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ORIGINAL ARTICLE

# Retrospective study of thoracotomy performed in a French level 1-trauma center

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## KEYWORDS

Emergency thoracotomy;  
Resuscitative thoracotomy;  
Blunt trauma;  
Cardiac arrest;  
Penetrating trauma

## Summary

**Objective:** Resuscitative thoracotomy, a potentially life-saving procedure, is used exceptionally, and essentially for penetrating trauma. Most of the available literature is American while reports from Europe are sparse. We report our experience in a French level 1-trauma center.

**Material and methods:** Patient records (patient age, gender, mechanism of injury, indication for emergency thoracotomy, anatomic injuries, interventions and survival) for all patients who underwent emergency thoracotomy between January 2005 and December 2015 were analyzed. **Results:** Twenty-two patients (19 males) underwent emergency thoracotomy. Median age was 27.5 (12–67) years. Twelve were performed for blunt trauma (55%) and 10 for penetrating injuries (45%). Thirteen patients presented with cardiac arrest, while nine had deep and refractory hypotension. Overall, survival was 32% ( $n = 7$ ). There were no survivors in the blunt trauma group while seven of ten with penetrating injuries survived. All patients presenting with cardiac arrest died.

**Conclusion:** The survival rate in this French retrospective study was in accordance with the literature.

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## Introduction

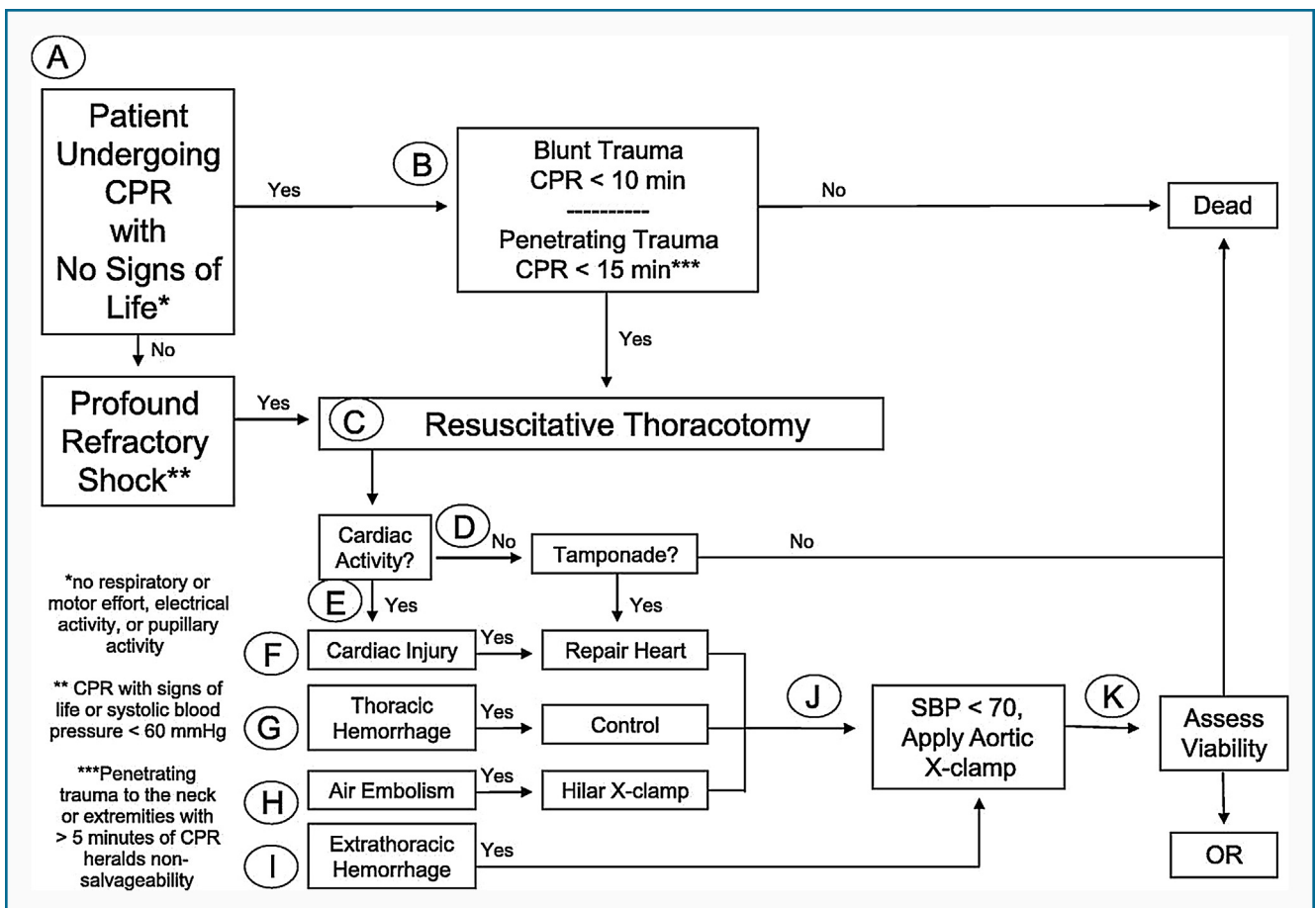
The recent events that bereaved France have underscored the potential demand to manage patients with thoracic injuries; emergency or resuscitative thoracotomy, even if only rarely performed, should be part of the therapeutic arsenal to meet the needs. Emergency resuscitative thoracotomy was initially promulgated by Schiff [1] as a means of open thoracic resuscitation for cardiac arrest of medical origin, in particular, during anesthetic induction, but was more or less abandoned in the beginning of the 20th century, replaced by external cardiac massage and closed chest resuscitation [2]. In the middle of the 20th century, emergency thoracotomy entered the armamentarium of surgeons dealing with patients in cardiorespiratory arrest (CRA) after open or penetrating trauma; thoracotomy was used to clamp the thoracic aorta, and to perform internal cardiac massage, the goal being to ensure adequate cerebral perfusion, expediently treat the intrathoracic lesions or release a cardiac tamponade [3]. In 2012, the Western Trauma Association published an algorithm for resuscitative thoracotomy in patients presenting with CRA of traumatic origin [4]: the indications for resuscitative thoracotomy were patients in refractory shock, and patients in CRA after less than 10 minutes of unsuccessful external resuscitation for patients with blunt trauma and 15 minutes for those with penetrating trauma (Fig. 1). In 2015, the Eastern Association for the Surgery of Trauma published their guidelines [5], recommending that resuscitative thoracotomy not be performed in patients without vital signs after blunt trauma.

In the literature, survival of patients after resuscitative thoracotomy for penetrating trauma has been found to be superior to that for patients after blunt trauma: in a review of 7035 cases of emergency thoracotomy, the American College of Surgeons Committee on Trauma (ACSCOT) reported an average survival rate of 11.2% for penetrating trauma compared to 1.6% for blunt trauma [6]. In 2015, the Eastern Association for the Surgery of Trauma reported similar survival figures: 10.6% for penetrating trauma vs. 2.3% for blunt trauma [5]. The literature on this topic is essentially from North-American series; there are few European, and in particular, French, series available.

The goal of this retrospective, monocenter study is to describe, for the first time in a French level 1-trauma center, a population of patients undergoing resuscitative thoracotomy for trauma. The patients included were those with either CRA or presenting with systolic blood pressure of 60 mm Hg or less, in spite of resuscitative measures.

## Material and methods

The records of all patients who underwent emergency thoracotomy between January 2005 and December 2015 at the University Hospital of Grenoble-Alpes were retrieved from a computerized operative schedule registry program. Patients who underwent remedial thoracotomy after elective thoracotomy, exploratory thoracotomy for suspicion of penetrating injury, or emergency thoracotomy for hemostasis after CT scan were not included. Patient records were



**Figure 1.** Algorithm for management of posttrauma cardiorespiratory arrest or hemodynamic instability with systolic blood pressure  $\leq 60$  mmHg, unresponsive to resuscitation according to the Western Trauma Association [4].

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