CPP TCCC

COMBAT PARAMEDIC/ PROVIDER

TACTICAL COMBAT CASUALTY CARE COURSE

MODULE 6: MASSIVE HEMORRHAGE CONTROL

Committee on Tactical Combat Casualty Care (CoTCCC)

TCCC TIER 1
All Service Members

TCCC TIER 2
Combat Lifesaver

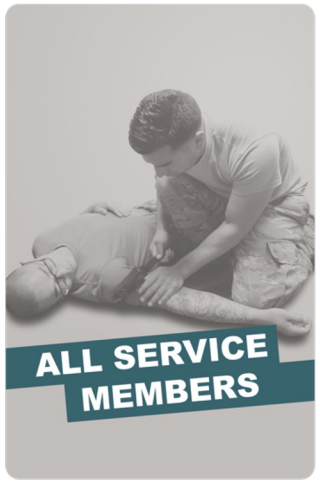
TCCC TIER 3
Combat Medic/Corpsman

TCCC TIER 4
Combat Paramedic/Provider

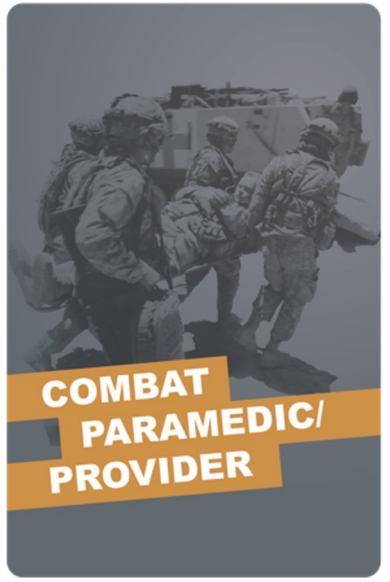
TACTICAL COMBAT CASUALTY CARE (TCCC) ROLE-BASED TRAINING SPECTRUM

ROLE 1 CARE

NONMEDICAL PERSONNEL



MEDICAL PERSONNEL



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STANDARDIZED JOINT CURRICULUM

1 x TERMINAL LEARNING OBJECTIVE

06 Given a combat or noncombat scenario, perform massive hemorrhage control during Tactical Field Care (TFC) in accordance with Committee on Tactical Combat Casualty Care (CoTCCC) Guidelines.

- **6.1** Identify life-threatening hemorrhage (bleeding).
- **6.2** Demonstrate an evaluation of previously applied tourniquets for hemorrhage control effectiveness.
- **6.3** Identify the importance of early application of limb tourniquets to control life-threatening bleeding in Tactical Field Care.
- **6.4** Identify anatomical sites for applying direct and indirect pressure to control bleeding.
- **6.5** Demonstrate the appropriate application of a CoTCCC-recommended limb tourniquet.
- **6.6** Identify risks associated with applying an improvised limb tourniquet.
- **6.7** Demonstrate the application of an improvised limb tourniquet.
- **6.8** Identify the principles and application of wound packing and pressure dressings.

15 x ENABLING LEARNING OBJECTIVES

= **Terminal Learning Objectives** = Cognitive ELOs = Performance ELOs

1 x TERMINAL LEARNING OBJECTIVE

06 Given a combat or noncombat scenario, perform massive hemorrhage control during Tactical Field Care (TFC) in accordance with Committee on Tactical Combat Casualty Care (CoTCCC) Guidelines.

- **6.9** Demonstrate the application of a CoTCCC-recommended hemostatic dressing.
- **6.10** Demonstrate wound packing and pressure dressing application.
- **6.11** Demonstrate improvised junctional hemorrhage control with hemostatic dressing and direct pressure.
- **6.12** Demonstrate the application of a CoTCCC-recommended junctional tourniquet.
- **6.13** Demonstrate the application of an injectable hemostatic agent.
- **6.14** Demonstrate the application of a wound closure device.
- **6.15** Identify any evidence-based medicine, best practices, casualty data, and Subject Matter Expert consensus on the aggressive use of tourniquets and hemorrhage control devices.

15 x ENABLING LEARNING OBJECTIVES

= **Terminal Learning Objectives** ● = Cognitive ELOs = Performance ELOs

Three PHASES of TCCC

MASSIVE HEMORRHAGE CONTROL spans all phases of TCCC

1. **CARE UNDER FIRE (CUF) / THREAT**
   - RETURN FIRE AND TAKE COVER
2. **TACTICAL FIELD CARE (TFC)**
   - WORK UNDER COVER AND CONCEALMENT
3. **TACTICAL EVACUATION CARE (TACEVAC)**
   - MORE DELIBERATE ASSESSMENT AND PRE-EVACUATION PROCEDURES

MARCH PAWS

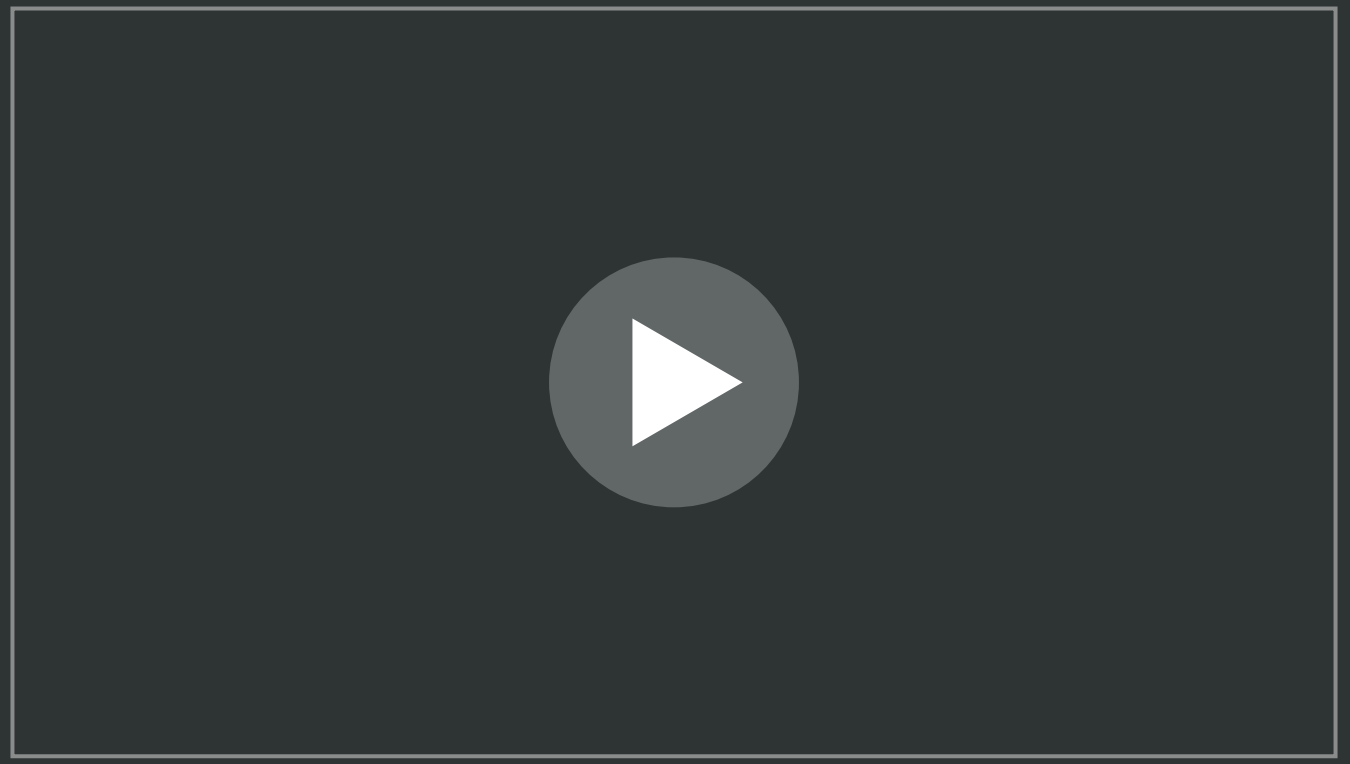
DURING LIFE-THREATENING

- **M** MASSIVE BLEEDING — #1 Priority
- **A** AIRWAY
- **R** RESPIRATION *(breathing)*
- **C** CIRCULATION
- **H** HYPOTHERMIA / HEAD INJURIES

AFTER LIFE-THREATENING

- **P** PAIN
- **A** ANTIBIOTICS
- **W** WOUNDS
- **S** SPLINTING

MASSIVE HEMORRHAGE OVERVIEW IN TFC



Video can be found on deployedmedicine.com

SECURITY AND TRIAGE IN TACTICAL FIELD CARE

REMOVE casualty's weapon and communication equipment, unit leadership will take responsibility for it

If **MULTIPLE CASUALTIES** are present, you may need to **TRIAGE,** keeping in mind **massive hemorrhage** is the **#1 Priority**

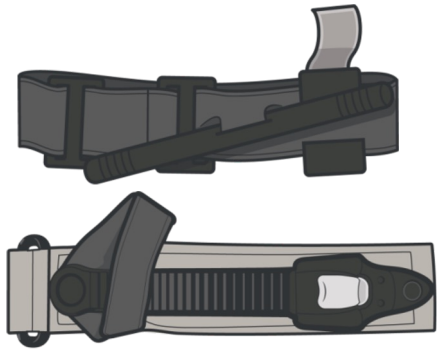
CONSIDER BODY SUBSTANCE ISOLATION (BSI)

As a **precaution,** the responder should don **latex-free** gloves whenever possible

If a Combat Lifesaver or Combat Medic/Corpsmen is available, direct them to assist

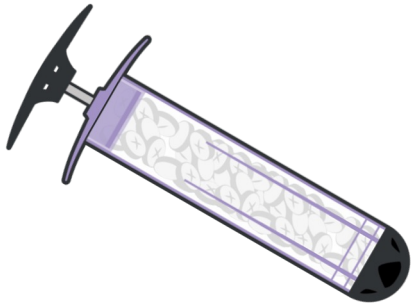
> ⚠ In tactical situations, BSI may not be feasible due to life-threatening bleed, TFC has now turned into CUF, etc.

TOOLS FOR LIFE-THREATENING HEMORRHAGE CONTROL



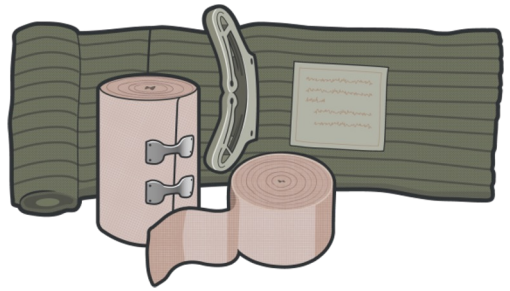
CoTCCC recommended
LIMB TOURNIQUETS

HEMOSTATIC GAUZE
and other dressings



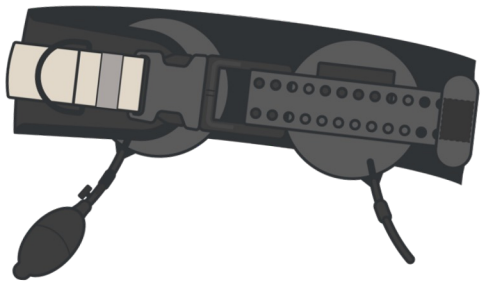
INJECTABLE HEMOSTATIC AGENT (XSTAT)

DIRECT PRESSURE

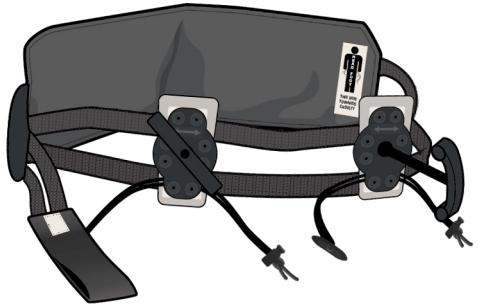


PRESSURE BANDAGES

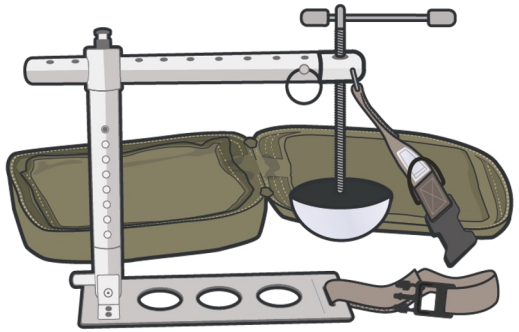
PRESSURE DELIVERY DEVICE



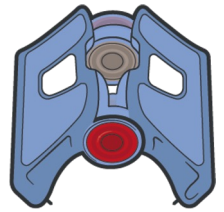
SAM JUNCTIONAL TOURNIQUET



JETT JUNCTIONAL TOURNIQUET



CROC JUNCTIONAL TOURNIQUET



WOUND CLOSURE DEVICE

PRIORITIZING MULTIPLE CASUALTIES

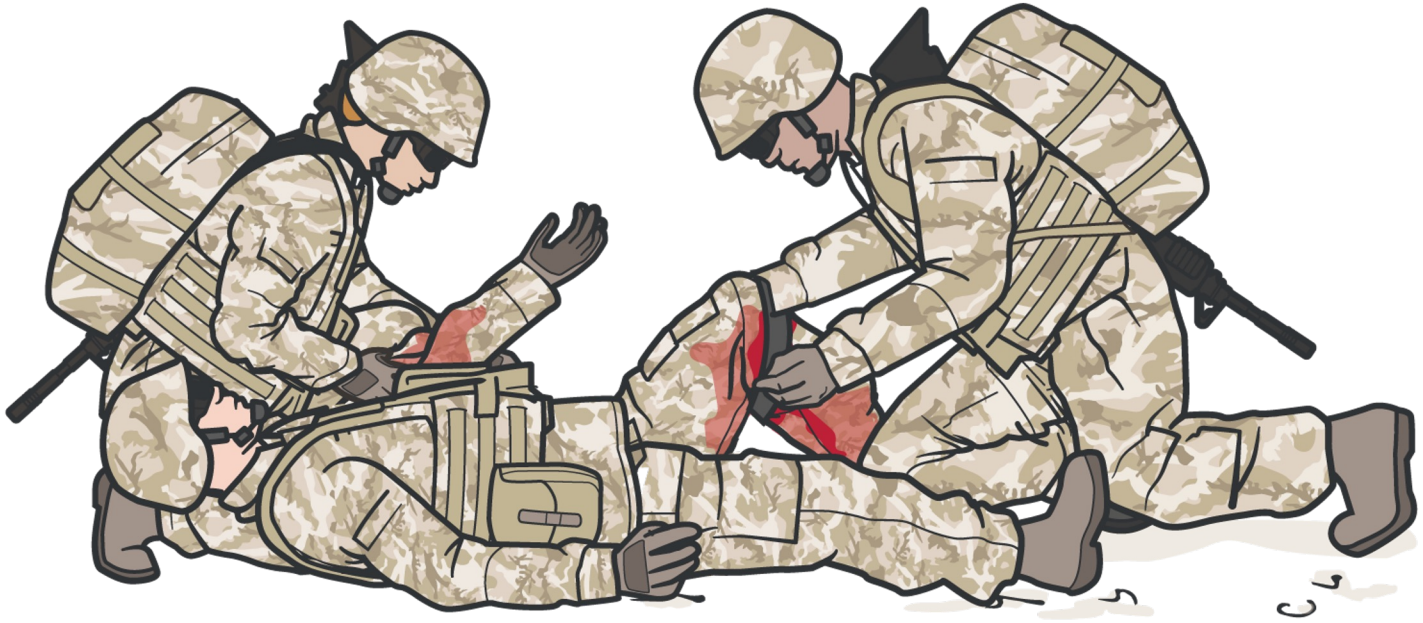
Casualties with these injuries must be treated first

1. **Massive Bleeding** — #1 Priority
2. **Airway** Compromised
3. **Respiratory** Distress
4. Altered Mental Status
5. **Hemorrhagic** Shock

EARLY CONTROL OF SEVERE HEMORRHAGE IS CRITICAL

Early control of significant external hemorrhage is the **most important intervention** to prevent death

- Casualties with Major Artery injury can bleed to death in 3 Minutes
- Early tourniquet use prevents late stage of shock
- Tourniquets are safe when applied for < 2 hours

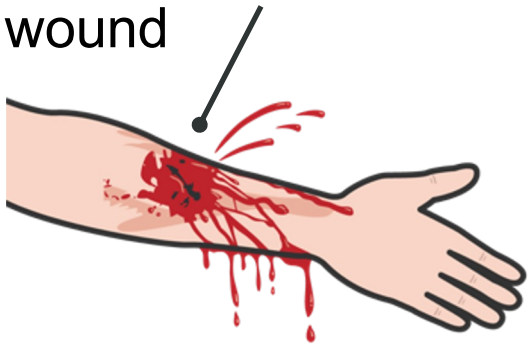


Hemorrhage remains the predominant cause of preventable death in combat fatalities

Level of Evidence: B-NR

IDENTIFICATION OF LIFE-THREATENING HEMORRHAGE

There is **PULSATILE** or **STEADY BLEEDING** from the wound



Traumatic **AMPUTATION** of the **arm** or **leg**

BRIGHT RED BLOOD is pooling on the ground

Overlying clothing becoming **SOAKED WITH BLOOD**

Bandages or makeshift bandages used to cover the wound are **INEFFECTIVE** and steadily becoming **SOAKED WITH BLOOD**

MASSIVE HEMORRHAGE REASSESSMENT

REASSESS any interventions performed in **Care Under Fire**

If a tourniquet (TQ) was previously applied in **CUF**:

- **ASSESS** for effectiveness (bleeding has stopped and distal pulses are absent)
- **APPLY** direct pressure to control bleeding, if still present
- **PLACE** a deliberate tourniquet **2-3 inches** above the wound directly on the skin

Level of Evidence: B-NR

Why use tourniquets instead of pressure dressings or bandages?
• Rapid control of severe (life-threatening) bleeding
• Effective in controlling arterial bleeding
• Simple and easy application
• Enhanced stability and compression
• Prolonged effectiveness

Tourniquets are a temporary measure allowing **EFFECTIVE** hemorrhage control and should be applied before shock to save lives. (Kragh)

MASSIVE HEMORRHAGE REASSESSMENT

REASSESS any interventions performed in **Tactical Field Care**

If a tourniquet (TQ) was previously applied:

- **ASSESS** for effectiveness (bleeding has stopped and distal pulses are absent)
- If **INEFFECTIVE**, apply a second tourniquet **side-by-side** with the first

The use of a tourniquet as a first aid tool on the battlefield is the foremost advance in prehospital care during the wars in Iraq and Afghanistan, with an estimated 1,000–2,000 lives saved by tourniquet application (Blackbourne, 2012)

Preventable combat deaths from *Not* using Tourniquets:

Maughon – *Mil Med 1970*: Vietnam
- 193 of 2,600
- 7.4% of total combat fatalities

Kelly – *J Trauma 2008*: OEF + OIF (2003/4 and 2006)
- 77 of 982 (in both cohorts of fatalities)
- 7.8% of total fatalities – no better than Vietnam

Tourniquets became widely used in 2005-2006

Eastridge – *J Trauma 2012*: OEF + OIF (to Jun 2011)
- 119 of 4,596
- 2.6% of total fatalities – a **67% decrease**

BLOOD SWEEP

AFTER treating *obvious* **MASSIVE HEMORRHAGE** in **CUF,**
do a rapid **head-to-toe** check for any unrecognized
life-threatening bleeding in **T**actical **F**ield **C**are

- Check the **neck**, **axillary,** and **inguinal** areas
- Check the **legs**, **arms**, **abdomen**, **chest,** and **back** (in a raking motion)

LIMB TOURNIQUETS

Tourniquets: The Primary driver for TCCC

- A device placed around a bleeding **ARM** or **LEG** that works by **compressing large blood vessels** (arterial and venous) and **stopping blood flow** to the injured extremity
- The TQ that should be used as the **FIRST option** is the **CASUALTY'S TQ** from **THEIR own JFAK**
- If this is not possible, or more than one tourniquet is needed, then use the **next available option** such as a TQ from unit mission equipment
- You should have a **new TQ** in your JFAK; it is designed as a **ONE-TIME USE DEVICE**

Practical use of emergency TQs to stop bleeding in major limb trauma (Kragh, 2008)

Study information and results:

- Combat Support Hospital in Baghdad
- 232 patients with tourniquets on 309 limbs
- CAT TQ was the best field tourniquet
- No amputations caused by tourniquet use
- Approximately 3% transient nerve palsies

*This study documented **232 LIVES SAVED** in this **ONE** hospital in a **ONE-YEAR** period.

Extremity hemorrhage math in Vietnam:
193 of 2600 = 7.4% x 46,233 fatalities = 3,421 preventable US deaths from extremity hemorrhage

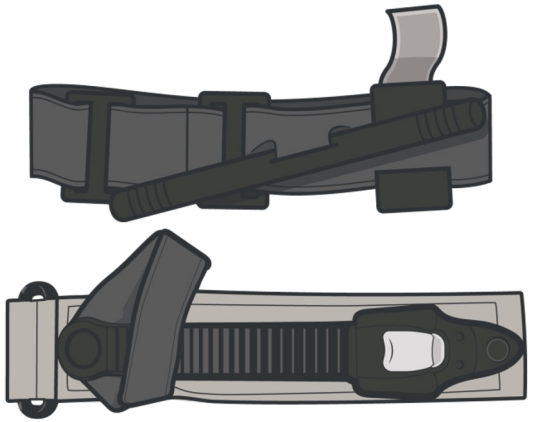
DELIBERATE TOURNIQUETS IN TACTICAL FIELD CARE

In TFC the **source** can be **identified** to ensure deliberate TQ placement

Deliberate TQs (in TFC) are applied **2-3 INCHES ABOVE THE WOUND**, directly on the skin (**not over clothing or on a joint**)

Ensure **all the slack** of the **TQ band** is pulled **tightly as possible**

If bleeding is **NOT** controlled with the first TQ, apply a second side-by-side with the first



Use a TQ to control life-threatening external hemorrhage that is anatomically amenable to TQ use or for **ANY traumatic amputation**

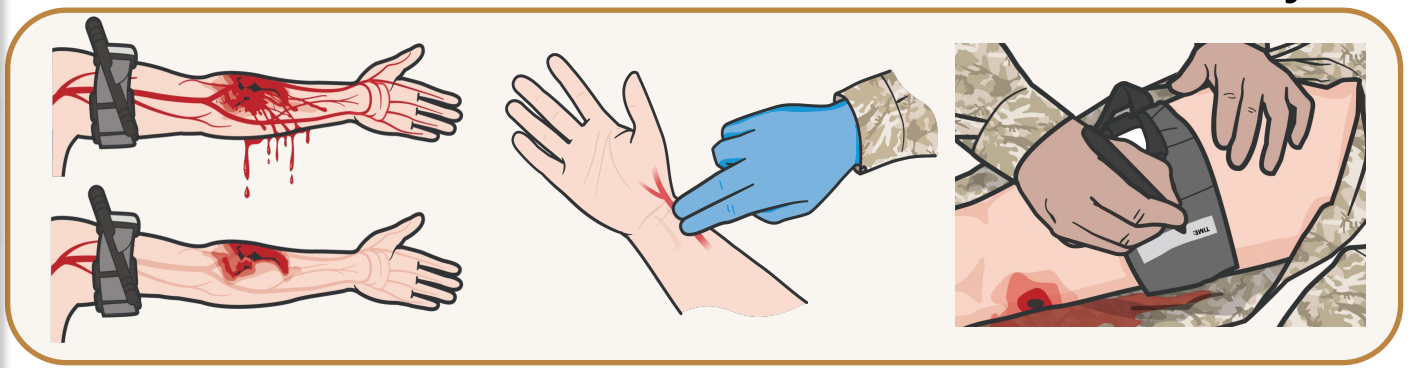
TQs need to be applied rapidly. The bleeding should be stopped **WITHIN ONE MINUTE** and the TQ fully secured within 3 minutes

The time of tourniquet placement should be documented on the tourniquet itself and on the DD Form 1380 TCCC Casualty Card in TFC

TOURNIQUET EFFECTIVENESS AND DOCUMENTATION

Is there a role for intermittent tourniquet loosening in TFC?	
Answer	Rationale
NO	Periodic loosening of tourniquets for the purpose of reperfusing the limb has resulted in incremental exsanguination and has no role on the battlefield. Additionally, periodic reperfusion of the ischemic limb may increase the amount of damage to the limb by worsening of the ischemia-reperfusion injury.

TQs can be assessed for effectiveness by:



Ensuring that the **BLEEDING** has Stopped

Checking a pulse distally on the limb where the TQ is applied to ensure there is **NO PULSE**

Time of TQ that is placed should be **documented** during the TFC and **NOT** the CUF phase

TQ application time is **important** in overall casualty care

INITIAL DIRECT PRESSURE BEFORE INTERVENTION

DIRECT PRESSURE can and **should be used** as a temporary measure **until** a **tourniquet** or **dressing** is in place

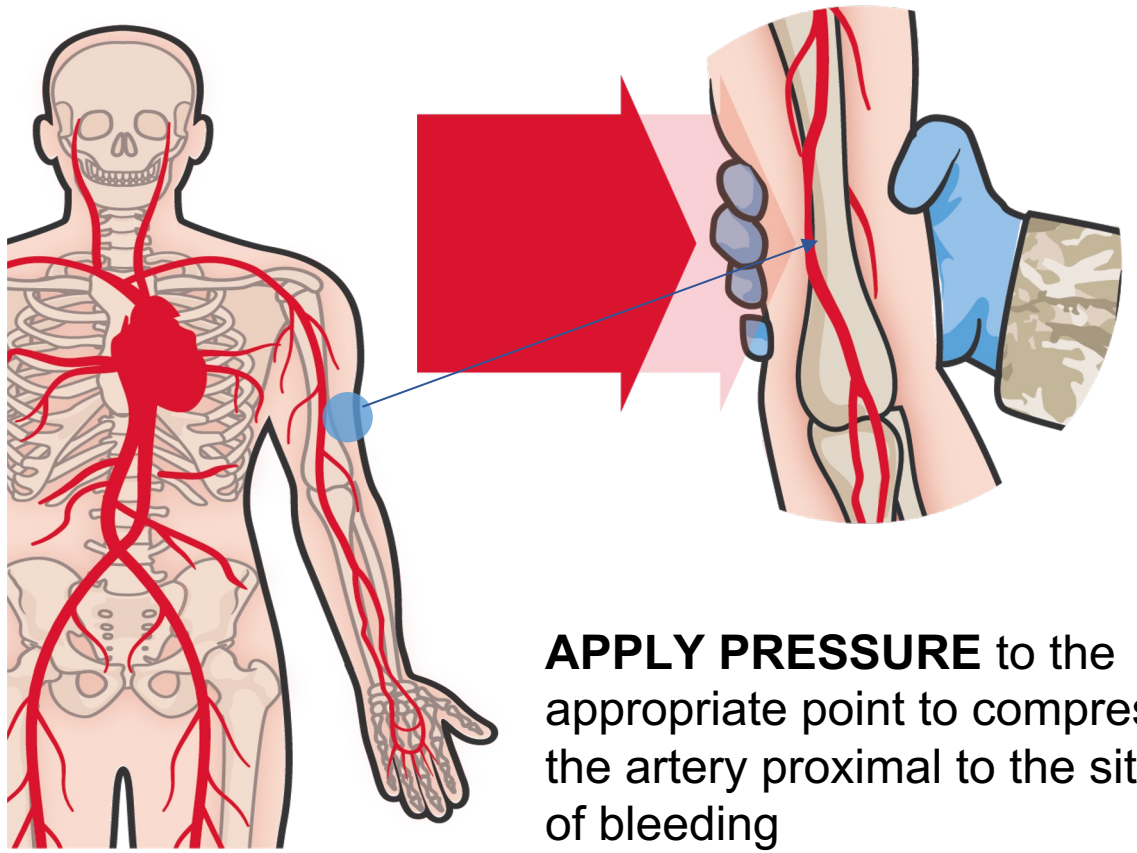
It is hard to use direct pressure alone to control significant bleeding or while moving the casualty

Direct pressure can be **used** if a treatment no longer maintains control of the bleeding **while a new treatment is started**

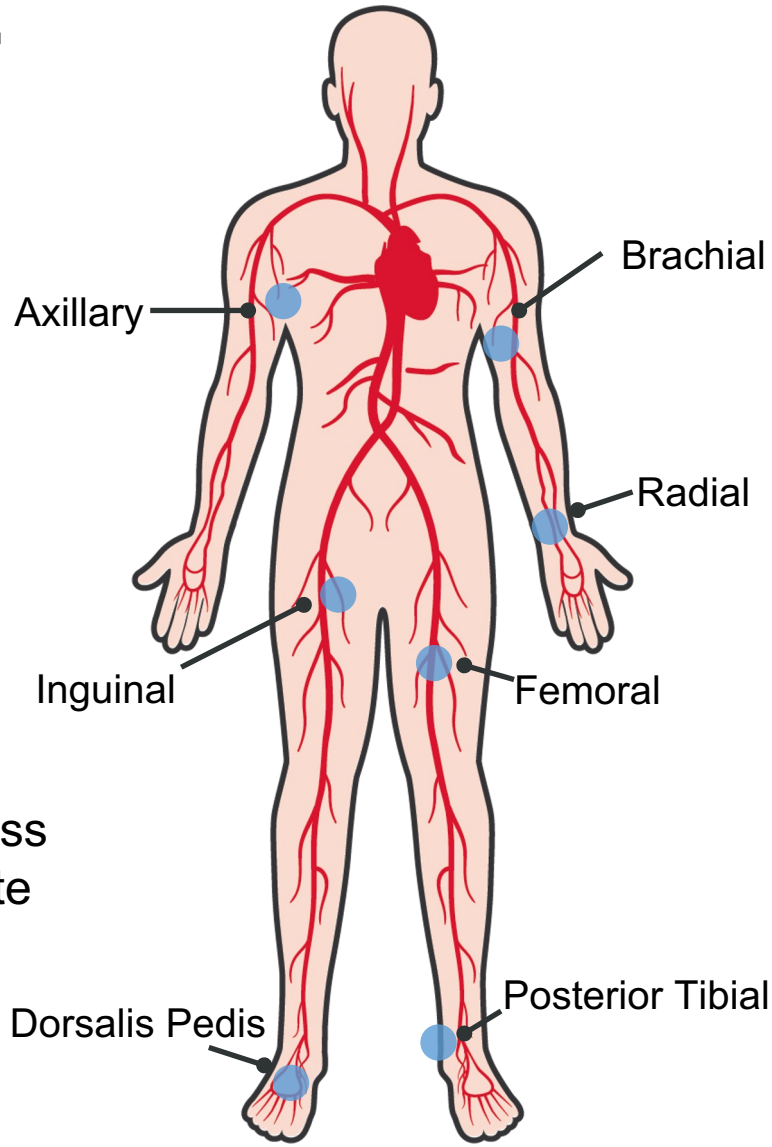
REMEMBER to ask other first responders to assist as needed

INDIRECT PRESSURE

INDIRECT PRESSURE can be used as a temporary control of bleeding until a **tourniquet** or **pressure bandage** can be applied

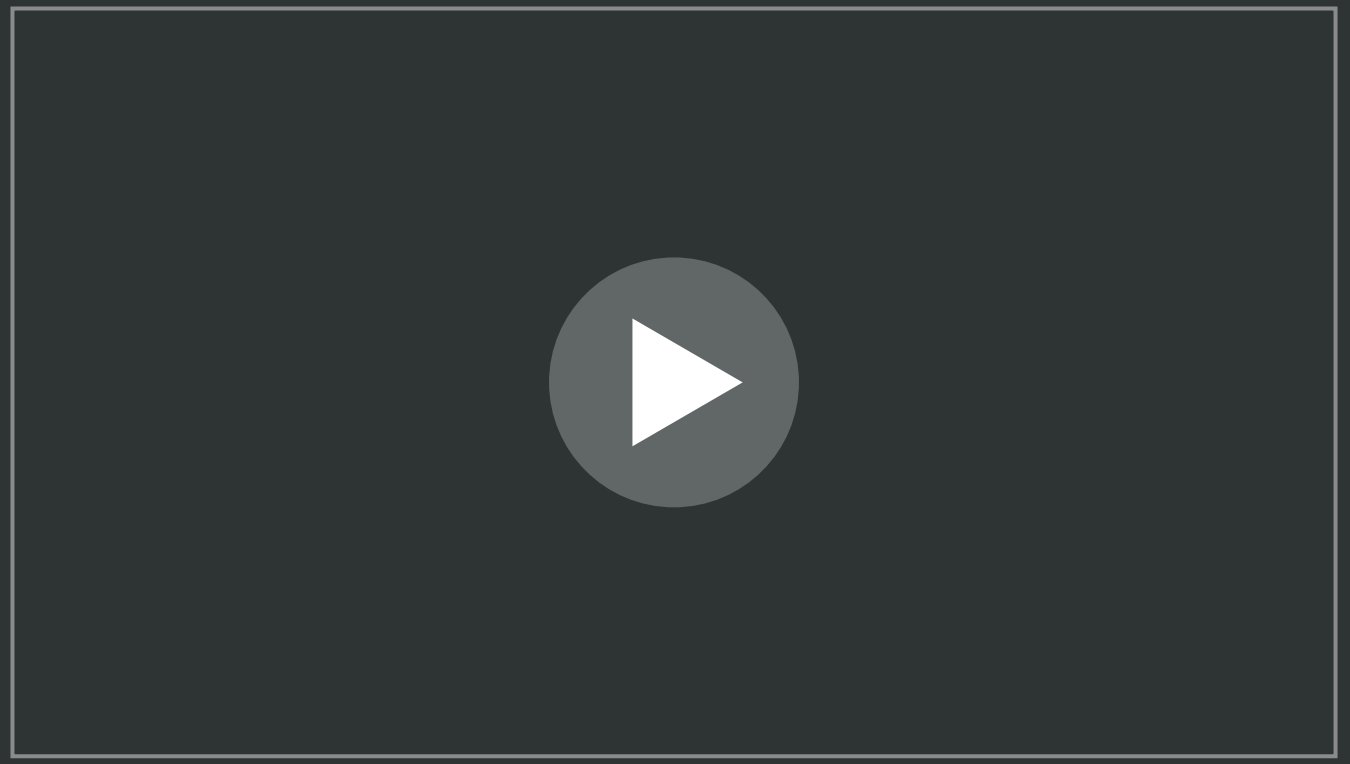


APPLY PRESSURE to the appropriate point to compress the artery proximal to the site of bleeding



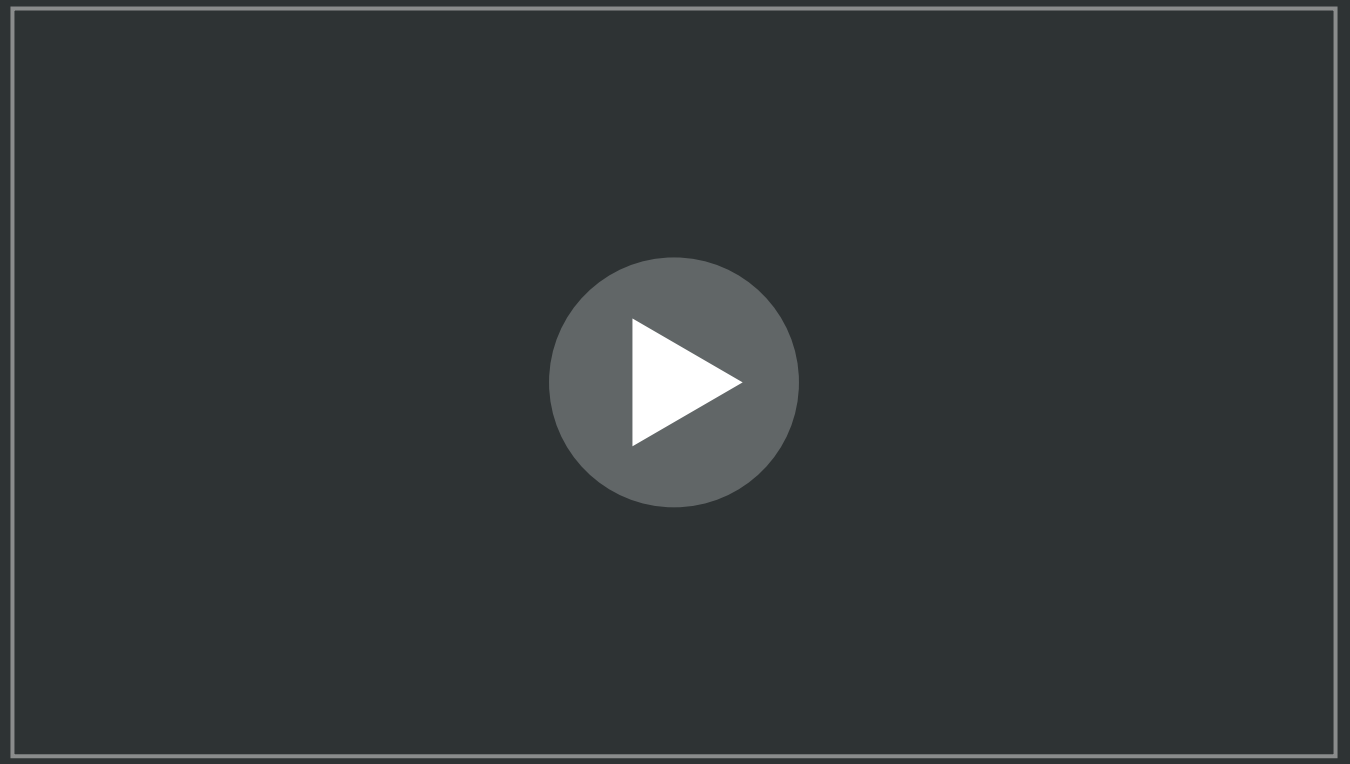
REMEMBER to ask other first responders to assist as needed

TWO-HANDED RATCHET TOURNIQUET IN TFC



Video can be found on deployedmedicine.com

TWO-HANDED WINDLASS TOURNIQUET IN TFC



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TOURNIQUET DRILL

- TQ Casualty Application
- TQ Self Application

IMPROVISED TOURNIQUETS

RISKS Associated with ALL improvised tourniquets:

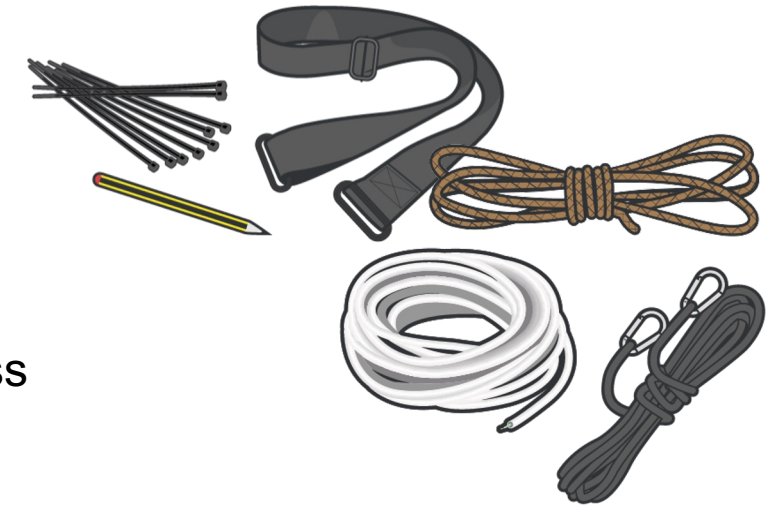
- **DAMAGE** may occur to skin if the band is too narrow
- Bleeding may **WORSEN**
- Bleeding **MAY NOT BE COMPLETELY CONTROLLED**
- An improvised TQ may likely **LOOSEN** over time from not being properly secured

SUITABLE

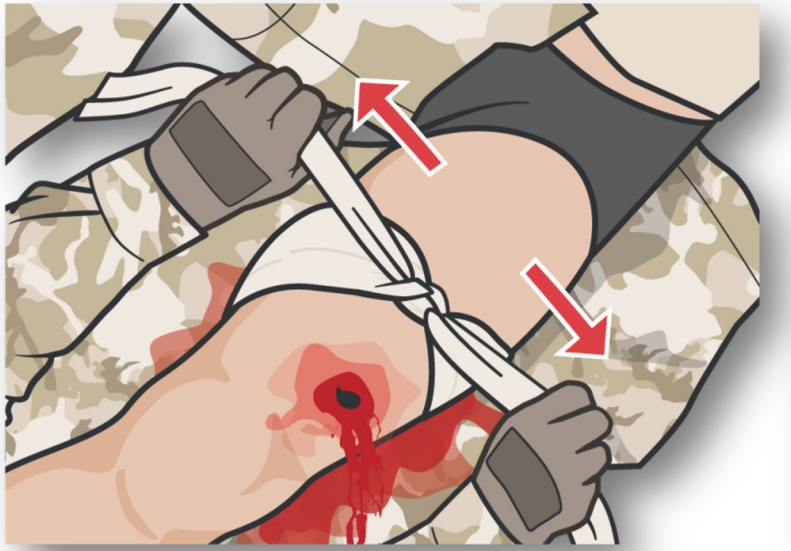
- ✓ At least 2 inches in width
- ✓ Sturdy windlass
- ✓ Fastening devices to prevent loosening

UNSUITABLE

- ✗ Too narrow (<2 inches)
- ✗ No windlass/ inadequate windlass



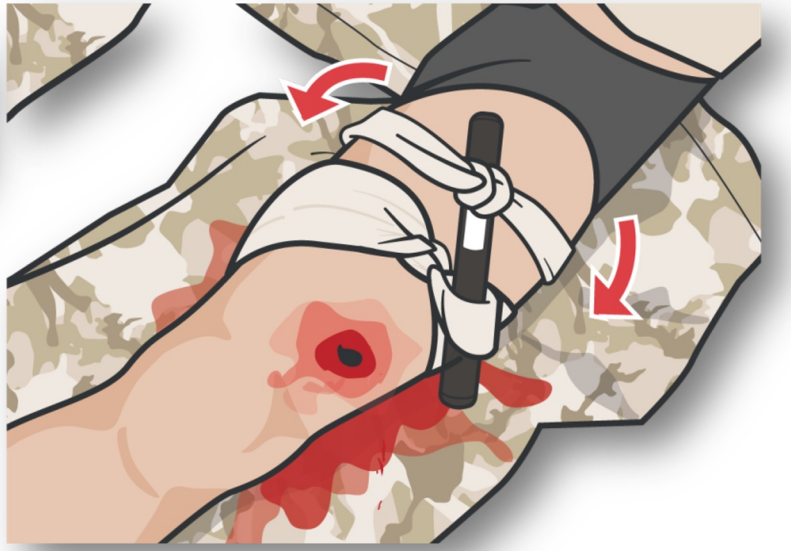
IMPROVISED TOURNIQUET APPLICATION



Appropriate tourniquet band material placed **2-3 inches above the wound** and tightened with a half knot

Full knot completed over a sturdy windlass rod of appropriate length

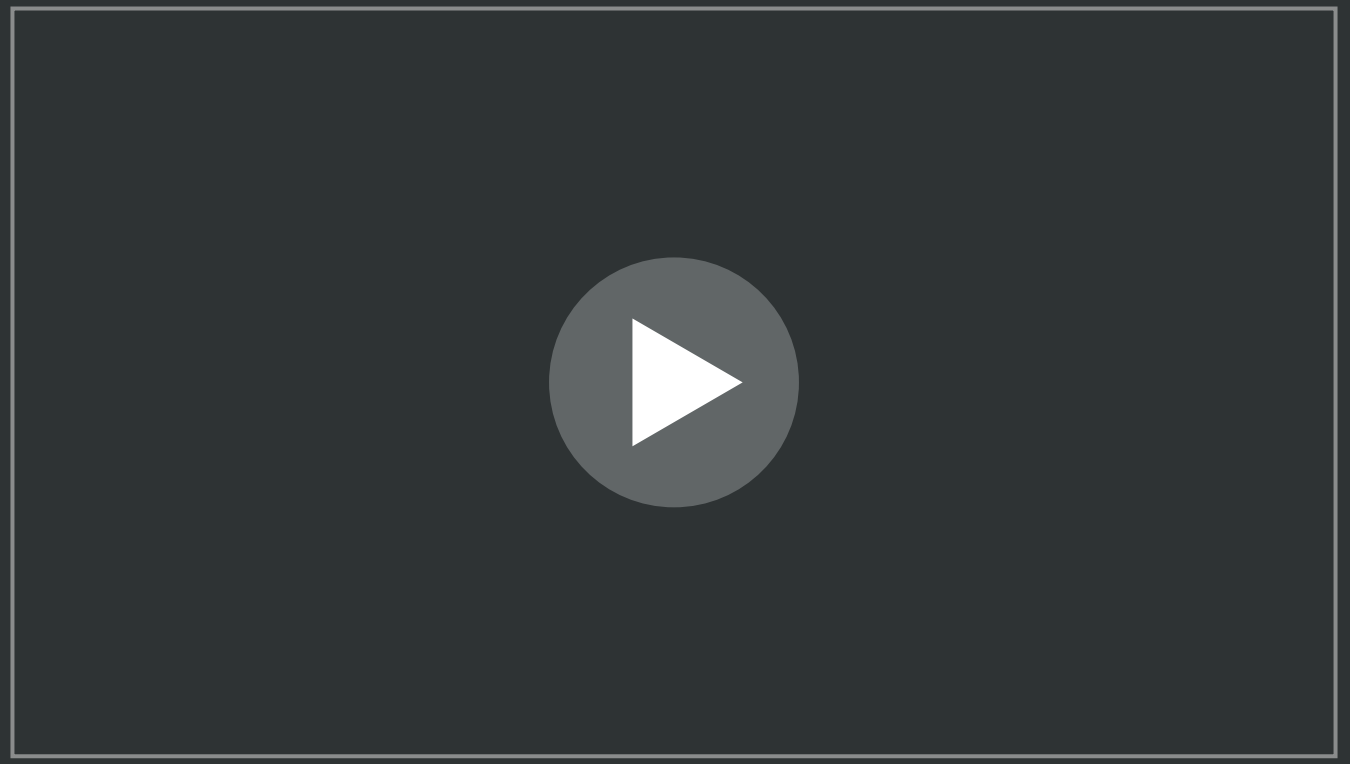
Windlass rod rotated to tighten **until bleeding is stopped** and **no distal pulse**



Securing materials used to secure windlass rod, maintain tension, and prevent loosening

⚠ Document **TQ placement time** on the casualty and the DD Form 1380

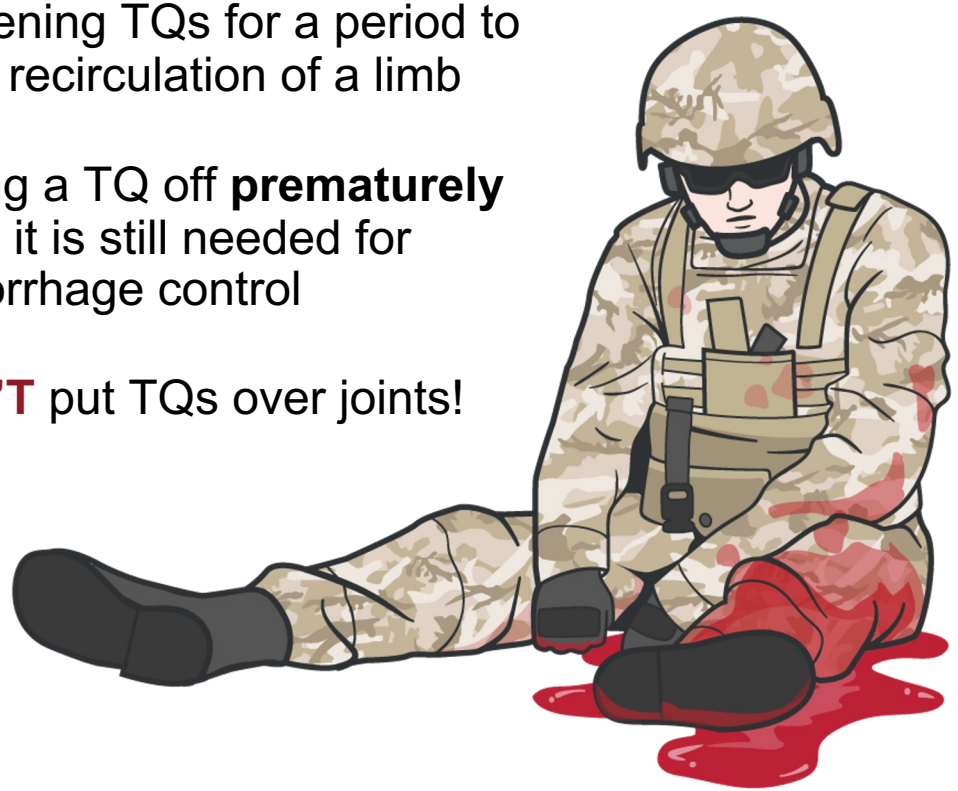
IMPROVISED LIMB TOURNIQUET



Video can be found on deployedmedicine.com

COMMON TOURNIQUET ERRORS

- **NOT** using one when you should or waiting too long to put it on
- **NOT** pulling all the slack out before tightening
- **NOT** making it tight enough – the TQ should stop the bleeding **AND** eliminate the distal pulse
- **NOT** using a second TQ, if needed
- Using a TQ for minimal bleeding *(However, **when in doubt**, apply a TQ)*
- Putting it on too proximally if the bleeding site is clearly visible
- Loosening TQs for a period to allow recirculation of a limb
- Taking a TQ off **prematurely** when it is still needed for hemorrhage control
- **DON'T** put TQs over joints!



SKILL STATION

TFC Hemorrhage Control (skills)

- Two-Handed (Windlass) TQ Application in TFC
- Two-Handed (Ratchet) TQ Application in TFC
- Improvised Limb TQ Application

HEMOSTATIC DRESSINGS

INDICATIONS for **Hemostatic Dressing** use are compressible (external) hemorrhage not amenable to limb tourniquet use or as an adjunct to tourniquet removal

- **Hemostatic dressing** is safe and contains active ingredients that assist with blood-clotting at the bleeding site
- **Hemostatic dressings** can be used with or without a pressure bandage
- JFAK contains **one hemostatic** dressing and **one dry sterile gauze**

⚠ **DO NOT** pack hemostatic dressings into chest wounds

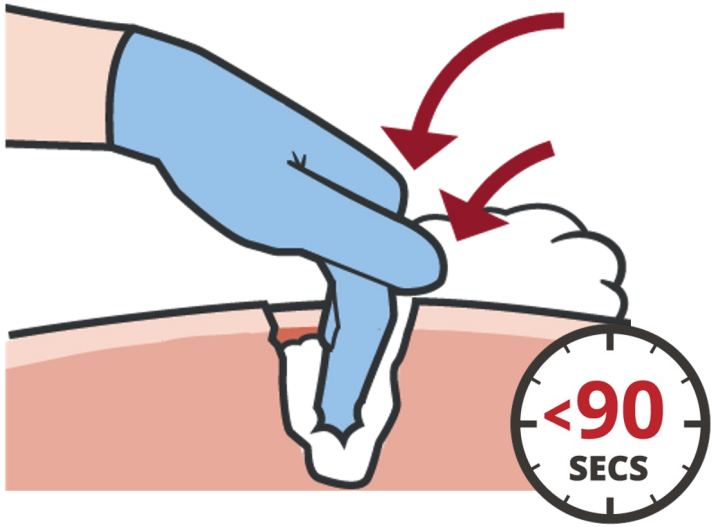
CoTCCC-Recommended Hemostatic Dressings:

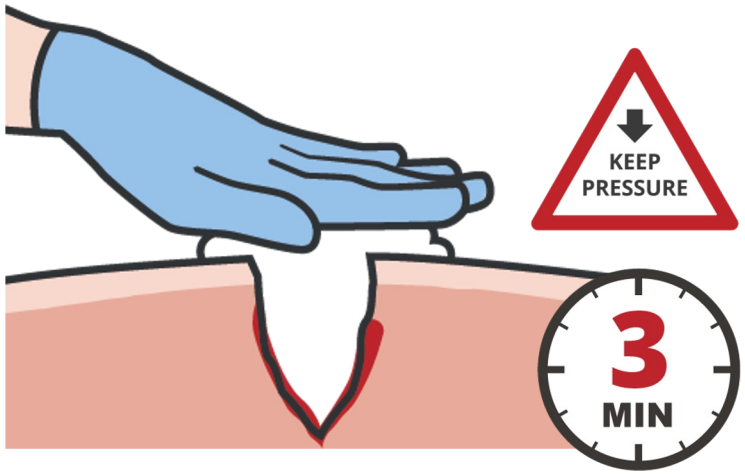
- **Combat Gauze**

Alternative hemostatic adjuncts:

- **Celox Gauze**
- **ChitoGauze**
- **XStat** (best for deep, narrow-tract junctional wounds)
- **iTClamp** (may be used alone or in conjunction with hemostatic dressing or XStat)

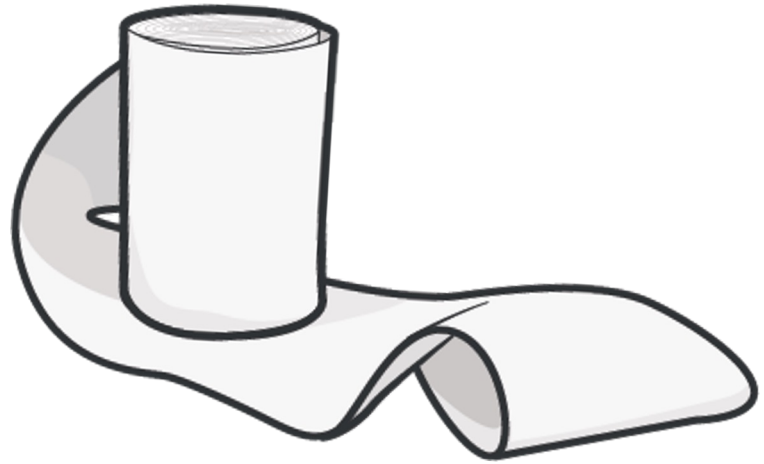
WOUND PACKING PRINCIPLES





- Identify **exact source** of bleeding and **APPLY** **direct pressure** **UNTIL** dressing or gauze is placed
- Pack the wound **maintaining** **CONSTANT** direct pressure within **90 SECONDS** to be effective
- Fill and pack the wound tightly, ensuring dressing or gauze extends 1-2 inches above the skin
- **HOLD** direct pressure for at least **3 MINS** *(**this is necessary**, even with the active ingredient in hemostatic dressing)*
- When packing a large wound, more than one hemostatic gauze and/or **additional** gauze may be **needed**
- Carefully **observe** to determine if bleeding has been **controlled**
- Once you are sure the bleeding has **stopped**, apply a pressure bandage

WOUND REPACKING FOR FAILED CONTROL



- If packed with hemostatic gauze, **remove** packing material and **repack** with a new hemostatic gauze, if available
- It may be a **fresh** hemostatic gauze of the **same type** or a **different type** if available
- Alternatively, additional **non-hemostatic** gauze **CAN** be applied on top of the first gauze
- If hemostatic gauze is **NOT** readily available, use dry sterile gauze or some other materials to pack the wound

PRESSURE BANDAGE PRINCIPLES

ALL dressings for **significant** bleeding **should be secured** with pressure bandages

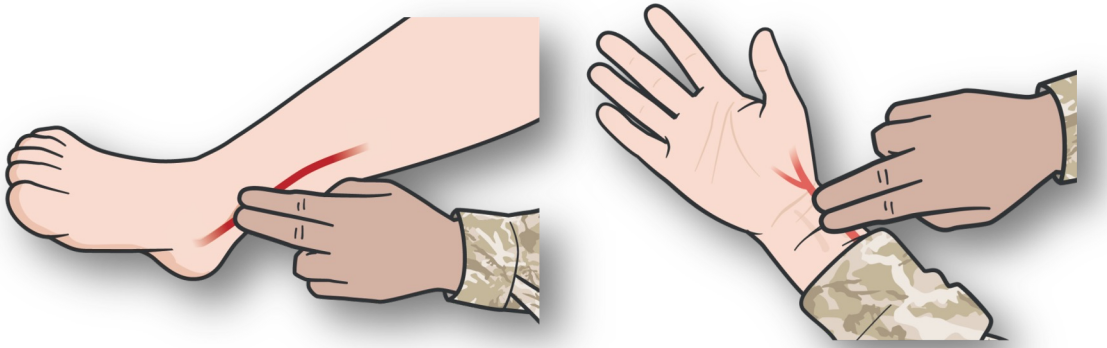
Place the bandage pad **directly** on the dressing, **continuing to apply direct pressure**

Wrap the pressure/elastic bandage **tightly**, focusing pressure over the wound

SECURE the hooking **ends** of the hook and loop or closure bar onto the last wrap of the bandage

Level of Evidence: C-LD

Check **circulation BELOW** the pressure bandage (**feeling for distal pulse)**

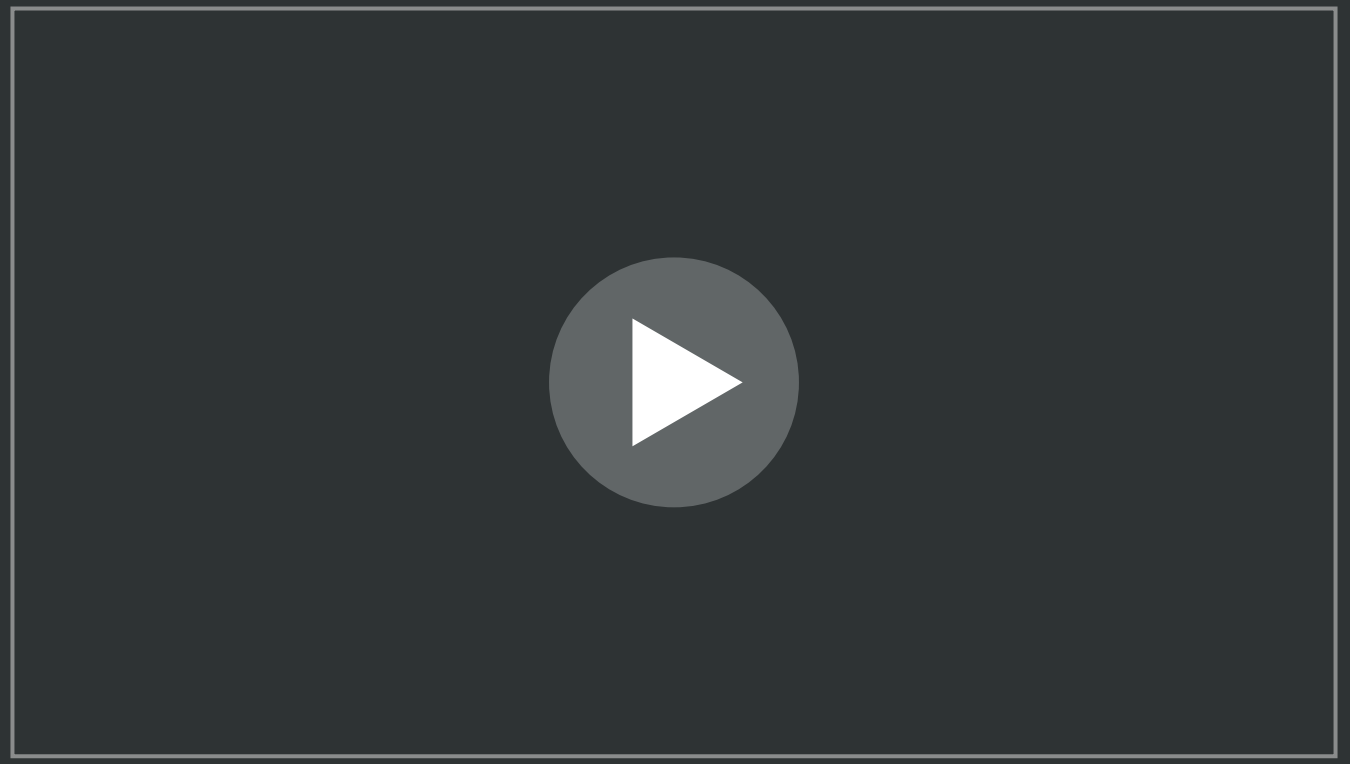


Assess **skin BELOW** the pressure bandage for **coolness** to touch, **bluish** hue, or **numbness**

If the pressure bandage is acting as a tourniquet, then you should **loosen** and resecure the bandage

Dressings and bandages should be **reassessed** and checked frequently and/or **EVERY TIME a casualty is moved**

HEMOSTATIC DRESSING AND WOUND PACKING



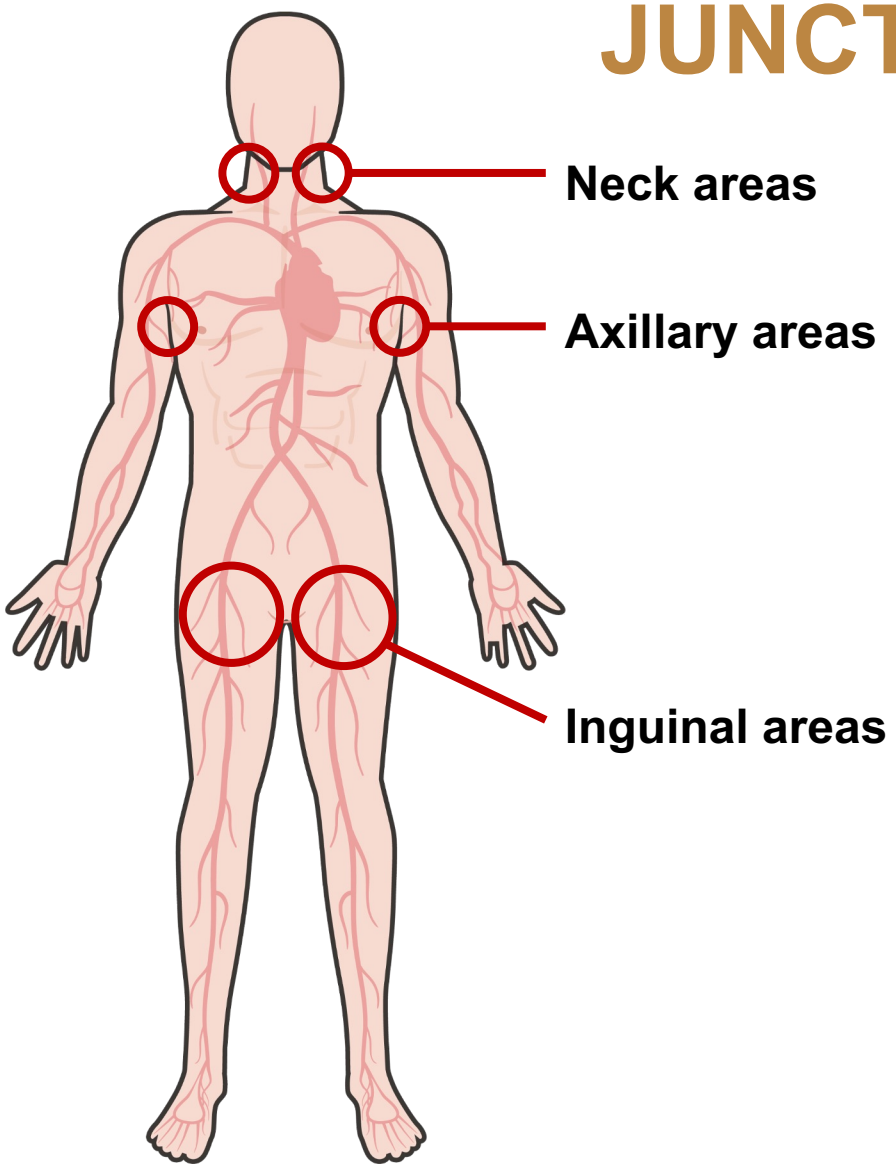
Video can be found on deployedmedicine.com

SKILL STATION

TFC Hemorrhage Control (skills)

Wound Packing With Hemostatic Dressing and Pressure Bandage

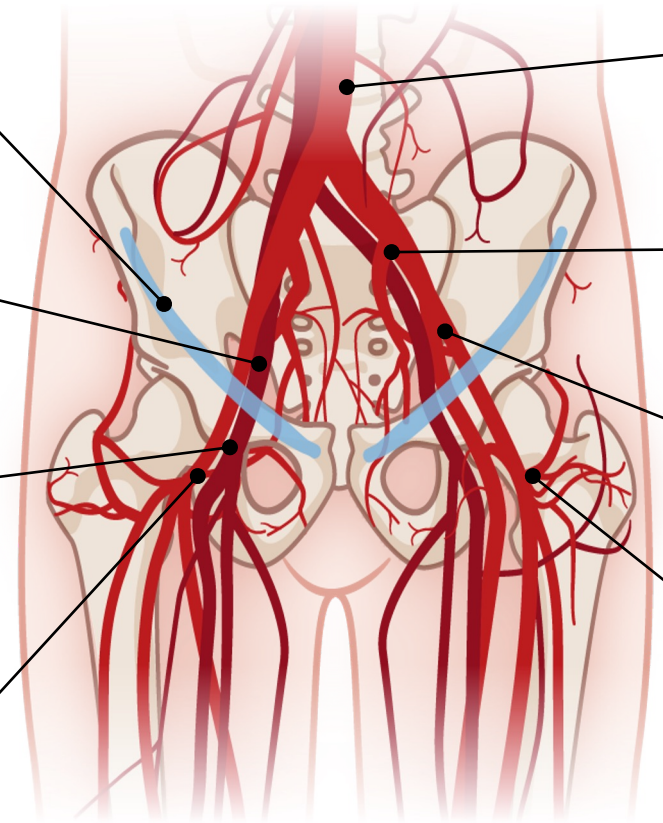
JUNCTIONAL ANATOMY



- Junctional areas are located at the **junctions of the extremities** and **neck** with the torso
- Junctional hemorrhage occurs with injury to the large blood vessels that pass through the junctional areas
- Junctional hemorrhage can also occur on the extremities if the **injury** is **TOO CLOSE** **to the torso** for a limb tourniquet to be applied

Blood vessels at **junctional areas are LARGER** than in the limbs but **can still be COMPRESSED** with direct pressure

PELVIC AND INGUINAL ANATOMY



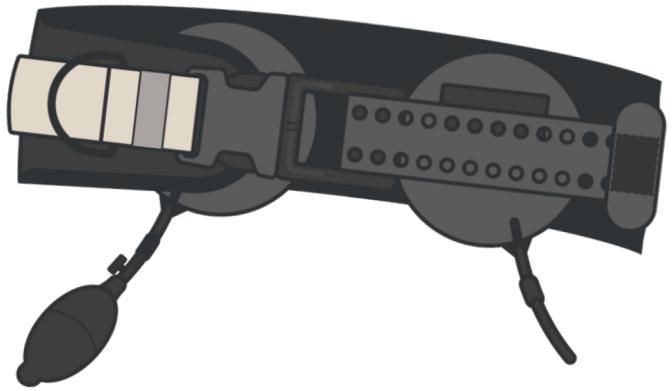
Level of Evidence: C-LD

BOTTOM LINE:

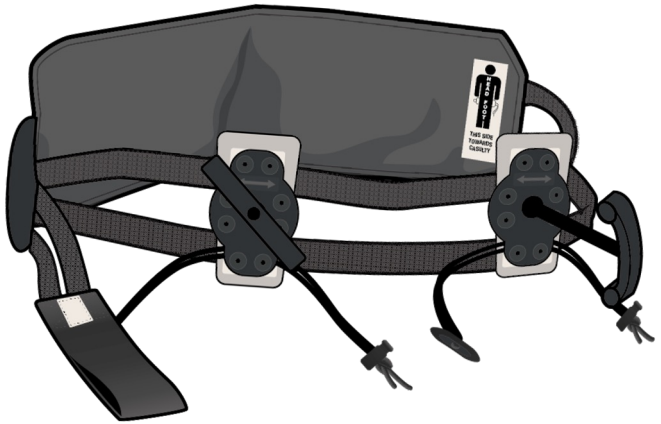
The site of lethal hemorrhage was **truncal (67.3%)**, followed by **junctional (19.2%)** and **peripheral-extremity (13.5%)** hemorrhage*

For a piece of shrapnel, the high thigh and groin are **Target Rich Environments** not covered by body armor

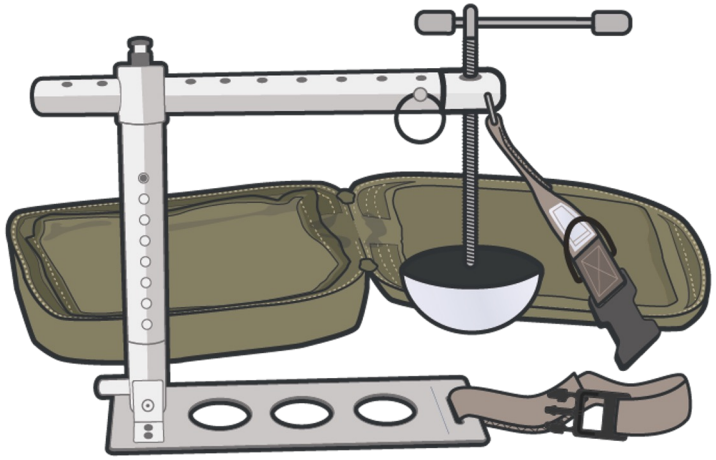
JUNCTIONAL TOURNIQUETS



SAM JUNCTIONAL TOURNIQUET



JETT JUNCTIONAL TOURNIQUET



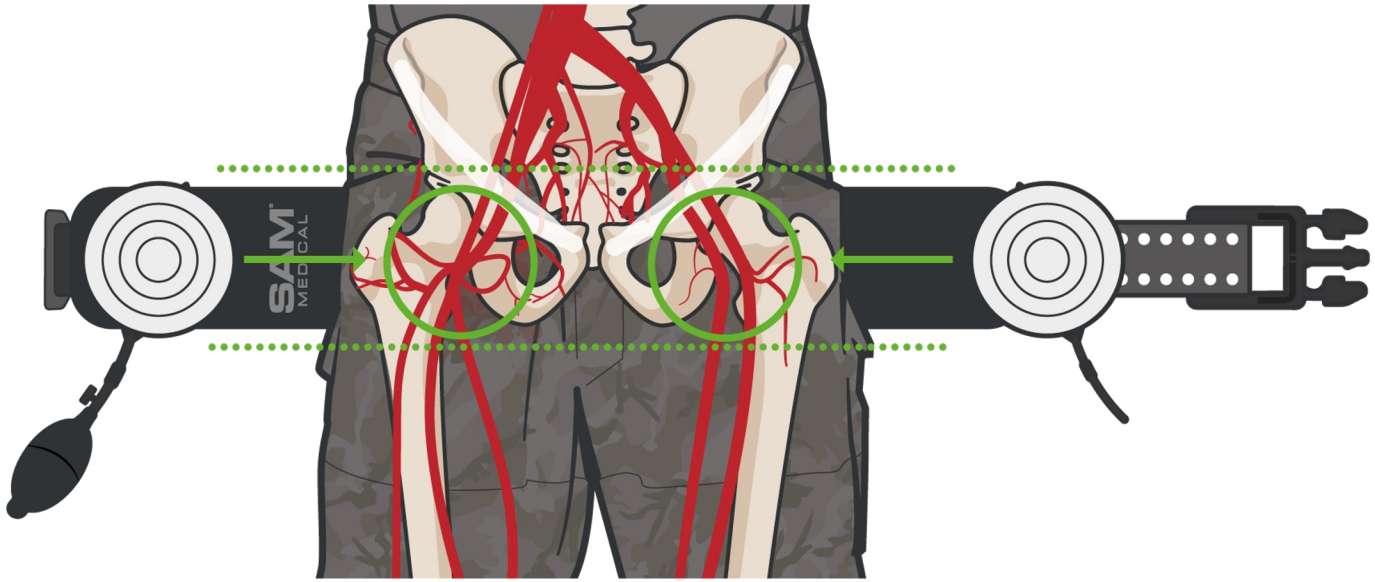
CROC JUNCTIONAL TOURNIQUET

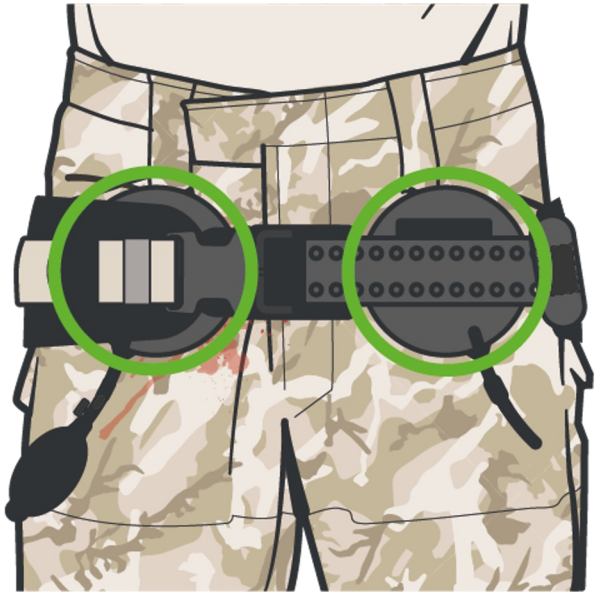
Level of Evidence: C-LD

REMEMBER Apply direct pressure and/or pack any open wounds with hemostatic dressing while preparing the junctional tourniquet

SAM JUNCTIONAL TOURNIQUET

> ⚠ Targeted compression devices (TCDs) **must** be positioned appropriately to compress the large vessels and control bleeding

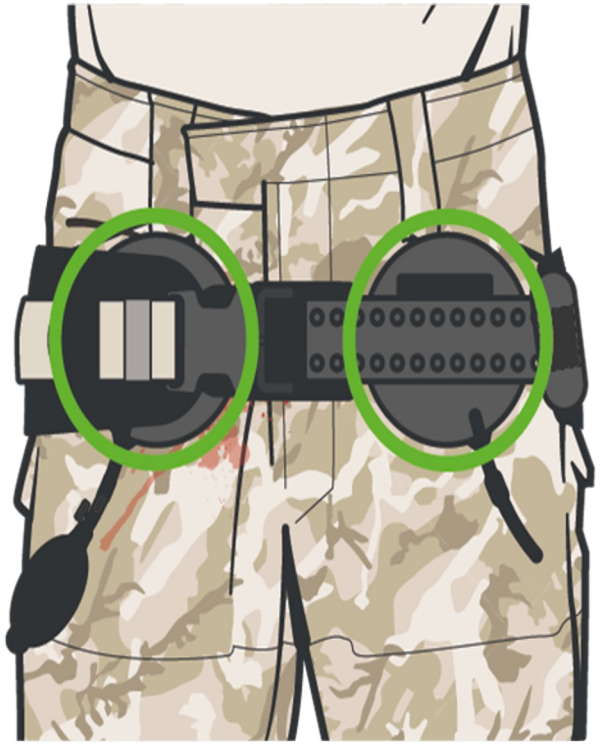




For inguinal junctional hemorrhage, the TCD(s) should be positioned over the femoral artery just below the inguinal ligament

For effective hemorrhage control, an audible click should be heard when the belt and buckle are appropriately secured; all slack must be removed from the belt before TCD inflation

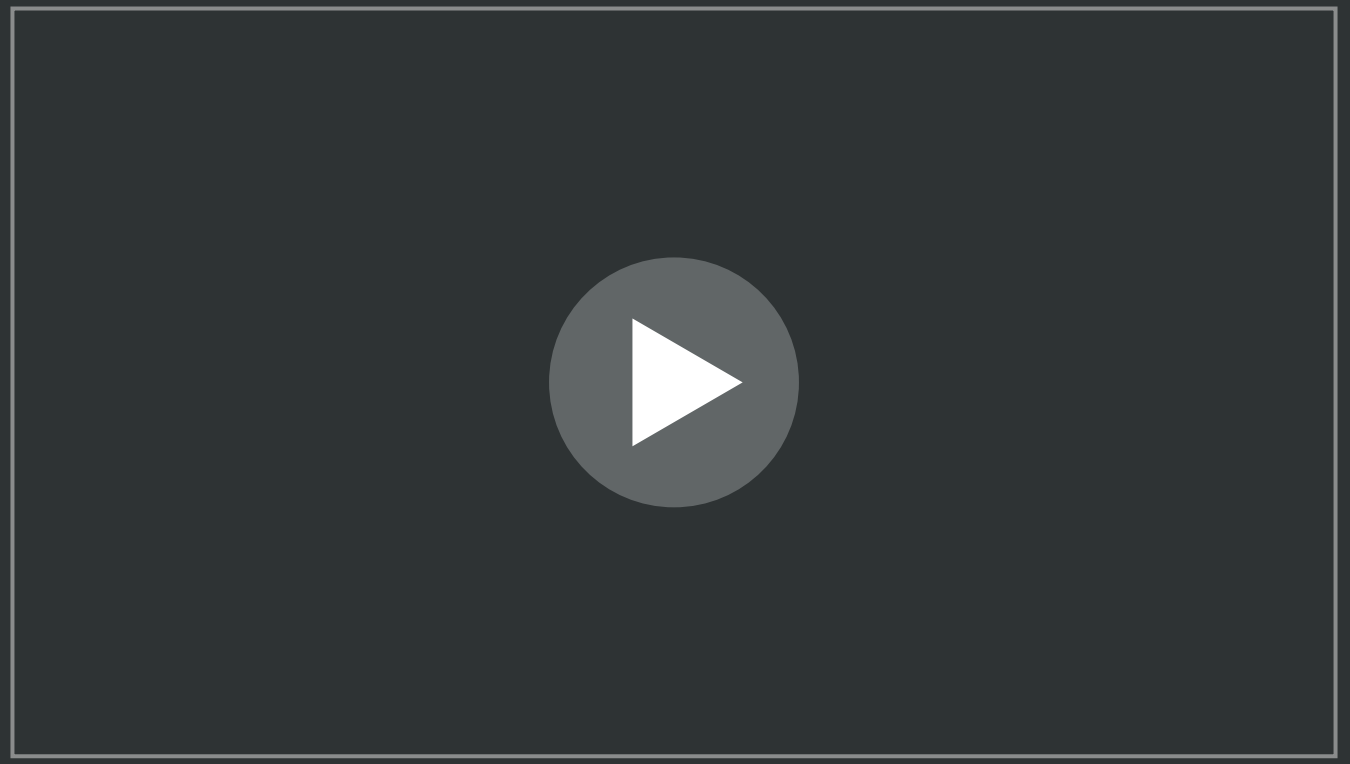
SAM JUNCTIONAL TOURNIQUET PLACEMENT



- **Inflate TCD(s)** until the hemorrhage stops and distal pulse is not longer present
- The bleeding should be stopped **WITHIN 90 SECONDS**
- When treating bilateral junctional injuries, use a second TCD following the same procedure
- **DOCUMENT** time of junctional TQ(s) placement tourniquet itself and on the DD Form 1380 TCCC Casualty Card

REMEMBER Monitor for hemorrhage control and adjust device as necessary especially after any casualty movement

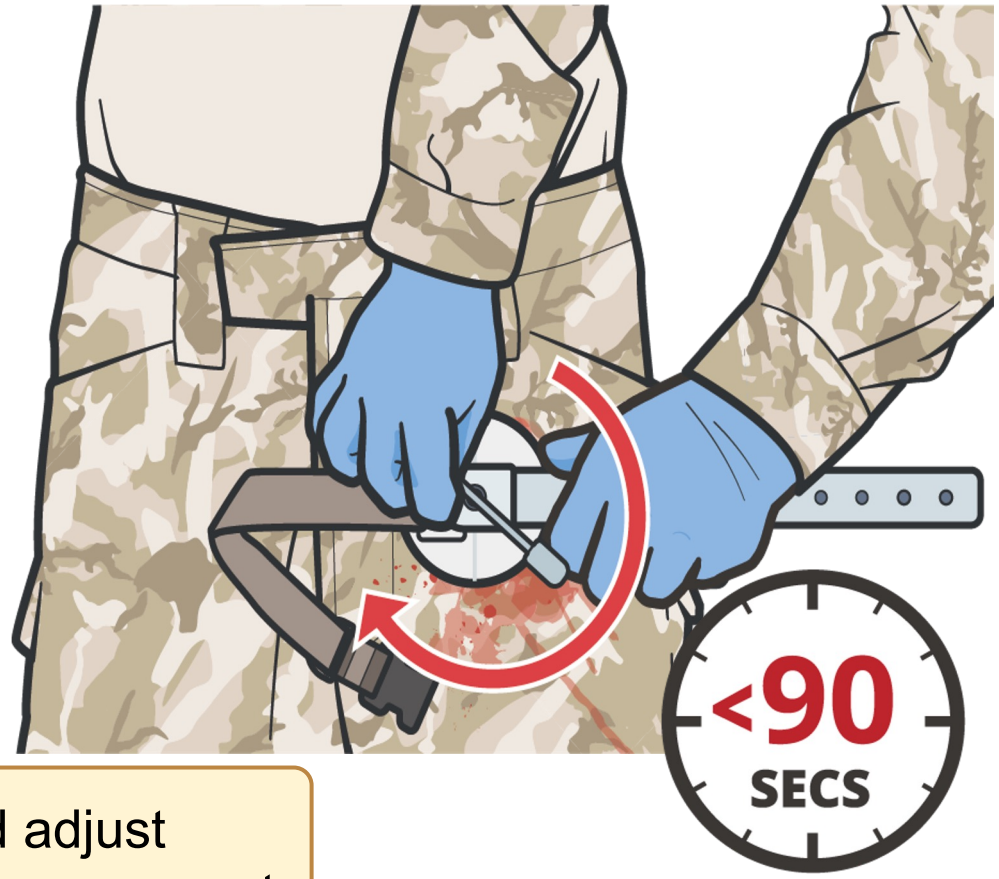
SAM JUNCTIONAL TOURNIQUET



Video can be found on deployedmedicine.com

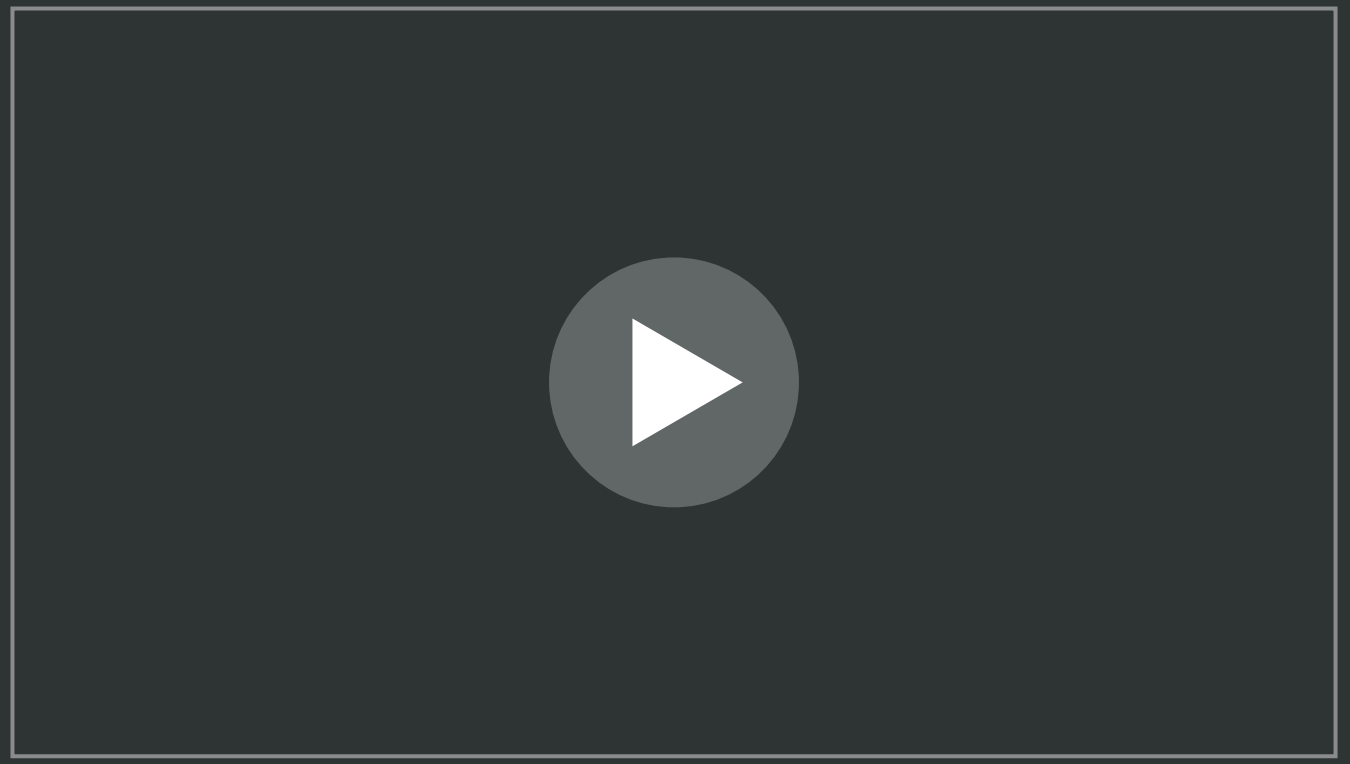
COMBAT READY CLAMP (CRoC) JUNCTIONAL TOURNIQUET

- Train regularly to maintain proficiency in the device set-up process
- **Tighten pressure disc** until the hemorrhage stops and distal pulse is no longer present
- Stop bleeding **WITHIN 90 SECONDS**
- Protect device from being moved or dislodged during casualty assessments or movements
- When treating bilateral junctional injuries, a second CRoC would be used following the same procedure
- **DOCUMENT** time of junctional TQ(s) on the casualty and on the DD Form 1380 TCCC Casualty Card



REMEMBER Monitor for hemorrhage control and adjust device as necessary especially after any casualty movement

COMBAT READY CLAMP (CRoC) JUNCTIONAL TOURNIQUET



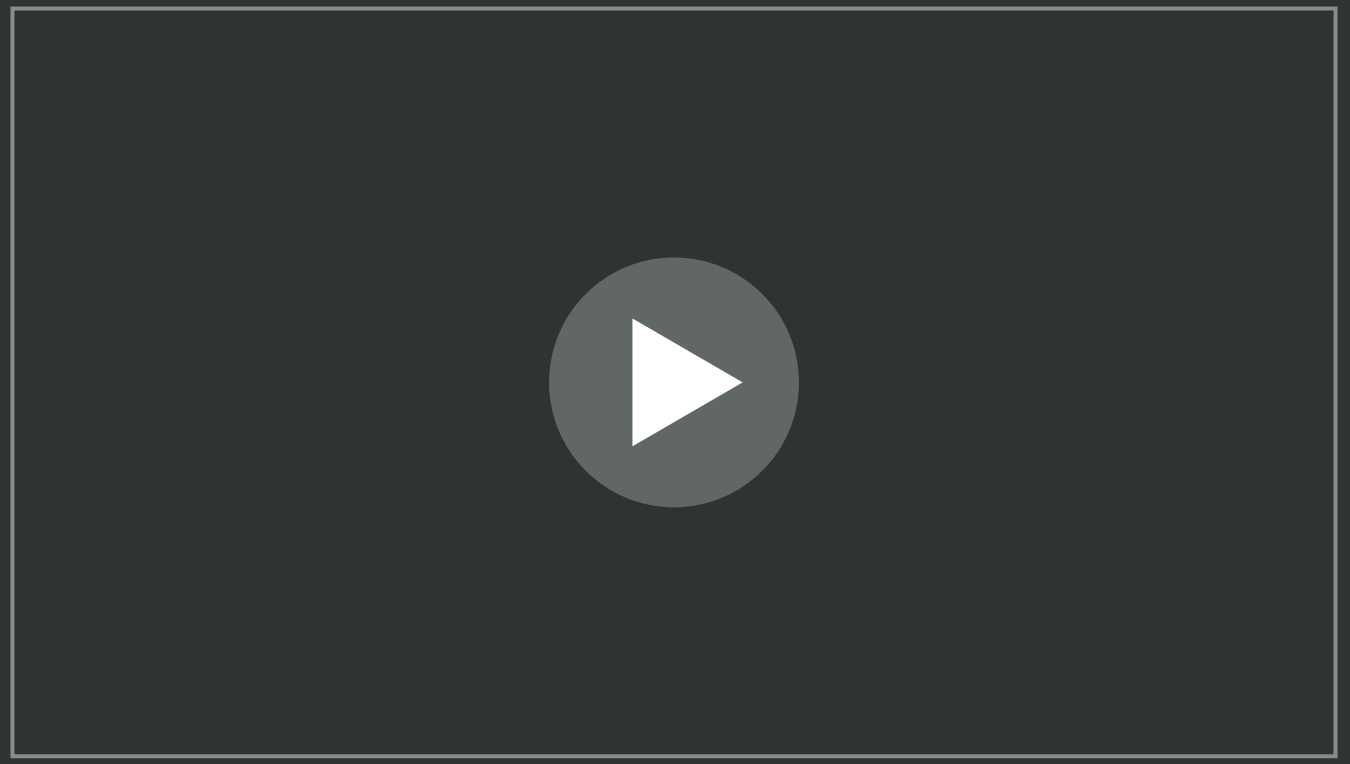
Video can be found on deployedmedicine.com

JUNCTIONAL EMERGENCY TREATMENT TOOL

- Remember to align the pressure pads at a 30-degree angle, parallel to the inguinal canal
- **Tighten pressure pads** until hemorrhage stops and distal pulse is no longer present
- Stop bleeding **WITHIN 90 SECONDS**
- For bilateral junctional injuries, repeat the same procedure on the other side
- **DOCUMENT** time of junctional TQ(s) on the casualty and on the DD Form 1380 TCCC Casualty Card

REMEMBER Monitor for hemorrhage control and adjust device as necessary especially after any casualty movement

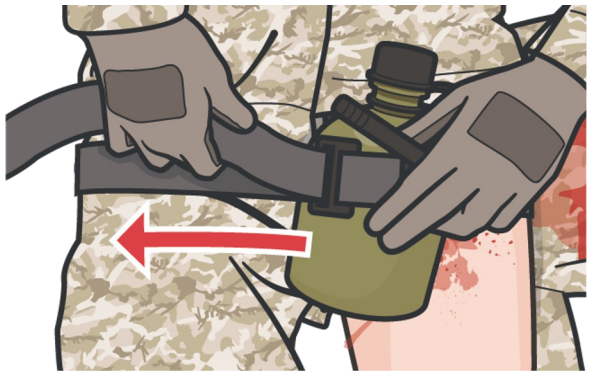
JUNCTIONAL EMERGENCY TREATMENT TOOL



Video can be found on deployedmedicine.com

JUNCTIONAL HEMORRHAGE CONTROL WITH IMPROVISED PRESSURE DELIVERY DEVICE

A **Pressure Delivery Device (PDD)** can be made by using materials such as a **shoe/boot, full water bottle, or canteen**



Pack groin injuries with hemostatic dressing and then use an **improvised PDD** for additional targeted, sustained pressure

The PDD is placed in the inguinal gutter while **MAINTAINING CONSTANT pressure** on the dressing-packed wound

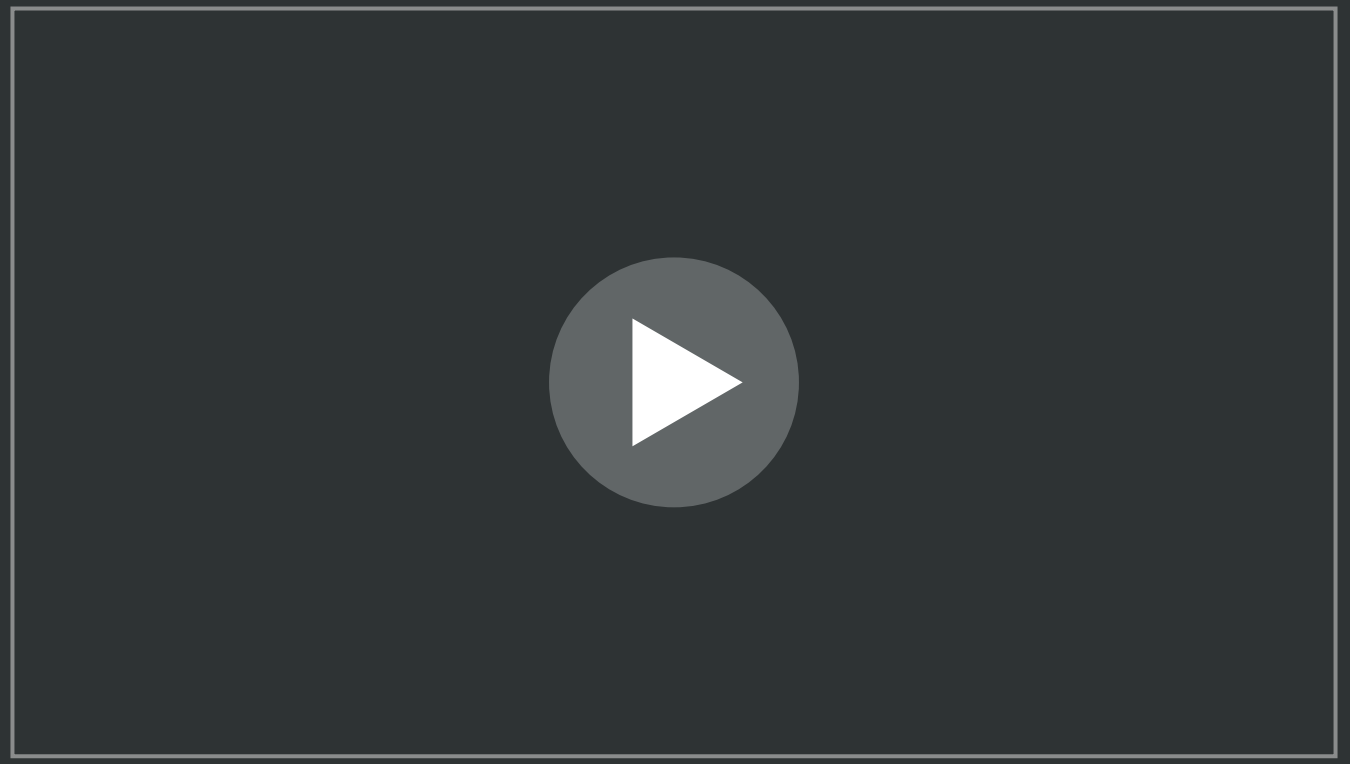
The PDD is then **secured** with a tourniquet* and **tightened** to add **ADDITIONAL** pressure

* ***Two TQs*** *may need to be joined* ***TOGETHER*** *when securing an improvised PDD*

REMEMBER Monitor for hemorrhage control and adjust device as necessary especially after any casualty movement

DOCUMENT time of Improvised PDD placement tourniquet on the casualty and on the DD Form 1380 TCCC Casualty Card

INGUINAL IMPROVISED JUNCTIONAL PDD



Video can be found on deployedmedicine.com

NECK JUNCTIONAL HEMORRHAGE CONTROL

Pack the wound with hemostatic dressing until the wound cavity is filled

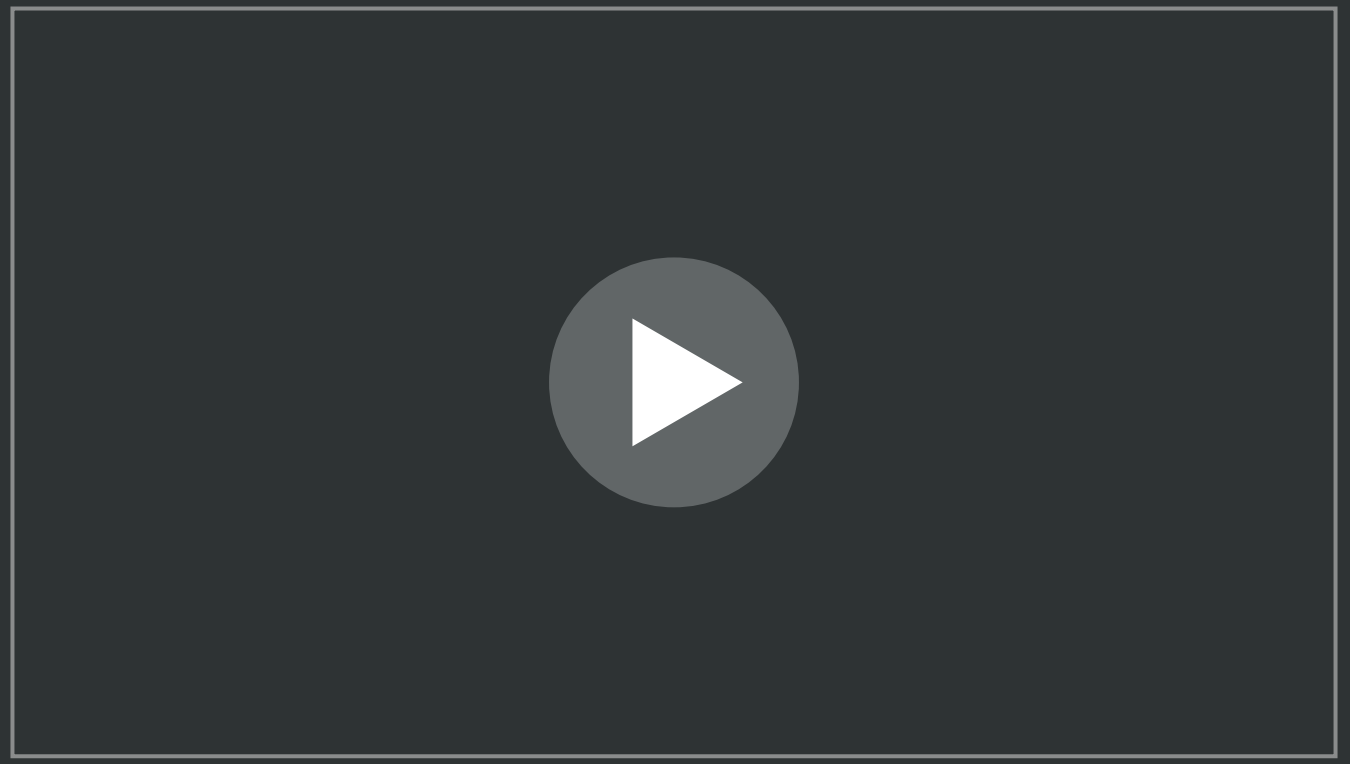
Apply firm, manual pressure for **3 MINS**

Secure with bandage
While maintaining pressure, wrap the pressure bandage diagonally across the chest under the opposite axilla

Swath the arm on the injured side

REMEMBER Monitor for hemorrhage control and adjust device as needed, especially after any casualty movement; **DO NOT FORGET** to ask other first responders to assist as needed

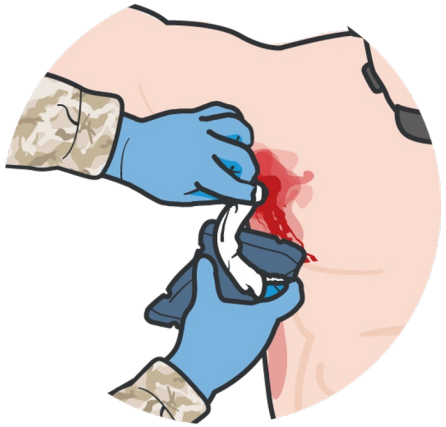
NECK JUNCTIONAL HEMORRHAGE CONTROL



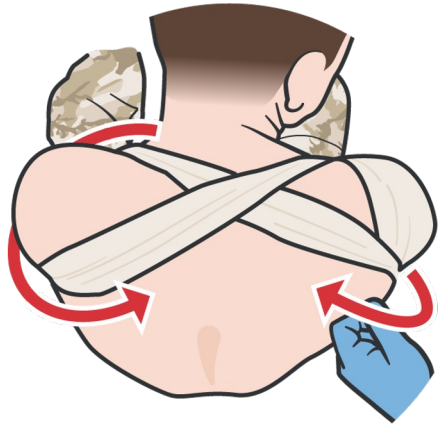
Video can be found on deployedmedicine.com

AXILLARY JUNCTIONAL HEMORRHAGE CONTROL

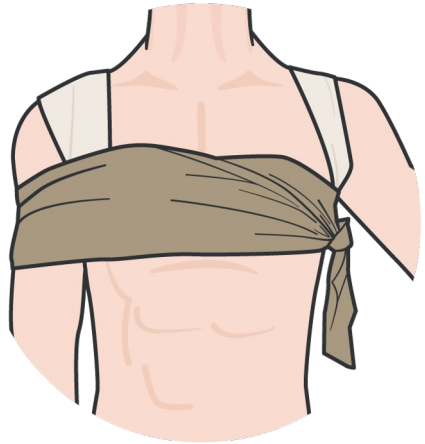
Lift the arm to expose the wound and assess the bleeding source



Pack the wound tightly with hemostatic gauze



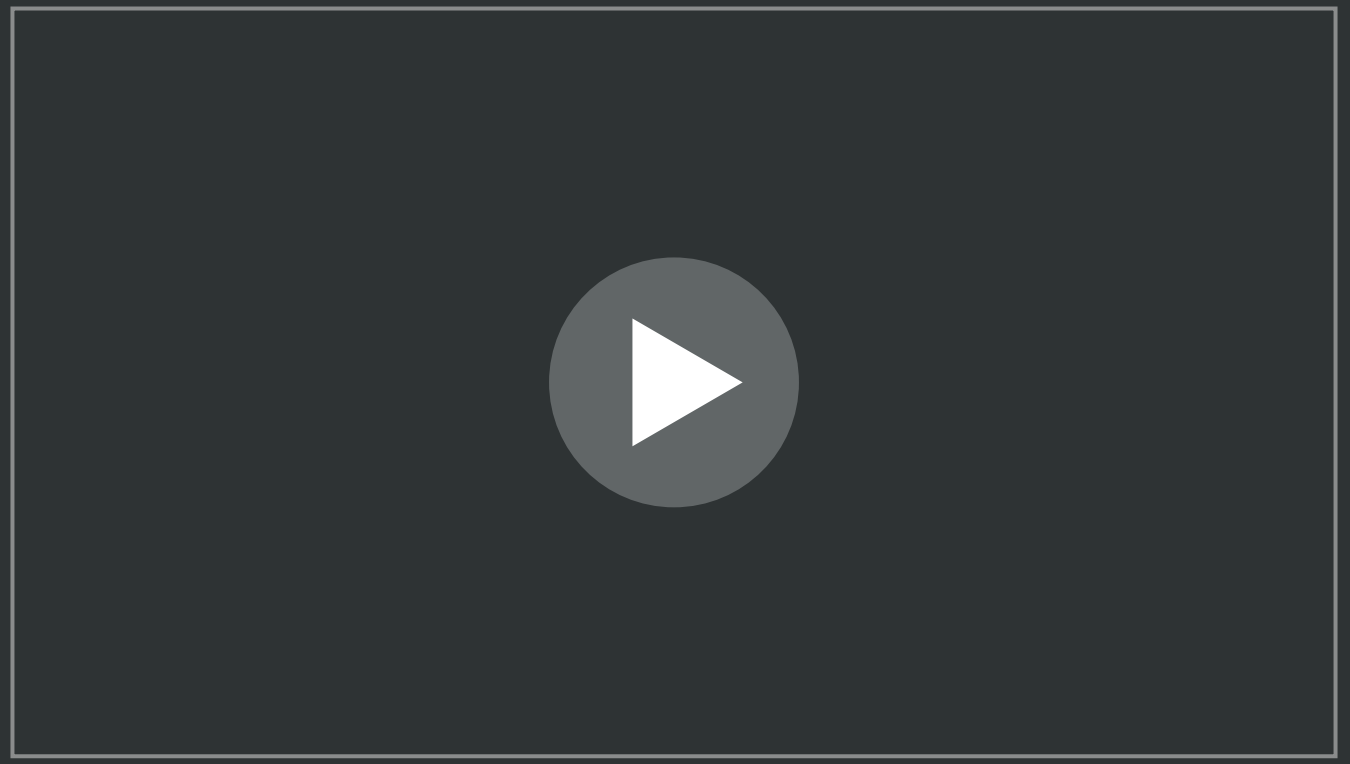
Wrap elastic bandage across, back, and under opposite axilla, anchoring around opposite shoulder



Swath the upper arm on injured side to the chest using a **cravat**

REMEMBER Monitor for hemorrhage control and adjust device as needed, especially after any casualty movement; **DO NOT FORGET** to ask other first responders to assist as needed

AXILLARY JUNCTIONAL HEMORRHAGE CONTROL



Video can be found on deployedmedicine.com

SKILL STATION

TFC Hemorrhage Control (skills)

- Inguinal Hemorrhage Control With Commercial Junctional Tourniquets
- Inguinal Hemorrhage Control With Improvised Junctional Pressure Delivery Device (PDD)
- Neck Junctional Hemorrhage
- Axillary Junctional Hemorrhage Control

INJECTABLE HEMOSTATIC AGENT: XSTAT

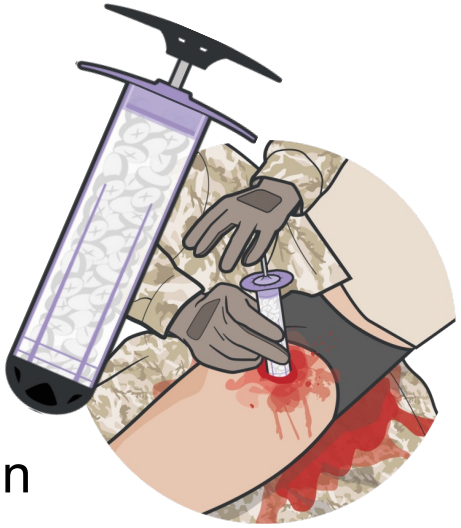
XSTAT contains flat, circular, compressed mini-sponges that are coated with chitosan and packaged in an applicator

- Sponges expand on contact with blood
- Best suited for narrow tract and junctional wounds
- XStat is **NOT** indicated for use (*in thorax, pleural cavity, mediastinum, abdomen, retroperitoneal space, sacral space, above the inguinal ligament, and tissues above the clavicle)*

Level of Evidence: C-LD

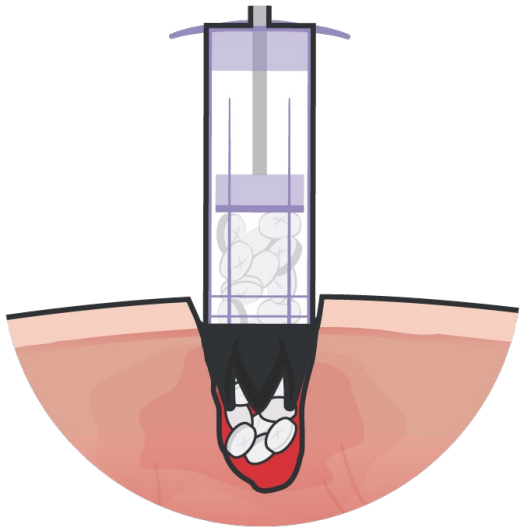
Benefits of XSTAT use:

- Rapid Hemostasis
- Ease of application
- Manual Pressure not required
- Radiopacity of identification

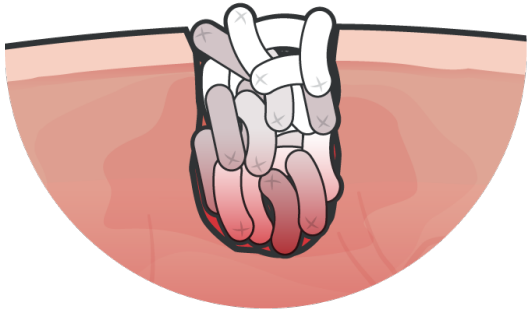


XSTAT is designed to control severe bleeding in traumatic wounds, particularly in situations where standard methods like direct pressure and tourniquets may be insufficient or impractical.

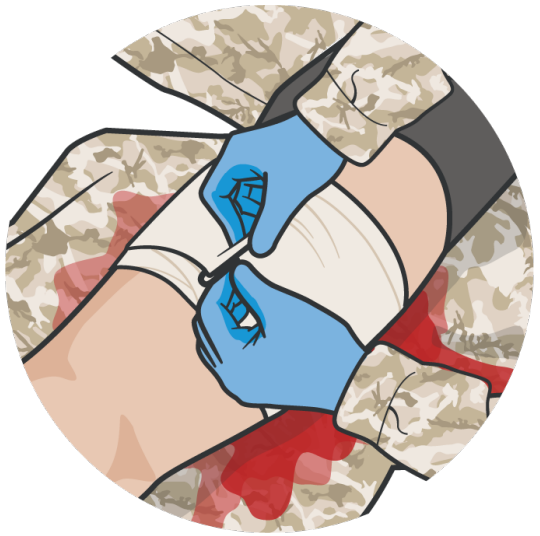
INJECTABLE HEMOSTATIC AGENT: XSTAT



- Insert applicator tip into the wound as close to the bleeding source as possible
- Deploy the mini-sponges into the wound tract or cavity



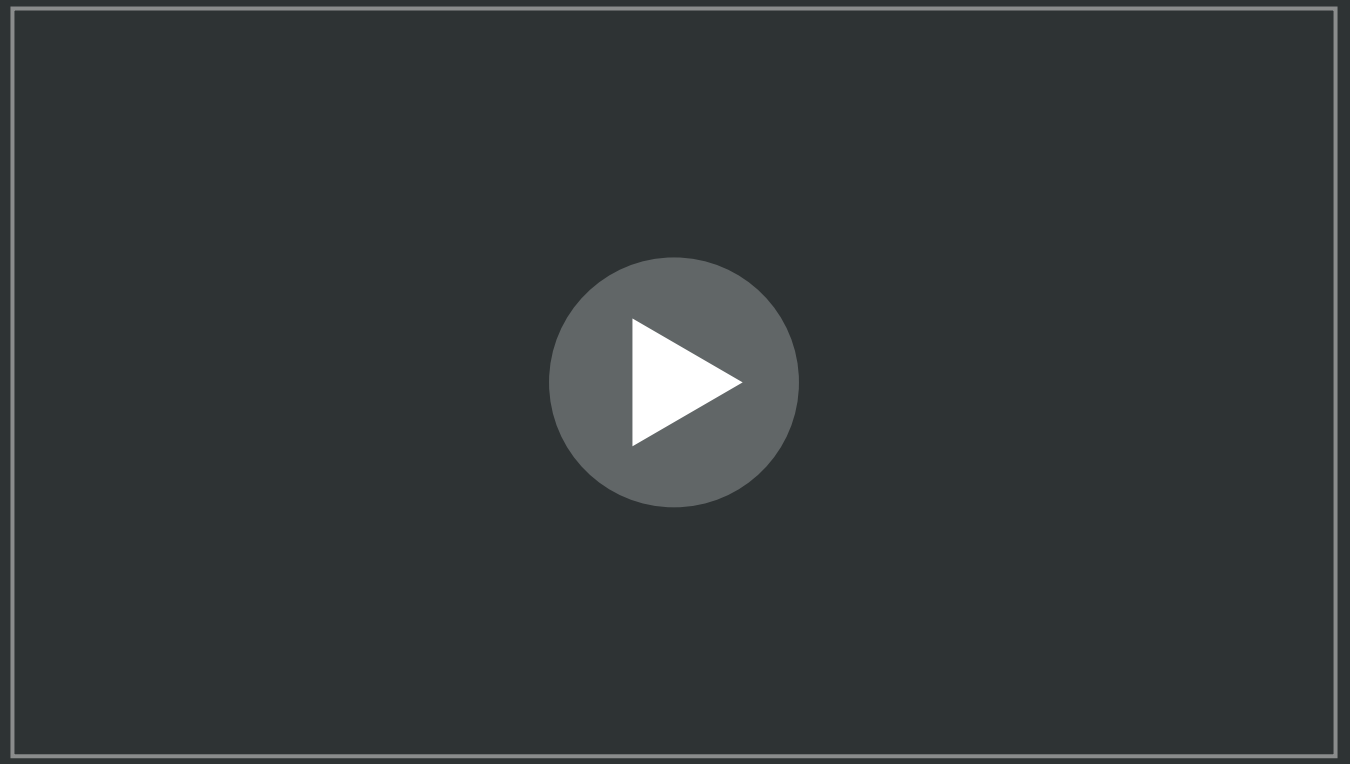
- Pack into the wound tract to the same density you would gauze
- Use additional applicators as necessary to completely pack the wound cavity/tract



- Apply manual pressure over the wound for 3 minutes until bleeding is controlled and apply a pressure bandage

⚠ **DO NOT** attempt to remove sponges in the field

INJECTABLE HEMOSTATIC AGENT (XSAT) VIDEO

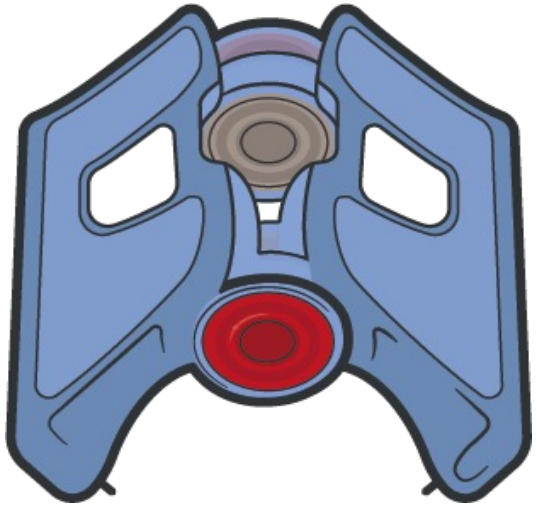


Video can be found on deployedmedicine.com

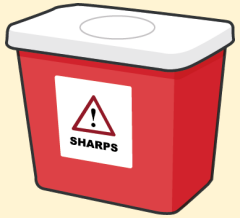
WOUND CLOSURE DEVICE

iTClamp is a **WOUND CLOSURE DEVICE** that can be used in conjunction with other hemorrhage control interventions e.g., wound packing or hemostatic agents

- Best suited for scalp, neck, or extremity, but can be used on some junctional wounds in the groin or axilla
- If applied to the neck, monitor casualty's airway and consider a definitive airway
- Wound is longer than 5cm (2 inches), additional iTClamps should be placed end to end in series



Several studies have demonstrated the **effectiveness** of the **iTClamp**, including a 2018 review that found **245 reported** uses, of which **81% achieved adequate control** of bleeding, **8% failed to control** bleeding, and **11% did not mention** bleeding control.



SHARPS HAZARD:
Handle with care to avoid injury and dispose of properly

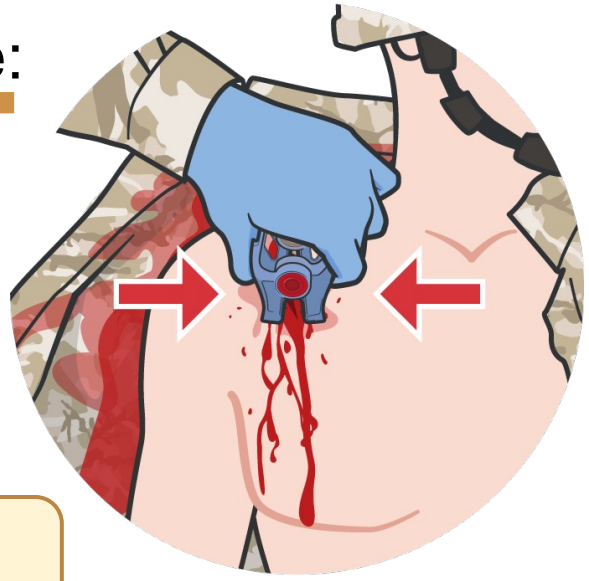
WOUND CLOSURE DEVICE

Benefits of **iTClamp** use:

- Rapid Application
- Versatile Use
- Alternative to Tourniquets

CAUTION:
Do not use near the eye

Level of Evidence: B-NR



iTClamp Mechanism of Action:

- The iTClamp consists of two opposing arms with interlocking prongs that close around the wound, providing immediate and effective hemostasis.
- Creating a temporary bridge over the wound, sealing the edges together and applying direct pressure to control bleeding.
- This seal creates a hematoma that tamponades injured vessels via hydrostatic pressure to replace direct pressure on the injured vessel

SKILL STATION

TFC Hemorrhage Control (skills)

- Inguinal Hemorrhage Control With Commercial Junctional Tourniquets
- Inguinal Hemorrhage Control With Improvised Junctional Pressure Delivery Device (PDD)
- Neck Junctional Hemorrhage Control
- Axillary Junctional Hemorrhage Control

SKILL STATION

TFC Hemorrhage Control (skills)

- Injectable Hemostatic Agent Application
- Wound Closure Device Application

EVIDENCE SUPPORTING MASSIVE HEMORRHAGE CONTROL STRATEGIES

Subject Category	Study Types	Level of Evidence
Early Control of Severe Hemorrhage	Meta-analysis of nonrandomized studies, observational studies, registry, lab evaluations and case studies	**B-NR**
Hemostatic Dressings and Adjuncts	Lab evaluation observational study with limitations	**C-LD**
Wound Packing and Pressure Bandages	Lab evaluation observational study with limitations	**C-LD**
Junctional Tourniquets	Meta-analysis of retrospective observational or Lab evaluation observational study with limitations	**C-LD**
Improvised Tourniquets	Lab evaluation observational study with limitations	**C-LD**
Injectable Hemostatic Agents	Meta-analysis of retrospective observational or Lab evaluation observational study with limitations	**C-LD**
Wound Closure Device	Retrospective observational study	**B-NR**

ASSESSING THE EVIDENCE FOR GUIDELINES

Level of Evidence	AHA Recommendation System Terminology Explanation	Why the AHA Classification System?
A	Evidence from multiple randomized clinical trials (RCT) with concordant results or from **HIGH-QUALITY** meta-analyses.	• The level of evidence recommendations allow readers to quickly glean information on the strength, certainty, and quality of evidence supporting each recommendation. • A recommendation with Level of Evidence (LOE) C does not imply that the recommendation is weak. • Although, RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.
B-R	Evidence from moderate-quality trials, or a meta-analysis of moderate quality (RCT) followed by an R to denote **RANDOMIZED** studies	
B-NR	Evidence from moderate-quality trials, or a meta-analysis of moderate quality followed by NR to denote **NON-RANDOMIZED** studies	
C-LD	There is no convincing evidence and is followed by LD to indicate **LIMITED DATA**	
C-EO	There is no convincing evidence and is followed by EO if the consensus is based on **EXPERT OPINION**, case studies or standards of care.	

SUMMARY

Knowledge Topics

- Identify life-threatening hemorrhage
- Identify the importance of early application of limb tourniquets to control life-threatening bleeding in TFC
- Identify anatomical sites for applying direct and indirect pressure to control bleeding
- Identify risks associated with applying an improvised limb tourniquet
- Identify evidence on aggressive use of TQs and hemorrhage control devices

Skills and Abilities

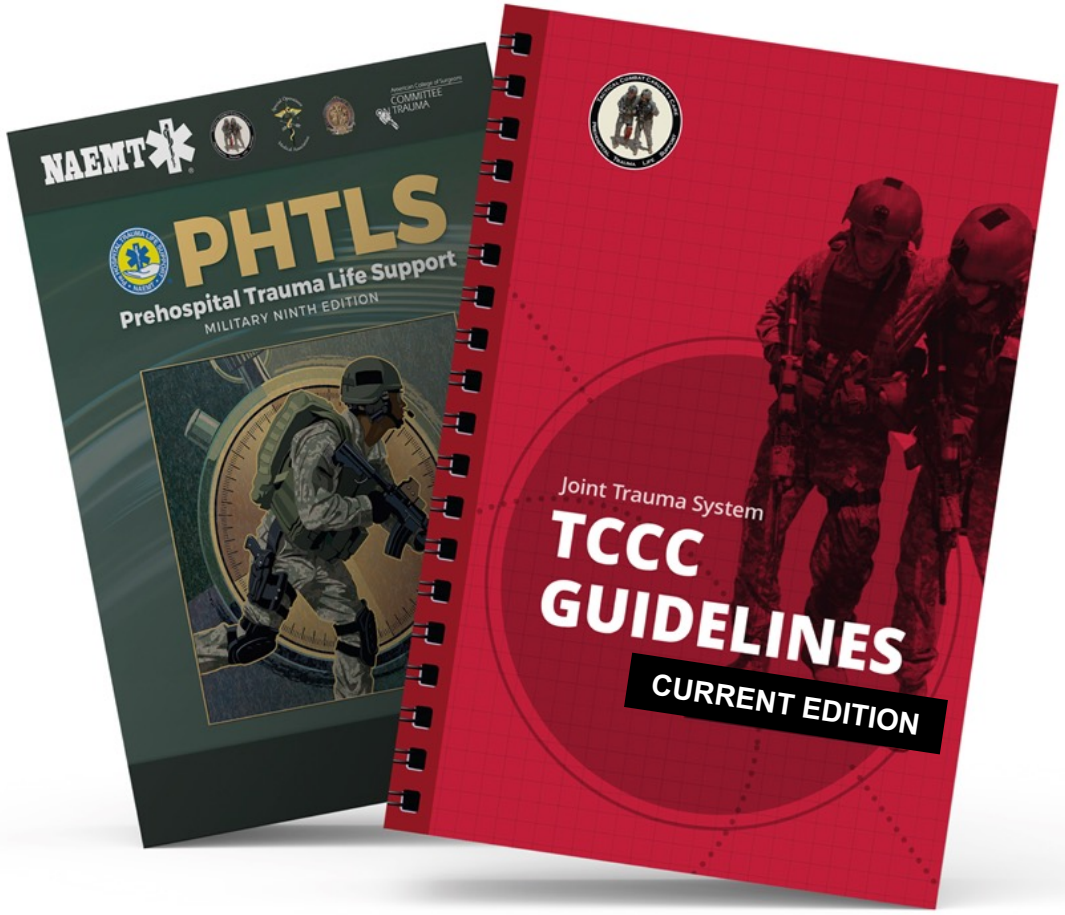
- CoTCCC-Recommended limb TQ application
- Improvised limb TQ application
- Wound packing and pressure dressing with Hemostatic gauze application
- Improvised junctional hemorrhage control with hemostatic dressing and direct pressure
- CoTCCC-recommended junctional tourniquet application
- Injectable hemostatic agent application
- Wound closure device application

CHECK ON LEARNING

- What is the proper distance a deliberate tourniquet should be placed from the bleeding site in TFC?
- What are the differences between the high & tight tourniquets used in Care Under Fire and the deliberate tourniquets placed in Tactical Field Care?
- How long should direct pressure be applied onto packed hemostatic dressings?
- Why is it important to check the pulse after applying a pressure bandage?
- What is junctional hemorrhage and how is it treated?
- Injectable hemostatic agent is contraindicated in which types of wounds?

ANY QUESTIONS?

REFERENCES



TCCC: Guidelines

by JTS/CoTCCC

These guidelines, updated regularly, are the result of decisions made by CoTCCC in exploring evidence-based research on best practices.

PHTLS: Military Edition, Chapter 25

by NAEMT

Prehospital Trauma Life Support (PHTLS), Military Edition, teaches and reinforces the principles of rapidly assessing a trauma patient using an orderly approach.

EVIDENCE BASED INJECTABLE HEMOSTATIC AGENT: XSTAT

- Priority must be placed on interventions, procedures, and training
- In response multiple novel and effective junctional tourniquets have been developed
- There is presently insufficient evidence to make a recommendation for which of the three cleared devices is the optimal choice for junctional hemorrhage control

Level of Evidence: 1C