

# MANAGEMENT OF PENETRATING THORACIC TRAUMA, AN EXPERIENCE OF 200 CASES

Mohammad Abid Khan Amer Bilal Viqar Aslam Mohtasim Billah Ainul Hadi  
Abdul Baseer Farid Ullah Manzoor Ahmed M.Muslim

## ABSTRACT

**BACKGROUND AND PURPOSE:** Penetrating chest injuries are commonly seen in thoracic trauma patients and are known to be associated with higher mortality and morbidity. The objective of our study are to assess the effect of penetrating chest injury concerning morbidity, mortality as well as clinical courses and outcome of injured patients with chest trauma.

**MATERIAL AND METHODS:** This study includes 200 cases of thoracic trauma patients with chest injury treated between January 2007 and January 2008 at our thoracic trauma unit. Parameters examined included injury pattern, injury severity, mortality, hemodynamics at admission, length of stay in thoracic trauma unit, and outcome.

**RESULTS:** 200 pure thoracic trauma patients, 150 males and 50 females, were included with solitary chest injury. Mean age at the time of injury was 30 years, 170 patients were intubated before admission. Average period in thoracic trauma unit was 10 days. Regarding the injury pattern in 100 patients a combined hemo-/pneumothorax was seen, 100 patients had either a hemothorax or a pneumothorax, out of 200 patients 150 patients had unilateral and in 25 patients a bilateral serial rib fracture was diagnosed, in 25 patients either sternal or singular rib fractures were determined, 150 patients had a unilateral pulmonary contusion, and in 50 patients a bilateral pulmonary contusion was diagnosed.

**CONCLUSION:** The present study shows that chest injuries in thoracic patients are common coexisting injuries and contribute significantly to the morbidity and outcome of these patients. Early intubation and ventilation in combination with an adequate circulatory stabilization with or without surgical management are crucial to avoid complications and deleterious outcome.

Key words: Chest trauma, Complications. Empyema,  
Tube thoracostomy. Hemothorax, pneumothorax

## INTRODUCTION

Approximately a quarter of deaths due to trauma are attributed to thoracic injury. Immediate deaths are essentially due to major disruption of the heart or of great vessels. Early deaths due to thoracic trauma include airway obstruction, cardiac tamponade or aspiration. Thoracic trauma is often life-threatening, and has been identified as a contributing factor in over 25% of trauma related deaths<sup>(1)</sup> Thoracic trauma may involve injuries to the:

- Chest Wall
- Lungs
- Heart
- Great vessels
- Tracheobronchial tree
- Esophagus
- Pleura

## PNEUMOTHORAX

A pneumothorax is a collection of air in the pleural cavity due to a communication between the atmosphere and the pleural space. The air enters as the result of perforation via the lung or the chest wall. The injury may be the result of Penetrating trauma, spontaneous ruptures of an emphysematous bleb, or may be spontaneous without any apparent cause.

## TENSION PNEUMOTHORAX

Defined as air under pressure within the pleural cavity, tension pneumothorax is also called valvular pneumothorax, mainly because the air enters the pleural cavity during inspiration, but is prevented from escaping during expiration. Tension pneumothorax occurs for a variety of reasons, but in the trauma patient it is most often a result of a blunt chest trauma. This condition causes increased intrathoracic pressure with decreased central venous return, which leads to.

\* Address for correspondence:  
Department of Thoracic Surgery Post Graduate Medical  
Institute Lady Reading Hospital  
Peshawar



## OTHER CLINICAL MANIFESTATIONS INCLUDE

- Open pneumothorax
- Tension pneumothorax
- Hemothorax
- Flail chest
- Pulmonary contusion
- Pulmonary laceration

The majority of patients with thoracic trauma can be managed by simple manoeuvres and do not require surgical treatment. Penetrating wounds to the chest in civilian practice result mainly from stabbing or gun shot wounds first aid training to public and mass education can prevent early deaths. Tube thoracostomy is the most common method of treating penetrating chest injuries.<sup>(2)</sup> Assessment of the chest entails a visual inspection of all aspects, including the back and both flanks. The nature of the chest wall excursion is noted. External signs of injury are documented and open wounds are characterized and treated as necessary. Although rare in our experience, the open sucking chest wound should be controlled with Vaseline gauze or suture. Breath sounds are evaluated to determine if any abnormality is present. Parenchymal lung injury may be difficult to detect by auscultation and a high index of suspicion is necessary, especially in patients who are being ventilated through an orotracheal tube with positive pressure. In the patient with diminished, abnormal or absent breath sounds, chest percussion may indicate the nature of the intrathoracic condition: pneumothorax, hemothorax or a combined hemo pneumothorax. Heart sounds and cardiac rate are assessed. Neck veins status is evaluated. This is particularly important when the patient is in shock, for tamponade and tension pneumothorax can mimic the hypovolemia from exsanguination. For all patients, intravenous access and volume restoration is begun. A chest radiograph is obtained initially to assist in the exact determination of the chest injury. Electrocardiography and echocardiography is performed if cardiac injury is suspected.

Immediate treatment for some chest injury should be instituted on clinical grounds because any delay is usually fatal. Shock associated with tension pneumothorax or cardiac tamponade is usually addressed by performing needle chest decompression for tension and pericardiocentesis for tamponade. Some injury small, stable pneumothoraces for example, can be treated by observation but the

patient should be monitored closely for evidence of clinical deterioration. Other conditions require prophylactic treatment with tube thoracostomy to prevent clinical deterioration at an inopportune time. The vast majority of chest injury can be treated with tube thoracostomy. This technique has evolved over the past thirty years to become the mainstay for the treatment of conditions causing pneumothorax, hemothorax or both. Tube thoracostomy is the preferred method for obtaining rapid re-expansion of injured lung, complete evacuation of the pleural space and monitoring the injured chest for the nature and extent of continued bleeding when present following insertion. Complications following chest injury can occur early or late. Technical problems with tube thoracostomy placement, position and function, delay in placement of the chest tube, the presence of a large hemothorax, incomplete re-expansion of injured lung, incomplete obliteration of the space between the pleural surfaces, delayed recognition of a diaphragmatic injury, pulmonary parenchymal contusion, extrathoracic hematoma, unstable chest all injury with multiple rib fractures, all predispose a patient to complications with the chest injury.<sup>(3,4)</sup>

## MATERIAL AND METHODS

Over a one year period we have managed a lot of trauma patients in our unit. In our study we have included 200 patients which were of penetrating injury to the thoracic cavity alone. Patients with multiple injuries were excluded. Parameters examined included injury pattern, injury severity, mortality, hemodynamics at admission, duration of ventilation, length of stay in thoracic trauma unit, and outcome.

## RESULT

The total number of patients were 200, there mean age was 30 years ranging from 15 to 60 years, 75% were male 25% were female. 170 (85%) patients were chest intubated before admission 5(2.5%) were initially observed but later intubated for haemo or pneumothorax. 25(12.5%) were managed without chest intubation successfully. Average period in thoracic trauma unit was 10 days. Regarding the injury pattern in 10 patients a combined hemo-/pneumothorax was seen, 10 patients had either a hemothorax or a pneumothorax, out of 200, 150 patients had unilateral and 25 patients had bilateral serial rib fractures, in 25 patients either sternal or singular rib fractures were determined, out of 200



150 patients had a unilateral pulmonary contusion, and in 50 patients a bilateral pulmonary contusion was diagnosed, the overall mortality was 5%. 85% out of intubated patients were managed alone with chest intubation and conservative management including low grade suction, nebulization, chest physiotherapy and spirometry. 2.85% of intubated patients were managed by early emergency thoracotomy for severe bleeding and unexplained shock. 11% was managed for clots evacuation by thoracotomy.

## DISCUSSION

Injury to the chest, whether by blunt or penetrating mechanism, creates a set of circumstances which must be addressed in an organized fashion in order to restore optimal function promptly and to prevent complication from occurring subsequently. The goals of treatment are to address injury and any loss of function sustained, restore function and to do so in such a manner that further adverse sequelae are minimized. The patient who sustains a chest injury is treated in a standardized manner after arrival at the trauma center. Immediate treatment for some chest injury should be instituted on clinical grounds because any delay is usually fatal. Some injury, small, stable pneumothoraces for example, can be treated by observation but the patient should be monitored closely for evidence of clinical deterioration. Other conditions require prophylactic treatment with tube thoracostomy to prevent clinical deterioration at an inopportune time. The vast majority of chest injury can be treated with tube thoracostomy. This technique has evolved over the past thirty years to become the mainstay for the treatment of conditions causing pneumothorax, hemothorax or both. Only a correctly placed, properly positioned thoracostomy tube achieves this goal. Many of the various complication which can occur in the patient

with chest injury are actually also diminished as a consequence of optimal technique. Complications following chest injury can occur early or late. Finally, risk of empyema occurrence in the setting of patient care must be considered in arriving at the decision to use antibiotic prophylaxis.<sup>(5,6)</sup> Overall thoracic trauma has a mortality rate of 10%,<sup>(7)</sup> while in our study is 5%. Indications for immediate thoracotomy have been determined<sup>(8,9,10)</sup> and they include wounds in the proximity of the heart and great vessels, evident cardiac tamponade, hemodynamic instability and weak response on resuscitation, evident esophageal injury, injuries of trachea, major bronchi and diaphragm, massive air leak, and radiological signs of blood retention in spite of drainage. The amount of initial hemorrhage amount and duration of prolonged hemorrhage through a chest tube are equivocal indications. Contraindications for thoracotomy in patients with the chest injuries are: removal of foreign bodies, minimal hemothorax, pulmonary hematomas, pulmonary parenchymal laceration, blast injuries of lung, and heart contusion.

## CONCLUSION

A patient with thoracic injury must be regarded as a very serious case, because there is such a narrow interval of opportunity to diagnose and treat thoracic trauma injury victims, prompt and aggressive management is imperative, the key to proper diagnosis is a meticulous assessment, any delay in assessment or intervention can multiply the chances of death. Expedient identification of all injuries must be a priority. Life-threatening injuries should be stabilized immediately. If the patient is stabilized, assessment should continue and include evaluation for complications and associated physiological compensations. Trauma-patient prognosis is largely related to the skill of the emergency department.

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