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EPIDEMIOLOGY, COMPLICATIONS, AND MANAGEMENT OF CHEST TRAUMA: A CROSS-SECTIONAL STUDY AT SHAR TEACHING HOSPITAL, IRAQ

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Abstract
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Background Thoracic trauma is a leading cause of morbidity and mortality, second only to head injuries in trauma-related deaths. Blunt injuries, particularly from road traffic accidents (RTAs), are more frequent than penetrating injuries, yet regional epidemiological data remain limited. Objective To evaluate the prevalence, etiology, complications, and management of chest trauma among patients admitted to Shar Teaching Hospital (STH), Sulaimani, Kurdistan Region, Iraq. Methods This cross-sectional study included 152 consecutive chest trauma patients admitted between January and December 2024. Data on demographics, trauma type, etiology, complications, and management were collected using a structured questionnaire. Clinical evaluation included radiological and laboratory investigations, primary and secondary surveys, and emergency protocols. Data were analyzed using SPSS Version 26. Results Males predominated (male-to-female ratio 4.6:1), with a mean age of 34.9 years (range 4–87); young adults (19–30 years) represented 30.9% of cases. RTAs were the most common cause (45%), followed by stab injuries (24%) and falls from height (23%). Blunt trauma accounted for 71.1%, commonly resulting in rib fractures, lung contusions, pneumothorax, and hemothorax. Penetrating trauma comprised 28.9%, most often complicated by hemothorax or hemopneumothorax. Management was conservative in 51.3%, chest tube insertion in 42.8%, and surgical intervention in 5.9% of cases. Conclusion Chest trauma at STH predominantly affects young adult males, with RTAs as the leading cause. Blunt trauma is more frequent, and most patients respond well to non-operative management or tube thoracostomy. Surgical intervention is reserved for severe cases. These findings emphasize the importance of rapid diagnosis, timely intervention, and preventive strategies to reduce trauma-related morbidity and mortality.

Keywords: Keywords Thoracic trauma, Tube thoracostomy, Thoracotomy

Introduction

Trauma remains one of the leading global causes of mortality, with thoracic injury ranking as the second most common cause of death after head trauma, accounting for approximately one-quarter of trauma-related fatalities.[1] The thoracic cage protects vital intrathoracic structures, including the lungs, heart, trachea, esophagus, diaphragm, and great vessels.[2] In the Middle East, thoracic trauma continues to be a significant contributor to injury-related deaths.[3] Large series from Turkey have reported that blunt trauma, mainly due to road traffic accidents (RTAs), accounts for nearly two-thirds of thoracic injuries presenting to emergency departments, with trauma-related mortality rates reaching 9.3%.[4]

Thoracic trauma can be broadly classified into blunt and penetrating injuries. Blunt thoracic trauma is more frequent and is commonly caused by RTAs, falls, or crush injuries, whereas penetrating injuries are less common and usually result from sharp objects such as knives or bullets.[1] RTAs remain the predominant cause of thoracic trauma in non-conflict regions worldwide.[5] The severity of thoracic trauma ranges from simple rib fractures to life-threatening conditions, including hemothorax, pneumothorax, pulmonary contusion, flail chest, cardiac tamponade, tracheobronchial rupture, traumatic aortic disruption, diaphragmatic rupture, and esophageal perforation.[1] Rib fractures are among the most common injuries in high-energy trauma, with multiple fractures significantly increasing the risk of mortality.[6] Elderly patients are particularly susceptible to rib fractures, which are associated with higher morbidity and mortality due to advanced age, comorbidities, multi-organ involvement, severe injuries, shock, and prolonged intensive care unit (ICU) admissions.[7]

Management of thoracic trauma begins with the rapid recognition and treatment of life-threatening conditions during the primary survey.[8] In stable patients, chest radiography is usually the first-line investigation because it is rapid, inexpensive, and widely available. However, computed tomography (CT) is considered the gold standard in polytrauma cases, as it provides greater sensitivity and detailed assessment, detecting injuries such as pulmonary contusions that may be missed on plain radiographs. Focused assessment with sonography for trauma (FAST) is also used in some centers; it is a bedside, non-invasive, radiation-free modality that can identify pericardial or pleural fluid collections.[9,10]

Most thoracic injuries can be managed conservatively without the need for thoracotomy, with only a minority requiring operative intervention.[11] In blunt trauma, chest tube drainage remains the cornerstone of

management, while surgical intervention is reserved for selected cases.[12] Importantly, some patients with blunt chest trauma may initially appear stable but deteriorate later, highlighting that clinical symptoms alone are not reliable predictors of outcome.[13] The site of injury, mechanism of trauma, and overall clinical condition influence the choice and timing of surgical intervention.[9]

Therefore, the objective of this study was to evaluate the prevalence of blunt and penetrating chest injuries according to age and gender, their etiologies, associated complications, and management among patients admitted to Shar Teaching Hospital (STH) in Sulaimani, Kurdistan Region, Iraq.

Patients and Methods

Study design

This was a cross-sectional study that collected primary data to better understand the patterns and management of thoracic trauma at Shar Teaching Hospital (STH).

Study setting

The study was conducted at Shar Teaching Hospital, the main accident and emergency center in Sulaimani city, Kurdistan Region of Iraq. Data were collected from all patients admitted with chest trauma between January 2024 and December 2024. A total of 152 cases were included.

Inclusion criteria

All consecutive patients admitted with chest trauma during the study period were included.Exclusion criteria

Patients who arrived in a state of cardiac arrest or were declared dead on arrival were excluded.

Ethical considerations

Informed consent was obtained from all patients prior to enrollment. Ethical approval (Approval No. 29) was granted by the Ethics Committee of the College of Medicine, University of Sulaimani, Iraq. The study adhered to international ethical standards, including the 2008 Declaration of Helsinki.

Data collection

A structured questionnaire was used to collect demographic and clinical information, including:

Age and Sex

Type of trauma (blunt or penetrating) and its cause.

Complications associated with the trauma.

Management approach (conservative treatment, chest tube insertion, or surgery).

Each case was thoroughly assessed using radiological imaging, biochemical tests, primary and secondary surveys, and emergency department protocols. All thoracic and associated injuries were carefully managed and systematically recorded using a standardized form.

Statistical analysis

Collected data were entered into Microsoft Excel, coded, and then imported into IBM SPSS Statistics Version 26 for analysis.

Results

During the study period at Shar Teaching Hospital, a total of 152 patients with chest trauma were recorded. There was a marked predominance of males, with a male-to-female ratio of 4.6:1. The mean age of patients was 34.9 years (range: 4–87 years). The largest proportion of cases (30.9%) occurred in the young adult group (19–30 years).

By age and gender distribution, 44.4% of females were in the 31–60 years group, while the majority of males were within the 19–30 years group (Table I).

Table I. Gender by age

		Sex		
		Male	Female	Total
AGE	0-12 years	5	2	7
	13-18 years	26	1	27
	19-30 years	44	3	47
	31-60 years	43	12	55
	>61 years	7	9	16
Total		125	27	152

The leading cause of chest trauma was road traffic accidents (RTAs), which accounted for 45% of cases. This was followed by stab injuries (24%), falls from height (FFH, 23%), bullet injuries (4%), and other causes like sports injuries (football or hockey) and physical assault(being kicked) (5%) (Figure 1).

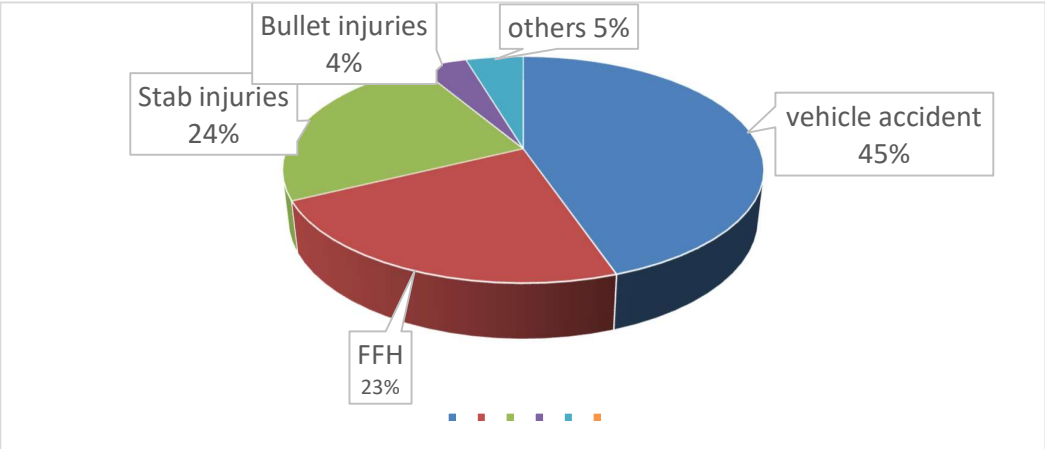

Figure 1. Causes of chest trauma

Regarding complications, minor injuries (including chest pain, lacerations, abrasions, and contusions) were most common and were observed in 43 cases (28.3%). These were followed by rib fractures with lung contusion (37 cases, 24.2%), hemothorax (28 cases, 18.4%), pneumothorax (25 cases, 16.5%), and hemopneumothorax (19 cases, 12.5%) (Figure 2).

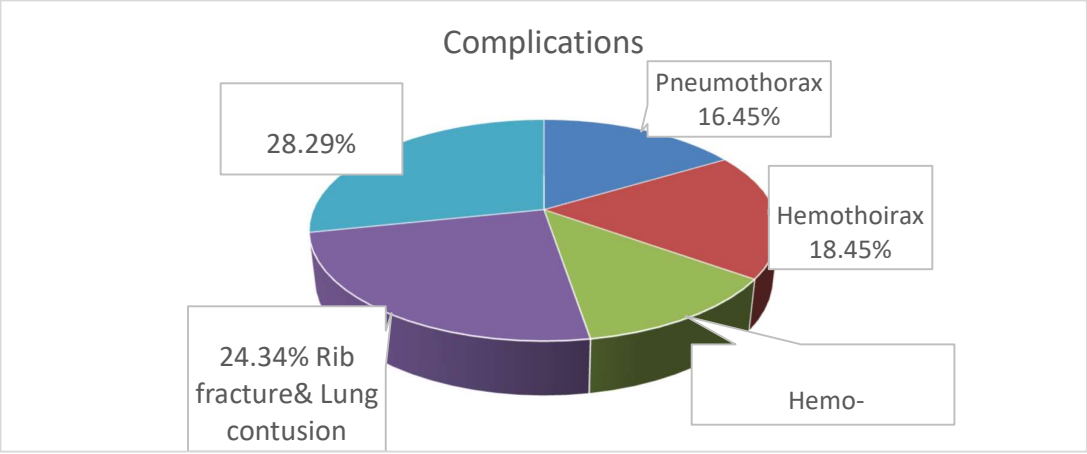

Figure 2. Complications of chest trauma

When stratified by age, RTAs (44.7%) were most frequent among middle-aged adults (31–60 years). Stab injuries (23.7%) were more common in the 19–30 years group, while falls from height (23%) predominated in the 31–60 years group (Table II).

Table II. Causes of trauma by age

	Age	0-12	13-18	19-30	31-60	≥ 61	Total
Cause of Trauma	Vehicle accident	4	8	20	29	7	68
	FFH	3	2	5	16	9	35
	Stab Injury	0	14	17	5	0	36
	Bullet	0	2	3	1	0	6
	Othors	0	1	2	4	0	7
	Total	7	27	47	55	16	152

Blunt trauma accounted for the majority of cases (71.1%) and was complicated most often by rib fractures with lung contusion (37 cases), pneumothorax (16 cases), and hemothorax (13 cases).

Penetrating trauma accounted for 28.9% of cases, with the most frequent complications being hemothorax (53.6%) and hemopneumothorax (73.7%) other complications like myocardial contusion, parenchymal injury, pneumonia (Table III).

Table III. Relation between type of trauma and complications

	Blunt (%)	Penetrated (%)
Pneumothorax	**16 (64%)**	**9 (36%)**
Hemothorax	**13 (46%)**	**15 (53.6%)**
Hemopneumothorax	**5 (26%)**	**14 (73.7%)**
Rib fracture lung & contusion	**37 (100%)**	**0 (0%)**
Others	**37 (86%)**	**6 (14%)**
Total	**108 (71.1%)**	**44 (28.95%)**

Management strategies varied according to the type of complication. For pneumothorax, the primary treatment was chest tube insertion (23 cases). Most hemothorax cases (19) were also managed with chest tube drainage, although 7 cases were treated conservatively and 2 required surgery. Rib fractures with lung contusion were managed predominantly with conservative treatment (32 cases). Other complications were treated conservatively in most cases like myocardial contusion, parenchymal injury, pneumonia (37 cases), while 6 cases required surgical intervention(open thoracotomy and VATS) (Table IV).

Table IV. Relation between complications and management

		Management		
		Chest tube	**conservative**	**surgery**
complications	**Pneumothorax**	**23**	**2**	**0**
	hemothorax	**19**	**7**	**2**
	Hemopneumothorax	**19**	**0**	**0**
	Rib fracture& lung contusion	**4**	**32**	**1**
	others	**0**	**37**	**6**

Discussion

In this study of 152 patients admitted to Shar Teaching Hospital (STH) with chest trauma, males predominated, with a male-to-female ratio of 4.6:1. This finding is consistent with previous reports by Masuma JS et al. (2021).[14] This predominance likely reflects greater male involvement in high-risk activities such as high-speed driving and motorcycle use. Patients' ages ranged from 4 to 87 years, with a mean age of 34.9 years. The majority of cases occurred among young adults aged 19–30 years, which is in agreement with other studies by Masuma JS et al. (2021) and Ibrahim SR et al. (2021).[14-17] However, some reports have demonstrated a higher incidence in the fourth decade of life.[5,18,19] Across all age groups, males were predominant except in the elderly population (≥61 years), where females were more frequently affected, possibly due to the higher incidence of falls among women.

Road traffic accidents (RTAs), including motor vehicle collisions, were the leading cause of chest trauma in the present study, accounting for 44.7% of cases, followed by stab injuries. RTAs were most common among middle-aged adults (31–60 years), whereas stab injuries predominated in the younger age group (19–30 years).

Blunt trauma represented the majority of cases (71.1%) and was most commonly associated with rib fractures complicated by lung contusions, pneumothorax, and hemothorax. These findings are consistent with previous studies.[23,25,26] Penetrating trauma accounted for 28.9% of cases and was most frequently associated with hemothorax and hemopneumothorax, in line with prior reports.[27] Minor injuries, including chest pain, lacerations, abrasions, and contusions, were also common, supporting trends reported in population-based studies.[23,24]

Regarding management, 51.3% of patients were treated conservatively, while 42.8% underwent tube thoracostomy. Although the routine use of prophylactic antibiotics in tube thoracostomy remains controversial, our institution routinely administers broad-spectrum parenteral antibiotics prior to chest tube insertion. Evidence suggests that prophylactic antibiotics—particularly in penetrating thoracic injuries—may reduce the risk of post-procedural infectious complications.[28] Surgical intervention was required in only 5.9% of cases and included management of clavicular shaft fractures due to the potential risk of vascular injury, as well as repair of diaphragmatic rupture via thoracotomy. These findings are consistent with previous reports.[29,30,32] Given the high prevalence and clinical significance of thoracic trauma, several regional studies have addressed its epidemiology and management.[31]

Conclusion

Chest trauma predominantly affected young adult males, with vehicular accidents as the leading cause, followed by stab injuries. Blunt trauma was more common than penetrating injuries, and most patients were managed non-operatively, often with tube thoracostomy, while only a small proportion required surgery. These findings emphasize the importance of early diagnosis, timely intervention, and targeted preventive strategies, and highlight areas for future research on management protocols and injury prevention.

Recommendations

Implications for public health include the need for targeted preventive strategies such as road safety campaigns, stricter enforcement of traffic regulations, promotion of helmet and seatbelt use, and education on safe driving practices. Early recognition and management of thoracic injuries in emergency settings can further reduce morbidity and mortality, ultimately decreasing the healthcare burden associated with chest trauma in the region.

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1.Ahmed Ibraheem Abbas, 2.Skalla Yusif Mawlood, 3.Soma Sarwar Hamasalih, 4.Sozyar Muhamad Abdulla
Work Concept and Design: 1,2,3,4
Data Collection and Analysis: 1,2,3,4
Responsibility for Statistical Analysis: 1
Writing the Article: 1, 4
Critical Review: 1, 2, 3,4
Final Approval of the Article: 1, 2,3,4

Each author believes that the manuscript represents honest work and certifies that the article is original, is not under consideration by any other journal, and has not been previously published.

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