



Original article

# Emergency thoracotomy: Experience of one year in a large tertiary trauma center

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## Abstract

**Introduction:** Emergency thoracotomy (ET) can be a life-saving procedure in highly selected trauma patients, especially after penetrating chest trauma. The aim of this work was to evaluate the outcome in trauma patients who were admitted to the Alexandria Main University Hospital (AMUH) during 1 year period and underwent ET as a management and to compare our results with that documented in the literature.

**Patients and methods:** This is prospective clinical study included trauma patients who were admitted to AMUH during 1 year period (August 2013–August 2014) and underwent ET. Analysis of the cause of trauma, age, sex, different tools of investigations used, concomitant organ injuries, systolic blood pressure (SBP), Glasgow Coma Scale (GCS), Injury Severity Score (ISS), Trauma Revised Injury Severity Score (TRISS) and mortality rate were performed.

**Results:** Twenty-two patients who had ET were included in this study (All were males, Age range: 5–45 years; median:  $23.5 \pm 7.83$  years). Twenty patients from twenty-two were survived. Two of them had blunt trauma while 18 had penetrating injuries. The most frequent injury encountered was isolated thoracic injury ( $n = 13$ ). Thoracotomy was performed in 20 patients, sternotomy in two, and one patient underwent additional laparotomy. Median ISS and TRISS were 10 (Range 9–29) and 0.98 (Range 0.54–0.99), respectively. Blood transfusion ranged between 1 and 13 units with a median of 2 units of packed red blood cells. The median time from admission to operating room was 37.50 min. Pre-operative (FAST & Thoracic Ultrasound) was done in 90.9% of patients. Most common indication for thoracotomy was shock (SBP < 90). The mortality rate was 9.1% for all patients and 10% for patients with penetrating trauma. Factors affecting mortality was ISS and the amount of blood transfusion.

**Conclusion:** ET procedure is an important tool in management of selected trauma patients. Rapid assessment, multidisciplinary approach, good resuscitation and prompt surgical intervention reduce the mortality and improve the outcome.

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**Keywords:** Emergency thoracotomy; Chest trauma; Thoracic injuries; Blunt chest trauma; Penetrating chest trauma

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## 1. Introduction

Thoracic trauma is accounting for about 25–50% of all fatal injuries [1]. The majority of patients with thoracic trauma can be managed non-operatively, with or without tube thoracostomy. However, there is still a small, but significant (10–15%), sub-group of thoracic trauma victims who require emergency thoracotomy (ET) [2]. ET has become an established procedure in the management of life-threatening thoracic trauma [3,4]. The aim of this work is to evaluate the outcome in trauma patients who were admitted to the Alexandria Main University Hospital (AMUH) during 1 year period and underwent ET as a management and to compare these results with that documented in the literature.

## 2. Patients and methods

This is a prospective clinical study included patients with trauma who were admitted to AMUH during 1 year period (August 2013–August 2014) and underwent ET. There is no sex or age restriction. Exclusion criteria included patients who have elective thoracotomy or medical or non-traumatic emergency thoracotomy, patients who had arrest pre-hospital or had arrived with no signs of life.

Analysis of the cause of trauma, age, sex, different tools of investigations used, concomitant organ injuries, systolic blood pressure (SBP), Glasgow Coma Scale (GCS), Injury Severity Score (ISS), Trauma Revised Injury Severity Score (TRISS), morbidity and mortality were performed. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS 20). Differences were considered to be significant at the  $p \leq 0.05$  probability level.

## 3. Results

During 1 year period (Aug 2013 to Aug 2014), twenty-two patients with chest trauma underwent ET in AMUH. All patients were males. The mean of age was  $25.18 \pm 9.34$  (range 5–45 years, median:  $23.5 \pm 7.83$  years). Two patients had blunt injuries (9.1%) and twenty patients (90.9%) presented with penetrating injuries. The mean length of hospital stay (LHS) was  $4.73 \pm 5.29$  (range 1–20) days. Eighteen patients (81.8%) were hospitalized for  $\leq 7$  days. Table 1 demonstrates the distribution of the patients according to the mechanism of injury.

Thirteen (59.1%) patients had isolated thoracic injuries, while nine (40.9%) had associated injuries including abdominal injuries, head injuries and injuries at extremities ( $n = 4$  (18.2%),  $n = 3$  (13.6%) and  $n = 10$  (45.4%) patients respectively).

The mean pulse was  $109.32 \pm 20.14$  b/min, and the mean SBP was  $75.0 \pm 32.77$  mmHg. The mean respiratory rate was  $28.04 \pm 8.68$  breath/min. The mean GCS was  $13.09 \pm 3.02$  and the mean of the Revised Trauma Score, ISS and TRISS were  $6.66 \pm 1.15$ ,  $12.68 \pm 5.07$  and  $0.93 \pm 0.11$  respectively. The mean time from admission to operating room was  $3.03 \pm 10.06$  h (range = 20 min to 2 days).

Beck's triad was clinically evident in five (22.7%) patients. In four of them (80%) cardiac tamponade was diagnosed intra-operatively. Cardiopulmonary resuscitation on arrival was performed in one patient (4.5%). Eighteen (81.8%) patients needed blood transfusion; the mean packed red blood cells (RBCs) transfused was  $3.06 \pm 2.94$  units (range 1–13 units). Arterial blood gas analysis (ABG) was done in six (27.3%) patients; where the pH level was  $<7.2$  in 16.6%, and  $<7.3$  in 83.33% of patients. The  $PCO_2$  level was  $<45$  mmHg in 16.6% and the  $PO_2$  level was  $>75$  mmHg in 66.6%. Respiratory acidosis was detected in 50%, while metabolic alkalosis, metabolic acidosis and mixed, were detected in 16.6% for each.

Table 1  
Distribution of patients according to mechanism of injury.

Mechanism of injury	No. of patients	%
RTA*	1	4.5
Falling of heavy object on chest	1	4.5
Stab chest	14	63.6
Pellets	4	18.2
Bullets	1	4.5
Penetration by foreign body	1	4.5

\*RTA = Road Traffic Accident.

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