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Evaluation of Risk Factors in Thoracic Trauma Patient at a Tertiary Care Hospital

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A B S T R A C T

Background: One of the most frequent injuries in the emergency room is thoracic trauma. They range from penetrating chest injuries to blunt chest injuries. To improve the prognosis, quick medical and surgical measures are required the present study was conducted to evaluate the pattern of thoracic trauma presenting to the emergency room, their outcome and risk factors contributing to it.

Methodology: This prospective observational study was carried out at the Department of General Surgery / Thoracic Surgery Hayatabad Medical Complex Peshawar from January 2020 to January 2021. Total 60 patients with thoracic trauma were included in the study. The mean ISS score was 38. Age, concomitant diseases, presence of pneumothorax and/or hemothorax, the need for mechanical support, length of stay and deaths were evaluated by using the t-test and x2 test where appropriate.

Results: There were 35 (58.3%) patients with blunt traumas and 25 (41.7%) patients with penetrating traumas. Among penetrating trauma, the most common injury was gunshot 12 (48%), followed by stab wounds 8 (32%) and occupational injuries 5(20%). Among blunt traumas, road traffic accidents RTAs 20 (57.1%) were frequently identified, followed by fall from height 9 (25.7%), assault 4 (11.4%) and occupational injuries 2 (5.7%). Mechanical ventilation was needed in 17 (28.3%) patients, diagnosis at the time of admission were, hemothorax 22 (36.7%), rib fractures were seen in 16 (26.7%), 12 (20%) patients with abdominal injuries and 10 (16.7%) with head injury.

Conclusion: For the treatment of chest injuries, thoracotomies and mechanical ventilation are frequently used. The occurrence of hemothorax, related abdomen, and brain injuries indicates the severity of the injury and the likelihood of a negative result.

Key words: Thoracic trauma; Rib fracture; Blunt chest trauma; Flail chest

Introduction

One of the most frequent causes of hospitalisation worldwide is trauma. Chest trauma affects as much as two-thirds of trauma patients.[1] A rib fracture to a heart or great vascular injury that poses a life-threatening risk are all examples of thoracic trauma. Thoracic trauma is the second most common cause of death, behind head injuries.[2] Thoracic trauma, either by itself or in combination with other non-thoracic injuries, accounts for 35% of all trauma-related fatalities in the United States.[3] More frequently than penetrating injuries, blunt chest injuries are responsible for 20-25% of all thoracic trauma-related fatalities.[5] Road traffic accidents (RTAs), particularly those that occur in poorer nations, are one of the leading causes of thoracic trauma. Road traffic accidents account for over 80% of all cases.[4]

Other causes include assault, a fall from a height, and work-related injuries.[5] Due to airway blockage and lung damage, thoracic injuries is crucial and can cause abrupt respiratory failure and mortality. Even though they are less frequent, penetrating chest injuries can be instantly fatal. In penetrating chest injuries, quick action is essential to preventing mortality. The majority of assaults that result in penetrating chest injuries include stabbings, fire arm and workplace accidents.6 Traumatic thoracic injuries are more frequent in children and young adults in Pakistan (21-50 years).[7] Rib fractures are among the most frequent thoracic injuries, while head injuries are frequently associated non-thoracic injuries.[8] Poor outcome in patients with thoracic trauma is predicated by advanced age, hemothorax, need for mechanical ventilation (MV) and associated non-thoracic injuries.[9]

The goal of the study is to determine the causes and risk factors of morbidity and mortality in thoracic injuries.

Methodology

This prospective observational study was carried out at the Department of General Surgery / Thoracic Surgery Hayatabad Medical Complex Peshawar from January 2020 to January 2021. Total 60 patients with thoracic trauma were included in the study.

The Institutional Review Board gave its ethical approval before the study could be carried out. All study participants and their guardians gave their informed consent. The study included patients who were 15 years of age or older and who presented with a traumatic injury to the thorax, either alone or in combination with additional injuries. In accordance with the Advanced Trauma Life Support (ATLS) protocol, all patients were evaluated and treated. After that, radiographic testing such as an X-ray, Focused Assessment with Sonography in Trauma (FAST), or computed tomography (CT) scan of the brain was performed if needed. Using a comprehensive approach, the accompanying non-thoracic injuries were treated. Stabilization of patients took place at the emergency room. Thoracotomies and tube thoracostomies were carried out as instructed. If necessary, mechanical ventilation was introduced. Patient information was gathered using a questionnaire that included the patient's demographics, the injury's features, the primary diagnosis, any related thoracic or non-thoracic injuries, medical and surgical procedures, and the injury's outcome. The Statistical Package for Social Sciences (SPSS) Statistics version 22 was used to process all data . Frequencies and percentages were computed for categorical data. In order to identify statistical association, Chi-square test was used. The mean and standard deviation (SD) were computed for continuous data. To establish statistical association, the independent T-test was used. P-values below 0.05 were deemed significant.

Table 1. Best line characteristics of study cases

Gender/Group	Frequency	Percentage
Gender		
Male	38	63.3%
Female	22	36.7%
Age groups		
< 30 years age group	21	35%
Middle age group	32	53.3%
> 60 years age group	7	11.7%

Results

Total 60 patients with thoracic trauma were included in the study, 38 (63.3%) were males and 22 (36.7%) were females. Age ranged between 15-70 years with a mean

Table 2. Mode of trauma / mortality

Mode of trauma	Frequency	Percentage
Blunt Trauma (n = 35)		
RTA	20	57.1%
Fall from height	9	25.7%
Assault	4	11.4%
Occupational injuries	2	5.7%
Penetrating Traumas (n = 25)		
Gun shot	12	48%
Stab wounds	8	32%
Occupational injuries	5	20%
Mortality (n = 6)		
Non thoracic	4	66.7%
Thoracic	2	33.3%

age of 42.5 years. There were 21 (35%) young participants age less than 30 years, 32 (53.3%) middle aged participants (age 30-60 years), and 7 (11.7%) elderly (age more than 60 years (Table 1).

There were 35 (58.3%) patients with blunt traumas and 25 (41.7%) patients with penetrating traumas. Among penetrating trauma, the most common injury was gunshot 12 (48%), followed by stab wounds 8 (32%) and occupational injuries 5 (20%). Among blunt traumas, road traffic accidents RTAs 20 (57.1%) were frequently identified, followed by fall from height 9 (25.7%), assault 4 (11.4%) and occupational injuries 2 (5.7%) (Table 2).

Mechanical ventilation was needed in 17 (28.3%) patients, diagnosis at the time of admission were, hemothorax 22 (36.7%), rib fractures were seen in 16 (26.7%), 12 (20%) patients with abdominal injuries and 10 (16.7%) with head injury (Figure 1).

Mortality rate in our study was 6 (10%). Amongst which, 4 (66.7%) had associated non-thoracic injuries and 2 (33.3%) with thoracic injury.

Discussion

Usually blunt in nature, traumatic thoracic injuries affect middle aged men (30-60 years). Men are more exposed because they travel around more and participate in riskier activities. RTAs are the main cause of blunt chest injuries; other prevalent causes include assault, falls from great heights, and occupational injuries.[10] Older Pakistani reports have described a similar male preference and involvement of young to middle-aged people. The economical effects of RTAs and the associated serious injuries are devastating in a country like Pakistan where the majority of people are middle aged males.[11,12]

Blunt traumas may be fatal in case of associated lung

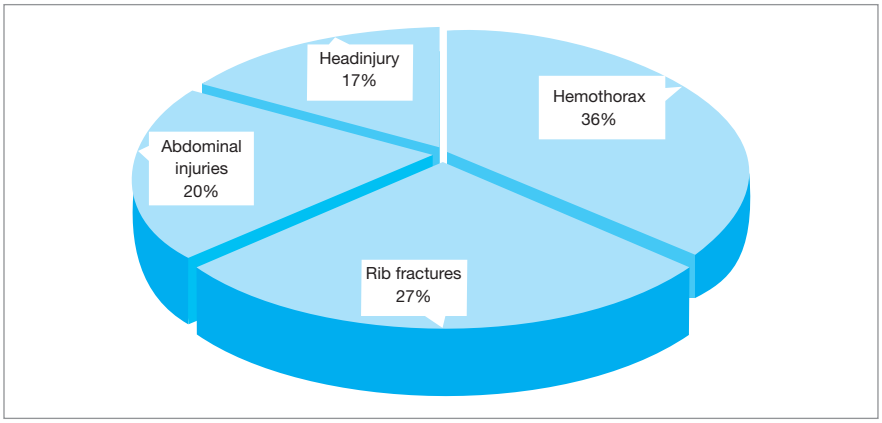

Figure 1: Diagnosis on admission

injuries or polytrauma. Among RTAs, motorbike accidents were most frequently encountered. In low-to-middle-income countries, motorbike accidents are a severe problem due to various reasons such as inexperienced bikers, disregard for safety measures, over speeding, overloading bikes with multiple passengers, and road conditions such as narrow, non-maintained, and poorly illuminated at night.[13]

In this study, gunshot (48%) and stab wounds (32%) were the most frequent causes of penetrating trauma. According to the majority of worldwide data, stab wounds are more frequent than gunshot wounds (93.7% vs. 5.94%).[14] Stabbing injuries have been reported more frequently in several local studies than gunshot wounds.[15]

We identified rib fractures and lung contusions as the most frequent ancillary thoracic injuries, along with hemothorax, hemopneumothorax, and pneumothorax as the most frequent primary thoracic injuries. Hemothorax was linked to more unfavourable outcomes, including mortality and mechanical ventilation in other investigations.[16] Hypovolemic shock due to decreased organ perfusion and more assisted breathing is brought on by a hemothorax. Hemothorax in blunt trauma may be due to rib fractures, laceration in lung parenchyma, and injuries to major thoracic and intercostal arteries, as is the case in our study. Rib fractures were associated with mechanical ventilation only.

With an increase in number of rib fractures the need for mechanical ventilation also increases. We saw rib fracture of four and more to be associated with mechanical ventilation. Lema MK et al stated that increased number of rib fractures is associated with increase in mechanical ventilation time.[17] Although we did not find any correlation of rib fractures with mortality. Chakmak M et al in their work reported more than thrice the risk of mortality in blunt trauma patients with rib fractures.[18] Their mortality risk was not associated with hemothorax as in our study. Literature has reported varying frequencies of hemothorax, hemopneumothorax, pneumothorax, rib fractures, and lung contusions in patients with thoracic trauma.[19] The frequencies may vary drastically depending on the extent of the injury.

In non-thoracic associated injuries bone fractures especially femur and clavicle and injury to abdominal viscera - liver and spleen - was common in our study. Bone fractures were the most frequently encountered associated injury. It did not affect the outcome and was not associated with mechanical ventilation or mortality. Abdominal injuries were associated with mechanical ventilation and head injuries, although, not as common, were associated with both mechanical ventilation and morality. Associated extremity and visceral injuries have been commonly reported in the literature.[20] Association of non-thoracic injuries has been a predictor of mortality in these patients as explained in the literature. There is twice the risk of mortality in patients with head injuries associated with thoracic trauma.[21]

We have been able to determine the pattern and outcome of traumatic thoracic injuries and its risk factors through this study, this also helped us to identify the risk variables that affect the outcome. This study does, however, have certain drawbacks. As it was based solely on one institution, it cannot be used to generalise the state of the entire nation. Its mortality report only covers in-hospital deaths; post-discharge morbidity or mortality were not included.

Conclusion

Adult mortality from traumatic thoracic injuries is preventable. RTAs, gunshot wounds, and stabbings continue to be common causes in our population. Frequently, a tube thoracostomy is required. For the treatment of chest injuries, thoracotomies and mechanical ventilation are frequently used. The occurrence of hemothorax, related abdomen, and brain injuries indicates the severity of the injury and the likelihood of a negative result.

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