CSOP 029 – Amputation

Version No: 1.1 Effective date: 13/12/2021

APPROVALS

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Next Review Date:	Dec 2023		

HISTORY

Effective Date	Version No.	Summary of Amendment
March	1.0	Creation of document
Nov 2021	1.1	Indication 4 moved to consideration only. Addition of Spencer Wells forceps to kit. Mention of fire service hacksaw. Removal of prophylactic tourniquets to non-amputated limbs. New Appendix 1. New literature search found no additional relevant papers.

REFERENCES

Reference	Document Title
1.	MacIntyre, A at al. Extreme measures: Field amputation on the living and dismemberment of the deceased to extricate individuals entrapped in collapsed structures. Disaster Medicine and Public Health Preparedness,

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	2013; 6(4), 428-435.
2.	Porter KM. Prehospital amputation. Emergency Medicine Journal 2010; 27**:** 940-942
3.	Leech C, Porter K. Man or machine? An experimental study of prehospital emergency amputation Emergency Medicine Journal 2016; 33: 641-644.

DEFINITIONS/ACRONYMS:

Abbreviations/Acronym	Definitions
HEMS	Helicopter Emergency Medical Services
USAR	Urban Search and Rescue
MTC	Major Trauma Centre
FRS	Fire and Rescue Service

ANNEX/APPENDIX

Document Reference Number	Document Title
1.	Amputation Algorithm

1. **Purpose**

To outline the indications, preparation, technique and appropriate debriefing of pre-hospital limb amputation. This procedure is required only rarely but may be life-saving. The procedure is within the skillset of any appropriately trained prehospital physician and does not require specific surgical knowledge although attendance at a cadaveric skills course is advantageous.

2. **Scope**

Background

Prehospital amputation is a rare event. There are very few published case reports or series, and many of these originate from the disaster medicine/USAR field which is dissimilar to civilian HEMS practice. With such a rare event, each incident is likely to be different and therefore complete standardisation of the procedure is not possible; however key principles should be followed before, during and after the event.

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Indications[2]

1. An immediate and real risk to the patient's life due to a scene safety emergency (eg vehicle on fire)
2. A deteriorating patient physically trapped by a limb when they will almost certainly die during the time taken to secure extrication.
3. The patient is dead and their limbs are blocking access to potentially live casualties.

Amputation may be considered for a completely mutilated non-survivable limb retaining minimal attachment, which is delaying extrication and evacuation from the scene in a non-immediate life-threatening situation. However, where possible this should be avoided, as it is very difficult to assess the likelihood of limb salvage in this setting. There have been cases where amputation was considered but the patient rescued, and subsequently the patient recovered with a functioning limb.

Preparation

- Ratify decision to proceed with on-site emergency services; confirm with fire and rescue that no other viable options for extrication remain
- Phone on-call senior pre-hospital doctor to run through the case with them to check there are no other viable solutions before proceeding.
- Where possible, take a pre-amputation photograph or video of the entrapment scene.
- Establish kit dump:
  - Haemorrhage Control Tourniquet x 2
  - Scalpel size 23 disposable – minimum of 2
  - Gigli saw wire and handles
  - Spencer Wells forceps
  - Trauma shears (sterile)
  - Emergency bandages for stump
  - Haemostatic gauze
  - Artery forceps
  - Sharps box

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- Brief the team clearly including having egress route, staff ready to extract, trolley prepared for patient's arrival. Outline plan for post-amputation management.
- A pre-alert phone call made to the receiving hospital informing them of the patient's status and current plan for amputation may be beneficial if there is a short transfer time to hospital.
- Assign member of emergency services on scene to protect sharps bin and to monitor all sharps being used to avoid accidental injury.
- Ensure optimal ABC treatment and sedation (e.g. ketamine IV) if required.
- Ensure the patient has received IV TXA.
- Apply an effective proximal tourniquet and record the time of application. Consider using two tourniquets side by side.
- Wear appropriate PPE including double gloves and eye protection.

Technique

Amputate as distally as possible. It may be quicker to go through obvious fractures.

Use a scalpel to divide the skin circumferentially, cut through the subcutaneous tissues and open the fascia of the underlying muscle groups. Pick up the muscles with a gloved hand and divide with scalpel or trauma shears. The scalpel may become blunt or blocked with tissue and need to be replaced: have multiple scalpels ready before the procedure.

Pass the Gigli wire under the bone using the Spencer Wells forceps and attach the handles. An assistant should hold the Spencer Wells forceps over the gap to avoid the wire coming up into the practitioners face when the bone has been separated.

Incise any remaining tissue and skin with scalpel or trauma shears to complete the amputation.

If the Gigli wire fails, then a fire service hacksaw may be a suitable alternative.

After extraction, examine the stump for bleeding, apply artery clips to any blood vessels and reassess tourniquets. Consider haemostatic gauze applied topically to the stump. Wrap the stump firmly with a padded dressing.

Transport the patient immediately to a MTC with ongoing resuscitation and pre-alert call via a recorded line.

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En-route administer IV antibiotics e.g. Co-amoxiclav.

It is possible that there may be scenarios where it is only safe for fire and rescue services to access the patient. In such circumstances, it is feasible that FRS equipment (hydraulic cutters, or a reciprocating saw with new blade) may be used to perform the amputation although this would be extremely traumatic for a fire crew and they would require adequate briefing.[3]

Operational experience suggests that it may be advantageous to have a second ambulance service team available to assist with post-extrication care, who have not been present during the amputation itself. Such a crew will likely have greater cognitive bandwidth available to assist with the ongoing management of the patient including onward transportation if required.

If feasible, once the remaining limb is released, consider asking for it to be transported to the receiving hospital. Occasionally, skin can be salvaged for reconstructive surgery

If a prophylactic tourniquet has been applied to other limbs during entrapment (as the distal limb could not be inspected for haemorrhage in the trapped state) these should be reassessed and considered for removal if upon direct inspection there is no active bleeding.

Debrief

An immediate scene debrief should be conducted where possible. On return to the airbase, a surgical skills audit form will be required in addition to standard documentation. Debriefing with the on-call clinical supervisor is recommended. Consideration should be given as to whether others involved at the scene might benefit from a delayed debrief.

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