

A successful emergency department resuscitative thoracotomy (EDRT) in an abdominal blunt trauma with cardiac arrest

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Clinical vignette

A 45 years old man was brought to the emergency department (ED) after an abdominal blunt trauma at the epigastrium.

On arrival he was confused, agitated, tachypneic and hypotensive, with a tender and distended abdomen. The extended-fast ultrasound revealed massive hemoperitoneum.

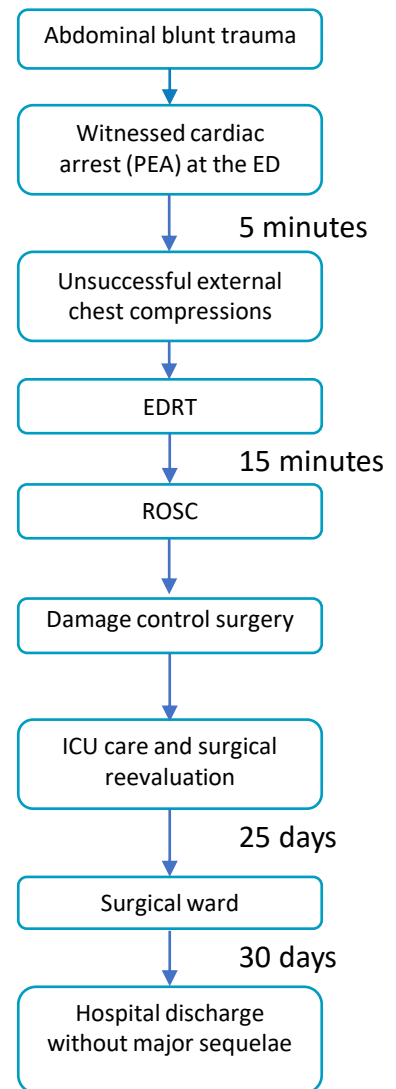
During the first assessment the patient went into cardiac arrest with a pulseless electrical activity. External chest compression and orotracheal intubation were performed and rapid intravenous infusions administered, although unsuccessfully.

Considering the witnessed cardiac arrest, the trauma mechanism and the hemoperitoneum, the thoracic surgeon performed an EDRT, opened the pericardium, cross-clamped the descending aorta and began internal cardiac massage, while blood products were infused. After 15 minutes of resuscitation there was a return of spontaneous circulation (ROSC).

After ROSC, the general surgeon performed a xipho-umbilical laparotomy in the ED and packed the abdomen with 9 laparotomy gauzes. The patient was then transferred to the operating room. An extended laparotomy revealed a grade 5 liver laceration up to the hepatic hilum. Pringle's maneuver allowed for bleeding control. The aorta was unclamped with a tourniquet in place after 35 minutes and the liver laceration sutured. The abdomen was packed, and a total body CT scan revealed active bleeding from the liver and the pancreatic duodenal artery. Therefore angiographic embolization was performed successfully, and the patient transferred to the ICU.

During the first 48 hours after trauma, the patient developed trauma coagulopathy which was treated according to the thromboelastogram with fresh frozen plasma, fibrinogen and activated factor VII. Due to persistent coagulopathic bleeding the patient underwent repeated laparotomies and thoracotomies. The ICU stay was also complicated by renal failure, atrial flutter and bacteremia.

The patient was stabilized and transferred to the surgical ward after 25 days, without neurological complications. Eventually, two months later he was discharged, without major sequelae.



Discussion

According to the Eastern Association for the Surgery of Trauma (EAST) guidelines [1], EDRT is mainly indicated for penetrating trauma, because of better reported outcomes than blunt trauma. However a conditional recommendation to perform EDRT is made also for extra-thoracic blunt trauma with signs of life. Moreover, EDRT is usually performed when the pulselessness is less than 15 minutes. Our patient suffered from an abdominal blunt trauma and when the cardiac arrest occurred external chest compressions were unsuccessful, and we were unable to obtain any blood pressure curve. However, the cardiac arrest was witnessed by the medical team and therefore the no flow period was very short, and signs of life were present (PEA). For these reasons and EDRT was performed and the aorta cross-clamping allowed for abdominal bleeding control, which in turn made the internal chest compressions along with fluid resuscitation successful.

As reported by Narvestad et al. [2], the most common mechanism of injury in Europe is blunt trauma and the survival rate of ET after blunt trauma is 12,9%. Instead, according to Segalini et al. [3], who published a case series of EDRT in an Italian hospital, the ET survival rate was 5.8%. Although low, the survival rate is increasing, but on the other hand the morbidity has to be considered. Indeed, one in five survivors of EDRT suffer significant neurologic sequelae and the complications of the procedure can be life threatening. As for our patient, he developed trauma coagulopathy and thoracic bleeding happened multiple times, but fortunately there were no neurologic sequelae.

Recently, resuscitative endovascular balloon occlusion of the aorta (REBOA) has been proposed alternative for the bleeding patients with non-compressible thoraco-abdominal injuries. Brenner et al. [4], showed a survival benefit over EDRT in patients not requiring CPR, but no differences were observed in patients requiring CPR at the emergency department.

In conclusion, we hereby presented a case of successful EDRT, which allowed for the patient survival, with a good neurologic outcome. However, further studies are required to determine the indication of EDRT in blunt traumas and whether a less invasive technique as REBOA may be superior and associated with less comorbidity.

References

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