

Patterns and Short Term Outcomes of Chest Injuries at Mbarara Regional Referral Hospital in Uganda

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Background: This study was conducted to establish the causes, injury patterns and short-term outcomes of chest injuries at Mbarara Regional Referral Hospital.

Methods: This was a prospective study involving chest injury patients admitted to Mbarara Regional Referral Hospital (MRRH) for a period of one year from April 2014 to 31st March 2015.

Results: A total of 71 chest injury patients were studied. Males (91.6%) were the majority and the ages ranged from 8 to 76 years (mean 32.9 years (+/- 14.0)). Majority of the patients (57.7%) sustained blunt injury. RTA was the most common cause of injury, affecting 49.3%. The commonest injury patterns were chest wall injuries and lung and pleural injuries accounting for 69.0% and 64.8 respectively. Rib fractures were the commonest chest wall injury (71.4%) while hemopneumothorax was the commonest (34.9%) finding among those with lung and pleural injury. Associated injuries were found in 64.2% and out of these, abdominal injuries were the commonest extra thoracic injury (39.1%) followed by head injury (37.0%), cuts and lacerations (37%) and fractures (28.3%). The commonest abdominal organs injured were spleen (44.4%), liver (27.8%) and stomach (16.7%). Majority of the patients had thoracostomy (47.9%) while 33.8% had non surgical treatment. Laparotomy and thoracotomy were done in 11 (15.5%) and 3 (4.2%) of the patients respectively. Complications occurred in 20 (28.2%) and the commonest complication was pneumonia 6 (30%). The mean length of stay was 7.14 days, SD=±6.1 and the mortality was 16.9%. The significant determinants of mortality were associated injuries ($X^2=4.57$, F.E=0.046), complications ($X^2=36.82$, F.E=0.000) and severe head injury ($X^2=13.85$, F.E=0.001).

Conclusion: The causes, patterns and short-term outcomes of this study are similar to those observed in other developing countries. Chest injury in our setting causes high mortality and measures to reduce road traffic accidents are urgently required.

Key words: Chest injury, pattern, outcomes

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Introduction

Thoracic trauma comprises 10-15% of all traumas worldwide. It directly accounts for approximately 25% of trauma related mortality and is a contributing factor in another 25 %¹. In a study by Galukande et al² carried out at Mulago Hospital, Accident and Emergency wards, on patients involved in bodaboda (motorcycle) related road traffic crashes, chest injuries were the fourth (following soft tissue injuries, fractures and head injuries respectively) commonest injuries, contributing 34.7 % . Chalya et al³ in Tanzania found chest injuries to account for 44% of RTA injuries.

In a study in Tanzania by Massaga et al⁴, chest injuries had a mortality rate of 24.2%. The same study blamed this high mortality rate on associated injuries, complications and delayed patient care. Chest injuries are also often associated with other extra thoracic injuries including head, abdomen and orthopedic injuries^{5, 6}. Several studies^{4, 5, 7} show that RTA is the commonest cause except in war areas and communities with high crime rates. Fortunately, the majority of the chest injuries are successfully managed with simple surgical procedures with a few requiring thoracotomy⁷. According to Stewart et al⁸ the commonest complications are pneumonia and pleural sepsis. Segers et al⁹ found that the ISS was the most significant factor determining survival ($P < 0.0001$) followed by neuro trauma ($P=0.05$).

Patients and Methods

This was a prospective study involving chest injury patients admitted to Mbarara Regional Referral Hospital (MRRH) for a period of one year from April 2014 to 31st March 2015. All patients admitted at

MRRH with chest injury diagnosed clinically and/or imaging were recruited by consecutive sampling. Excluded chest injury caused by isolated burns, spinal injury, lacerations limited to subcutaneous fat and inhaled or swallowed foreign bodies.

Results

A total of 71 patients with thoracic injuries were studied. Table 1 shows the age distribution. The peak incidence was in the 31 – 40 years age group. Only 14 (20%) were aged above 40 years. There was a predominance of males with a M : F ratio of 11 : 1.

Table 1. Distribution of Patients by Social Demographic Characteristics (N =71)

Variable	Frequency(N=71)	Percentage (%)
Age	32.9(+/- 14.0)	
≤10	2	2.8
11-20	11	15.5
21-30	18	25.3
31-40	26	36.6
≥41	14	19.7
Sex		
Male	65	91.6
Female	6	8.4
Occupation		
Peasants	43	60.6
Students	11	15.5
Driver/rider	5	7.0
Security personnel	3	4.2
Others	9	12.7
Residence		
Mbarara	21	29.6
Isingiro	19	26.8
Ntungamo	9	12.7
Sheema	5	7.0
Kiruhura	3	4.2
Others	14	19.7

Causes

Figure 1 shows the causes of chest trauma. Road traffic crashes accounted for 49% of the cases. Four (6%) of patients were injured by animals with wild and domestic animals contributing 2 cases each. Falls were the causes of chest injury in 5 patients, 4 of them being aged below 20 years.

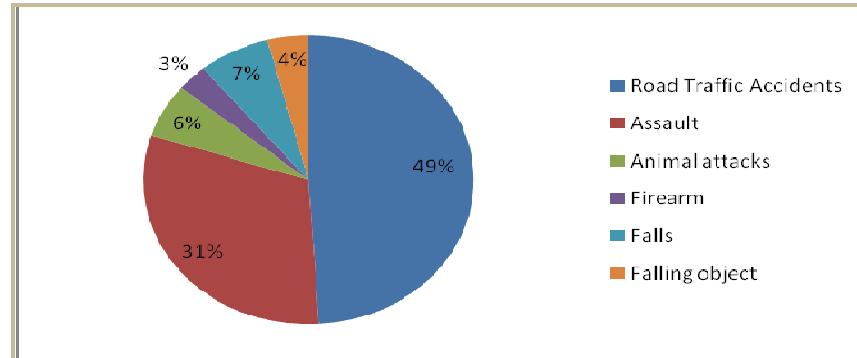


Figure 1. Distribution of patients by the cause of Chest injury (n =71)

Patterns of injury

Blunt trauma accounted for 41 (57.7%) of the chest injuries, 23 (32.4%) were penetrating chest injuries while 7 (9.9%) were neither blunt nor penetrating. Among the 35 patients with rib fractures, 28 (80%) of them had 1-4 ribs fractured while 7 (20%) had 5-9 ribs fractured.

Associated injuries

Other associated injuries were present in 46 (64.8%) of the cases while 25 (35.2%) had isolated the chest injury. Among the 46 patients found with associated injuries, 18 (39.1%) had abdominal injuries, 17 (37%) had cuts and lacerations, head injuries were present in 17(37%) and fractures in 13 (28.3%). Table 2 shows the specific injured abdominal organs. Eight patients had associated splenic injury.

Treatment

As regards to the various treatment options for the chest injuries, 47(66.2%) were surgical while 24(33.8%) were non surgical. Only two out of five patients with tension pneumothorax had emergency needle decompression before chest tube insertion. The various treatment procedures used to treat the chest injuries are shown in Figure 4.

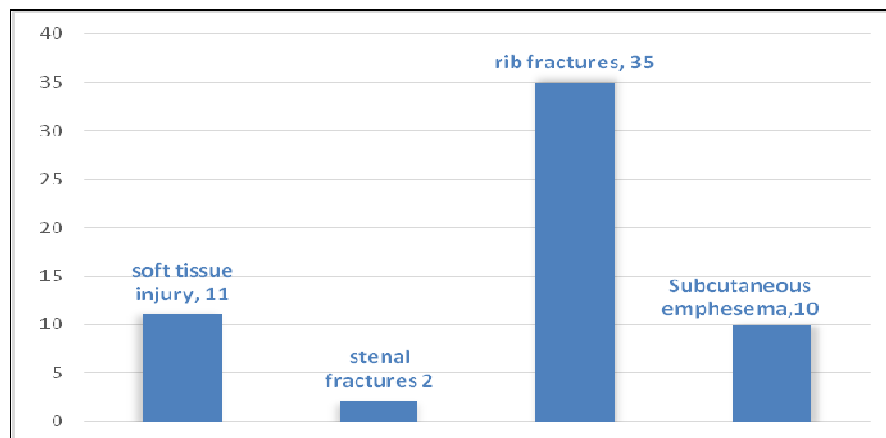


Figure 2. Distribution of Types of Chest Wall Injuries (n =49)

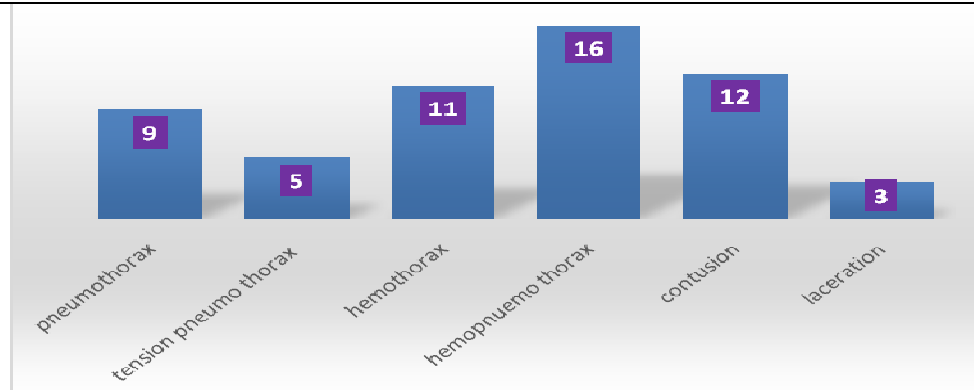


Figure 3. Distribution of Types of Lung and Pleural Injuries (n=46)

Table 2. The Specific Injured Abdominal Organs.

Abdominal injury	Frequency(n=18)	Percentage (%)
Spleen	8	44.4
Liver	5	27.8
Stomach	3	16.7
Others	2	11.1

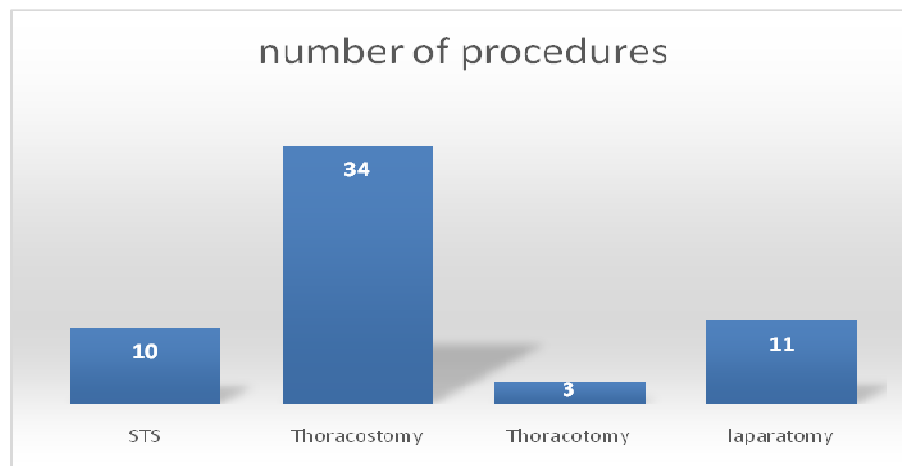


Figure 4. Distribution of Surgical Procedures among Patients who received surgical treatment (n = 47)

Short Term Outcomes of Chest Injuries

Fifty one (71.8%) of the patients had no complications as result of chest injury while 20 (28.2%) had complications. These complications included pneumonia 6 (30%), surgical emphysema 5 (25%), clot from inadequately drained haemothorax 2 (10%), empyema 2 (10%), wound sepsis 3 (15%) and hypovolaemic 2 (10%).

The mean length of hospital stay was 7.14 days, (SD=±6.1) and 12 (16.9%) of the patients died as a result of the chest injuries while the majority 59 (83.1%) survived. Among those who survived, 56 (95%) were discharged, 2(3.3%) had run away from the hospital facility and 1 (1.7%) was referred for further management.

Relationship Between Associated Injuries and Patient Outcomes

The presence of associated injuries was found to have statistically significant association with mortality ($X^2=4.57$, F.E=0.046), OR 95% CI = .047(.142-.017). This meant that the more one had an associated injury the more they were likely to die. Furthermore, among those participants that had head injuries ($n=17$), 12 participants had mild head injuries while 6 had severe head injuries, 12 (70.6%) survived while 5 (29.4%) died. Among those who had severe head injuries 5 (83.3%) died while 1 (16.6%) run away. Severe head injury was found to be a statistically significant predictor of outcome. There the participants who had chest injury associated with severe head injury were more likely to die ($X^2=13.85$, F.E=0.001).

Relationship between Complications and Patient Outcome

There was a statistically significant relationship between complications and mortality ($X^2=36.82$, F.E=0.000). This implies that the more a participant had complications as a result of chest injury, the more they were likely to die.

Table 3. Multivariate Analysis of Vital Signs and Patients Survival

Variable	Odds Ratio	P-value	95% CI
Pulse rate	1.8	0.461	(0.36 - 9.46)
Systolic Bp	1.6	0.464	(0.44 - 5.84)
SpO2	1.6	0.612	(0.25 - 10.73)
Respiratory rate	0.1	0.104	(0.01 - 1.57)
Glasgow Coma Scale	21	0.033*	(1.28 - 370.12)

F.E value <0.05 is statistically significant in the table above *indicates statistically significant

Discussion

Lema et al⁵ and many other authors also observed that males in their productive ages were predominantly affected by chest injuries. The males being more involved in the risky daily activities to earn a living for their homes explains their predominance. Most of the patients were from Mbarara (29.6%) and its immediate neighboring districts due to their proximity to the regional referral hospital. Peasants (60.6%) and students or pupils (15.5%) were the most affected by chest injuries. Chalya et al⁶ in Tanzania studied RTA and also found that the students (58.8%) and businessmen (35.9%) were the main victims. These people opt for the cheapest means of transport (walking and motorcycle) which also happen to be more dangerous.¹⁰

All the participants in this study did not receive any pre-hospital while majority arrived to hospital in private/hired cars. Chalya et al¹¹ also found that none of the patients received pre-hospital care and majority (58.8%) was also brought to hospital by relatives and good Samaritans. Murad et al¹² found pre-hospital care to be a significant contributor to survival.

In this study, the commonest cause of chest injuries were Road Traffic Accidents with motorcycles used for commercial transport accounting for the majority. In a study on patients involved in bodaboda (motorcycle) related road traffic crashes, chest injuries contributing 34.7%² while Nwadiaro et al¹³ found motorcycles to contribute 30% of morbidity and mortality arising from RTA. World Health Organization notes the escalating road traffic accidents in developing countries, and gives the increasing motorization, poor road infrastructure, not complying to traffic laws and driving or riding under the influence of recreational substances as some of the major reasons for this trend^{14, 15}. The increased usage of motorcycle for commercial transportation is favored by the cheapness, ability to beat heavy traffic jams,

access to remote non-motorable areas and poverty. Adeghehngbe et al¹⁶ and Solagberu et al¹⁷ studied motorcycle accidents and found that poor licensing, non adherence to traffic rules, at times reckless riding by largely illiterate motorcycle users as the factors responsible for the increased motorcycle accident injuries.

Blunt injury (57.7%) represented the majority of the trauma mechanism while chest wall (69.0%) and lung and pleura (64.8%) injuries occurred the most. Rib fractures were the most chest wall injuries while hemopneumothorax were the major lung and pleura injuries. Massaga et al⁴ found in their study that majority of the chest injuries were blunt with rib fractures in 42.9% as the main contributors. Atri et al¹⁸ also found rib fractures as the commonest chest injury contributing 60%. Otieno et al¹⁹ documented hemopneumothorax as one of the main injuries sustained in the Kenyan rural population.

Our study found number of rib fractures not to be a significant determinant of outcome. Whitson et al²⁰ also found that increasing number of rib fracture among chest injury patients was not an independent prognostic factor. Similarly, Huber et al²¹ found no effect of rib fractures on survival although the same study found bilateral flail chest to be a significant predictor of outcome.

In this research, there were only 5 (7.0%) diaphragmatic injuries and 4 (80%) of them were diagnosed intraoperative. Okugbo et al²² showed diaphragmatic injuries to be in only 8% of the chest injury participants. The diagnosis of blunt trauma diaphragmatic rupture begins with clinical suspicion.²³ Tariq et al²⁴ also found that about 50% of the diaphragmatic injuries were diagnosed for the first time at laparotomy or thoracotomy for other concomitant injuries.

None of the participants had esophagus, tracheobronchial, cardiac and great vessels injuries. Injuries involving the heart and great vessels cause sudden death and are therefore rarely seen in the chest injury patient.²⁵

In this study 64.2% of the participants had associated injuries, with abdominal injury being the commonest. Splenic and liver injuries were the most common abdominal injuries observed. These 3 abdominal organs are anatomically in close proximity which explains the above trends. Subedi et al²⁶ found that rib fractures were a good indicator of underlying liver and spleen injuries. Ibenzi et al²⁷ studied patterns of abdominal injury at Muhimbili Hospital and found chest injury as the second most common associated extra-abdominal injury while Chalya et al²⁸ in Tanzania also found chest injuries (75%) to be the most common associated injury among patients with splenic injuries.

The commonest complication encountered was pneumonia. Stewart et al⁸ also found pneumonia and pleural sepsis as the commonest complication blaming it on retained clots, contamination from open wounds and insertion of the chest tubes. There was no statistically significant relationship between hospital stay and associated injuries or hospital stay and complications. Lema et al⁵ also found complications were a significant determinant of mortality but not hospital stay.

The mortality was 16.9% which is high and the statistically significant predictors of mortality included associated injuries, severe head injury and complications. Mezue et al²⁹ found a high mortality rate of 43% among head injury patients who had associated chest injuries. While Lema et al⁵ in Tanzania had a much less mortality of 3.3 %, Massaga et al⁴ reported a much higher mortality of 24.2% and documented severity of injury, associated injuries and delayed medical care as being responsible for this outcome. Lema et al⁵ attributed non severe chest injuries (unless there were serious associated extra-thoracic injuries) on the low mortality rate but also the hospital the research was carried out does not offer free services like ours.

Conclusions

The causes, patterns and outcomes of chest injuries observed in this study are not very different from those made in other series done in developing countries. Road traffic accidents are the commonest causes and measures to reduce them are urgently needed. Chest injury causes high mortality rate and also mainly affecting males in their most productive ages. Associated injuries and complications are significant determinants of mortality.

Limitations

There was inadequacy in diagnostic capacity and emergency and intensive care services.

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