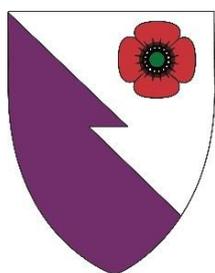


The Royal College of Emergency Medicine

Best Practice Guideline

**Traumatic Cardiac
Arrest in Adults**



September 2019

Contents

Considerations	3
Emergency departments (EDs) that are not designated Major Trauma Centres	3
Causes of Traumatic Cardiac Arrest (TCA)	3
Withholding resuscitation	3
Favourable prognostic signs	3
Initial presenting rhythm	3
Initial management priorities	4
Point of care ultrasonography	4
Clear protocols for resuscitative thoracotomy	4
Successful resuscitation and return of spontaneous circulation (ROSC)	4
Indications to stop resuscitation in TCA	4
TCA in children	4
About this document	5
Authors	5
Acknowledgements	5
Review	5
Conflicts of Interest	5
Disclaimers	5
Research Recommendations	5
Audit standards	5
Key words for search	5
References	6
Appendix 1	7

Considerations

Emergency departments (EDs) that are not designated Major Trauma Centres

For EDs that are not designated Major Trauma Centres a Traumatic Cardiac Arrest (TCA) may be an infrequent event which requires a modification to the 'standard' cardiac arrest protocol and a different 'mental model' for the whole team to work within. The evidence base for the management of TCA is still evolving and there remain areas of significant controversy.

Causes of Traumatic Cardiac Arrest (TCA)

The causes of TCA are different to those of 'medical' cardiac arrests and therefore a different approach to managing this situation is required. The significance of the presenting rhythm is different from 'medical' cardiac arrests. The priorities of initial management of TCA are different to those of a medical cardiac arrest. Survival from TCA is improving and is now similar to survival from medical cardiac arrest.

Taking into account all of these differences, it is important that all trauma team members have a shared understanding of the specific priorities when managing a TCA, and how they differ from the management of 'medical' cardiac arrests. Ideally, ED consultant should be present or called in for all patients in TCA. The ED Consultant should ensure the whole team has a shared understanding and expectations regarding TCA. An example algorithm to help shared team understanding is included in, appendix 1.

Withholding resuscitation

Withholding resuscitation in TCA due to likely futility is a key decision and the following indications maybe useful; massive trauma incompatible with survival (e.g. decapitation, hemicorporectomy, exposed brain matter); no signs of life in the preceding 15 minutes (reactive pupils, spontaneous movement, agonal respiratory efforts, organized electrocardiographic activity); or signs of prolonged cardiac arrest (dependent lividity, rigor mortis).

Favourable prognostic signs

Relative favourable prognostic signs in TCA may include a penetrating mechanism of injury, particularly thoracic; vital signs at any time since first medical contact; signs of life (any spontaneous movement, respiratory efforts, organised electrical activity on electrocardiogram, reactive pupils) at any time since first medical contact; short duration of cardiac arrest (<10 minutes); cardiac contractility on point-of-care ultrasonography.

Initial presenting rhythm

With regard to the initial presenting rhythm, Pulseless Electrical Activity (PEA) may be indicative of a low or very low cardiac output state rather than 'true cardiac arrest' ('pseudoPEA').

Initial management priorities

Initial management priorities during TCA include stopping catastrophic external haemorrhage (e.g. tourniquet, haemostatic dressings), ensuring adequate oxygenation & ventilation, performing bilateral thoracostomies, minimising internal haemorrhage (e.g. pelvic binder) and rapid blood transfusion as per major haemorrhage protocols.

There is some evidence to suggest that the following interventions which would be considered standard in a 'medical' cardiac arrest could reasonably be omitted or delayed during the initial phases of a TCA (by a senior clinical decision maker); external chest compressions (may make low output state even lower & cause further chest trauma), vasopressors (e.g. adrenaline, metaraminol), defibrillation.

Point of care ultrasonography

Point of care ultrasonography has a role in determining if any cardiac contractility is present, the presence or absence of cardiac tamponade and assessing the degree of cardiac filling.

Clear protocols for resuscitative thoracotomy

Individual departments are advised to have clear protocols in place for when and in which circumstances it will be appropriate to perform an emergency resuscitative thoracotomy, taking into account individual and institutional skills available.

Successful resuscitation and return of spontaneous circulation (ROSC)

In the event of a successful resuscitation and ROSC, prior determination of an institution's ability to perform damage control surgery (to arrest internal haemorrhage) is essential.

Indications to stop resuscitation in TCA

Indications to stop resuscitation in TCA may include; cardiac standstill on ultrasound (tamponade excluded, no return of spontaneous circulation), lack of response to life saving interventions, persistently low ETCO₂, and long duration of cardiac arrest.

TCA in children

Although TCA in children has its own considerations, many of the principles of management are the same.

About this document

Authors

James France
Jason Smith
Jonathan Jones
Edward Barnard

First published in September 2019.

Acknowledgements

QEC Committee.

Review

Usually within three years or sooner if important information becomes available.

Conflicts of Interest

None.

Disclaimers

The College recognises that patients, their situations, Emergency Departments and staff all vary. This guideline cannot cover all possible scenarios. The ultimate responsibility for the interpretation and application of this guideline, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

Research Recommendations

None.

Audit standards

None.

Key words for search

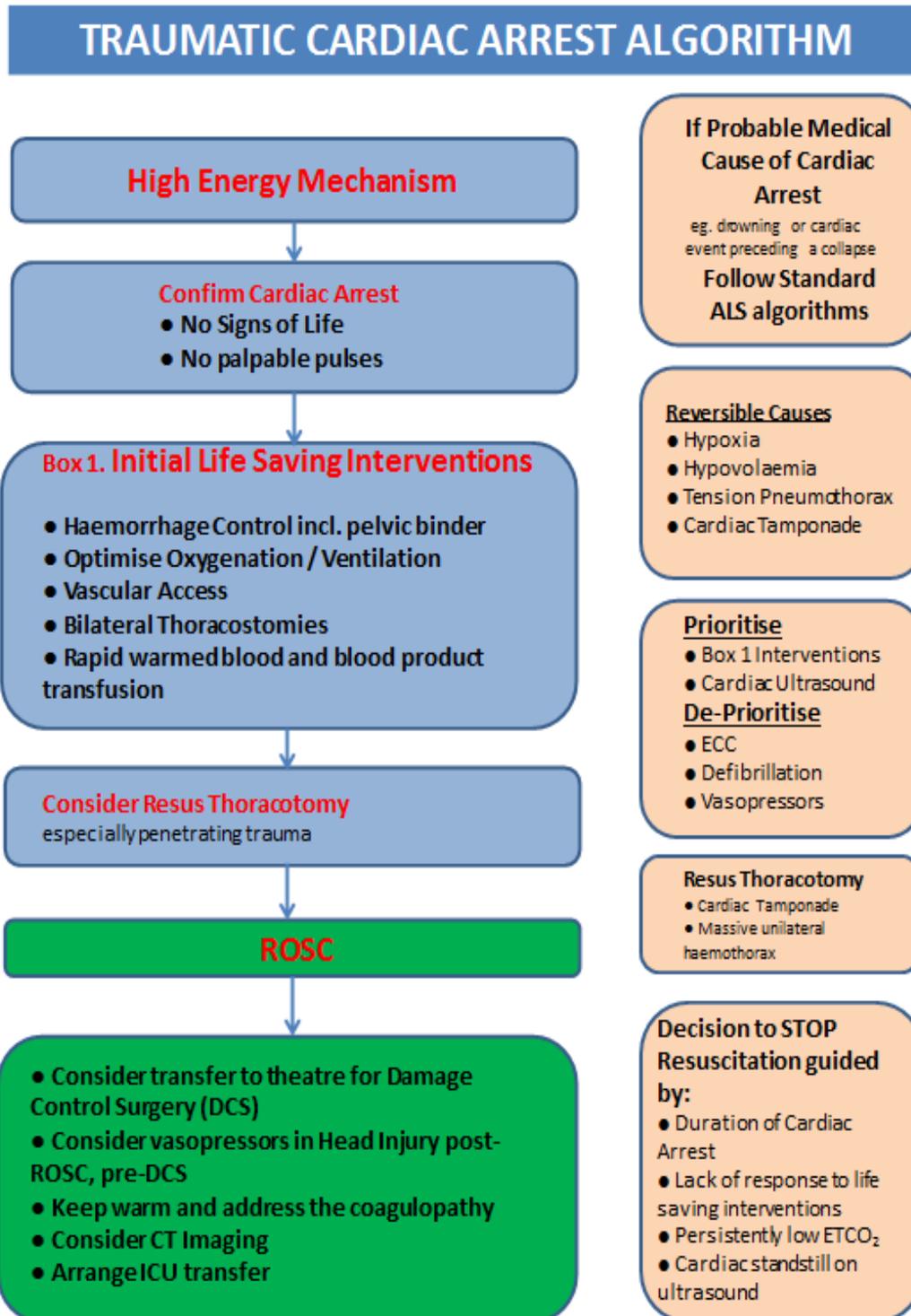
Traumatic cardiac arrest, emergency department.

References

1. Vassallo J, Nutbeam T, Rickard AC, Lyttle MD, Scholefield B, Maconochie I, Smith JE. *Paediatric traumatic cardiac arrest: the development of an algorithm to guide recognition, management and decisions to terminate resuscitation. Emergency Medicine Journal.* 2018;35: 669-674.
2. Vassallo J, Webster M, Barnard EBG, Lyttle MD, Smith JE. *Epidemiology and aetiology of paediatric traumatic cardiac arrest in England and Wales. Arch Dis Child.* 2019;104(5): 437-443.
Available from: doi:10.1136/archdischild-2018-314985.
3. Barnard E, Hunt P, Lewis P, Smith JE. *The outcome of patients in traumatic cardiac arrest presenting to deployed military medical treatment facilities: data from the UK Joint Theatre Trauma Registry. J R Army Med Corps.* 2018;164(3):150-154.
4. Barnard EBG, Yates D, Edwards A, Fragoso-Iñiguez M, Jenks T, Smith JE. *Epidemiology and aetiology of traumatic cardiac arrest in England and Wales - a retrospective database analysis. Resuscitation.* 2017;110: 90-94.
5. Smith JE, Le Clerc S, Hunt PAF. *Challenging the dogma of traumatic cardiac arrest management: a military perspective. Emergency Medicine Journal.* 2015;32: 955-960.
6. Smith JE, Rickard A, Wise D. *Traumatic cardiac arrest. J R Soc Med.* 2015;108: 11-16.
7. Lockey D, Crewdson K, Davies G. *Traumatic Cardiac Arrest: Who Are the Survivors? Ann Emerg Med.* 2006;48(3): 240-4.
Available from: doi:[10.1016/j.annemergmed.2006.03.015](https://doi.org/10.1016/j.annemergmed.2006.03.015).
8. Sherren PB, Reid C, Habig K, Burns BJ. *Algorithm for the resuscitation of traumatic cardiac arrest patients in a physician-staffed helicopter emergency medical service. Crit Care.* 2013;17(2): 308.
Available from: doi:10.1186/cc12504.
9. Luna GK, Pavlin EG, Kirkman T, Copass MK, Rice CL. *Hemodynamic effects of external cardiac massage in trauma shock. J Trauma.* 1989;29(10): 1430-3.
10. Jeffcoach DR, Gallegos JJ, Jesty SA, Coan PN, Chen J, Heidel RE, et al. *Use of CPR in hemorrhagic shock, a dog model. J Trauma Acute Care Surg.* 2016;81(1): 27-33.
11. Evans C, Quinlan DO, Engels PT. *Reanimating Patients After Traumatic Cardiac Arrest. A Practical Approach Informed by Best Evidence. Emerg Med Clin N Am.* 2018;36(1): 19-40.
Available from: doi:[10.1016/j.emc.2017.08.004](https://doi.org/10.1016/j.emc.2017.08.004).

Appendix 1

Example of a local Traumatic Cardiac Arrest (TCA) Algorithm.





**The Royal College of
Emergency Medicine**

The Royal College of Emergency Medicine
7-9 Breams Buildings

London

EC4A 1DT

Tel: +44 (0)20 7400 1999

Fax: +44 (0)20 7067 1267

www.rcem.ac.uk

Incorporated by Royal Charter, 2008

Registered Charity number 1122689

Excellence in Emergency Care