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# Thoracic Crisis Control: Overview of Thoracic Emergency Management in Dhaka Medical College Hospital

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**Abstract** **Original Research Article**

***Background:*** Emergency management is a critical aspect of medical and surgical practice, particularly in ensuring patient survival. Within the realm of medicine, thoracic emergencies encompass both traumatic and non-traumatic cases, necessitating prompt and effective intervention. Since its establishment in 2010, the Department of Thoracic Surgery has collaborated with the Department of Casualty to address thoracic emergencies. ***Methods:*** This retrospective study involved the review of hospital documents of 1192 patients, who attended thoracic surgery and casualty departments of Dhaka Medical College Hospital in last twelve months, requiring emergency major or minor surgeries. Patients were selected according to preset inclusion and exclusion criteria. Patient details, operative procedure and in-hospital mortality and morbidity rates were recorded. ***Results:*** A total of 1,192 cases requiring thoracic emergency intervention, spanning both traumatic and non-traumatic etiologies, were analyzed. The mean age of affected individuals was 32.79±17.04 years for males and 24.00±19.16 years for females. Intercostal chest drains were administered in 351 non-traumatic cases and 799 traumatic cases, reflecting the diverse nature of thoracic emergencies encountered. The overall success rate in managing major non-traumatic thoracic emergencies was found to be 100%, demonstrating the efficacy of interventions in these cases. However, in traumatic emergencies, the success rate was lower at 88.57%. ***Conclusion:*** Several factors contribute to the lower success rate in traumatic emergencies, including limited infrastructure for emergency management, delayed presentation to the hospital, and insufficient allocation of resources relative to the current workload. Addressing these challenges is imperative to enhance the outcomes of traumatic thoracic emergencies and optimize patient care in critical situations.

**Keywords:** Bronchial Disruption, Diaphragmatic Rupture, Hemothorax, Intercostal Chest Drain Tube, ICT, Pleural Effusion, Pneumothorax.



## 1. INTRODUCTION

Trauma has been a major health issue since the beginning of mankind. Over time, with the advancement of society, rapid urbanization, and increasing population density, the incidence of trauma has significantly escalated, making it one of the leading public health concerns worldwide [1]. Trauma can result from various causes, including road traffic accidents (RTA), physical assaults, accidental injuries, falls, and occupational hazards. Among these, RTAs remain the most frequent cause, followed by violent assaults and unintentional injuries. The outcome of trauma largely depends on the speed and accuracy of medical intervention, ranging from complete recovery to long-term disabilities or even death [2]. Consequently, the adequacy and timeliness of trauma management play a crucial role in determining patient prognosis. Polytrauma cases, where multiple organ systems are simultaneously affected, are commonly encountered in emergency settings and require a well-coordinated, multi-disciplinary approach involving various specialties such as surgery, orthopedics, neurosurgery, and critical care [3]. Among trauma cases, thoracic trauma accounts for a significant proportion and is associated with high morbidity and

mortality rates. Thoracic trauma constitutes 10–15% of all polytrauma cases [4], and is responsible for approximately 25% of all trauma-related fatalities in the United States [5]. Internationally, blunt chest trauma ranks as the third leading cause of trauma-induced mortality, following head and abdominal injuries [6]. Given its high fatality rate, the severity of thoracic trauma often determines the overall outcome in polytrauma patients. Therefore, rapid emergency management is essential for ensuring patient survival [7]. Thoracic injuries can result from various traumatic forces, including blunt, sharp, and blast mechanisms. These injuries may involve internal organs such as the lungs, heart, and great vessels, as well as skeletal structures like the sternum and ribs. Among these, rib fractures are particularly significant because they often indicate underlying internal organ damage. Studies have shown that the greater the number of fractured ribs, the higher the risk of mortality [8]. Multiple rib fractures are frequently associated with severe pulmonary contusions, hemothorax, pneumothorax, and flail chest, all of which can rapidly lead to respiratory failure if not promptly managed. Emergency thoracic surgeries are sometimes required in critically ill trauma patients, but they are also performed in non-traumatic medical conditions [9]. Conditions such as pulmonary tuberculosis, heart failure, renal failure, chronic liver disease, and certain autoimmune disorders may necessitate surgical intervention when associated with pleural effusion. Additionally, rare parenchymal lung diseases with intractable hemoptysis may require urgent surgical management to prevent life-threatening hemorrhagic complications. Given the complexity of thoracic trauma and associated conditions, a multi-specialty approach is essential for optimal patient outcomes. This retrospective study evaluates the effectiveness of multi-specialty emergency management at Dhaka Medical College Hospital, analyzing the impact of timely interventions on survival rates and long-term recovery.

## 2. METHODOLOGY

This retrospective study is concerned with all the thoracic emergencies that took place in the year 2022. Isolated thoracic trauma, thoracic trauma associated with poly trauma or medical conditions requiring emergency interventions from the department of thoracic surgery, Dhaka Medical College Hospital were included in this study. Data were collected from operation theater and ward register book where particulars of the patient, details of procedure and outcome (mortality/morbidity) were recorded. A total number of 1192 cases were included in this study needing major or minor surgeries. As per the inclusion criteria of this study, patients who presented themselves or were referred to the Department of Thoracic Surgery and Casualty at Dhaka Medical College Hospital, requiring emergency surgeries (major/minor) were included in the study. On the other hand, according to the exclusion criteria of this study, patients with incomplete documentation (including diagnosis, surgical procedure, and mortality/morbidity) and those who expired before or during induction of anesthesia at the operation theater, without receiving any surgical intervention were excluded from the study. Data was analyzed using SPSS (statistical package for social science) and frequencies and distribution were expressed in terms of percentage, mean, standard deviation. For qualitative data chi square test and for quantitative data independent T test were used respectively. Confidence interval was set at 95%. Minor Thoracic Surgery [10], refers to surgical procedures that are typically less invasive and have a lower risk of complications compared to major thoracic surgeries. That may involve diagnostic procedures, biopsies, or simple interventions that don't require extensive incisions or significant manipulation of vital structures within the chest cavity. Examples of minor thoracic surgeries include thoracentesis (fluid removal from the chest cavity), pleural biopsy, or insertion of a chest tube (ICT) for drainage. Major Thoracic Surgery [10], refers to more complex and invasive procedures that often involve significant manipulation of organs and structures within the chest cavity. These surgeries may require larger incisions and carry a higher risk of complications due to their complexity. Major thoracic surgeries can include procedures such as lung resections (lobectomy, pneumonectomy), esophagectomy (removal of part or all of the esophagus), thoracic tumor resections, or complex repair of thoracic trauma.

## 3. RESULT

This study was carried out on 1192 patients who received treatment for both non traumatic and traumatic chest emergencies in Dhaka medical college hospital in the year 2022. Table 1 describes the demographic profile of the study subjects. A small percentage of both traumatic and non-traumatic thoracic emergencies needed major life saving surgeries 4.19% & 1.95% respectively as depicted by figure I. The most common indications for minor surgery (ICT) in non-traumatic thoracic emergencies were complications arising from pneumonia and pulmonary tuberculosis (as illustrated in Figure 2). Trauma-induced emergencies where managed with both major and minor surgeries. These cases were commonly associated with hemothorax, pneumothorax, and hemopneumothorax, with some instances necessitating bilateral intervention. Thoracic crises requiring emergency major surgery were often associated with polytrauma and necessitated a multidisciplinary approach for optimal outcomes. Despite not reaching the success rates of developed countries, our center achieved a success rate of 88.57% with very limited resources.

**Table 1: Demographic profile of the cases**

| Variables | Male (mean ± SD) | Female (mean ± SD) |
|---|---|---|
| Age | 32.79 ± 17.04 | 24.00±19.16 |
| Sex (n/%) | 822 (68.95%) | 370 (31.04%) |

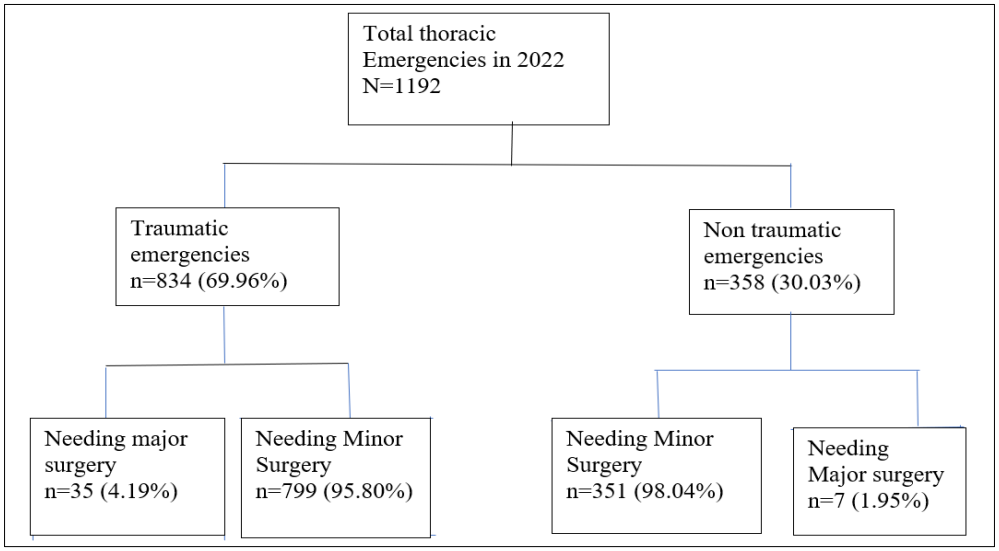


**Figure 1: Distribution of thoracic emergencies**

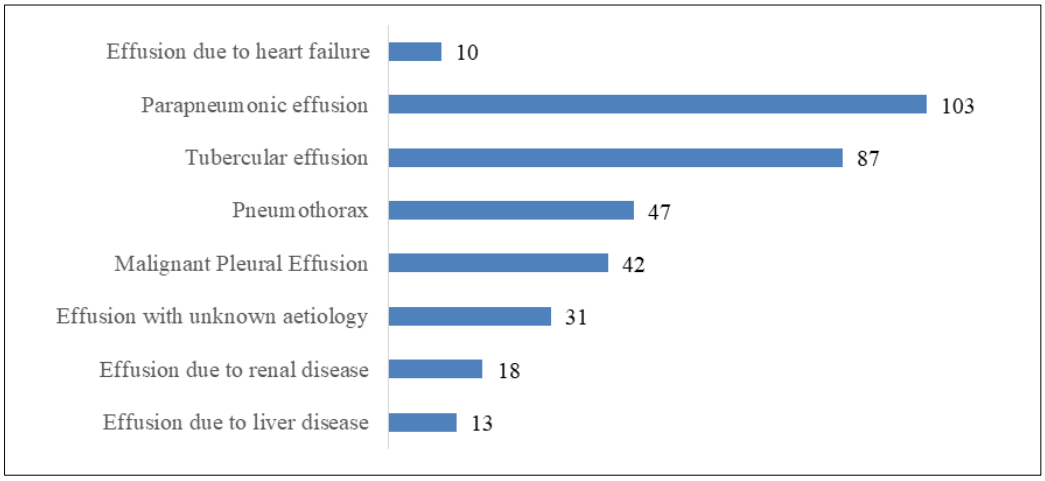


**Figure 2: Distribution of non-traumatic emergencies needing minor surgery in 2022 (n=351)**

**Table 2: Table showing findings and outcome of non-traumatic major surgery**

| Emergency Procedure (n) | Thoracic Findings (n) | Outcome (n, %) |
|---|---|---|
| Lobectomy due to massive haemoptysis (2, 28.57%) | Bronchiectasis of right upper lobe (1) | Improved (2, 100%) |
| | Aspergilloma (1) | |
| Rigid Bronchosocopy (2, 28.57%) | Foreign body in bronchus (2) | Improved (2, 100%) |
| Massive Pericardial effusion (3, 42.85%) | Pericardial window (3) | Improved (3, 100%) |

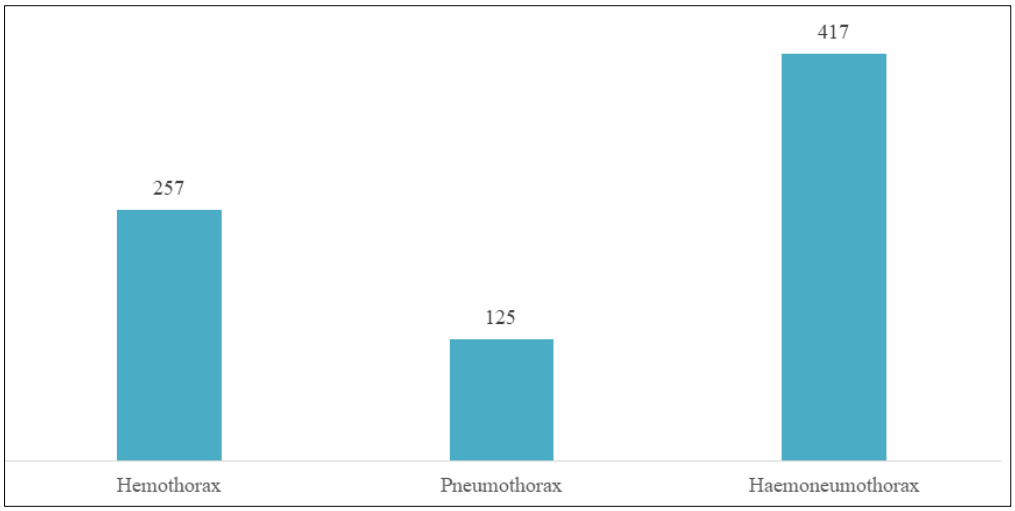


**Figure 3: Distribution of traumatic emergencies needing minor surgery**

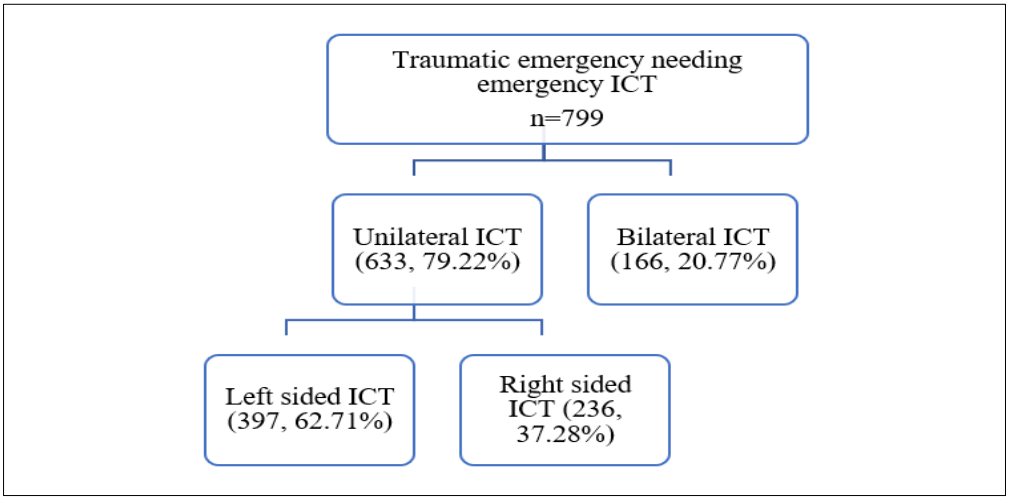


**Figure 4: Distribution of thoracic emergencies needing ICT**

**Table 3: Findings, associated injuries and outcome of major surgery following trauma**

| Emergency Procedures (n) | Thoracic Findings (n) | Associated Extra thoracic Injuries (n) | Outcome (n, %) | Overall success rate |
|---|---|---|---|---|
| Exploratory Thoracotomy with or without Laparotomy (19, 54.28%) | Intercostal vessel injury (10) | Fracture femur (1) | Improved (18, 94.73%) | 88.57% |
| | | | Death (1, 5.26%) | |
| | Foreign body in chest (7) | Ruptured Spleen (1) | | |
| | Lung Laceration (2) | Fracture left radius (1) | | |
| | | Bowel Injury (1) | | |
| Diaphragm Repair (12, 34.28%) | Rupture/Laceration (12) | Herniation of abdominal contents (4) | Improved (10, 83.33%) | |
| | | Fundus of stomach perforation (1) | Death (2, 16.66%) | |
| | | Bowel perforation (1) | | |
| | | Liver Injury (1) | | |
| Airway Reconstruction (3, 8.57%) | Right bronchial disruption (2) | | Successful re-implantation (3, 100%) | |
| | Left bronchial disruption (1) | | | |
| Chest Wall Reconstruction (1, 2.85%) | Chest wall tissue lost with multiple rib fracture | Fracture left radius and left femur | Prolonged ICU stay resulting in mortality (1, 100%) | |

**Figure 5: Bronchial disruption following blunt trauma chest**

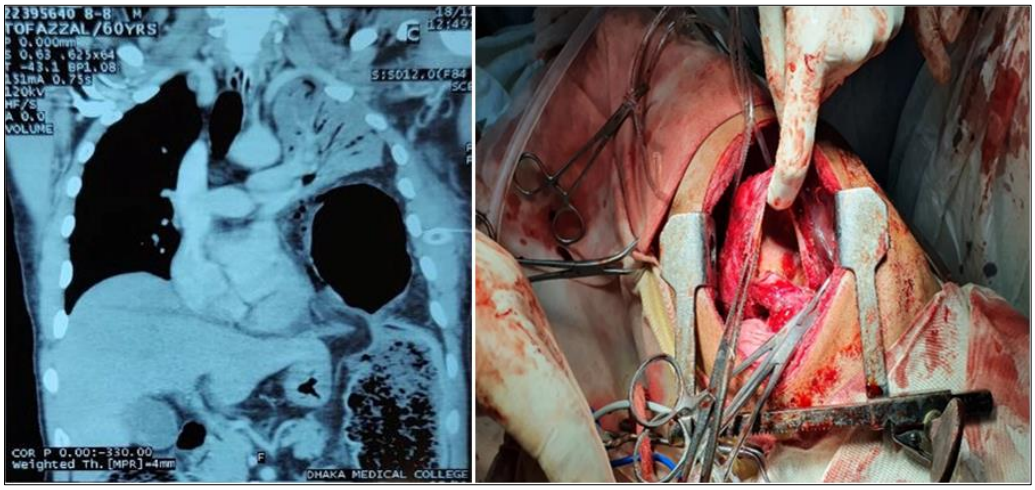

**Figure 6: Radiological and operative view of a traumatic diaphragmatic rupture**

## 4. DISCUSSION

Thoracic emergencies are a major concern for hospital emergency department since long. Although no standardized statistics is available in our country, the traumatic andnon-traumatic emergency form a major bulk in hospital emergency. In USA one third of the emergency death is due to thoracic emergency [5-11]. In our study the majority of patients were male 822 (68.95%) having age 32.79±17.04 years. The reason behind it, is the fact that, man in their thirties are most productive and are often involved in various economic activities, whereas most females are homebound. This is similar to a study conducted in Srilanka [12]. The study population comprises of emergency occurring more due to trauma (69.96%) rather than non-traumatic (30.30%). The non-traumatic thoracic emergencies in our study are caused by a variety of medical conditions which is explained in figure 2 and table 3. Due to social and demographic variations in countries the disease pattern varies, as a result of which this portion of our findings could not be compared with studies conducted in other countries. In traumatic thoracic emergencies road traffic accidents are the major cause of chest injury resulting in hemothorax (32.16%), pneumothorax (15.64%) and hemopneumothorax (52.19%). The probable cause of this is mostly due to increased mobility and number of vehicles on roads and reckless driving. This is similar to a study conducted in China [13, 14]. Traumatic injuries that required major surgeries were often associated with other extra thoracic traumatic injuries (table 2) and very often needed multi-disciplinary approach for proper management, which is similar to a study conducted in east china [15]. The fate of a major thoracic surgery carried out due to poly trauma resulting from road traffic accident, depends on a variety of factors. The dynamics (velocity, force, momentum) involved in inflicting trauma, overall health status of the victim (age, sex and overall medical conditions), and time needed to ensure availability of primary and subsequent specialist care with overall proficiency of the hospital where it is being managed. Dhaka medical college hospital with its all-round dedicated casualty service is managing such major cases with an overall success rate of 88.57% and morbidity/morality of 11.43%. Studies conducted in Turkey and Sweden had an overall mortality rate of 9.3% and 6.6% respectively [16, 17]. The mortality rate in our study is way higher than previous studies because of the fact that we still lag behind in setting up of proper infrastructure for managing emergency rapidly in our

hospitals. Higher mortality rates are also aided by the fact that very limited resources are allocated compared to the volume of emergency we deal with every day.

**Limitations:**

This was a single-centered study with small-sized samples. Moreover, the study was conducted over a very short period. So, the findings of this study may not reflect the exact scenario of the whole country.

## 5. CONCLUSION

Several factors contribute to the lower success rate in traumatic emergencies, including limited infrastructure for emergency management, delayed presentation to the hospital, and insufficient allocation of resources relative to the current workload. Addressing these challenges is imperative to enhance the outcomes of traumatic thoracic emergencies and optimize patient care in critical situations.

**Recommendations:**

Steps should be taken to set up thoracic surgery departments all-round the country so that thoracic surgeons can collaborate with casualty team (multi-disciplinary approach) to reduce mortality in trauma cases. It will also help to rapidly manage thoracic emergencies associated with many medical diseases.

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**Conflict of Interest:** None declared

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