ED Thoracotomy: Who Benefits?
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The undifferentiated trauma patient is one of the most acute and visible displays of emergent resuscitation and management in the modern Emergency Department. One option practitioners have for evaluating and treating trauma patients is the emergent thoracotomy. While mainly seen as under the aegis of trauma surgeons, a number of EM residency programs require their residents to participate in and be familiar with the concept, risks, and benefits of the procedure. The procedure itself can frequently be seen as aggressive and potentially just the "first part of the autopsy" [1]. However, knowing the indications and data supporting those indications can help change the perspective from one of futile dissection to that of a life- and limb-saving intervention.

For the sake of the discussion, we will only consider patients with penetrating thoracic injuries (whereas certain trauma centers/physicians/surgeons will consider both blunt and penetrating injuries). For patients with penetrating cardiac injuries, they are deemed to have "salvageable postinjury cardiac arrest" if they have had "**witnessed penetrating trauma with <15 minutes of prehospital CPR**". Additionally, if they have "**persistent severe postinjury hypotension (SBP ≤ 60 mmHg) due to cardiac tamponade, hemorrhage […] or air embolism**." Contraindications include CPR for >15 minutes and no signs of life. [2] Given the relatively vast scope that can be covered by these indications and contraindications, it is important to recognize which patients may benefit most from this aggressive intervention.

A seminal review of literature pertaining to thoracotomies in the ED was published in 2000 by Peter Rhee and colleagues. Their review was intended to characterize the relationship among mechanism of injury, location of injury, and signs of life to help determine the patient who would benefit most from a thoracotomy in the ED. Individually, the reports studied noted an overall survival rate of 7.4% with a range of **1.8% to 27.5% (for both blunt and penetrating** injuries). The authors do note that of the patients who survive, 92.4% can have a positive outcome. **Direct cardiac injury due to stabbing had the highest likelihood of survival**, but the authors note that clear determination of the structures injured is difficult in an emergent setting. Blunt trauma, abdominal injuries, and injuries with multiple sites have a lower likelihood of a positive outcome. Patients without signs of life in the field are unlikely to survive their resuscitation and even if they do survive, are unlikely to regain meaningful neurological function. [3] It is important to remember the indications of thoracotomy, however, as the procedure is not without risk and cost to both providers and society.

A retrospective cohort study performed by Passos and associates looked at "appropriate" and "inappropriate" use of ED thoracotomies in blunt and penetrating trauma. Using definitions similar to those listed above, authors found 28 appropriate and 60 inappropriate thoracotomies for penetrating injuries and 24 appropriate versus 3 inappropriate thoracotomies in blunt trauma (using <5 minutes of arrest with signs of life as 'appropriate'). Of the 63 inappropriate cases, the authors found a 0% survival rate with substantial use of resources. [4] This is equal to that of non-intervention, of which the survival rate is 0%. With this in mind, it is important to consider the indications and contraindications of ED thoracotomies. Accurately ascertaining the "down

time" of the patient prior to arrival of the hospital is essential for determining the utility of a thoracotomy for both appropriate resource stewardship and patient survival.

References

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