

MANAGEMENT OF THORACIC INJURIES IN CHILDREN

Kifayat Khan, Zahid Aman, Gohar Rehman, Mohammad Yunas Khan, Tariq Waheed

*Department of Paediatric Surgery, department of Surgery
and department of Paediatrics,
Postgraduate Medical Institute,
Lady Reading Hospital, Peshawar.*

ABSTRACT

Objective: The aim of the study was to know the effective way of treatment and to sort out the measures for the prevention of various complications arising from thoracic injuries in children.

Material and Methods: This is a prospective study performed on 173 children with thoracic injuries. Birth trauma was not included in this study. All these patients were received in emergency and were admitted to paediatric surgery unit of Lady Reading Hospital Peshawar during a period of 2 years from January 2000 to December 2001.

Results: Blunt trauma (121 cases) was the most common cause of chest injuries seen in these children as compared to penetrating injuries (52 cases). All of them (156 cases) except lung contusion and chest wall injuries were treated with chest tube drainage and under waterseal. The clinical condition resulting from these chest injuries confirmed on X-ray chest were haemothorax (99 cases), haemopneumothorax (51 cases) and pneumothorax (6 cases). Cardiac injuries, great vessel injuries, esophageal injuries, tracheobronchial injuries, stove in and flail chest injuries were not encountered during the course of this study. There is no mortality from chest intubation in this study. There was no case of emergency thoracostomy however only 2 cases needed elective thoracotomies for complications after treatment with chest intubation.

Conclusion: Emergency thoracostomy is a life saving procedure in all the clinical conditions resulting from thoracic trauma. Isolated chest injuries can be treated effectively by tube drainage of the chest on the affected side, which is safe, less traumatic and associated with least morbidity and no mortality.

Key words: Thoracic injuries, tube thoracostomy, pneumothorax, haemothorax.

INTRODUCTION

Trauma remains the most common cause of death in the developed countries. Chest injuries are defined as trauma to the thorax due to any mechanical insulting force directly applied to the thorax. It can result from blunt or penetrating injury to the chest causing variable degree of damage to the chest wall on the intra thoracic contents or viscera¹.

Generally 25% of trauma deaths result from thoracic injuries². Chest trauma is as common in children as in adults. Majority of these patients can be managed conservatively with initial resuscitative measures, which include I/V fluids, chest tube, analgesia and physiotherapy while being observed. Cardiac or great vessels injuries are rare as well as fatal on the spot. Esophageal and tracheobronchial injuries although rare in children are best treated conservatively when diagnosed early³. Blunt trauma to chest in children is more common than penetrating chest injuries⁴. Almost all of them are treated conservatively and very few cases will need emergency thoracostomy. However some of them may need elective thoracostomy when there is some complication⁵. Most of the thoracic injuries are associated with other injuries and are common as compared to isolated chest injuries⁶. Pneumothoracies, haemothoracies, haemopneumothoracies are the common clinical condition resulting from blunt or penetrating chest injuries. Closed chest drainage is the mainstay of treatment in the initial management of these patients. Chest drains are removed as early as possible during the course of treatment preferably within 3-5 days, to avoid various septic complications⁷.

MATERIAL AND METHODS

It is a prospective study carried out at Paediatric surgery department, Lady Reading

hospital Peshawar between January 2000 and December 2001. A series of 173 patients were treated during this 2-year period. Age of these children ranged from two years to 14 years. Male to female ratio was 1.5 -1. All these patients came through emergency or referred from other departments and were admitted to paediatric surgery unit Lady Reading hospital Peshawar. Initial treatment was given in the form of resuscitation by giving I/V fluids, I/V antibiotics, oxygen inhalation, analgesia and blood transfusion if needed. Chest intubations with under waterseal was considered in all symptomatic patients along with the management of other associated conditions. X-ray chest was performed in every patient except in patients with high index of suspicion of chest trauma with underlying pathology, in whom decision of putting a chest drain was purely taken on clinical grounds who were clinically unstable and having respiratory distress. 4th or 5th Intercostal space was chosen in the midaxillary line for chest tube insertion, chest wall was infiltrated with 0.5 - 1% lignocain solution. Skin incision of 1-2 cm length in the intercostal space was made and with blunt dissection, with the help of an artery forceps, a track was made through the intercostal muscles. Chest tubes of different sizes ranging from 22 -30 F were used according to the age of the patients. The tube after intubation was connected to an under waterseal bottle which was freely allowed to drain into it.

Tube output was regularly monitored and recorded. Tube was left in place for 2-5 days and the decision of extubation was defined on the clinical improvement and daily chest radiographs. The use of I/V antibiotics was the routine to be administered in every patient with chest drain. After removal of the chest drain they were given oral antibiotics for 3-5 days. For follow up they were asked to come after two weeks and were assessed clinically and radiologically.

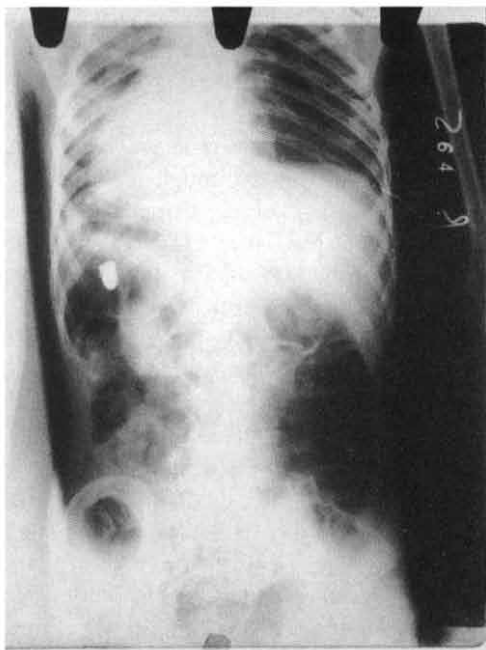


Fig. 1

RESULTS

A total of 173 children with thoracic injuries were received in emergency and were admitted to paediatric surgery unit PGMI/Lady Reading Hospital Peshawar from January 2000 to December 2001. There were 105 boys and 68 girls and the age ranged from 2 to 14 years. 121 patients were with blunt trauma to the chest while 52 patients were having penetrating chest injuries (Fig-1). 25

patients received isolated chest injuries while 148 patients also had other associated injuries such as abdominal trauma, head injuries, skeletal injuries & soft tissue injuries etc. Right side of the chest was involved in 71 patients, Left side in 92 patients while 10 patients were having bilateral chest injuries. 99 patients presented with haemothorax (Fig-2), 51 with haemopneumothorax, 6 with pneumothorax (Fig-3), 8 with lung contusions and 9 patients with chest wall injury alone. 17 patients were treated conservatively with antibiotics, analgesics volume replacement therapy and observation for 2-3 days. 156 patients were treated for 2-3 days with closed chest drains i-e tube thoracostomy. There was not a single case of emergency thoracotomy. Elective thoracotomy was performed in two cases one for pyothorax and another for organized heamatoma (Clotted Haemothorax). I/V fluids, I/V antibiotics, analgesics were used in every patients during the course of management. There was not a single patient dying form isolated chest injury. Two patients died with associated injuries due to multiorgan dysfunction syndrome. They were discharged to home on oral antibiotics for 3-5 days. They were advised to come after two weeks for follow up, 120 patients came for follow up examination the rest were lost to follow up.

RATIO OF BLUNT AND PENETRATING THORACIC TRAUMA IN CHILDREN

Category of Chest Injury	Mechanism of injury		
	Blunt Trauma	Penetrating Trauma	Total
Isolated Chest Injuries 25 (14.45%)	12 (48%)	13 (52%)	25 (64.45%)
Associated with other Injuries 148(85.54%)	109 (73.64%)	39 (26.35%)	148 (85.54%)
173(100%)	121(96.94%)	52(30.05%)	173(100%)

TABLE - 1

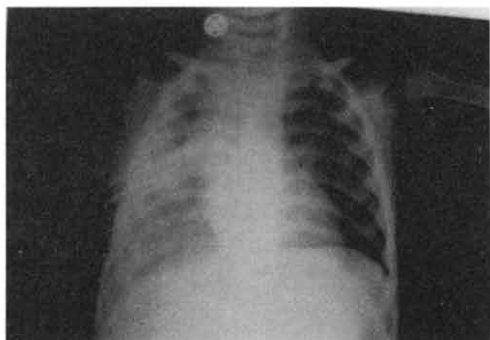


Fig. 2

DISCUSSION

The purpose of this study was to know the factors that affected the outcome of treatment in the management of children with thoracic injuries. Early presentation and quick initial resuscitation and chest intubation are the parameters that correlate with the short term outcome of such patients.^{7,8}

Thoracic trauma is often a life threatening condition and these patients can be saved when treated properly in time. Chest intubation with under water seal bottle is the main stay of treatment besides other resuscitative measures for these conditions and associated injuries. It is a simple procedure which can be performed in the ward and even on the bedside. X-ray chest is the only investigation available in emergency but the decision of putting a chest tube is taken on clinical grounds or by diagnostic needle tap, particularly when the x-ray is inconclusive or when the x-ray can not be performed because of the serious nature of injuries or lack of the facility of x-ray. We performed x-ray examination in all patients but in a few of these patients the clinical findings could not be correlated with the x-ray findings. After chest intubations these patients need to be continuously monitored clinically as

INCIDENCE OF VARIOUS CONDITIONS DUE TO THORACIC TRAUMA IN CHILDREN

Clinical Condition	Percentage
Haemothorax	99(57.22%)
Pneumothorax	06(03.46%)
Haemopneumothorax	51(29.47%)
Lung Contusions	08(04.62%)
Chest wall injuries	09(05.20%)
Total Cases	173(100%)

TABLE - 2

well as radiologically.⁹ Haemodynamic instability, continuous and profuse drainage of blood from the chest tube in excess of more than 500ml in three successive hours are the main indications for proceeding to emergency thoracotomy.^{10,11} We had no case of emergency thoracotomy, all of them were successfully treated with chest intubation alone or only observation in some cases. The rate of chest intubation is comparable with the world literature, while the percentage of emergency thoracotomy is not in keeping with the literature. There were two cases of elective thoracotomy which were operated upon four weeks later being treated with chest drains. The main indication for elective thoracotomy are empyema, clotted haemothorax, prolonged air leak, non healing oesophageal perforation & non healing

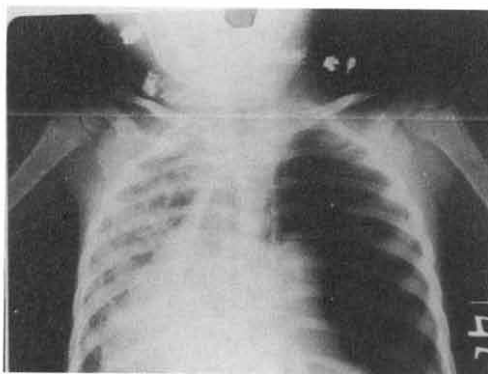


Fig. 3

MECHANISM OF CHEST TRAUMA AND THE SIDE OF THE CHEST INVOLVED

Mechanism of Injury and number of cases	Side of Chest involved		
	Rt.Side	Lt.Side	Bilateral
Blunt Trauma Total = 121(69.94%)	52(42.97%)	61(50.41%)	08(06.61%)
Penetrating Trauma Total = 52(30.05%)	19(36.53%)	31(59.61%)	02(03.84%)
Grand Total = 173(100%)	71(41.04%)	92(53.17%)	10(05.78%)

TABLE - 3

chylothorax.^{10,11,12} In our series there was one case of clotted haemothorax and one empyema thoracic which required elective thoracotomy. The use of antibiotics is controversial,¹³ but it was our policy to use prophylactic antibiotics in all patients with thoracic trauma and chest intubation. It was seen in this study that there was only one case of empyema which was treated with elective thoracotomy. The use of prophylactic antibiotics and early extubation were the two main factors which were related to reduced incidence of infective complication of chest intubation.¹⁴

There is no mortality from chest trauma alone, however 2 patients died due to associated injuries. The reason of low mortality is that all those seriously injured patients did not reach the hospital alive, so they are not recorded, causing decrease in the incidence of mortality in these patients.^{14,15}

Blunt trauma was commonly observed in this study than the penetrating injuries. The reason is that children can be easily caught in accidents such as RTA, falls, etc. FAI is the common cause of penetrating chest trauma in other studies^{16,17} but it is less commonly seen in children and also in our study.

REFERENCES

1. Rewe MI, O'Neill JA, Grosfeld JL, et al. Thoracic Trauma, In Rowe M I, O'Neill JA Grosfeld JR, et al (eds) : Essentials of Paediatric Surgery. 1995; 195 (Chap 18),
2. Ashraf SS, Grotte G. Penetrating chest injury. In Recent advances in surgery 18. By Tayar 1 and Johnson 1995: 69.
3. Cordero JA, Kueheer Dit, Fortune JB. Distal esophageal rupture after external blunt trauma: Report of two cases J. Trauma 1997; 42: 321.
4. Sarihan H, Abes M, Akyazici R, et al: Blunt Thoracic Trauma in children. J Cardiovasc Surg 1996; 37: 525.
5. Black TC, Snyder CL, Miller JP, et al. Significance of chest Trauma in children. South Med J 1996; 89: 494.
6. David Hormuth, Dominic Cefali, Thomas Rouse, et al: Traumatic Disruption of the Thoracic Aorta in Children.
7. Ahmad Z, Bilal A, Khan M S, et al. Emergent Tube thoracostomy for Penetrating Thoracic Trauma JPMI-1999; 13(1): 55.
8. Suyin A, Lum Min, Keneth W, Gow and Gesffrey K Blair. Traumatic Intercostal Hernia: Presentation and Diagnostic Workup. J Pediatr Surg. 1999; 34(10): 1544.
9. Ivatury RR, Wallothdmb MN, Roberg RJ, et al. Penetrating thoracic injuries. Infield

- stabilization vs. prompt transport. *Ann Thoracic Surg* 1987; 433: 189.
10. Indu Deglur Kar and Aprim Y Youhana: Penetrating chest injuries. *Surgery* 2000; 51: 239.
 11. Demetriades D, Rabinowitz B, Markides M. Indications for thoracotomy in stab wounds of the chest. A prospective study of 543 patients. *Br. J Surg* 1996; 73: 888.
 12. Perforation of the Intrathoracic Esophagus from blunt trauma in a child: case report and review of the literature. *J Pediatr Surg* 1999; 34(3): 495.
 13. Demetriades D, Breckon C, Kakoyiannis S. et al. 494-497 1989. Antibiotic prophylaxis in penetrating injuries of the chest, *Ann Royal Coll Surg Eng* 1991; 73: 348.
 14. Eddy AC, Ln GK, Copass M. Empyema thoracic in patients undergoing emergent closed tube thoracostomy for thoracic trauma *Am J-Surg* 1989: 157:494.

Address for Correspondence:

Dr. Kifayat Khan,
 Department of Paeds Surgery,
 Lady Reading Hospital,
 Peshawar.