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Research Article

POSSIBLE OUTCOMES OF CHEST TRAUMA IN A SURGICAL UNIT

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Abstract:

Objective: To explore the main chest trauma injuries and analysis of suitable trauma management at surgical units of a hospital in Pakistan.

Methodology: This was a case series research conducted during Sep, 2016 to Feb, 2018 at Services Hospital Lahore. A total of 103 chest injury patients were evaluated during the period. All the patients with chest trauma and associated injuries with an age of 12 or more years were included in this research.

Results: The study lasted for 18 months and a total of 103 patients were analyzed for various chest traumas during the research time period. The chest injuries were divided into two categories blunt and penetrating injuries. The prevalence of each type was 58% and 42% respectively. Chest injuries without any trapped blood (haemothorax) and trapped air (pneumothorax) was noticed in 30 patients (29%). Tube insertion was carried out in 64 trauma patients for treatment of pneumothorax (62%). A total of 9 Thoracotomy cases (9%) were performed. Out of 9 patients, only two cases required emergency procedure. An overall mortality rate of 8% was observed in this research.

Conclusion: The chest piercing injuries are often seen due to gunshots and other chest probing. Blunt injuries are more common. Most of the trauma cases are curable at local hospitals and some cases require complex operations at a major surgical care hospital.

Keyword: Chest trauma, Tube thoracotomy, Pneumothorax, Haemothorax, Blunt trauma, Penetrating trauma.

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INTRODUCTION:

Trauma is one of the primary causes of mortality and illness nowadays [1]. Not enough research on the topic of chest trauma is available in national literature. Generally, penetrating chest injuries are caused by accidents and gunshots. In USA, the trauma patients were frequently hospitalized in the last 10 years [2, 3] (12 patients admitted / million population / day). Moreover, chest traumas are causing 20 to 25% of deaths in the USA [4]. In most of the chest trauma cases, patients face death after reporting at hospital [5]. The mortality ratio can be controlled by quick diagnosis and effective management [6]. Due to the continuously changing medical advancements in the field of thoracic surgery, the skill and knowledge of the general surgeons is not comparable to their counterparts in the field of cardiothoracic surgery [7]. Though the mortality rate is high in such cases, but still 80 to 90% chest trauma patients can be treated with chest intubation (for pleural drainage) [5, 8, 9]. Some critical situations in chest trauma patients are out of control of general surgeons and their management becomes a challenge for them [7].

Most of the chest trauma injuries are caused by gunshots, accidents and stabbing into the chest [10]. Patients who fail to reach hospital die due to severe loss of blood, collection of fluid around the heart which causes the heart to compress and stop functioning [11], collection of free air in the chest, and multiple breakages of ribs which leads to resistant hypoxia. However, effective management in all cases who reach hospital alive can lead to desired outcomes [12]. The objective of the study was to determine the predominant pattern of injuries following blunt and penetrating chest trauma and assess the adequacy of the management strategies

based on Primary Trauma Care (PTC) guide-lines¹³ employed for chest trauma in a general surgical unit of a trauma care hospital.

METHODOLOGY:

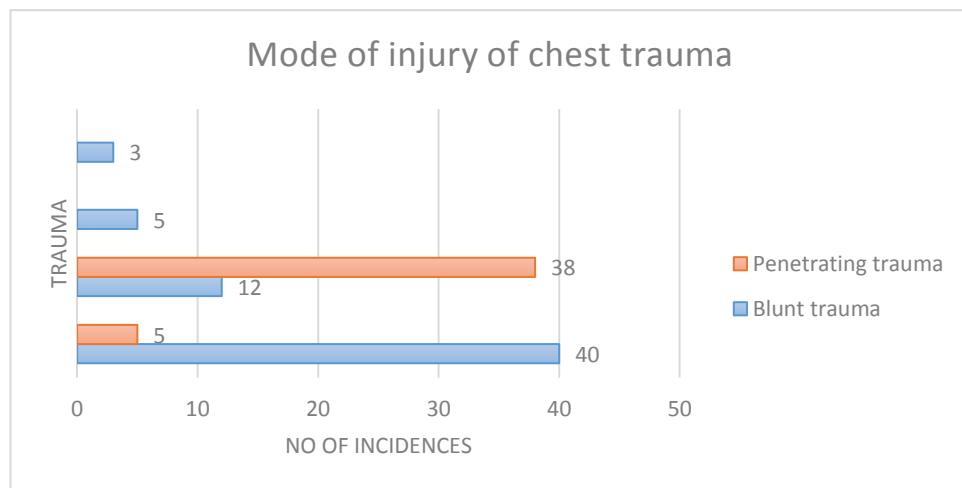
The current research was carried out at Services Hospital Lahore Surgical Units during 18 months from Sep, 2016 to Feb, 2018. A hundred and three chest trauma patients were studied during the time period of the research. All the subjects with an age of 12 or more years and suffering from chest injuries were included in this research. Seriously injured patients were treated in emergency (for example patients who required urgent haemothorax and pneumothorax intubations). Clinical investigations were conducted on the basis of X-ray (chest & abdomen), USG, blood CP & grouping and other indicated modalities. Patients were kept in close supervision until they were stabilized. The chest injury management included thoracostomy, thoracotomy and ventilator support where required. Serious patients were also provided ICU care. Patients with less severe and marginal injuries were treated conservatively. Blood and air pleura were removed with chest intubation. Preliminary management to the patients with life threatening chest injuries was adopted according to the type and severity of the trauma.

RESULTS:

The number of patients reported with chest injuries during the period was 103 patients. Average age of the patients was 36 years (age range 12 to 70 years). The subjects included 95 males and 8 females. More patients (58%) had blunt injuries whereas less patients (42%) are found with penetrating injuries. The details of mode of injuries are provided in Table-1.

Table-I: Mode of injury of chest trauma

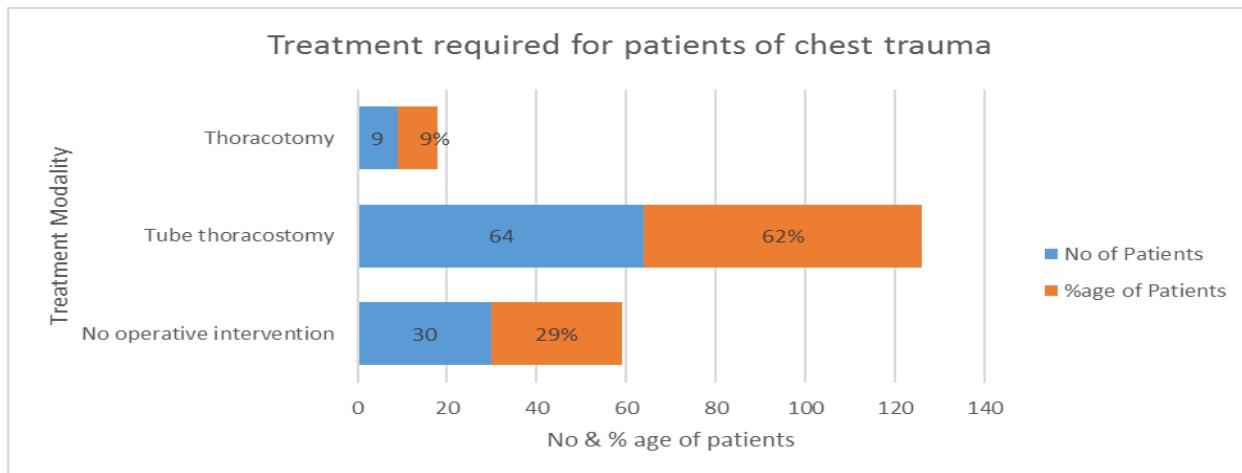
Blunt trauma	(n=60)	Penetrating trauma	(n=43)
Road side accident	40	Stab	5
Assault	12	Gun shot	38
Fall from height	5		
Animal related trauma	3		



Minor chest wall injuries were noticed in 30 patients (29%) without haemothorax or pneumothorax. Most of the patients (64 patients, 62%) required chest intubation for haemothorax or pneumothorax (34 patients of penetrating injuries and 30 patients of blunt chest injuries (Table-II).

Table-II: Treatment required for patients suffering from chest trauma (n=103)

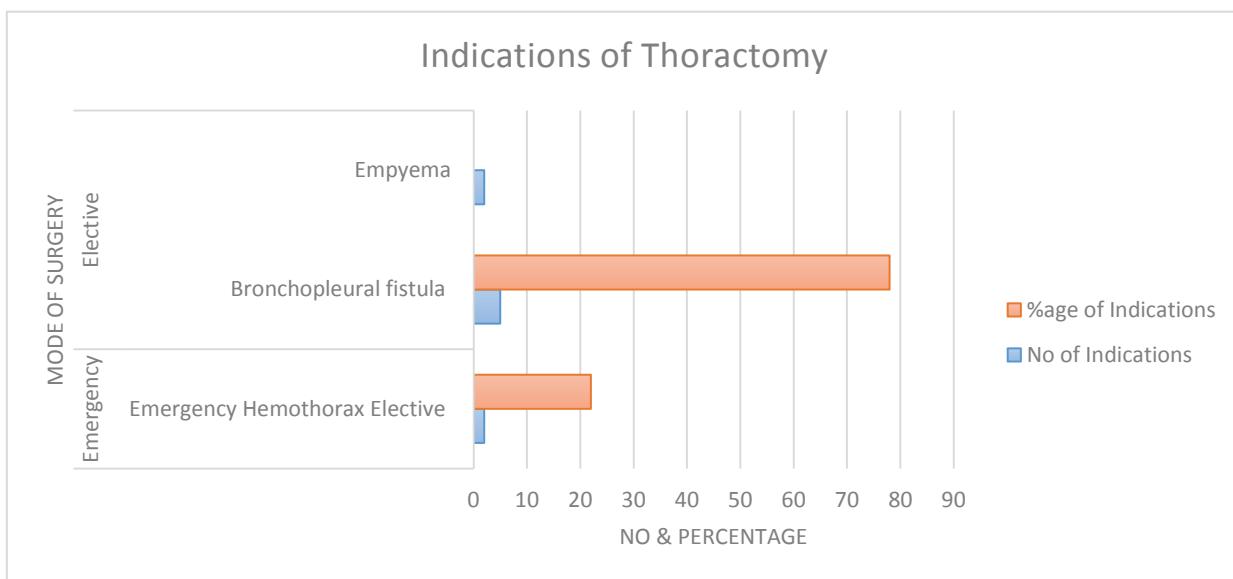
Treatment modality	n	%
No operative intervention	30	29
Tube thoracostomy	64	62
Thoracotomy	9	9



Major chest surgeries (Thoracotomy) were carried out in emergency for 2 patients and elective thoracotomy was conducted in 7 patients. Only the patients with penetrating injuries needed extensive thoracotomies. Emergency thoracotomy was necessary because of excessive loss of blood (greater than 1500 ml) and interior artery bleeding.. The patients were diagnosed with bronchopleural fistula and empyema and required surgical removal of upper surface in empyema cases (Table-III).

Table-III: Indications of Thoracotomy (n=09)

Mode of surgery	Indications	n	%
Emergency	Emergency Haemothorax Elective	2	22
Elective	Bronchopleural fistula	5	78
	Empyema	2	



Associated injuries were observed in 20 patients which include head, limbs, neck and thorax injuries with 2 or more body systems. Five patients were treated through laparotomy for diaphragmatic rupture. The patients suffering from neuro problems were admitted in the neurosurgery ward and provided necessary treatment there. Two patients of multiple broken ribs were managed with pain killers and chest intubation while 1 patient was kept on ventilator support during this process. Post-operative complications were seen in 15 subjects. Out of 15, two patients had developed empyema, 8 had developed pneumonia and rest were seen with wound infections.

DISCUSSION:

The trauma surgery requires special expertise and knowledge to undertake complex cardiothoracic, retroperitoneal and vascular injuries. The general surgeons are not as confident as specialist surgeons in this field [14]. A UK based research delivered that it is better to provide initial, timely and effective management of injuries in cases of severe chest traumas by general surgeon available in the vicinity and later refer the patient to the trauma center after stabilization [14].

Our research was carried out at Services Hospital, Lahore and patients were initially treated by general surgeons which were lacking the expertise in critical thoracic surgery. Interestingly, cardiothoracic injuries require expert surgeons in less than 10% cases (Blunt trauma) and 15-30% (penetrating injuries) [16]. Many

studies conducted in western countries have confirmed that X-rays, intubation and respiratory support are the key procedures required in 80 to 85% cases of chest injuries [17-20]. In our research we also conducted the same basic principles in light of PTC standards in almost 85% cases. The use of ventilator support for the patients have increased the success rate up to 92% which was reported by other studies conducted by Farooq [1] and Hanif [9] where the success rate with ventilator support elevated to 85%. No major thoracotomy procedure was conducted in these cases. The patients' age was between 12 – 70 years with a mean of 36 years. The mean ages of the patients in the studies conducted by Farooq [1] and Hanif [9] were 37 years and 30 years respectively. Most of the chest trauma patients were males (94%) and were between 20 to 50 years. We observed more cases of blunt chest injuries (58%) as compared to penetrating traumas

(42%). Farooq and Hanif showed the prevalence of blunt and penetrating injuries as (44% & 56%) and (65% & 35%) respectively. It was concluded from these results that the occurrences of penetrating traumas are increasing probably due to fire arms and gunshot related injuries.

Major chest thoracotomy was required in 10 to 15% patients [21]. The time of the procedure was managed according to the patients' conditions. In our research, 2 patients required emergency procedure due to excessive blood drainage and interior artery bleeding, while other patients have undergone elective procedure due to non-life threatening condition of the patient. Farooq's study also delivered that most of the thoracotomies were conducted in cases of extra blood drainage caused by penetration. The numbers of thoracotomies performed in our research were 9% which were comparable to the results delivered by Farooq & Hanif studies (8%). Rubikas study yielded the thoracotomies procedure in 25% cases [22]. Blunt chest injuries were treated conservatively and did not require any thoracotomy in any patient as compared to less than 3% thoracotomies in cases of blunt trauma by Rubikas [23]. Same was reported in less than 10% in another research by Stahel et al [5]. Farooq and Hanif studies reported rib fractures in 44% and 76% cases while in our research 85% broken or fractured ribs cases were seen. Patients suffering from multiple injuries and fractures (flail chest cases) were kept on ventilator support.

Out of 8 patients died during the research, 5 patients were suffering from multiple injuries, 2 were having associated head injury (neurosurgical nature) and 1 patient died of flail chest (multiple rib fractures). All the patients were provided with the ventilator support during the treatment when and where required. The mortality rate in our research was 8% which is comparable to the mortality rate (7%) of the researches conducted by Farooq et al [1, 2, 3, 4, 5, 6, 7, 8, 9] and Hanif et al [1].

CONCLUSION:

The chest piercing injuries are often seen due to gunshots and other chest probing. Blunt injuries are more common. Most of the trauma cases are curable at local hospitals and some cases require complex operations at a major surgical care hospital.

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