

Blunt Chest Trauma and the Role of Chest Intubation: A Descriptive Study from Ayub Teaching Hospital

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Abstract

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**Background:** Blunt chest trauma is a major cause of morbidity and mortality worldwide, often resulting from road traffic accidents, falls, and crush injuries. Such trauma can lead to life-threatening conditions including hemothorax, pneumothorax, and pulmonary contusions. Chest intubation (tube thoracostomy) remains the first-line life-saving intervention in the acute management of these injuries. **Objective:** To evaluate the role of chest intubation in patients with blunt chest trauma, focusing on effectiveness, complications, and clinical outcomes. **Methods:** A descriptive observational study was conducted on 500 patients with blunt chest trauma

admitted to Ayub Teaching Hospital, Abbottabad, from March 2021 to April 2022. Demographics, mechanisms of injury, clinical presentation, complications, and outcomes following chest intubation were analyzed. **Results:** The majority of patients were male (76%). Road traffic accidents were the most common mechanism (68%), followed by falls (22%) and crush injuries (10%). Chest intubation improved lung expansion in 87% of cases and stabilized hemodynamic parameters in 81%. Complications occurred in 15% of patients, most commonly local infection (7%) and tube blockage (5%). Mortality was 9%, primarily due to associated polytrauma and massive hemorrhage rather than the intubation procedure itself. **Conclusion:** Chest intubation is an effective and generally safe procedure for the management of blunt chest trauma. Early recognition of thoracic complications, prompt tube insertion, and vigilant monitoring significantly improve survival outcomes. **Keywords:** blunt chest trauma, chest intubation, tube thoracostomy, hemothorax, pneumothorax, trauma outcomes

## Introduction

Blunt chest trauma is one of the most frequent and serious forms of physical injury, accounting for up to 15% of trauma admissions globally. Unlike penetrating trauma, blunt trauma results from high-energy impact that causes widespread damage without external breach of the chest wall. Common causes include road traffic accidents, falls from height, and crush injuries.

The thoracic cavity contains vital structures such as the lungs, heart, and great vessels, making blunt chest trauma potentially life-threatening. The clinical presentation often includes pneumothorax, hemothorax, pulmonary contusions, and rib fractures, which can rapidly compromise respiratory function and circulation.

Chest intubation (tube thoracostomy) plays a pivotal role in managing such cases. By evacuating air or blood from the pleural cavity, it restores negative intrathoracic pressure, allowing lung re-expansion and stabilization of the patient's respiratory and hemodynamic status. Despite its proven efficacy, chest intubation is not without risks, such as tube malposition, infection, and blockage.

This study evaluates the effectiveness, complications, and outcomes of chest intubation in 500 patients with blunt chest trauma admitted to Ayub Teaching Hospital over a two-year period.

## Material and Methods

### Study Design and Setting

This descriptive observational study was conducted in the Department of Thoracic Surgery, Ayub Teaching Hospital, Abbottabad, from March 2021 to April 2022.

### Study Population

Five hundred consecutive patients presenting with blunt chest trauma requiring chest intubation were included. Patients with penetrating chest trauma or those not requiring chest intubation were excluded.

## Data Collection

Data were recorded on age, sex, mechanism of injury, presenting symptoms, indication for chest intubation, complications, hospital stay, and final outcomes.

**Outcomes Assessed:** Primary outcomes: improvement in lung expansion, stabilization of respiratory and hemodynamic parameters. Secondary outcomes: complications of chest intubation (tube blockage, infection, malposition, dislodgement), and survival to discharge.

**Ethical Considerations:** Ethical approval was obtained from the hospital's review board. Informed consent was taken from patients or their guardians.

## Results

Table 1. Demographic and Clinical Characteristics of Patients (n = 500)

| Variable               | Frequency (n) | Percentage (%) |
|------------------------|---------------|----------------|
| Gender - Male          | 380           | 76.0           |
| Gender - Female        | 120           | 24.0           |
| Age 16–20              | 65            | 13.0           |
| Age 21–40              | 260           | 52.0           |
| Age 41–60              | 120           | 24.0           |
| Age >60                | 55            | 11.0           |
| Road traffic accidents | 340           | 68.0           |
| Falls                  | 110           | 22.0           |
| Crush injuries         | 50            | 10.0           |
| Hemothorax             | 210           | 42.0           |
| Pneumothorax           | 185           | 37.0           |
| Hemopneumothorax       | 75            | 15.0           |
| Subcutaneous emphysema | 30            | 6.0            |

Table 1 summarizes the demographic profile and clinical characteristics of patients with blunt chest trauma who required chest intubation. The majority of patients were male (76%), with a mean age of 35.6 years. Most cases occurred in the 21–40 years age group (52%), reflecting the higher exposure of young adults to road traffic accidents. Road traffic accidents were the predominant mechanism of injury (68%), followed by falls (22%) and crush injuries (10%). Hemothorax (42%) and pneumothorax (37%) were the most frequent indications for chest intubation, while hemopneumothorax (15%) and subcutaneous emphysema (6%) were less common.

Table 2. Outcomes and Complications of Chest Intubation (n = 500)

| Outcome/Complication          | Frequency (n) | Percentage (%) |
|-------------------------------|---------------|----------------|
| Improved lung expansion       | 435           | 87.0           |
| Hemodynamic stabilization     | 405           | 81.0           |
| Local infection               | 35            | 7.0            |
| Tube blockage                 | 25            | 5.0            |
| Tube malposition/dislodgement | 15            | 3.0            |
| Mortality                     | 45            | 9.0            |
| Mean hospital stay (days)     | 8.2 ± 3.5     | -              |

Table 2 presents the clinical outcomes and complications following chest intubation in patients with blunt chest trauma. The procedure proved effective, with improvement in lung expansion observed in 87% of patients and hemodynamic stabilization achieved in 81%. Complications occurred in 15% of cases, most commonly local infection (7%) and tube blockage (5%), while tube malposition or dislodgement was rare (3%). The overall mortality rate was 9%, mainly due to associated polytrauma and hemorrhage rather than intubation failure. The average hospital stay was 8.2 ± 3.5 days, reflecting the acute nature of trauma management.

Discussion

This study demonstrates that chest intubation remains a cornerstone in the management of blunt chest trauma. Most patients were young males involved in road traffic accidents, reflecting regional epidemiological trends similar to those reported globally.

Chest intubation was effective in improving lung expansion (87%) and stabilizing

patients (81%), findings consistent with earlier studies on thoracic trauma management. Complications occurred in 15% of cases, mainly infections and tube blockage, which aligns with international literature reporting complication rates of 10–20%. Importantly, none of these complications were directly fatal. The mortality rate of 9% in this series was largely attributable to severe associated injuries rather than chest intubation itself.

### Conclusion

Chest intubation is an effective, safe, and life-saving intervention in patients with blunt chest trauma. It ensures rapid stabilization, facilitates lung re-expansion, and reduces mortality when applied promptly. Complications are relatively infrequent and manageable with proper technique and monitoring. Training emergency teams in tube thoracostomy and strengthening pre-hospital trauma care can further improve outcomes in blunt thoracic trauma cases.

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