt Trauma, Chest Injury, Haemothorax, Pneumothorax, Tube Thoracostomy, Thoracotomy

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BACKGROUND

Thoracic trauma accounts for 10 to 15% of all traumas and is responsible for approximately 25% of trauma related mortalities.[1,2] Blunt chest injury is the most common thoracic injury. Although majority of the blunt chest injuries are benign, it can also result in many intrathoracic complications which requires prompt diagnosis and appropriate treatment. Injuries to the thoracic cavity or its contents require urgent intervention as a life-saving measure. These possibilities should always be kept in mind during the resuscitation of every trauma patient. All these intrathoracic injuries may cause haemothorax and/ or pneumothorax, the most common complication that can occur immediately after blunt chest injury.[3] The mechanism of injury should also influence the index of suspicion for these critical injuries.

The purpose of this study was to analyse the incidence, mechanism, management and injury related complications of patients with blunt chest injuries.

METHODS

This is a prospective observational study of 324 patients with blunt chest injuries from January 2015 to December 2018 in Regional Institute of Medical Sciences, Imphal. All patients with blunt chest injuries admitted in the Surgery ward and Orthopaedic ward with or without associated injuries were included in this study. Patients with penetrating chest injuries and patients with rib fracture who were not admitted in the ward were excluded from this study.

All 324 patients with blunt chest injuries with or without associated injuries were initially treated in the Emergency ward. All patients were treated as per ATLS guideline. Chest X-ray and CT scan of the chest were the main imaging modalities used. Patients with pneumothorax and/ or mild to moderate haemothorax underwent intercostal drainage irrespective of the clinical status in case of severe polytrauma patients. Chest drain output of more than 1000 ml (at the initial drain), persistent air leak, and diaphragmatic rupture were considered as an indication for thoracotomy. Patients with minimal haemothorax or pneumothorax were managed conservatively with closed monitoring of vitals and follow up CT scan of the chest during the hospital stay. In the follow up CT scan if the haemothorax or pneumothorax found to be increased then tube thoracostomy was performed.

RESULTS

A total of 324 patients (M=271, F=53) with blunt chest injuries were prospectively analysed. Age range was 18 - 82 years. Majority of the patients were in the age group of 21 to 40 years comprising 177 (54.6%) patients (Table 1). Road traffic accident (RTA) were the most common cause of blunt chest injuries comprising 88.9%. Chest pain and with varying degree of respiratory discomfort were the most common symptoms at presentation whereas tenderness over the chest wall, bone crepitation and subcutaneous emphysema were the most common findings on physical examination. The treatment of blunt chest injuries includes primary modalities such as appropriate analgesia, oxygen therapy, bronchodilators if associated with pulmonary contusion and respiratory exercise, as well as secondary treatments for complications such as tube thoracostomy and thoracotomy.

Age Group (in Years)	No. of Patients (%)
1 – 10	Nil
11 – 20	22 (6.8)
21 – 30	91 (28.1)
31 – 40	86 (26.5)
41 – 50	55 (17.0)
51 – 60	32 (9.9)
61 – 70	26 (8.0)
71 – 80	9 (2.8)
More than 80	3 (0.9)
Total	324

Table 1. Age Distribution

Mechanism of Injury	No. of Patients (%)
RTA	288 (88.9)
Fall from height	19 (5.9)
Simple fall	9 (2.8)
Sports injury	1 (0.3)
Assault	7 (2.2)

Table 2. Mechanism of Injury

Injuries	No. of Patients (%)
Rib fracture only	57 (17.6)
Rib fracture with haemothorax	141 (43.5)
Rib fracture with pneumothorax	19 (5.9)
Rib fracture with haemopneumothorax	54 (16.7)
Flail chest associated with haemothorax	11 (3.4)
Subcutaneous emphysema associated with pneumothorax and/or haemothorax with rib fracture	7 (2.2)
Isolated subcutaneous emphysema with or without rib fracture	6 (1.9)
Sternal fracture with mediastinal haematoma	4 (1.2)
Pulmonary contusion	13 (4.0)
Myocardial contusion	5 (1.5)
Traumatic asphyxia	1 (0.3)
Diaphragmatic injury	6 (1.9)
	324 (100)

Table 3. Types of Chest Injury

Associated Injuries	No. of Patients (%)
Clavicle fracture	24 (7.4)
Scapula fracture	9 (2.8)
Long bone fracture	21 (6.5)
Spinal injury	3 (0.9)
Pelvic fracture	4 (1.2)
Intraabdominal injuries	12 (3.7)
Head injury	11 (3.4)
Total	83 (25.6)

Table 4. Associated Injuries

Treatment	No. of Patients (%)
Conservative	134 (41.4)
Tube thoracostomy	184 (56.8) (96 patients with haemothorax, 15 with pneumothorax, 54 with haemopneumothorax, 11 with flail chest, 7 with subcutaneous emphysema and 1 with traumatic asphyxia)
Thoracotomy	34 (10.5) (6 patients with diaphragmatic rupture, 11 with massive haemothorax, 17 with major air leak with haemothorax)

Table 5. Treatment Modality

Rib fracture with or without associated haemothorax or pneumothorax was the most common injury (87.1%). This was followed by haemothorax (60.2%) and

haemopneumothorax (5.9%). 11 (3.4%) patients presented with flail chest with varying amount of bilateral haemothorax. Traumatic asphyxia was the least common injury in patients with blunt chest injuries (Table 3). A total of 83 (25.6%) patients were associated with other injuries, most common associated injuries were clavicle (24 (7.4%) patients) and long bone (21 (6.5) patients) fractures. Twelve (3.7%) patients were associated intraabdominal injuries (Table 4). Tube thoracostomy was performed in 184 (56.8%) patients. Out of 141 patients with haemothorax, 45 patients had minimal or mild haemothorax and were treated conservatively.

A total of 134 patients were managed conservatively and these group of patients include rib fractures without or with minimal haemothorax or pneumothorax, pulmonary contusion, myocardial contusion, sternal fracture with or without mediastinal haematoma, and isolated subcutaneous emphysema. These conservatively managed patients had follow up Chest X-ray or CT scan after on the second or third day after admission. Figure 1. CT scan at time of admission and Figure 2 CT scan of the same patient after 72 hours. Thirty-four (10.5%) patients underwent thoracotomy (Table 5), and this includes 6 patients with diaphragmatic rupture, 11 patients with massive haemothorax, 17 patients with major air leak with haemothorax. 6 patients with diaphragmatic rupture, 11 with massive haemothorax, 17 with major air leak with haemothorax. Pulmonary laceration was encountered in all 19 patients with major air leak. Nine patient had active bleeding from the intercostal vessels. Two patient with associated with intraabdominal bleed had developed acute renal failure postoperatively. Four patients died in the course of treatment (Table 6).

Complications	No. of Patients (%)
Acute renal failure	2 (0.6)
Death	3 (0.9)
Retained haemothorax	27 (8.3)
Empyema thoracis	1 (0.3)

Table 6. Complications and Mortality

DISCUSSION

Blunt chest injuries are frequently seen in civil populations. Blunt chest injury is common among blunt trauma patients and may be isolated or concomitant. Blunt trauma predominately affect male individuals aged 30-40 years. These injuries are mainly caused by road traffic accidents, as well as falls from heights and the incidence of blunt chest injuries caused by road traffic accidents was reported to be 70-80%.[4,5,6,7] Blunt thoracic trauma has a significant impact on morbidity and mortality when left untreated.[8] In our series, majority of our patients (83.6%) were male and majority of the patient (54.6%) with blunt chest injuries were in the age group of 21 to 40 years. Road traffic accident (RTA) were the most common cause of blunt chest injuries comprising 88.9%.

Almost all of our patients presented with chest pain and varying degree of dyspnoea. Chest physiotherapy and high flow nasal prongs were the mainstay in management of blunt chest injuries with rib fracture.[9,10] Majority of our patients were treated with oxygen therapy at least in the initial period of the treatment and chest physiotherapy or respiratory exercise were recommended in all our patients. Rapid mobilisation through physiotherapy is considered a key factor in preventing complications including pneumonia, respiratory failure and ARDS and effective pain control is necessary to allow for deep breathing chest physiotherapy and improved lung function.[11,12] Rib fractures are reported as the most common pathologies associated with chest trauma with an incidence of 35-40%.[13] However, in our series, 89.2% of our patients had rib fractures with or without associated intrathoracic injuries.

Figure 1. CT Scan at Admission

Figure 2. CT Scan of the Same Patient after 72 Hours

Although Chest X-ray is the first tool used to evaluate trauma patients, it might underestimate the severity of a pulmonary contusion or other intrathoracic injuries may not be immediately appear on radiographs taken at the time of admission, thoracic CT remains superior.[14,15] In our series, we mainly rely on CT scan for the diagnosis, however it depends on the haemodynamic stability of the patient. In this study, 232 (71.6%) patients had haemothorax or pneumothorax of varying amount accompanied by rib fracture, out of these 232 patients, 184 (56.8%) patients were treated by tube thoracostomy initially. In most of the series[16,17] such injuries are treated by tube thoracostomy. It is also important to keep in mind that compared with rib fractures, bilateral lung contusions associated with haemothorax or pneumothorax were a more important regarding adverse outcomes.[18] Only 10-15% of patients with thoracic injury require thoracotomy.[19] We performed thoracotomy in 34 (10.5%) patients.

CONCLUSIONS

Blunt chest injuries carry a high morbidity and mortality risk if not managed with appropriate and urgent treatment. Tube thoracostomy is the main procedure performed in any chest

injury. High index of suspicion is required for any intrathoracic organ involvement in the management of chest injuries due to blunt trauma. Early decisions to perform surgical intervention can improve outcomes for patients with severe thoracic injury and unnecessary delayed intervention should be avoided.

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