

Management of Penetrating Chest Injuries

Muhammad Ateeq*, Shazia Jahan*, Azhar Sajjad**, Faisal .G. Bhopal*

* Department of Surgery, District Head Quarters Teaching Hospital, Rawalpindi

** Pakistan Atomic Energy Commission Hospital, Islamabad

Abstract

Background: To determine the pattern of penetrating thoracic injury, including the causes, the role of surgery and intervention outcomes in general surgical unit.

Methods: In this descriptive study patients of all age groups and either sex with isolated penetrating chest trauma or poly trauma were included.

Results: Out of total 926 patients, studied during ten years period, 694 cases (74.94%) were medico legal. Haemopneumothorax was the most commonly observed consequence of penetrating chest injury. (n=539). Tube thoracostomy was performed in 855 (92.33%) cases. Acute Respiratory Distress Syndrome (ARDS) was the commonest complication (5.07%). Overall mortality rate was 08.96%.

Conclusion: Timely rescue of patients, from site of accident, to the adequate health facility ensures better outcome

Key Words: Chest injury, Tube thoracostomy,

Introduction

Road traffic accidents and the increasing violence are common causes of increasing chest injuries. Blunt trauma is not usually associated with military or civilian violence, while penetrating chest trauma often is. ¹ According to United States National Trauma Data Bank 25% deaths occurring due to trauma in United States are due to chest injuries. ² Many patients with chest injuries die after reaching hospital and many of those patients can be saved with prompt adequate management. ³ The operative competence of a general Surgeon in this anatomical region of the body can not be compared with a cardiothoracic surgeon, however most of the cases of chest trauma are adequately and successfully being managed by general surgeons. ⁴ In spite of high mortality associated with chest injuries most of the chest injuries can be managed by simple interventions like tube thoracostomy. Critical condition of the patients with chest trauma can become challenging for general surgeons on certain occasions. ⁴

Firearm injuries and stab wounds of the chest are the major cause of chest injuries. Road traffic accidents are second common cause of chest injuries. Pre hospital deaths due to chest injuries are mostly due to great vessel injuries, cardiac injuries and tension pneumothorax. ⁵

Chest trauma management is difficult, but the results are usually rewarding. All patients who reach hospital alive should survive by appropriate management. The selection of patients for operation or observation can be made by clinical examination and appropriate investigations. The indications of surgical intervention include significant pneumothorax, hemothorax, hemopneumothorax, diaphragmatic injuries, extensive pulmonary laceration, and great vessel injuries. The most frequent complication of chest trauma is atelectasis. Other potentially fatal complications range from exsanguinations to adult respiratory distress syndrome. The general outlook of penetrating chest injuries is improving as better treatment and prevention of complications have greatly reduced morbidity. Although hospital mortality has fallen by a factor of ten since the mid 19th century, the total mortality caused by penetrating chest injuries has undergone less change. ⁶

Patients and Methods

This descriptive study was conducted in Surgical Unit, District Headquarters (Teaching) hospital Rawalpindi from June 2000 to June 2010. This hospital is a main referral centre for trauma cases including all medico legal cases from the Rawalpindi Division. A total of 926 consecutive patients with penetrating thoracic injuries presenting in emergency department were included and evaluated. Patients of all age groups who presented with penetrating chest trauma either isolated or associated with poly trauma were included. Patients with blunt chest injuries were excluded from the study. On arrival to emergency department of hospital all patients were evaluated and resuscitated according to ATLS guideline of trauma care. ⁷ Emergency tube thoracostomy was performed in life threatening chest injuries. Secondary survey was performed once the patient had been stabilized.

Associated injuries were managed on their merit. Haemoglobin levels, blood grouping and chest x rays were the main investigations done in emergency room. Ventilator support was provided where indicated. CT scan chest, bronchoscopy, pulmonary function test were performed in the surgical ward / ICU where indicated.

Results

A total number of 926 patients with penetrating chest trauma due to different causes were admitted in surgical unit during the study period. Out of 926 patients 439 patients (47.40%) sustained multiple injuries in addition to chest injury. Majority of patients were male 74.94% (n= 694) where as 232 were females (25.05%). Most of the patients were of young age group, mean age 37 years, and 43 patients were of paediatric age group. 694 (74.94%) patients out of total 926 were medico legal cases.

Table 1: Mode of injury

Mode of injury	Number (%)
Gunshot injuries	536(57.88)
Stab wounds	216(23.32)
Road traffic accidents	143(15.44)
Fall	31(03.4)

Table 2: Nature of injuries

Nature of injuries	Number (%)
Haemopneumothorax	539(58.20)
Haemothorax	382(41.25)
Pneumothorax	205(21.81)
Rib Fracture	87(15.18)
Flail segment chest	45(04.85)
Tension pneumothorax	17(02.96)
Cardiac tamponade	04(0.69)
Poly trauma	439(47.40)

Table 3: Surgical intervention

Intervention	Number of patients(%)
Chest intubations	855(92.33%)
Thoracotomy	103(12.04%)
Emergency	73
Elective	30
Conservative	13(01.40)

Gunshot injuries were the most common mode of injury (57.88%)(Table 1).

Haemopneumothorax was the most frequent consequence of chest injury (58.20%)(Table 2) Out of total 926 patients of penetrating chest injuries 47.40% patients sustained multiple injuries in addition to chest injury. Combined thoracoabdominal injuries were seen in 20.84% patients, who underwent exploratory laparotomy. Tube thoracostomy was done in 92.33% cases, out of which 12.04% patients underwent thoracostomy (Table III).

Massive haemothorax was the most common indication of emergency thoracotomy in 70.83%.(Table 4)

Table 4: Thoracotomy indications

Indication	Number(%)
Massive haemothorax	73(70.83)
Empyema	24(30.30)
Bronchopleural fistula	06(05.82)

Adult respiratory distress syndrome (ARDS) was the most common cause of morbidity in our series(08.96%). Total mortality was 8.96%, out of which 19 patients died due to non chest injury related complications (Table 5).

Table 5: Complications

Complication	Number(%)
ARDS	47(05.07)
Empyema Thoracis	39(04.01)
Mortality	83(08.96)

Discussion

Management of polytrauma patients is a task which surgeons in public sector hospitals are often faced with. A study conducted in UK showed that most general surgeons should retain the ability to manage trauma. They consider that the best services for severely injured patients would be to manage their injuries at a hospital with specialist trauma services either through direct referral from site of incident or transfer from an acute receiving hospital after the initial resuscitation and stabilization. ⁸

Penetrating chest trauma is a challenging surgical problem worldwide. Present study presents data of a tertiary care hospital of the city, which is a main referral centre of the medico legal cases of Rawalpindi Division. After the provision of Government ambulance transport services, Rescue 1122, the trauma patients are being more efficiently and quickly transferred to tertiary care hospitals, but this service is not yet available in all metropolis. Even

in developed world, 10% of accidents victims die before reaching a hospital. ⁹ At District Head quarter's (teaching) hospital (DHQ) Rawalpindi, where thoracic surgery unit is not available, general surgical team is responsible for providing surgical management to chest trauma victims. Studies show that chest trauma is common in second to fifth decade of age and in males. It has been observed that incidence of penetrating chest trauma is rising with time because of gunshot injuries, due to increasing violence and availability of weapons in the society. ¹⁰

Haemothorax is the most commonly observed consequence of penetrating chest injury. Successful management of haemothorax, in these cases, by thoracostomy is well established. Simple rib fracture without haemothorax / pneumothorax were found in 44% cases in study by Farooqi et al and 76% cases by Hanif. ^{1,9} In present study the frequency of rib fracture was 9.39% , which is low due to the fact that we have included only patients with penetrating chest injuries, whereas as others have included patients with both penetrating and blunt chest injuries in their studies. In our set up still thoracostomy is performed more frequently, while in developed world video assisted thoracoscopic surgery is in vogue. ¹¹⁻¹³

Overall mortality rate was 08.96%, (83 patients) out of which 19 patients had poly trauma. Our mortality rate is comparable with other studies. The reported mortality rate in a Nigerian study was 7.7%. ¹¹

Conclusion

To reduce pre hospital stay facility of public ambulance transport system like Rescue 1122 should be extended to the peripheral areas.

References

1. Farooq U, Raza W, Zia N, Hanif M, Khan MM. Classification and management of chest trauma. *J Coll Physicians Surg Pak* 2006; 16(2):101-03.
2. American College of Surgeons. National trauma data bank. Chicago: Ann Surg 2004; 240:96-104.
3. Locicero J, Mattox KL. Epidemiology of chest trauma. *Surg Clin North Am* 1989; 69:15-16.
4. Marya SKS, Singla SL. Management of chest injuries by a general surgeon. *Ind J Surg* 1987; 49:235-38.
5. Brooks A, Butcher W, Walsh M, Lambert A, Browne J. The experience and training of British general surgeons in trauma surgery for abdomen, thorax and major vessels. *Ann R Coll Surg Engl* 2002; 84:409-13.
6. Richardson JD. Indications for thoracotomy in thoracic trauma. *Curr Surg* 1985; 42:361-63.
7. American College of Surgeons. Advanced Trauma Life Support (ATLS) student manual. 6th ed. Chicago, IL: American College of Surgeons, 1997.
8. Better Care for the severely injured. Joint report of the Royal College of Surgeons of England and British Orthopaedic Association; London: 2000.
9. Hanif F, Mirza SM, Chaudhry AM. Re-appraisal of thoracic trauma. *Pak J Surg* 2000; 16:25-28.
10. Khan MLZ, Haider J, Alam SN, Jawaid M, Malik KA. Chest Trauma Management: Good outcomes possible in a general surgical unit. *Pak J Med Sci* 2009; 25(2):217-21.
11. Thomas MO, Ogunleye EO. Penetrating Chest Trauma in Nigeria. *Asian Cardiovasc Thorac Ann* 2005; 13:103-06.
12. Segers P, Van Schil P, Jorens O, Van Den Brande F. Thoracic trauma: an analysis of 187 patients. *Acta Chir Belg* 2001; 101:277-82.