Top 10 Tips to Avoid Trouble with Tourniquets

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EMS State of the Science

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Beware of the Tourniquet!

• “...tourniquets are an invention of the Evil One, and it is no exaggeration to say that many limbs have been lost during this campaign by the indiscriminate use of them.”

-Major Blackwood, Physician, Royal Army Medical Corps, 1916 (WW 1): “Treatment of Wounds from Trench to Field Ambulance”

J R Army Med Corps 2001;147:230
Should we use tourniquets in civilian EMS?

- They are good for the military
- They are good for the surgeons
- They are good for the patients

- So, why not civilian EMS?
Should we use tourniquets in civilian EMS?

- They are good for the military
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**YES!**

- So, why not civilian EMS?
Is this a military or civilian injury?
Military Use:

- *Every soldier* issued a tourniquet
- Trained to use it (Combat Lifesaver Course)
- Self and Buddy Aid

If they can do it, so can you!
Routine EMS Tourniquet Use Algorithm

**Civilian EMS**

Tourniquet Use Algorithm

Significant Extremity Bleeding with Need for Other Interventions?

**Yes**

- Apply tourniquet to the bleeding limb(s) on proximal segment

**No**

- Transport ≥ 30 minutes expected

**Yes**

- Reassess tourniquet for removal

**No**

- Leave tourniquet on and transport

Taillac P and Doyle G: Tourniquet First! *JEMS*, October 2008 (suppl).
#2: Use a *real* tourniquet

**Improvised tourniquets...suck!**

- Belt, cravat/stick, twine, etc.
  - Less effective
  - Nerve/muscle injury more likely
  - Sharp edge / Narrow girth
  - Very high pressure needed to occlude arterial flow
#2: Use a *real* tourniquet

**Blood Pressure Cuff as Tourniquet**

- Safe and can be effective, BUT
- Difficult with mangled / amputated limb
- Not designed to hold high pressures
- You need it to check BP!
Best Tourniquet?

- Combat Application Tourniquet (CAT)
  - Windlass
  - Smaller, lighter
  - Fielded by the military
  - Best for prehospital

Best Tourniquet?

- Emergency and Military Tourniquet (EMT)
  - Pneumatic
  - Wider
  - More comfy
  - Larger/heavier
  - More complicated
- Best for emergency departments

#3: Use it early

Civilian Prehospital Recommendations:

- Significant extremity hemorrhage with need for other interventions:
  - Apply tourniquet during primary survey
  - Complete A,B,Cs
  - Then when time, hands, supplies available:

  *Medic may reassess tourniquet for possible replacement with pressure dressing*

#3: Use it early

Pressure Dressings

- Excellent, effective **first line treatment for extremity hemorrhage**
- But...to apply well:
  - Takes time
  - Takes hands
  - Takes supplies
- Difficult with mangled extremities or partial / complete amputations
#3: Use it early

Tourniquet provides:

- Rapid (30 seconds or less) hemorrhage control

- THEN, you’re freed to continue on to:
  - Other patients (multiple patient scene triage)
  - Other priorities (A,B,C) in a single, multiply-injured trauma patient
#3: Use it early

U.S. Army CSH Baghdad

- **Survival** with tourniquet use:
  - Applied BEFORE patient in shock: 96%
  - Applied AFTER patient in shock: 4%
  - Applied PREHOSPITAL: 89%
  - Applied IN ED: 78%

*Much better outcome when tourniquet applied prehospital and before shock develops*
#4: Remove it soon (if you can)

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60 – 90 minutes clearly safe, sooner is better
Tourniquet Reassessment (By Medic)

Taillac P and Doyle G: Tourniquet First! JEMS, October 2008 (suppl).
Tourniquet Removal
(By Medic!)

Taillac P and Doyle G: Tourniquet First! JEMS, October 2008 (suppl).
#5: Use it effectively

- Apply several centimeters above wound
- Don’t apply over joint
- Must completely eliminate distal pulse
  - Avoid the “venous tourniquet”
  - Continued arterial inflow, no venous outflow
    - Increased bleeding
    - Increased edema
    - Increased compartment syndrome
#6: Width matters

- Wider tourniquets require less force, distributed over a larger surface area, to compress the artery.
- Less tissue damage
- Less pain
- Best for thigh use

![Graph showing occlusion pressure versus ratio of tourniquet width to limb circumference.](image)


Clin Orthop 1993;286:257
#7: Two can be better than one

- Placed side by side
- Increased effectiveness from 82% to 92%

Kragh, J Trauma 2008;64:S38–50
#8: Use Pain Control

- Tourniquets hurt!
- Morphine, fentanyl, etc.
- Avoid this technique
#9: Make them obvious

- **Mark it!**
  - Brightly colored cloth
  - Don’t cover with clothing
- **Sharpie to the patient’s forehead**
  - Time of application
- **Advertise it!**
  - Tell the next provider it’s there
  - Tell the patient to tell EVERYONE that it’s there
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#10: Dialysis fistula bleeding

- If direct pressure fails...
- Safest to place very proximally, away from the fistula
- Tighten to effect only
- May result in fistula thrombosis!
Cardiac Remote Preconditioning

- NO soldiers died of a STEMI after receiving tourniquet!

(I was paying attention, Dr. Valenzuela)
Back to the Future...

- The tourniquet is “to be regarded with respect because of the damage it may cause, and with reverence because of the lives it undoubtedly saves. It is not to be used lightly in every case of a bleeding wound, but applied courageously when life is in danger.”

Bailey, H. Surgery of Modern Warfare, E&S Livingstone; Edinburgh, 1941
Practice makes perfect…

Questions?

Lesson learned:
Tourniquets work better on limbs.