

Tube Thoracostomy in Penetrating Thoracic Injuries

Rameez Ahmed Siddiqui,¹ Shahida Parveen Afridi,^{1*} Akram Rajput,¹ Abdul Basir Khaskheli¹

ABSTRACT

<i>Objective</i>	<i>To determine the frequency of tube thoracostomy in penetrating thoracic injuries at a tertiary care hospital.</i>
<i>Study design</i>	<i>Cross sectional study.</i>
<i>Place & Duration of study</i>	<i>Department of Surgery Unit III, Civil Hospital / Dow University of Health Sciences Karachi, from March 2012 to March 2014.</i>
<i>Methodology</i>	<i>All patients who presented with penetrating chest injuries due to firearm, stabs etc were treated according to ATLS protocol. Tube thoracostomy was performed when indicated. Chest tube was passed under local anesthesia.</i>
<i>Results</i>	<i>A total of 100 patients included in this study. There were 92 males and 8 females. Mean age of the patients was 30+7.29 year. Mechanism of injuries included gunshot injury (n=62), stabs (n=24) and shrapnel injury (n=14). Pneumothorax was diagnosed in 39 patients, haemothorax in 35, sucking wound of the chest in 20 patients and major vascular injury in 4 patients. Associated extra thoracic injuries were present in 26 patients. Tube thoracostomy was performed in 78 patients. Twenty-two patients underwent thoracotomy.</i>
<i>Conclusions</i>	<i>Majority of patients with penetrating chest injuries were managed by tube thoracostomy. No mortality occurred in this series.</i>
<i>Key words</i>	<i>Thoracic injuries, Tube thoracostomy, Thoracotomy.</i>

INTRODUCTION:

Thoracic trauma is the major cause of morbidity and mortality especially during the first four decades of life.¹ Pre hospital deaths resulting from thoracic injuries are due to great vessels rupture and exsanguinations, cardiac tamponade, tension pneumothorax and bilateral flail chest with deep refractory hypoxia.² Chest injuries are relatively common cause of preventable death among trauma patients.³ The frequency of penetrating trauma varies

geographically. Various causes include accidents, falls, collisions, blast injuries, and fragmenting military devices.⁴ Many of these deaths can be prevented by prompt diagnosis and correct management.

About 80% of patients with thoracic life-threatening injuries can be managed by tube thoracostomy.⁵ The surgical management of these patients is challenging for the surgeons. Early recognition of chest injuries, an aggressive approach in the management with tube thoracostomy or thoracotomy can prevent morbidity and improve survival of patients with penetrating chest trauma.⁶ The rationale of this study was to determine the frequency and outcome of tube thoracostomy in penetrating thoracic injuries.

¹ Department of Surgery Unit III, Civil Hospital / Dow International Medical College/Dow University of Health Sciences Karachi.

Correspondence:

Dr. Shahida Parveen Afridi ^{1*}

Department of Surgery Unit III

Civil Hospital / Dow University of Health Sciences
Karachi

E-mail surgeonshahida@rocketmail.com

METHODOLOGY:

This was a prospective cross sectional study carried out at the Department of General Surgery Civil Hospital / Dow University of Health Sciences Karachi, from March 2012 to March 2014.

All the patients above 18 year of age, of either sex who presented with penetrating chest injuries due to knife, bullet and shrapnel, were included. Patients with poly trauma and associated life threatening injuries were excluded.

All patients were managed according to the ATLS protocol in emergency department. Chest tube was passed under local anesthesia in a triangle of safety without having a chest x-ray in critically ill patients. X-ray chest or CT scan were performed in stable patients before passing the chest tube. Post intubation chest x-ray was performed in all patients. Variables studied were age of the patients, gender, mechanism of injury (knife, bullet, and shrapnel), injuries sustained, associated injuries and management with tube thoracostomy or thoracotomy. Frequency and percentages were calculated for categorical variables and mean and standard deviation for numerical variables. SPSS version 17 was used to analyze data.

RESULTS:

A total of 100 patients were studied with penetrating chest injuries over a period of two years. The age of the patients ranged from 18 year to 56 year with mean age of 30 + 7.29 year. There were 92 male and 8 female patients. Initial tube thoracostomy was performed in 94 patients of which 4 had more than 1500 ml of blood drained in chest bottle. In 10 patients continuous blood was drained at the rate of more

than 200 ml per hour. Two patients with pneumothorax had continuous air leak and thoracotomy was performed. Six patients presented in the state of shock. In these patients immediate resuscitative thoracotomy was performed. Cardiac tamponade was noted in two and major vascular injury in four patients (table I).

Two patients with pneumothorax required thoracotomy due to major air leak and bronchopleural fistula. Fourteen patients with hemothorax required thoracotomy. In two of these patients bleeding was from bronchial vessels, 8 bleed from intercostal vessels and 4 had bleeding from internal mammary artery. Patients diagnosed with cardiac tamponade and major vascular injury underwent thoracotomy. Sucking wound of the anterior chest wall was diagnosed in 20 patients and all were managed by tube thoracostomy. Associated abdominal injuries were found in 17, long bone fracture in 5, head injury in 2, and spinal injuries in 2 patients.

DISCUSSION:

Chest injuries are commonly seen in the developing countries. The injuries encountered are similar as reported from other parts of the world. The data from developing countries showed that young males are most commonly involved.⁷ Same pattern was observed in this series. The mean age in this series was 30.79 year which is similar to another study

Table I: Mechanism of Injury and Injuries Sustained

Variable	Frequency (n)	Percentage (%)
Mechanism of injury		
Gun shot	62	62
Knife	24	24
Shrapnel	14	14
Injuries sustained		
Pneumothorax	39	39
Hemothorax	35	35
Sucking wound of chest	20	20
Major vessels injury	04	04
Cardiac tamponade	02	02
Associated injuries		
Isolated chest injuries	74	74
Abdominal injury	17	17
Long bone fracture	05	05
Head injuries	02	02
Spinal injuries	02	02

where mean age was 28 year.⁸

Most common mechanism of injury was the firearm which occurred in 60% of patients in our study, In contrast to another study stab was most common mechanism.⁹ Majority of patients were diagnosed on clinical examination and chest x-rays.¹⁰ In most of the penetrating chest injuries major operative intervention is not required. Most of the patients are managed with observation and serial evaluation using radiography or simple tube thoracostomy. Ultrasound and CT obviate the need of serial chest x-ray in stable patients.¹¹ About 80% of penetrating thoracic injuries can be managed by tube thoracostomy as seen in our study where 78% patients required only this simple procedure.

Surgical intervention in chest trauma can be assessed on clinical examination and x rays. In certain situations immediate chest tube placement is required before x-ray to save the lives.^{11,13} Thoracotomy was performed in 22 patients in our series. Rubika reported urgent thoracotomy in 25%, of patients due to potentially life-threatening injuries.¹⁴ Karmy Jones et al reported that 30% patients underwent thoracotomy after penetrating chest injury in their series.¹⁵ Video assisted thoracoscopic surgery (VATS) has been used in the management of chest trauma but due to non availability in emergency, it was not employed in current series.¹⁶ Thoracotomy was performed in 22% of patients in this series. Cardiac tamponade and vascular injuries encountered in 6% patients only. Standard guidelines were followed for the management of these conditions based upon amount of blood drained by chest intubation and general condition of the patients.^{17,18}

Thoracic injuries are often associated with other injuries particularly to the abdomen. In this series 26% patients had associated injuries. For associated abdominal injury laparotomy may be required.¹⁹ It seems that there is no significant difference in the severity of chest injuries which are associated with extra thoracic injuries though the morbidity and mortality does increases when another system is involved.²⁰ There was no mortality recorded in our series. Dongel reported 1% mortality in his series.²¹

CONCLUSIONS:

Majority of the penetrating chest injuries can be managed by initial resuscitation and tube thoracostomy. Thoracotomy is required in patients who continue to bleed after tube thoracostomy or major blood vessel injury and cardiac tamponade.

REFERENCES:

- Demirhan R, Onan B, Oz K, Halezeroglu S. Comprehensive analysis of 4205 patients with chest trauma: a 10-year experience. *Interact Cardiovasc Thorac Surg*. 2009;9:450-3.
- Yardley IE, Donaldson LJ. Deaths following prehospital safety incidents: an analysis of a national database. *Emerg Med J*. 2016;33: 716-21.
- Davis JS, Satahoo SS, Butler FK, Dermer H, Naranjo D, Julien K, et al. An analysis of prehospital deaths: Who can we save? *J Trauma Acute Care Surg*. 2014;77:213-8.
- Khan IA, Ghaffar S, Asif S, Zia ur R, Asad S, Ahmed E, et al. Management of thoracic trauma: experience at Ayub Teaching Hospital, Abbottabad. *J Ayub Med Coll Abbottabad*. 2009;21:152-4.
- Bastos R, Baisden CE, Harker L, Calhoon JH. Penetrating thoracic trauma. *Semin Thorac Cardiovasc Surg*. 2008;20:19-25.
- Gholipour C, Rad BS, Vahdati SS, Ghaffarzad A, Masoud A. Evaluation of preventable trauma death in emergency department of Imam Reza hospital. *World J Emerg Med*. 2016;7:135-7.
- Vodicka J, Spidlen V, Safranek J, Simanek V, Klecka J, Altmann P, et al. [Penetrating thoracic injury--seven-year experience with its diagnostics and treatment]. *Rozhl Chir*. 2007;86:120-5.
- O'Connor JV, Scalea TM. Penetrating thoracic great vessel injury: impact of admission hemodynamics and preoperative imaging. *J Trauma*. 2010;68:834-7.
- Onat S, Ulku R, Avci A, Ates G, Ozcelik C. Urgent thoracotomy for penetrating chest trauma: analysis of 158 patients of a single center. *Injury*. 2011;42:900-4.
- Mefire AC, Pagbe JJ, Fokou M, Nguimbous JF, Guiifo ML, Bahebeck J. Analysis of epidemiology, lesions, treatment and outcome of 354 consecutive cases of blunt and penetrating trauma to the chest in an African setting. *S Afr J Surg*. 2010;48:90-3.

11. Magnotti LJ, Weinberg JA, Schroepel TJ, Savage SA, Fischer PE, Bee TK, et al. Initial chest CT obviates the need for repeat chest radiograph after penetrating thoracic trauma. *Am Surg.* 2007;73:569-72.

12. Heydari F, Esmailian M, Dehghanniri M. Diagnostic Accuracy of Ultrasonography in the Initial Evaluation of Patients with Penetrating Chest Trauma. *Emerg (Tehran)* 2014;2:81-4.

13. Farooq U, Raza W, Zia N, Hanif M, Khan MM. Classification and management of chest trauma. *J Coll Physicians Surg Pak.* 2006;16:101-3.

14. Rubikas R. [Emergency thoracotomy]. *Medicina (Kaunas)*. 2003;39:158-67.

15. Karmy-Jones R, Namias N, Coimbra R, Moore EE, Schreiber M, McIntyre R, Jr., et al. Western Trauma Association critical decisions in trauma: penetrating chest trauma. *J Trauma Acute Care Surg.* 2014;77:994-1002.

16. Jin J, Song B, Lei YC, Leng XF. Video-assisted thoracoscopic surgery for penetrating thoracic trauma. *Chin J Traumatol.* 2015;18:39-40.

17. Ahmad T, Ahmed SW, Hussain N, Khan MI. Role of Urgent Thoracotomy in improving the survival of patients with severe chest trauma. *J Coll Physicians Surg Pak.* 2009;19:575-8.

18. Clarke DL, Quazi MA, Reddy K, Thomson SR. Emergency operation for penetrating thoracic trauma in a metropolitan surgical service in South Africa. *J Thorac Cardiovasc Surg.* 2011;142:563-8.

19. Yang J, Gao JM, Hu P, Li CH, Zhao SH, Lin X. Management of multiple trauma with mainly thoracic and abdominal injuries: a report of 1166 cases. *Chin J Traumatol.* 2009;12:118-21.

20. Kaur K, Singhal SK, Bhardwaj M, Kumar P. Penetrating abdomino-thoracic injury with an iron rod: An anaesthetic challenge. *Indian J Anaesth.* 2014;58:742-5.

21. Dongel I, Coskun A, Ozbay S, Bayram M, Atli B. Management of thoracic trauma in emergency service: Analysis of 1139 cases. *Pak J Med Sci.* 2013;29:58-63.

Author's Contributions:

Rameez Ahmed Siddiqui: Manuscript writing.
Shahida Parveen Afridi: Proof reading of manuscript.
Akram Rajput: Data collection.
Abdul Basir Khaskheli: Data collection

Conflict of Interest:

The authors declare that they have no conflict of interest.

Source of Funding:

None

How to cite this article:

Siddiqui RA, Afridi SP, Rajput A, Khaskheli AB. Tube thoracostomy in penetrating thoracic injuries.. *J Surg Pakistan.* 2016;21(4):138-41. Doi:<http://dx.doi.org/10.21699/jsp.21.4.6>.