ICRC PRE-HOSPITAL EMERGENCY CARE: GUIDANCE FOR APPLYING TOURNIQUETS
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PURPOSE

This document seeks to provide guidance in the use of tourniquets in contexts where the International Committee of the Red Cross (ICRC) works. It may be used directly by trained professionals or to train emergency and other responders in the use of tourniquets. It is designed for use in environments where resources are scarce and/or travel times to comprehensive care long; it will also be useful for weapon bearers with limited medical resources. In contexts that do not have these restrictions, the guidance may, in certain circumstances, be altered after consultation with the Health Unit in Geneva.
OVERVIEW

Catastrophic, uncontrolled haemorrhage is the primary cause of death in 35 per cent of trauma patients. It can set in before the arrival of emergency services. Death by trauma-related catastrophic haemorrhage from an extremity can be prevented.

Applying an arterial tourniquet is recommended as a pre-hospital measure to control severe traumatic bleeding. The use of commercial tourniquets (C-TQ) – which are designed, tested and registered to control haemorrhage in pre-hospital care – is universally agreed upon.

This document will describe the indications for applying a C-TQ in permissive (safe) and non-permissive (unsafe) environments, and the procedures for doing so. It will also describe when and how to use an improvised tourniquet. All this should be done within a structured and organized approach to trauma management, such as c-ABCDE (catastrophic haemorrhage, Airway, Breathing, Circulation, Disability, Exposure) or MARCH (massive haemorrhage, airway control, respiratory support, circulation, hypothermia/head injury).
DEFINITION OF ‘CATASTROPHIC HAEMORRHAGE’ (LIFE-THREATENING BLEEDING)

- Blood spurting from the wound
- Wound won’t stop bleeding
- Bandages soaked with blood
- Blood pooling on the ground
- Loss of all or part of an arm or leg

Figure 1. Signs of catastrophic bleeding
The bleeding described above will be accompanied by signs of shock. How rapidly a patient shows signs of shock depends on the speed with which they lose blood, as well as on their age and medical history, and on environmental factors such as the external temperature.

Signs of shock associated with catastrophic blood loss (hypovolemic shock)
- Shallow, rapid breathing
- Weak, rapid pulse
- Nausea/vomiting
- Decrease in blood pressure (depending on patient’s ability to compensate)
- Altered state of consciousness, including agitation
- Skin cold and clammy to the touch; pallor
- Pallor and cyanosis
- Slowed capillary refill time

Initially, there are no signs or symptoms of shock

In the final stage of shock, the patient’s organs are failing and the patient is dying. It is a gradual process – you might first notice that the patient is pale and anxious and has a rapid pulse.

Figure 2. Initial and final stages of shock
The places where tourniquets may be applied are indicated in Figure 3. Note that when the injury is closer to a junction, i.e. an armpit or the groin, a C-TQ is less likely to be effective; wound packing may be more successful in controlling the catastrophic bleeding.

Figure 3. Where to apply tourniquets
INDICATIONS FOR TOURNIQUET USE IN CATASTROPHIC HAEMORRHAGE

- Tourniquets should be used only by trained responders, or under their supervision.
- Tourniquets should be used only on the patient’s limbs and not on their body, i.e. not on their torso, neck or head.
- In situations that are permissive (safe; only a single seriously injured person; and/or availability of sufficient resources), direct pressure with pressure dressings and haemostatic dressings (if available) should be used as first-line therapy for life-threatening bleeding from extremities. If that does not arrest the catastrophic bleed, then the use of a C-TQ is indicated.
- In non-permissive environments (insecure; several casualties; and/or unavailability of sufficient resources to manage many different injuries), a C-TQ should be used as first-line therapy for life-threatening bleeding from extremities and should be applied as soon as possible after the injury.
- If a C-TQ is not available, direct manual pressure with a haemostatic dressing, if available, should be used to deal with life-threatening bleeding from extremities.
- If a C-TQ is not available and direct manual pressure, with or without the use of a haemostatic dressing, fails to stop life-threatening bleeding, a first-aider with the necessary training may consider using an improvised tourniquet.
- Reassess the bleeding site frequently.

Important considerations
- If possible, maintain direct pressure on the wound while the tourniquet is being prepared and applied.
- Application of a tourniquet may not stop all the bleeding, especially from a bone or stump. The aim is to restrict the loss of blood until it is no longer life-threatening. Once this is done there is no need to apply tourniquets to stop minor bleeding, as that may do the patient even more harm.
• The patient will be in extreme pain while the tourniquet is being applied and if conscious, may try to remove it. Follow the pain management protocol if available.
• The date and time of application of the tourniquet must be documented, preferably with an indication directly on the patient that a tourniquet has been applied (for example, writing a ‘T’ on the patient’s forehead). All health professionals involved in follow-up treatment of and care for the patient need to be informed that a tourniquet has been applied, and when.
• If a tourniquet is not indicated, use standard methods of bleeding control, i.e. direct pressure, compression bandage, haemostatic dressings.
• Do not loosen the tourniquet periodically to perfuse the limb.
Trained responders are capable of working in more than one kind of context. For the purposes of this document, these are the factors to take into account while proceeding to manage a catastrophic haemorrhage: the number of patients; the safety and security of the scene; and the safety of the responders. Contexts are divided into two categories:

- non-permissive: insecure (unsafe) context and/or several patients
- permissive: safe context and a single patient.
TOURNIQUET APPLICATION

A. NON-PERMISSIVE CONTEXTS: INSECURE AND/OR SEVERAL PATIENTS

1. Verify or confirm the existence of catastrophic bleeding from a limb.
2. Instruct the patient to try to move to a safer location if possible and apply direct pressure to the wound.
3. Instruct the patient to apply the tourniquet over his or her clothes, proximal to (above) the bleeding site(s).
4. If the site of the life-threatening bleeding is not readily apparent, apply the tourniquet high and tight (as proximally as possible) on the injured limb.
5. Otherwise, and if it is safe:
   a. apply the tourniquet approximately five to seven cm above the bleeding site
   b. if the catastrophic bleeding does not stop, add a second tourniquet just above the first one
   c. and if the catastrophic bleeding still does not stop, apply a third tourniquet two to three cm above the joint of the affected limb, or above the second tourniquet if it is already above the joint.
6. If the catastrophic bleeding has not completely stopped, pack the wound with haemostatic dressings and/or use compression pressure bandages and direct pressure.
7. If you do not have enough tourniquets you may remove the first tourniquet and apply it above the joint.
8. If a C-TQ is not available and direct manual pressure with or without the use of a haemostatic dressing fails to stop life-threatening bleeding, a first-aider who has the necessary training may consider using an improvised tourniquet.

Indication for converting or relocating a tourniquet
Relocation should be considered if the limb tourniquet is high and tight, but only after the patient is in a safe environment.

Once the tourniquet is in the correct location on the limb, and after you have completed your trauma assessment of the patient, check whether the tourniquet has to be converted, as per the conditions listed below, by using pressure or haemostatic dressings.
Indications for converting/relocating the tourniquet:
1. The patient is not displaying signs of shock.
2. It is possible to monitor the wound closely for bleeding.
3. Transport time to definitive care is greater than two hours.
4. The tourniquet has been in place for less than six hours.

Every effort should be made to convert tourniquets in less than two hours if bleeding can be controlled by other means.

Do not remove a tourniquet that has been in place for more than six hours unless close monitoring, surgery, anaesthesia and appropriate blood testing are available.

**Relocating a tourniquet**
1. Expose the wound fully.
2. Identify an appropriate location at least five to seven cm above the injury (not over a joint).
3. Apply a new tourniquet directly to the skin.
4. After that has been applied properly, the previous tourniquet can be loosened but should be left in place.
5. Assess for bleeding.
6. Retighten previous tourniquet if heavy bleeding occurs.

**Converting a tourniquet**
1. Expose the wound fully.
2. Pack the wound fully with haemostatic or plain gauze.
3. Apply a pressure dressing properly.
4. After that has been applied properly, the previous tourniquet can be loosened but should be left in place.
5. Assess for bleeding.
6. Retighten previous tourniquet if heavy bleeding occurs.

**Do not attempt a conversion if you are not a health professional.**

Conversion of a tourniquet should be attempted only once. If the conversion is unsuccessful, **DO NOT TRY AGAIN.**
B. **PERMISSIVE CONTEXTS: SAFE AND A SINGLE SERIOUSLY INJURED PATIENT**

1. Verify or confirm the existence of catastrophic bleeding.
2. Apply firm pressure as close as possible to the site of bleeding, usually with two or three fingers directly on the source of blood loss.
3. Do not use bulky dressings, as they can make it difficult to put enough pressure in the right place.
4. Pressure dressings should be used if available, preferably with a device to direct more pressure to the site of blood loss.
5. Do not remove the first dressing if it becomes soaked with blood, as that will dislodge any clots that might have formed. Add another pad instead and apply firm pressure.
6. If a haemostatic bandage is available, you may consider deep wound packing with it. After bandaging the extremity, apply pressure on the wound for three minutes or for whatever length of time recommended by the manufacturer.
7. If the catastrophic bleeding does not stop:
   a. apply a tourniquet approximately five to seven cm above the bleeding site
   b. if the catastrophic bleeding does not stop, add a second tourniquet just above the first one
   c. and if the catastrophic bleeding still does not stop, apply a third tourniquet two to three cm above the joint of the affected limb, or above the second tourniquet if it is already above the joint.
8. If you do not have enough tourniquets you may remove the first tourniquet and apply it above the joint.
9. If a C-TQ is not available and direct manual pressure with or without the use of a haemostatic dressing fails to stop life-threatening bleeding, a first aider who has the necessary training may consider using an improvised tourniquet.
Tourniquet use for catastrophic haemorrhage – Insecure context and/or multiple casualties

**Catastrophic bleeding from limb**

- **YES**
  - Instruct patient to move to a safe place and apply direct pressure
  - Instruct patient to apply a tourniquet, over his or her clothes, proximal to the bleeding site

- **NO**
  - Catastrophic bleeding stopped?
    - **NO**
      - Apply a second tourniquet just above the first one
      - Catastrophic bleeding stopped?
        - **NO**
          - Apply a third tourniquet two to three cm above the joint of the affected limb, or above the second tourniquet if it is already above the joint
          - Catastrophic bleeding stopped?
            - **YES**
              - Pack the wound with haemostatic dressings and/or use compressive pressure bandages and direct pressure
              - Assess and monitor the patient for signs of shock
            - **NO**
              - Indication for tourniquet conversion or relocation:
                1. NO signs of shock
                2. Possible to monitor the bleeding site
                3. Transport time to definitive care is more than two hours
                4. C-TQ has been in place for less than six hours

- **Follow normal haemorrhage-control procedure**

- **Remember that your own safety is your first priority**

- **If the site of the bleeding is not readily apparent, apply the tourniquet high and tight (as proximally as possible) on the injured limb**
Tourniquet use for catastrophic haemorrhage – Insecure context and ONE patient

**Catastrophic bleeding from limb**

- **Apply direct pressure**
- **Apply compressive or haemorrhage bandage**

- **Catastrophic bleeding stopped?**
  - **NO**
    - **Apply a second tourniquet just above the first one**
  - **YES**
    - **Assess and monitor the patient for signs of shock**

- **Catastrophic bleeding stopped?**
  - **NO**
    - **Apply a third tourniquet two to three cm above the joint of the affected limb, or above the second tourniquet if it is already above the joint**
  - **YES**

Follow normal haemorrhage-control procedure.
Commercial tourniquet (C-TQ)

Applying a C-TQ in an insecure context

1. Instruct the patient to apply the tourniquet over his or her clothes, proximal to (above) the bleeding site(s).

2. If the site of the life-threatening bleeding is not readily apparent, apply the tourniquet high and tight (as proximally as possible) on the injured limb.

Once the patient is in a safe environment, consider relocating the C-TQ according to the steps listed above.
Applying a C-TQ in a secure context

1. Apply the tourniquet five to seven cm above the bleeding site.

2. Pass the tip of the tourniquet through the buckle and tighten it by pulling hard on the band.

3. Pull the tourniquet very tight and secure it with the Velcro strips.

4. Hold the windlass rod and twist it until the bleeding is at an end and the distal pulse cannot be palpated.
5. Put the windlass rod in the rod-locking clip, to lock it in place.

6. Secure the windlass rod inside the locking clip with the rod-securing strap.

7. Record the time and the date of application.

8. If the catastrophic bleeding does not stop, apply a second tourniquet just above the first one.
9. If the catastrophic bleeding still does not stop, apply a third tourniquet two to three cm just above the joint.

What is an improvised tourniquet?
An improvised tourniquet must be made out of strong and flexible material, such as gauze or strips of canvas or kerchiefs. To minimize damage to the flesh, ensure that the tourniquet is at least five cm in width. A sturdy stick or something equally stiff should be used as a windlass to tighten the tourniquet.

If the tourniquet is too narrow – like a rope – it will cut into the patient’s flesh and do further harm.

Applying an improvised tourniquet

1. Fold a triangular bandage and use it as a bandage-type dressing. (The band used should be two to five cm in width.)

2. Apply the bandage five to seven cm above the bleeding site.
3. Tighten the bandage using a simple knot.

4. Make another simple knot in the same bandage.

5. Make a rod of suitable length out of some hard material, for use as a windlass.

6. Insert the rod between the two knots.
7. Rotate and twist the rod until the bleeding stops.

8. Pass the loose ends of the bandage over the rod.

9. Make a knot to tighten the loose ends under the entire bandage.
10. Record the time and the date of application.

11. If the catastrophic bleeding does not stop, apply a second tourniquet just above the first one.

12. If the catastrophic bleeding still does not stop, apply a third tourniquet two to three cm just above the joint.
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The ICRC helps people around the world affected by armed conflict and other violence, doing everything it can to protect their lives and dignity and to relieve their suffering, often with its Red Cross and Red Crescent partners. The organization also seeks to prevent hardship by promoting and strengthening humanitarian law and championing universal humanitarian principles.

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