Original Article

The Presentation and Management of Thoracic Trauma in a General Surgical Ward

Presentation & Management of Thoracic Trauma

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ABSTRACT

Objective: To evaluate the various modes of presentation of thoracic trauma and to assess the adequacy of management in a surgical ward of a tertiary care hospital.

Study Design: A retrospective study

Place and Duration of Study: This study was conducted at the Surgical Department Khalifa Gul Nawaz Teaching Hospital Bannu from July, 2016 to April, 2018.

Materials and Methods: A total of 220 patients with thoracic trauma, including both blunt and penetrating thoracic trauma presented to the emergency unit of KGN hospital were included in this study.

Results: Out of the 220 patients, 48% (105) were with blunt thoracic trauma and 52% (115) with penetrating thoracic trauma. Rib fracture was detected in 70% (154) cases, haemopneumothorax in 40% (88) of patients, pneumothorax in 28% (61), haemothorax in 18% (40), flail chest in 6% (13) of the cases, traumatic rupture of diaphragm in 7% (15) of the cases. Pure thoracic trauma was present in 62% (136) patients, thoracic trauma with associated injuries presented in 38% (84) patients and out of these 84 cases, 15.5% (13) cases had polytrauma. During treatment, 77.7% (171) of the patients were treated either non operatively or with chest tube thoracostomy. 16.5% (36) developed complications. 8.18% required thoracotomy. The overall mortality was 8.18% (18).

Conclusion: Penetrating chest trauma is increasing with time due to gunshot injuries although blunt trauma is commoner worldwide. Most of the chest trauma patients can be managed in the general surgical wards satisfactorily and only a few patients need surgical intervention in their management.

Key Words: Thoracic trauma, penetrating injuries, blunt injuries, complications, mortality and morbidity

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INTRODUCTION

Thoracic trauma is the 3rd leading cause of death after head and spinal injuries[1]. It accounts for 20-25% deaths due to trauma. Isolated thoracic trauma is found in 60-65% of the cases while associated chest trauma is found in 35-40% of the cases. Pure thoracic trauma has a mortality rate of 4-8%, in associated cases 13-15% and in poly trauma cases 25-30%[2].

Road traffic accidents are the commonest causes of blunt trauma accounting for more than >70% while in penetrating trauma gunshot wounds account for more than 60% of the cases. Although blunt thoracic trauma is generally commoner than penetrating thoracic trauma but in our setup in KPK the penetrating trauma is commoner, mostly due to gun shots, stray bullets, stab wounds and blast injuries.

Early diagnosis and prompt treatment of various life threatening conditions, better resuscitative measures, perioperative care and effective surgical procedures have significantly improved the outcome of thoracic trauma patients[3]. Gunshot wounds to the heart have been found with a high rate of mortality. Perioperative death from thoracic injuries is due to great vessel injury and exsanguinations, cardiac tamponade, tension pnuemothorax and bilateral flail chest with deep refractory hypoxia[4].

The outcome and prognosis for a vast majority of chest trauma cases are excellent. More than 80% of patients require either non-invasive therapy or at most tube thoracostomy[5]. However, about 10-15% of blunt trauma and 15-30% of penetrating chest trauma require open thoracotomy[6,7].

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MATERIALS AND METHODS

220 patients with chest trauma either alone or in association with other organ injuries presented to the accident and emergency department during July 2016 to April 2018 were included in the study, with the age ranged 15-75 yrs with the mean 38±12 yrs. All these

patients after proper resuscitation in the emergency were admitted to the surgical unit. On presentation to the emergency, clinical history and physical examination including primary and secondary survey according to the ATLS protocol were taken. Resuscitation of these patients went hand in hand with the assessment. Blood samples drewed for complete blood picture and arterial blood gases and serum viral profile. Chest x-rays were taken for every case. Chest and abdomen u/s and CT scan were done for complicated cases. Patients who were looking ill and on examination and investigations diagnosed as having life-threatening injuries e.g. immediate tube thoracostomy for tension pneumothorax, emergency room thoracotomy for massive haemothorax were done. Patients having pnuemothorax, haemopnuemothorax and haemothorax were shifted to the main operation theatre for tube thoracostomy. All these patients after resuscitation and stabilization were shifted to the surgical wards for further management. Of course, there were some patients with mild thoracic trauma received in the A/E department were straight forward transferred to surgical ward for observation for the next 24hrs. However, the few patients with flail chest who needed ventilatory support were shifted to ICU.

The records of all the above patients were reviewed and the data were collected retrospectively. The demographic features, type of trauma, clinical and radiological findings, associated organ injuries, management of the chest pathologies, surgical intervention, morbidity and mortality were analyzed and recorded.

Statistical analysis: Data were fed to the computer, were analyzed using software package for social sciences version 22 IPSS. Mean and standard deviation was used for continuous, while frequency and percentages for discrete variables. The difference in proportion was estimated by Pearson's chi square (x^2) and Fischer exact test, with the threshold for significance $p<0.05$.

RESULTS

A total 220 patients were studied for various chest injuries during the 21 months duration. Age ranged 15-75 yrs with the mean age 38±12 years. More than 50% patients were in their 2nd and 3rd decades of life. 90% (198) were males and 10% (22) were females.

Table No.1: Mode/mechanism of chest trauma

Blunt trauma		Penetrating trauma	
Road traffic accident	75	Gunshot	65
Assault	15	Stab Wounds	25
Fall from a Height	12	Blast injuries	20
Animal Related	3	And others	5
Total	105	Total	115

Table No.2: Pattern of chest injuries

Type of injury	Blunt thoracic trauma	Penetrating thoracic trauma
1) Haemopneumothorax	60	28
2) Pneumothorax	61	0
3) Haemothorax	25	15
4) Rib fracture	120	34
5) Clavicle fracture	15	8
6) Chest wall injuries	4	6
7) Lung contusion	8	7
8) Traumatic diaphragmatic rupture		
9) Flail chest	10	5
10) Surgical emphysema	13	0
11) Tension pneumothorax	20	10
12) Open pneumothorax	30	23

Table No.3: Associated injuries (n=84)

Injuries	Number
1) Head injuries	35
2) Limb long bone fractures	12
3) spinal injuries	12
4) Pelvic fractures	9
5) Spleenic injuries	4
6) Liver injuries	6
7) other abdominal visceral injuries	6

Table No.3: Various treatments offered

Treatment instituted	Blunt thoracic trauma	Penetrating thoracic trauma
1)Conservative or observation	30	6
2)tube thoracostomy	55	80
3) Laparotomy	10	11
4)Mechanical ventilator	8	0
5) Thoracotomy	0	6
ER(emergency room) Elective	0	12

Table No.4: Morbidities in the management of chest trauma

Morbidities Patients (%)	
Pneumonia	8 (3.6)
Respiratory failure	12(5.5)
Acute respiratory distress syndrome	8(3.6)
Empyema	6(2.37)
Septicemia	4(1.8)
Wound infection	10 (4.4)
Overall morbidities	21.73

Table No.5: Mortality in the management of thoracic trauma

Chest trauma mortality Patients deaths (%)	
Thoracic injury with neurosurgical trauma	4 (1.8)
Mortality in thoracic polytrauma	8 (3.64)
Flail chest mortality	6 (2.73)
Overall mortalities	18 (8.15)

DISCUSSION

Thoracic trauma continues to be a major public health issue in the world. It constitutes 20-25% of all the 50% deaths due to trauma. Road traffic accidents (RTA), fire arm injuries(FAI), stabbings and falls are the frequent causes of thoracic trauma. Young males in their 2nd, 3rd and 4th decades of life are the usual sufferers. RTA account for >70% of all the causes of blunt thoracic trauma. Among these more than 50% are either by motor car or motor bike accidents. Among the causes of penetrating chest trauma, gunshot wounds (homicidal, suicidal, stray bullet, blast injuries) constituted more than 60% of the causes.

Worldwide the incidence of blunt trauma is more than the penetrating chest trauma but in many urban hospitals in America, the incidence of penetrating trauma is higher than the blunt one[8].The same was the situation in this our study where the incidence of penetrating chest trauma was more than blunt trauma. (52% versus 48%).

Internationally males outnumber females by a large ratio because of their greater exposure to outdoor activities and rivalries etc[9]. In our study the male to female ratio was 198 versus 22.

The time of incidence of trauma and arrival of patients in the hospital (Golden Hours) is considered critical in the patient management. Patients arrived to the hospital with in the Ist 30-60 mints after the occurrence of major thoracic trauma, the patients chance of survival are increased[10].

Surgical intervention is required in about 10-15% cases of blunt thoracic trauma and 15-30% cases in penetrating thoracic trauma[11,12]. Many western studies suggest, observation or chest tube placement, adequate volume replacement, chest physiotherapy, occasional respiratory support, pain and infection control (by analgesics and antibiotics) and serial chest x-rays are the only treatments required in 80-85% cases of thoracic trauma[13]. Adding respiratory support, the success rate of management is increased to 92% without major thoracic surgery. In our study the success rate of management was 82% and the overall surgical intervention rate was 8.18%.

Thoracotomy can be early emergency one (emergency room thoracotomy) for unstable patients e.g. patients with heavy intrathoracic bleed, cardiac tamponade and cardiac message[13]. In our study, 6 cases of severe thoracic trauma (with intrathoracic bleed from intercostal arteries) underwent emergency room thoracotomy (the bleeder were ligated).

In our study rib fracture was present in 70%(154) of cases of thoracic trauma while in many local studies the value ranges from 44%-64% and it has been reported as the most common injury in the thoracic trauma[14,15].

Chestintubation is the most frequent surgical procedure in thoracic trauma patients and in our study it was in 61.4% (135) cases for the purpose of re-expansion of collapsed lungs, complete drainage of pleural cavities and monitoring of the injured lung for any continued blood loss. Also many international studies have reported its insertion rate upto 70%.

Head injury was the most frequent extra thoracic trauma followed by extremities trauma. The common involvement of this structure have been reported to be associated with a high mortality which is in conformity with this study[14,15].

In our series, pure thoracic trauma was present in 62% of patients and associated injuries in 38% of cases. The international statistic expresses the values for pure thoracic injuries from 60-70% and associated injuries in 35-40% of cases.

Flail chest was present in 5.91% of cases in our series while many local studies have reported it between 6.6-20%[16,17]. The mortality for flail chest was 2.73% while in literature it is between 4.5-20%.

8 out of 13 patients of flail chest were put on ventilator in ICU. Many western studies have shown a high mortality due to ventilator support from conditions like barotraumas and volutraumaending up in ARDS[18,19].

The overall morbidity in our study was 21.26% while the international figures for it vary between 20-30%. The overall mortality rate in our series was 8.18% while in the literature it varies from 5-15%. In literature the mortality rate for isolated thoracic injuries is 4-8%, for associated injuries 13-15% and for polytrauma it is 25-30%[2]. The mortality from thoracic trauma was more in old patients than the young ones.

Morbidities in the management of chest trauma.

Morbidities patients (%)
pneumonia 8 (3.6) Respiratory failure Acute respiratory distress syndrome Empyema Septicemia 4 (1.8) Wound infection
Overall morbidities

Chest trauma in association with extra thoracic injuries makes the presentation and management of such patients a complicated and difficult with a high rate of mortality and morbidity.

The average hospital stay was 7.8 (1-14) days. Patients were discharge from the hospital and followed for the next 2-3 months with almost no uneventful incidence.

Mortality in the management of thoracic trauma.

Chest trauma mortality
Thoracic injury with neurosurgical trauma Mortality in thoracic polytrauma Flail chest mortality
Overall mortalities

Thoracic surgeons are not usually a part of the initial thoracic trauma emergency management in most of the trauma centers worldwide. In North America thoracic surgeon is present in 1 out of 16 level 1 trauma centers. This is due to the presentation of injuries, many of which do not need the specific knowledge of thoracic surgeon in each patient. Thoracic surgeon intervention in operating theatre was required in only 5.4% of cases. This paper expresses that thoracic surgeons are occasionally required in the management of the thoracic trauma patients. Many deaths can be prevented by prompt diagnosis and aggressive treatment. Thoracic trauma patients are generally managed in the emergency (resuscitation) and general surgical ward by the general surgeons in more than 90% of cases.

CONCLUSION

Blunt thoracic trauma is generally commoner than the penetrating thoracic trauma and that surgical interventions are required occasionally. Thoracic surgeons are not usually part of the trauma team in most of the trauma centers. Most of thoracic trauma cases are dealt in the surgical wards by the general surgeons with good outcome and only a minor number of patients are referred/dealt by the thoracic surgeons.

Author's Contribution:

Concept & Design of Study:	Gul Sher Khan
Drafting:	Abdul Ghafoor
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Revisiting Critically:	Gul Sher Khan, Abdul Ghafoor
Final Approval of version:	Gul Sher Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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