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Pattern and Management outcome of Hospitalized Chest Trauma Patients in Tgsh

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PATTERN AND MANAGEMENT OUTCOME OF
HOSPITALIZED CHEST TRAUMA PATIENTS IN
TGSH

By: MeronArgaw

Bahir Dar
October, 2021

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HOSPITALIZED CHEST TRAUMA PATIENTS IN
TGSH

A THESIS SUBMITTED TO BAHIR DAR UNIVERSITY COLLEGE OF
MEDICINE AND HEALTH SCIENCES, DEPARTMENT OF SURGERY FOR
THE PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
CERTIFICATE IN SURGERY

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DECLARATION

This is to certify that the thesis entitled “pattern and management outcome of hospitalized chest trauma patients in TGSH, Bahir Dar, Ethiopia”; submitted as partial fulfillment of specialty in General Surgery, Bahir Dar University, is a record of my original work and has not been submitted to any other institution for any purpose. The references used for this thesis proposal are properly cited and the assistance I received has been duly acknowledged.

Name of the candidate

Date

APPROVAL OF THESIS

I hereby certify that I have supervised, read and evaluated this thesis titled “pattern and management outcome of hospitalized chest trauma patients in TGSH, Bahir Dar, Ethiopia” by Dr. MeronArgaw under my guidance I recommended the thesis for oral defense.

Advisor’s name	Signature	Date
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2. _____	_____	_____

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ABSTRACT

Background: trauma is the third most common cause of death in all age groups; one out of four trauma patients die due to thoracic injury or its complications. Chest trauma is usually caused by motor vehicle accident, falling from height, violence including bullet and stab injury. Chest wall and pulmonary injuries range from rib fractures to flail chest, pneumothorax, hemothorax, pulmonary contusion and tracheobronchial injuries. Only 10% of thoracic trauma patients require operative management and the remaining 90% can be treated with simple methods such as appropriate airway, oxygen support, analgesics and tube thoracostomy. With early and appropriate diagnosis, the morbidity and mortality can be significantly reduced by simple treatment methods.¹

Objective: to assess the pattern and management outcome of hospitalized chest trauma patients in TGSH.

Methods: A single center based retrospective cross-sectional study was done. Data was collected from patient's record to assess pattern and outcomes hospitalized chest trauma patients at TGSH during a one year period of time. All patients who were admitted with the diagnosis of chest trauma in TGSH from March 1, 2020 to March 30, 2021 were included in the study. A structured research tool was used to collect all necessary data from the patients' medical record. The collected data was entered into SPSS version 25 for analysis and descriptive and logistic regression models were used to present the result.

Results: a total of 76 patients hospitalized for chest trauma were included in the study. Violence was the leading cause of chest trauma among these patients followed by RTA. The peak age incidence of chest trauma was 18 to 45 years with a mean of 39.96 (± 17.23) years. The mortality rate was found to be 5.3% and complication developed in 31.6% of patients. ICU admission (AOR 23.785, 95% CI 1.731-326.771) Presence of associated spinal cord injury (AOR 13.302, 95% CI 1.013-174.662) was factors associated with death among traumatic chest injury patients. Bilateral chest trauma (AOR 0.178, 95% CI 0.045-0.688) and laparotomy (AOR 5.656, CI 1.479-21.626) were associated with development of complication in this study.

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ACRONYMS AND ABBREVIATIONS

RTA	Road Traffic Accident
TASH	TikurAnbessa Specialized Hospital
TGSH	TibebeGhion Specialize Hospital
BCT	Blunt chest trauma
UOG	University of Gondar
MOI	mechanism of injury
LOS	length of hospital stay
ICU	intensive care unit
COR	crude odds ratio
AOR	adjusted odds ratio

1 Introduction

1.1 Background

Trauma is the leading cause of death, hospitalization and long-term disabilities worldwide. It is one of the highest contributing causes to mortality, with approximately 5.8 million deaths worldwide each year.² It is associated with substantial costs to the individual and society, making it a significant global public health concern. Road traffic accidents, domestic violence, natural and occupational hazards are some of the common causes of trauma.

Chest trauma is an important trauma globally accounting for about 10% of trauma admission and 25-50% of trauma death.³ studies show it is predominantly a disease of the youth in society. Due to their immediately life-threatening nature, the identification of thoracic injuries is considered an early priority in the care of polytrauma patient.⁴ the leading causes of blunt chest injury are falls from height and road traffic collisions.⁵ Stab and gunshot wounds are the major causes of penetrating chest trauma.⁶

Most major blunt chest traumas involve rib fracture with lung contusion and hemothorax.⁷ with rib fractures representing the most frequent type of bone fracture, being observed in about 10% to 20% of all trauma patients.⁸ even though blunt chest trauma is more common, penetrating trauma can be acutely life threatening.⁹

Trauma affecting the chest wall, even in isolation, can carry a significant morbidity and mortality and thus appropriate management is vital. It can result in significant pain, altered chest wall mechanics, hypoventilation, infection and respiratory failure.⁵

Tube thoracostomy is the mainstay of treatment for majority of chest trauma patients¹⁰. Whereas a small proportion of patients require direct surgical interventions.¹¹ However, complications like atelectasis, pneumonia and empyema can significantly alter the overall management outcome during the course of hospitalization.

Coming to our setup despite the limitations of resources and manpower, efforts are being made to manage patients successfully. Understanding the patterns of chest trauma and factors that cause an impact in the management can contribute to develop preventive methods of chest trauma, an organized management of patients, improved patient outcome, prevention and early detection of complications as well as general reduction health center burden.

1.2 Statement of the problem

Worldwide trauma continues to be the leading cause of morbidity and mortality¹². In Africa, particularly in South Africa, trauma-related injury has an increased morbidity and mortality when compared to the rest of the world, with numbers approaching two to six times the global average.² Thoracic trauma comprises 10–15% of all traumas and represents 25% of all fatalities due to trauma. The incidence of trauma varies, and relatively higher numbers of chest injuries are observed in some regions.¹³

Chest trauma is reported to be among the major causes of hospitalization and long term disabilities accounting for 25% of all trauma related deaths and 10% of hospital admissions, with motor vehicle accident being the most common cause.¹² Another study¹⁴ shows the main causes of chest trauma to be violence (41%), RTAs (33%), and fall down accidents (23%) other factors like work, domestic, and sport accidents, accounting for the rest 3%. In study done in Africa, Tanzania, trauma including chest injuries continues to be one of the leading causes of morbidity among the young and old with an estimated mortality of 40% [4]. In Bugando Medical Centre, chest trauma has been commonest cause of surgical admission and contributes significantly to high morbidity and mortality¹⁵

Only few published studies showed the burden of chest injury in our country; however chest trauma continues to be a major public health challenge with increasing prevalence overtime due to large number of road traffic accidents in the country. Chest region is the

fourth mostly affected body region by RTCs in Ethiopia and accounts for 9.5% of all body region injured in the country.¹⁶

Concerning the pattern of injuries, pneumothorax, hemothorax, rib fractures and pulmonary contusions were the most frequent injuries in patients sustaining blunt chest trauma and different studies show variable numbers. In one series, rib fractures presented in 34%, 75% of which had 4 or less rib fractures. 31% of rib fracture cases were isolated, whereas 69% had another intra- thoracic injury (hemothorax/Pneumothorax, lung contusion) which increases as the number of fractured ribs increased.¹⁴

In Ethiopia, a study done in Addis Ababa showed that majority of the patients sustained rib fractures (32.3%), whereas hemopneumothorax and pulmonary contusion were diagnosed 18.2% and 14.6% cases among traumatic chest injury patients respectively. This finding was in line with the study conducted in the United Kingdom.¹⁶

Despite the prevalence of thoracic injury following trauma, the majority of patients can be treated by non-surgical approach with relatively simple methods, such as tube thoracostomy, appropriate analgesics management, and good pulmonary toilet.¹⁵ In one study the majority of chest trauma patients were managed non-operatively, chest tube insertion required in 75%, whereas tube thoracotomy was required only in 5.56%.¹⁷

Even isolated rib fractures are associated with high morbidity and mortality, with complications seen in up to 36% of all cases. In addition many patients with blunt chest trauma have associated injuries, in which case patients will require significant input in the acute setting, frequently require critical care support and often need prolonged inpatient admissions.⁵

Rising mortality rates depend on the severity and complexity of the wounds and older age. Hospital mortality rates for isolated chest injuries were reported to range from 4 to 8%, and increased to 13–15% when another organ system was involved and to 30–35% when more than one organ system was involved.¹⁸ Whereas higher mortality rate was reported in a study done in our country, from 192 chest injury patients included in the study, about one-fourth of chest injury victims died during treatment period in TASH. Road traffic collision (RTC) was the leading cause of chest injury victims. Age of the

victims, time elapsed between the occurrence of traumatic chest injury and admission to health care facilities, length of stay in hospital, presence of multiple extra-thoracic injury and development of complications were factors associated with death among traumatic chest injury patients.¹⁶

1.3 Significance of the study

The purpose of this study is to investigate the patterns and treatment outcome of chest trauma patients in the study area in order to improve management, and prevent complications. It could give us insight to the degree of impact of chest trauma in the society as well as the burden in health facilities. This could be essential for establishment of prevention strategies as well as treatment protocols. It can be a baseline data for researchers interested to conduct further studies on chest injuries especially for those in the surgery, public health department, and emergency medicine.

Hence, this study was conducted to describe pattern and management outcome of hospitalized chest trauma patients in TGS.

2 Literature Review

Scholars from different part of the world studied the burden of trauma worldwide and have set the standard of care in many areas of trauma, including that of the chest. In order to plan trauma resources more efficiently, accurate assessment of the full scope of chest trauma is required. Number of deaths and the magnitude of disability caused by chest injuries should be studied in order to provide useful information for allocating resources and improving management in the field.

According to a British Journal, Trauma makes up a significant proportion of the emergency department caseload globally, of which blunt chest trauma accounts for up to 15% of cases and rib fractures were the most frequent injury following blunt chest trauma, affecting up to two thirds of patients.⁵

In United States, gunshot and stabbing account for 10% and 9.5% of penetrating chest injuries. This incidence can rise as high as 95% in countries engaged in war.¹⁹

Chest trauma ranks third behind head and extremity trauma in major accidents in the United States. Motor vehicle accident is the most common etiology (70%). many of these injuries are of moderate severity and rarely require surgical intervention. Despite these, 20% of all trauma deaths per year are attributable to chest trauma, which is approximately 16,000 deaths per year in the country and is also associated with significant morbidity. The patterns of injuries detected included injuries to the chest wall, flail chest, pneumothorax, hemothorax, pulmonary and other viscera. However isolated chest injury was found to be uncommon and is associated with head injury, extremity injury and abdominopelvic injuries with variable number of occurrences.²⁰

According to a study done in Germany, majority of patients sustaining chest trauma were found to be male with mean age of 46.1. RTA accounted for 56% the injuries, and falls made up for most of the remaining injuries (27%). The mortality of blunt thoracic trauma was found to be influenced by age, with mortality reaching to 40% for those aged above 75, and gender, in which male patients were found to suffer a lower mortality (16.5%) than female patients (20.5%). In addition, presence of extrathoracic injuries, lung parenchymal injury, the number of fractured rib and presence of bilateral flail chest were found to affect outcome of patients with chest injury.²¹

Thoracic trauma is one of the leading causes of mortality and morbidity in developing countries. A 10 year experience in patients with chest injury was analyzed in one study done in Turkey and thoracic trauma continued to be a major cause of hospitalization in civil population. The study found that in chest trauma, associated extrathoracic injuries complicate the presentation and management of the victims, resulting in increased mortality and hospital stay. In this series, the incidence of chest wall pathologies was 36.1%, of which rib fractures were identified in 32.1% of patients. The morbidity rate and hospital stay were both increased in patients having fractures involving more than three ribs and suggested hospitalization of such patients at a level 1 center. Patients with flail chest in their study were managed in ICU but in all cases surgical stabilization was not done. While the reported mortality rate in flail chest varies from 5.4 to 40%, mortality

rate in this study was 11.1%, representing a relatively lower ratio. Tube thoracostomy is the choice of treatment in chest trauma complicated with rib fractures and haemopneumothorax. On the other hand ratio of thorachotomy in this study was 6%, and intrathoracic bleeding was the leading pathology in 50%.the overall mortality rate in these series was 9.3% in chest injury patients. Morbidity and mortality were both higher in blunt chest injury.²²

Coming Ethiopia a study done in Gedo Zone, Dilla analyzed the pattern and outcomes of injuries among trauma patients. The prevalence of injury in this study was 46.6% which was higher than studies conducted in UOG (25%) and TikurAnbesa hospital (32%) which was attributed to poor road safety and more motorcycle transportation in the study area. The study revealed that male gender and young age group, (20-40 years) were the most commonly injured ones and RTA was the commonest type of injury, (47.3%), followed by inter- personal violence, (30.1%). The commonest type of injury in these series was lower extremity injury (35.9%), followed by upper extremity (19.7%), and polytrauma (15.4%), whereas chest trauma was found to be the lowest type of injury. The study showed that the prevalence of death was high (6%) compared to a similar study conducted in the University of Gondar (2.11%).²³

Another study done in Addis Ababa Ethiopia showed that RTC was the most common cause of traumatic chest injury followed by violence, which accounts for 44.5% and 34.9% cases respectively. nearly three-fourth (73.4%) of chest trauma patients were male. About one-third of the chest injury patients were treated non-operatively. Chest tube was inserted in the majority (62.0%) of patients. Advanced procedures such as laparotomy and thoracotomy were done for 13% and 3.6% of the chest injury patients respectively. Hospital acquired pneumonia and wound sepsis were among the most common complications developed by chest injury patients. The prevalence of death among traumatic chest injury patients was 27.6% in this study.¹⁶

3 Conceptual Framework

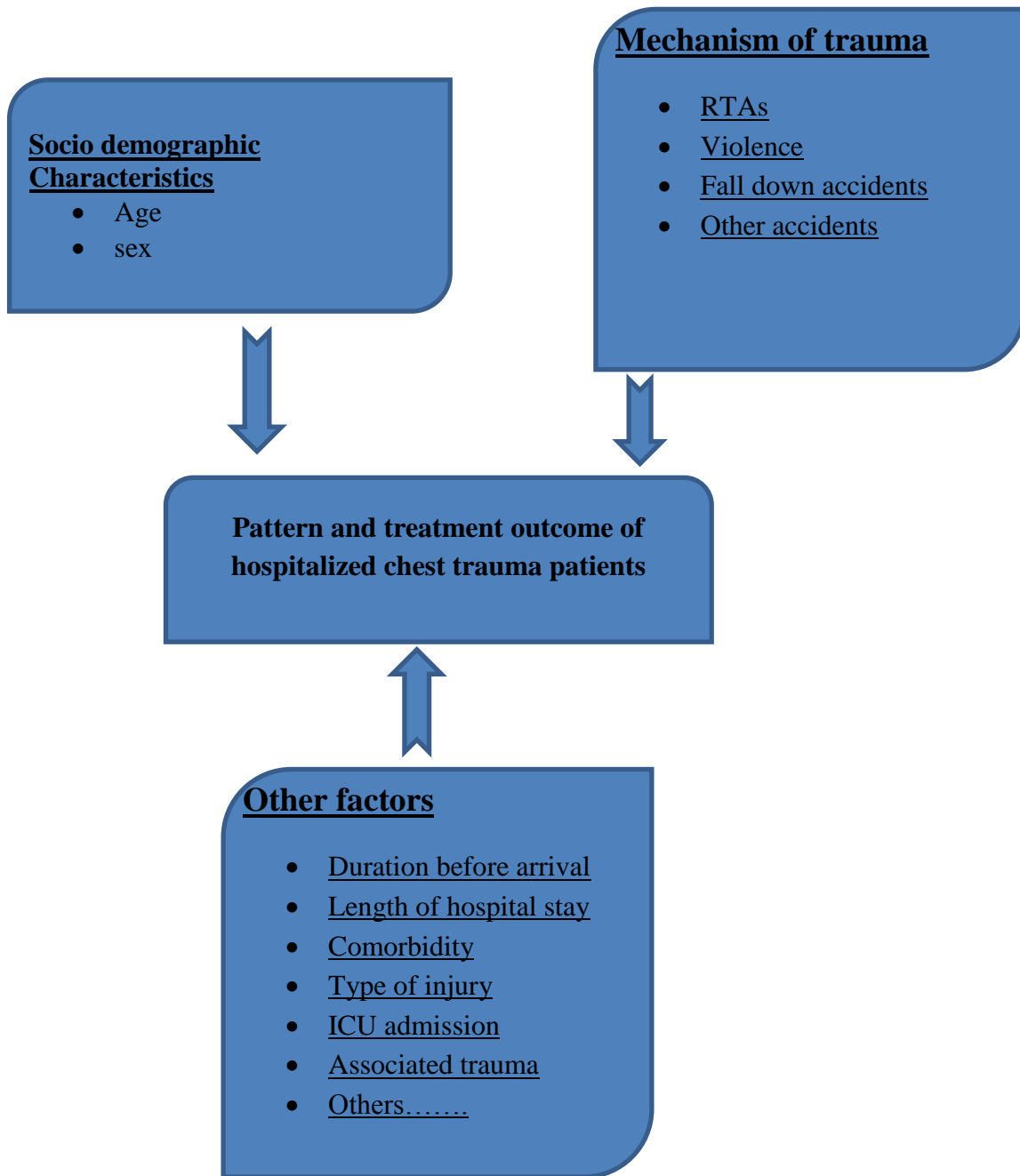


Figure 1:- Conceptual frame work on pattern and treatment outcome of blunt chest trauma at TGSHBahir Dar Ethiopia 2021.

4 Objective

4.1 General objective

- To assess the patterns and outcomes of hospitalized adult chest trauma patients admitted to TGSH from March 1, 2020 to March 30, 2021.

4.2 Specific objectives

- To determine pattern of chest trauma among hospitalized patients for chest injury in TGSH from March 1, 2021 to March 30, 2021
- To determine the outcome of adult patients admitted for chest trauma in TGSH from March 1, 2020 to March 30, 2021.
- To determine the frequency and types of complications occurring in adult patients admitted and managed for chest trauma in TGSH from March 1, 2020 to March, 2021.

5 Research Design and Methodology

5.1 Study area and study period

The study was conducted in TGSH, BahirDar, Ethiopia.

Bahardar is located 560km away from capital city of Ethiopia, Addis Ababa in northwest direction. The city is located in Amhara region as a capital city for the regional government.

Tibebe-Ghion specialized hospital (TGSH): is one of the largest specialized referral hospitals in the Amhara region and the country at large. It is a general public hospital and one of the university hospitals in the country. It is a new referral teaching hospital which is established by Bahardar University in 2018 G.C and currently it runs residency programs in seven specialties.

The study was conducted, by reviewing records of patients with chest trauma who were seen in TGSH, from March 1, 2020 to March 30, 2021.

5.2 Study design

A hospital based retrospective cross-sectional study design was conducted to assess the patterns and treatment outcome among patients admitted for chest trauma to TGSH, Bahar Dar, Ethiopia.

5.3 Population

5.3.1 Source population

The entire patients admitted for traumatic chest injury to TGSH from March 1, 2020 to March 30, 2021.

5.3.2 Study population

All patients admitted and managed with the diagnosis of chest trauma to TGSH that fulfill the inclusion criteria, from March 1, 2020 to March 30, 2021.

5.4 Inclusion and exclusion criteria

5.4.1 Inclusion criteria

All complete recorded data of adults who aged above 18 years admitted and managed for chest trauma from March 1, 2020 to March 30 2021.

5.4.2 Exclusion criteria

Chest trauma patients' chart that had incomplete data was excluded.

Chest trauma patient's charts which are lost from record office at the time of data collection were excluded.

5.5 Variables

5.5.1 Dependent variables

Outcome of chest trauma (Yes, No), complication (Yes, No)

5.5.2 Independent variables

- Age
- Sex
- Mechanism of trauma
- Duration of presentation
- Types of chest trauma
- Patterns of chest trauma
- Associated injury
- Presence of comorbidity
- Length of hospital stay
- ICU admission
- Comorbidity
- Bilaterality of chest trauma

5.6 Data collection tools

The list of patients admitted with the diagnosis of chest trauma were identified from TGSU emergency department and surgical wards. The records of each patient were accessed from TGSU record office based on the identified list. Structured and pre- tested questionnaire was prepared in English and modified based on the pretest results before the study period. Data was collected by trained data collectors and general practitioners working in surgical department. The primary investigator rechecked the data collection forms to ensure their completeness and accuracy.

5.7 Data processing and Analysis

The data was entered to SPSS, version 25 for analysis. Descriptive statistics were used to summarize the data. Tables, texts and graphs were used to present the results. Logistic regression models were used to explore the association of each independent variable with the dependent variable. Initially the COR for each independent variable with 95% CI was determined. Then, all variable with

p-value of <0.25 were considered for multivariate logistic regression to control the effect of confounders. Lastly, the level of significance was set at $p<0.05$.

5.8 Data quality control

Various precautions and appropriate data quality control mechanism were applied in all data management process to assure quality of data. These include pre testing data collection tool, intensive training of data collector, close supervision of data collection process, verification of completeness.

5.9 Ethical Consideration

Letter of permission to carry out the study was obtained from BDUCMHS, IRB (Institutional Review Board). Then cooperation letter was sent for TGSH to obtain consent to perform data collection. Confidentiality of patient information is maintained by taking the data anonymously. The data extracted from medical registration charts is used for the study and every data is kept confidential.

5.10 Dissemination plan

The findings of the study will be presented during final thesis defense at Bahir Dar University medical science college. Copies of the final thesis will be sent to libraries of Bahir Dar University and also to Bahir Dar city health administration and regional health bureau.

5.11 Operational definition

Death: any patient admitted to surgical ward and started treatment at TGSH as a result of chest trauma regardless of its cause but lost his/her life in the hospital during the course of treatment before discharged from the hospital.

Alive: any patient admitted to surgical ward and started treatment TGSH as a result of chest injury regardless of its cause and discharged either cured with or without disability or referred to other hospitals for further treatment but not died in TGSH were considered alive.

Adult patient: a patient aged 18 years and above

Trauma: is defined as a physical injury or a wound to living tissue caused by an extrinsic agent.

6 Results

6.1 Socio – demographic characteristics

A total number of 76 patients were studied. Their ages were 18 and above with a mean of 39.96 years (± 17.23).the peak age incidence was between 18 to 45 years accounting for 63% of patients. There were 61 male (80.3%) and 15 female (19.7%) with the male to female ratio of 4 to 1 with a male predominance in each age group (fig 2).

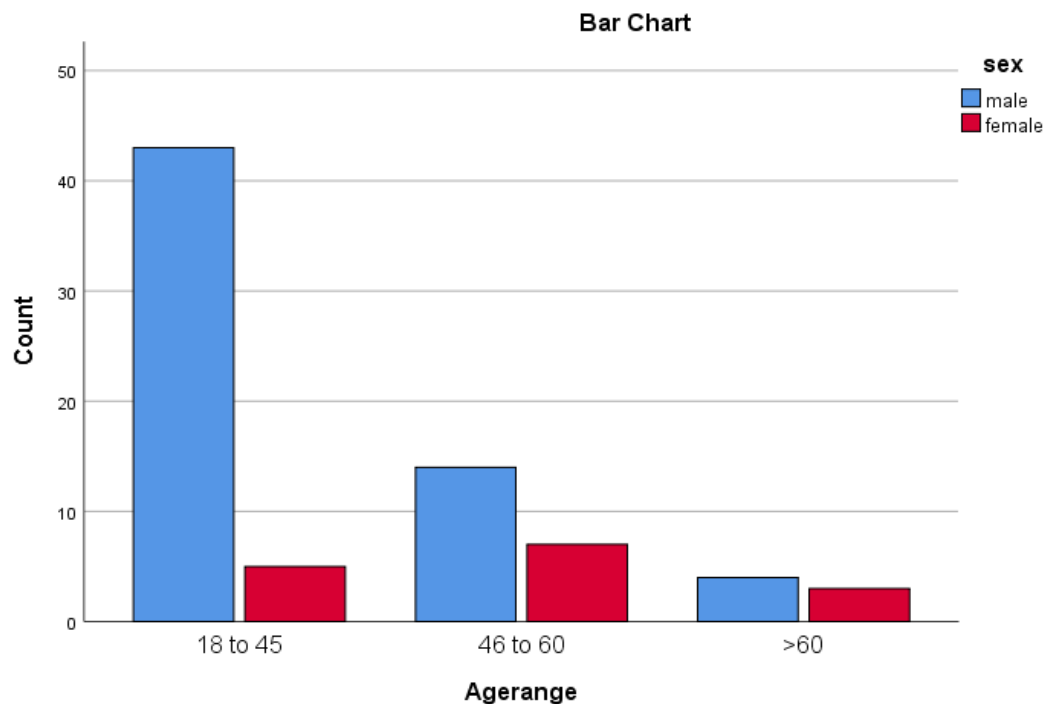


Fig 2: Age and sex distribution

6.2 Mechanism chest trauma and injury type

Violence was found to be the leading cause of chest trauma accounting for 31 (40.8%) of patients, of these patients presenting with violence 19 (61.3%) sustained bullet injury.

The second most common contributing factor was RTA which accounts for 39.5% (30 of the 76 patients) of chest trauma patients that required inpatient treatment. The other less

common causes were fall down and other accidents contributing for 12% and 3% of patients respectively.

Blunt chest traumas, as seen in other studies ²⁴ was found to be more common compared to penetrating chest trauma (57.9% Vs 42%).15 patients (19.7%) had bilateral chest trauma and bilateral chest tube was inserted.

Table 1: mechanisms of violence

Violence category	Frequency	Percentage
Gunshot	19	61.29%
Stab	11	35.4%
Stick	1	3.2%

6.3 Patterns of chest trauma and associated injuries

Among the variable patterns of chest trauma, hemopneumothorax was found to be the most common occurring in 38 (47.4%) of patients followed by hemothorax (38.2%) and rib fracture 9(30.3%). 11 (14.5%) patients had clavicular fracture whereas pulmonary contusion was diagnosed in 15.8% of patients, Out of the 76 study patients 45 patients (59.2%) were found to have one or more associated traumas, the most common being abdominal trauma occurring in 26.3% of patients followed by lower extremity injury in (19.7%). Head injury and spinal cord injury were seen in 14.5% and 11.8% of patients respectively. The frequency of these and other associated traumas is seen in shown in table 2.

In these series, 73.4% of the patients arrived to the hospital within 24 hours of sustaining the trauma. The rest 26.4% came after 24 hours of trauma.

Table 2. Distribution of variables among study group

Variable		Frequency	Percentage	
Mechanism of injury	RTA	30	39.5%	
	Violence	31	40.8%	
	Fall down	12	15.8%	
	Other accident	3	3.9%	
Patterns of chest trauma	Hemothorax	29	38.2%	
	Pneumothorax	11	14.5%	
	Hemopneumothorax	36	47.4%	
	Rib fracture	23	30.3%	
	Pulmonary contusion	12	15.8%	
	Clavicular fracture	11	14.5%	
Associated trauma	Head injury		11	14.5%
	Neck injury		2	2.6%
	Diaphragmatic injury		8	10.5%
	Abdomen (total)		20	26.3%
	Intraabdominal organ	Hollow viscus	7	9.2%
		Liver	6	7.9%
		Spleen	8	10.5%
		Kidney	1	1.3%
	Upper extremity		9	11.6%
	Lower extremity		15	19%
	Pelvic		5	6.6%
	Spinal		9	11.8%
Duration before arrival to hospital	<2 hrs	5	6.6%	
	2-6 hrs	25	32.9%	
	7-24 hrs	26	34.2%	
	>24 hr< 1wk	16	21.1%	
	>1 weak	4	5.3%	

6.4 Management

FAST was done for 72 (94.7%) of patients with variable outcomes, there was incomplete documentation for majority of patients whether or not CXR was done. Chest CT was done for 12 (15.8%) of patients either at initial presentation or for evaluation of complications.

Tube thoracostomy was done for all patients admitted with the diagnosis of chest trauma. 5 of the 76 admitted patients (i.e 6.6%) for chest trauma patients required thoracotomy, of which one was for the indication of massive hemothorax at presentation the other four patients undergone thoracotomy for complication in the same admission. 19.7% of patients undergone laparotomy for associated abdominal traumas. Whereas orthopedic and maxillofacial procedures were performed in 13 (17.1%), and 2 (2.6%) of patients

Table 3. investigation and management of patients

	Variables		frequency	Percentage
Investigations done	FAST	Yes	72	94.7%
		No	4	5.3%
	Chest CT	Yes	12	15.8%
		No	64	84.2%
procedure	Chest tube		76	100%
Operative management	Thoracotomy		5	6.6%
	Laparotomy		15	19.7%
	Orthopedic		13	17.1%
	Maxillofacial		2	2.6%
ICU admission	Admitted		6	7.9%
	Not admitted		70	92.1%

6.5 Treatment outcome

From a total of 76 patients included in this study 4 patients died during the course of treatment giving mortality rate of 5.3%. 24 of the study patients (31.6%) developed complication, of this the commonest was HAP accounting for 13.2% of patients admitted with traumatic chest injury, Followed by empyema which in 8 (10.5%) patients. Surgical site infection and atelectasis are some of the other complications. 50% of patients have a hospital stay of less than two weeks, the rest stayed for more than 2 weeks.

Table 4: treatment outcome among chest trauma patients

Variables	Frequency	Percentage
Outcome		
Dead	4	5.3%
Alive	72	94.7%
complication	24	31.6%
Empyema	8	10.5%
Atelectasis	3	3.9%
Pneumonia	10	13.2%
SSI	3	3.9%
LOS		
<2days	2	2.6%
3 to 7 days	12	15.8%
8 to14 days	24	31.6%
15 to 21 days	17	22.4%
>21%	21	27.6%

6.6 Factors associated with outcome among chest injury patients

In the bivariate analysis multiple factors were found to have association with the treatment outcome in terms of mortality and risk of development of complication. In multivariable regression the majority of this association was not found to be significant.

Mortality of patients was found to have significant association with the presence of concomitant spinal cord injury (**AOR: 13.302, 95% CI 1.013-174.662**) and ICU admission (**AOR: 23.785 95% CI 1.731-326.771**).

Bilateral chest trauma (**AOR 0.178, 95% CI 0.045-0.688**) and laparotomy (**AOR 5.656, 95% CI 1.479-21.626**) were significantly associated with development of complication in this study patients.

Table 4 bivariate and multivariable logistic regression for mortality

Variable	Category	Outcome		COR (95% CI)	AOR (95% CI)	P value
		Dead (%)	Alive (%)			
Pulmonary contusion	Yes	2(16.7%)	10(83.3)	6.2(0.782- 49.166)		
	No	2(3.1%)	62(96.9)			
ICU admission	Yes	2(33.3%)	4(66.7%)	17.000 (1.876- 154.065)	23.785(1.7 31- 303.547)	0.018
	No	2(2.9%)	68(97.1%)			
Abdominal injury	Yes	1(5%)	19(95%)	0.93(0.091 -9.491)		0.951
	No	3(5.4%)	53(94.6%)			
Spinalcord injury	Yes	2(22.2%)	7(77.8)	9.286(1.12 7-76.541)	13.302(1.0 13- 174.662)	0.049
	No	2(3%)	65(97%)			

Table 5: bivariate and multivariable logistic regression.

Variable	Category	Complication		COR (95% CI)	AOR (95% CI)	P value
		Yes (%)	No (%)			
Billaterality	Bilateral	9(60%)	6(40%)	0.217 (0.66- 0.712)	0.176 (0.045- 0.688)	0.013
	Unilateral	15(24.6 %)	46(75.4%)			
laparotomy	Yes	9(60%)	6 (40.0%)	4.6(1.405- 15.061)	5.656(1.479 -21.626)	0.011
	No	15(62.5 %)	46 (75.4%)			
contusion	Yes	6 (50%)	6 (50/5%)	2.556(0.72 8-8.95		0.145
	No	24 (31%)	52 (68.4%)			

7 Discussion

In this study the majority of chest trauma patients were found to be in the young and productive age group (18-45) and males account for higher number of patients. Similar sociodemographic observation were reported in other studies^{16, 15, 25}. This finding can be explained by the active and risk taking nature of this group of population which can be at higher risk for RTA and engagement in violent activities.

Violence, unlike most studies showed^{20, 16} was found to be the leading cause chest trauma. Among those patients presented with violence majority sustained bullet injury. Which is relatively larger proportion compared to reports from other studies. This result was reflected in the presence of higher proportion of penetrating chest trauma, majority of which resulted from bullet injury, among the study group. Even though penetrating injuries were less common as compared to blunt chest trauma (42% Vs57.9%), this figure is still relatively higher when compared with reports from other setups^{16, 26, 27}.

RTA was found to has a lower figure as compared to other studies^{28,12} which can be explained by higher proportion of violence. It is still the second leading cause, accounting for significant number of chest trauma patients. Awareness creation and working on the public systems for control of both violence/bullet and RTA can contribute to reduction of chest trauma among the society and decrease the burden of health institutions in the area.

majority of the chest trauma patients had one or more associated traumas, the most common being abdominal trauma and extremity injuries which is comparable with other reports²⁵. Associated traumas were found to affect mortality and development of complication in multiple studies¹⁶, in this study spinal cord injury was found to be associated with increased mortality with $P < 0.005$ and development of complication was increased among patients with associated abdominal trauma that undergone laparotomy, but no significant in those who were managed conservatively for the abdominal trauma.

Since the study was done among hospitalized chest trauma patients, tube thoracotomy was done for all. So the place of non-operative management for chest trauma was

not included in the study design. The small sample size and the inclusion of patients that undergone thoracotomy for complication of chest trauma like empyema, and BPF can explain the relatively higher figure of thoracotomy compared to other studies^{29, 16}.

The main purpose of this study was to examine the treatment outcome of chest trauma patients that required inpatient management. According to this study the general mortality was 5.3% which was relatively comparable to other studies.¹⁵ ICU admission and presence of associated spinal cord injury were found to be highly associated with increased mortality in this study, this association is observed in some other studies^{30, 16}.

In general there was higher ICU admission rate among chest trauma patients as compared to other studies³¹, and this may accentuate its significance in mortality. The increased risk of mortality in chest trauma patients with associated spinal cord injuries was reported in one study done in TASH ¹⁶. This association can be expected since spinal cord injury is one indicator of high energy trauma especially in RTA as well as other blunt injuries.

The rate of complication among chest trauma patients was comparable to other reports.^{16, 32} pneumonia being the most common. Patients with bilateral chest trauma and those that undergone laparotomy were found to be at increased risk of development of complications after chest trauma.

In contrast to many studies, age, duration between trauma and hospital arrival, and comorbidity didn't show significance impact in mortality and development of complication.^{16, 17} this might be due to the small sample size of the study.

8 Limitation of the Study

The study being done on a single center and limited time frame can make the result less representative of the whole population in the area. And smaller size study population can influence the significance of some independent variables to the outcome during regression. In addition, the retrospective nature of the study and the presence of incomplete registration might affect the outcome to some extent. More accurate data

could have been collected if the study was multi-centered, prospective, and a more complete data registration was available. These and larger study population can improve the precision of the result.

9 Conclusion

Despite the limitations the result of the study is comparable with reports from various other studies. Violence especially gunshot injuries, unlike many other reports were found to be the major contributing factor for chest trauma admission in this study which should be an alarming observation. Working on the society in terms of awareness and control of RTA and violence can decrease the prevalence of chest trauma in the area. With more accurate registration of patients' records and enrolling prospective study over larger study population, we can find out more exact figure about the pattern and treatment outcome of chest trauma patients in the area and contribute for improved outcome of patients.

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Appendices

Annex A:

No	Question		Response
1	Age		
2	Sex	A.	Male
		B.	Female
3	Time duration between injury and presentation to hospital (hours)	A.	<2
		B.	2-6
		C.	7-24
		D.	>24
		E.	More than a 1 week
4	Length of hospital stay (in days)	A.	<2
		B.	3-7
		C.	8-14
		D.	15-21
		E.	>21
5	Outcome	A.	Dead Possible cause of death _____
		B.	Alive
6	Mechanism of chest injury	A.	RTA
		B.	Violence
		C.	Falling down
		D.	Others
7	Bilaterality of chest trauma	A.	Unilateral
		B.	Bilateral
8	Investigation done	A.	FAST
		B.	CXR
		C.	Chest CT
		D.	Others
9	Types of chest injury	A.	Hemothorax
		B.	Pneumothorax
		C.	Hemopneumothorax
		D.	Pulmonary contusion
		E.	Rib fracture
		F.	Flial chest
		G.	Clavicular fracture
		H.	Multiple trauma

		I.	Others
10	History of underlying comorbid chronic illness	A.	Diabetic mellitus
		B.	Cardiovascular disease
		C.	Others
11	Injury mechanism	A.	Penetrating
		B.	Blunt
12	Injury mechanism	A.	Pure chest injury
		B.	Thoracoabdominal trauma
13	Level of energy	A.	High energy
		B.	Low energy
14	Associated trauma	A.	Head and neck
		B.	Extremities injury
		C.	Abdomen
		D.	Pelvis
		E.	Spinal cord
		F.	Others
15	Types of interventions	A.	Non-operative intervention
		B.	Chest-tube insertion
		C.	Thoracotomy
		D.	Laparotomy
		E.	Others
16	Complication	A.	Yes
		B.	No
17	If the answer to question no 15 is yes, then types of complication	A.	Pneumonia
		B.	Empyema
		C.	Atelectasis
		D.	Surgical site infection I. Yes II. No
		E.	Other _____