



Purpose

This procedure provides guidance on the management of Traumatic Cardiac Arrest during retrieval missions

Procedure

Traumatic Cardiac Arrest management

For Review

July 2015

1. Introduction

- 1.1. Cardiac arrest refers to the combination of pulselessness and the absence of signs of life
- 1.2. Survival rates from traumatic cardiac arrest are poor but comparable with published survival rates for out-of-hospital cardiac arrest of any cause. Patients who arrest after hypoxic insults and those who undergo out-of-hospital thoracotomy after penetrating trauma have a higher chance of survival. Patients with hypovolemia as the primary cause of arrest rarely survive¹.

2. Objectives

- 2.1. To optimise the approach to the management of pre-hospital traumatic cardiac arrest by pre-hospital critical care teams.

3. Scope

- 3.1. Clinical crew

4. Process

4.1. Airway Management

4.1.1 All cardiac arrest patients should be intubated without anaesthetic drugs, however if ROSC occurs anticipate the need for IV sedation and analgesia.

4.1.2 Quantitative capnometry should be used to confirm tracheal tube placement, to assess the effectiveness of resuscitation, and to inform prognosis².

4.2 Respiratory Management

4.2.1 Unless the possibility of tension pneumothorax can be reliably excluded, bilateral open thoracostomies should be made³. Needle thoracocentesis may be performed



initially for reasons of access or expediency but these should not be considered to provide definitive pleural decompression.

4.2.2 Inadequate peripheral perfusion precludes reliable pulse oximetry so this monitoring modality may be omitted initially.

4.3 Circulatory Management

4.3.1 Obvious external haemorrhage should be arrested with appropriate combinations of elevation, pressure dressing, and tourniquet use.

4.3.2 Obvious long bone or pelvic disruption should be splinted.

4.3.3 A 500ml intravenous or intraosseous fluid bolus should be given followed by reassessment of pulses. Blood is the resuscitation fluid of choice. Hartmann's or hypertonic saline may be infused as an alternative. More fluid may be given if there is no return of spontaneous circulation (ROSC), titrated to the presence of a palpable radial pulse (blunt trauma) or central pulse (penetrating trauma)⁴.

4.3.4 In pulseless electrical activity or in the presence of obvious thoracic trauma, external cardiac compressions may be omitted at the discretion of the treating physician, since the theoretical mechanisms of action of this intervention are unlikely to be useful in these scenarios⁵.

4.4 Drug therapy

4.4.1 There is no evidence that intravenous drugs such as adrenaline improve survival from cardiac arrest, but there is an association between vasopressor use and worse outcome in major trauma patients⁶. Intravenous adrenaline may therefore be omitted.

4.5 Beginning & discontinuing resuscitation

4.5.1 Resuscitation need not be attempted on patients with clearly un-survivable injuries or who on examination are unequivocally dead. If there is doubt as to the timing of cardiac arrest, resuscitation should be commenced while a more thorough historical and physical assessment is made.

4.5.2 Cessation of resuscitation attempts may be appropriate if there is no response to therapy. However sensitivity should be shown to environmental and human factors (particularly the casualty's family) on scene. In some cases it may be appropriate to transfer to hospital with ongoing resuscitation. This should be the default action in all paediatric cases in whom resuscitation has commenced, regardless of therapeutic futility.



4.6 Special Circumstances

4.6.1 Paediatrics

4.6.1.1 The therapeutic priorities during traumatic cardiac arrest are the same in children as in adults.

4.6.1.2 If resuscitation has been commenced on a child, this should be continued until the patient has been transferred to hospital, regardless of futility (see 4.5.2 above).

4.6.2 The pregnant patient

4.6.2.1 Patients in the second half of pregnancy (uterine fundus above the umbilicus) should be resuscitated in the left lateral tilt position at least 15 degrees to minimise uterocaval compression. An extrication board may facilitate this⁷.

4.6.2.2 Survival of both mother and baby may be dependent on perimortem caesarean delivery being undertaken within four minutes of arrest⁸ with maternal survival improved with this procedure even after this time period. It may be necessary and appropriate therefore to undertake this in the pre-hospital environment if human resources are available to conduct simultaneous adult and neonatal resuscitation.

4.6.3. Penetrating trauma

4.6.4 Thoracic or upper abdominal penetrating injury resulting in cardiac arrest should initially be managed as in 4.1.1 and 4.2.1 above. If there is no ROSC a clamshell thoracotomy should be made with the specific purpose of relieving cardiac tamponade, controlling a cardiac wound(s), and if necessary providing internal cardiac massage. The decision to perform the procedure must be made within 1min and access to the pericardium gained within 3min. A detailed description of this technique is beyond the scope of this HOP but is clearly explained elsewhere⁹.

In the event of return of circulation consideration should be given to transferring the patient directly to the receiving hospital operating suite.

4.6.4 The 'medical' arrest

4.6.4.1 Patients without obvious major injury or those involved in low energy mechanisms should be suspected of having had a primary cardiac arrest prior to injury. In such situations it would be appropriate to follow standard resuscitation algorithms.

5. References

1. Lockey D, Crewdson K, Davies G. Traumatic cardiac arrest: who are the survivors? *Ann Emerg Med.* 2006 Sep;48(3):240-4



2. Levine RL, Wayne MA, Miller CC. End-tidal carbon dioxide and outcome of out-of-hospital cardiac arrest. *N Engl J Med.* 1997 Jul 31;337(5):301-6

3. Massarutti D, Trillò G, Berlot G, Tomasini A, Bacer B, D'Orlando L, Viviani M, Rinaldi A, Babuin A, Burato L, Carchietti E. Simple thoracostomy in prehospital trauma management is safe and effective: a 2-year experience by helicopter emergency medical crews. *Eur J Emerg Med.* 2006 Oct;13(5):276-80.

4. Revell M, Porter K, Greaves I. Fluid resuscitation in prehospital trauma care: a consensus view *Emergency Medicine Journal* 2002;19:494-498

5. Chandra CN. Mechanisms of Blood Flow During CPR. *Annals of emergency medicine* 1993, vol. 22 (2), no 2:281-288

6. Sperry JL et al. Early use of vasopressors after injury: Caution before constriction. *J Trauma* 2008 Jan; 64:9

7. Rudloff U. Trauma in pregnancy *Arch Gynecol Obstet* (2007) 276:101–117

8. Barraco RD et al. Practice Management Guidelines for the Diagnosis and Management of Injury in the Pregnant Patient: the EAST Practice Management Guidelines Work Group <http://www.east.org/tpg/pregnancy.pdf> accessed 07/09/09

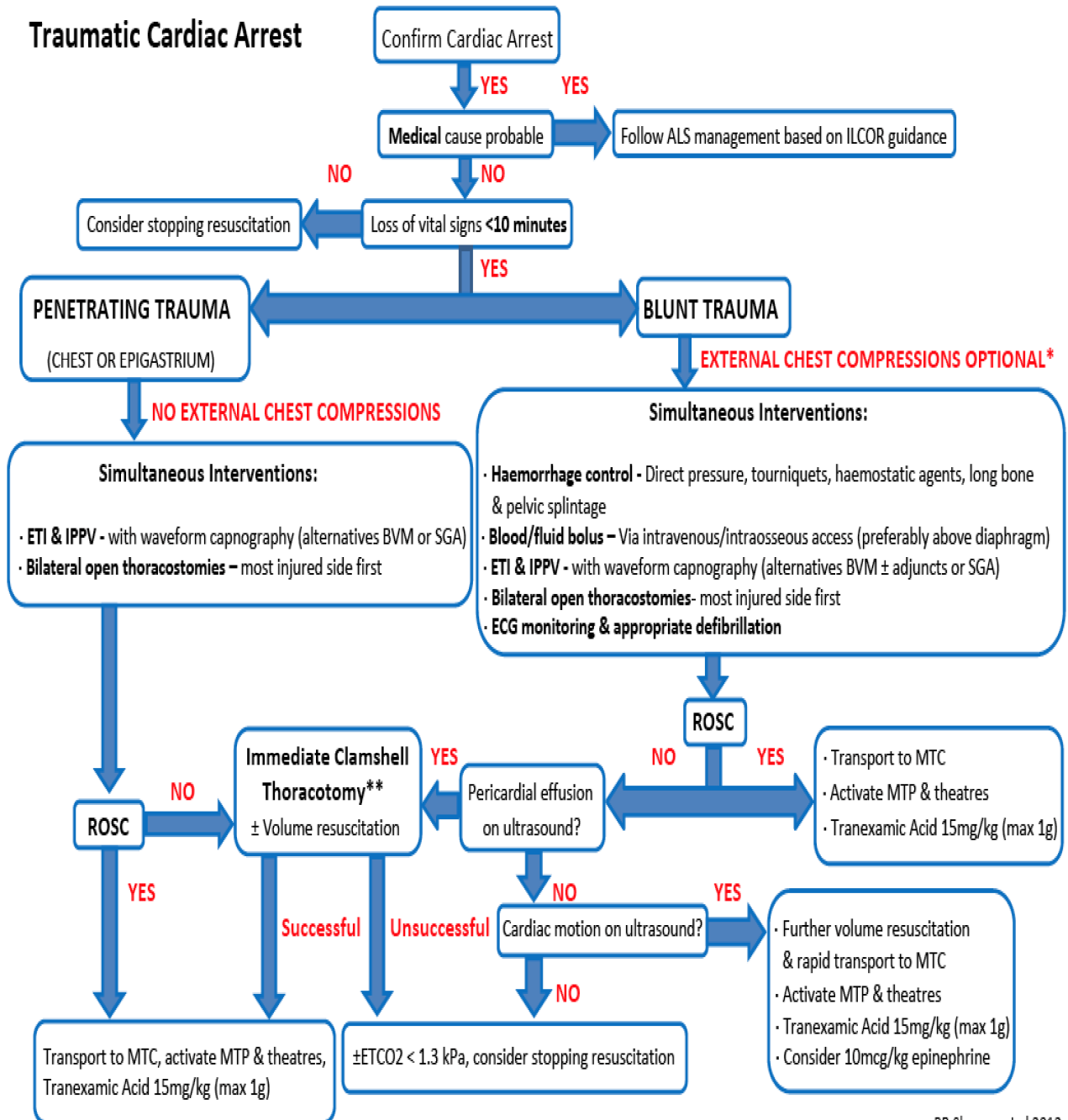
9. Wise D, Davies G, Coats T, Lockey D, Hyde J, Good A. Emergency thoracotomy: "how to do it" *Emergency Medicine Journal* 2005;22:22-24

10. Sherren, P, Reid, C, Habig, K, Burns, B. Algorithm for the resuscitation of traumatic cardiac arrest patients in a physician staffed helicopter emergency medical service. *Critical Care* 2013, 17:308.

Appendix A Traumatic Cardiac Arrest Algorithm¹⁰



Traumatic Cardiac Arrest



PB Sherren et al 2012