




## Advancing Perfusion Therapies for Extremity Ischemia: Extending the Window for Limb Salvage


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### Disclaimer

The views expressed in this presentation are those of the author and do not necessarily reflect the official policy or position of the Department of the Army, the Department of Defense, nor the U.S. Government.

Disclosures: None



### Large Scale Combat Operations

- Peer or Near-Peer Adversary
- Loss of air superiority/delayed evacuations
- Potential for 100s-1000s of casualties per day

**Casualty Care Implications of Large-Scale Combat Operations (LSCO)**

**LSCO**

- 100,000+ personnel advanced militaries

**Examples:**

- World War I
- Russia-Ukraine War
- Operation of Israel (2023/2024)

**Medical Multi-Domain Operations (MDO)**

- Integrated Field Care
- Triage
- Blood Products
- Damage Control Surgery
- Respiratory Capacity
- Definitive Care

**Requires:** Integrated MDOs with civilian and federal health systems


**Requirements:**

- Integrated Field Care
- Triage
- Blood Products
- Damage Control Surgery
- Respiratory Capacity
- Definitive Care

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### Tourniquet

**Survival With Emergency Tourniquet Use to Stop Bleeding in Major Limb Trauma**

COE, Alan F. Knapik, Jr., MC, USA; Thomas J. Holroyd, PhD; David G. Bone, PhD; LTC Charles J. Fox, MC, USA; Charles E. Wade, PhD; Jose Salinas, PhD; and COL John R. Robinson, MC, USA

*(Ann Surg 2009;249: 1-7)*

- Improved survival without increase in limb loss
- 'Golden Hour' paradigm of evacuation

**A brief history of the tourniquet**

David B. Wilkins, MD; Patrick L. McKay, MD; Todd E. Rosman, MD; and Thomas M. Shah, MD; Military, US and For Your Defense, Inc.

JVS 2012

**17th Century TQ**

**Tourniquet Problems in War Injuries**

MAJOR LUTHER E. WOLFF  
 Medical Corps, Army of the United States


**Captain Theodore P. Adams**  
 Medical Corps, Army of the United States

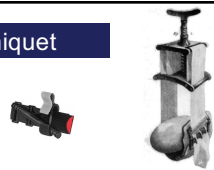
THE BULLETIN OF THE U.S. ARMY MEDICAL DEPARTMENT April 1941

MILITARY MEDICINE, Vol. 112, 234, 2023



**Misuse of Tourniquets in Ukraine may be Costing More Lives and Limbs Than They Save**


Ross A. Stevens, MD; Michael E. Baker, MD, FACS; Jonathan B. Zubeck, MD, Lt UKR; Michael Saratolova, MD, FACS





## Hemorrhage vs. Ischemia

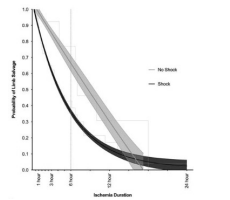


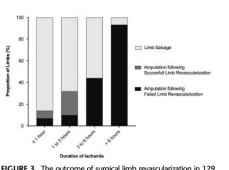
### Shock + Major Extremity Vascular Injury

**Impact of Ischemia Duration on Lower Limb Salvage in Combat Casualties**


Ann Surg 2022

Zane B. Perkins, PhD; Alexander J. Kerney, MD; Joseph M. White, MD; Alvaro L. Lavin, MD; Brandon W. Propp, MD; Nigel R.M. Fox, MD; and Todd E. Rosman, MD





**FIGURE 3.** The outcome of surgical limb revascularization in 129 ischemic limbs following a traumatic arterial injury to the ilio-femoral-popliteal axis, according to the duration of limb ischemia.








> *J Spec Oper Med.* 2024 Mar 13:V057-2PCH doi: 10.55460/v057-2PCH. Online ahead of print.

**Life Over Limb: Why Not Both? Revisiting Tourniquet Practices Based on Lessons Learned From the War in Ukraine**

Jessica L. Patterson, Robert T. Bryan, Michael Turconi, Andrea Leiner, Timothy P. Placatt, Lori L. Rhodes, Luke Soull, Stephen Donnelly, Christopher W. Reynolds, Joseph Loucas, Andrew D. Fisher, Tara Kuthir, Valeri Artemenko, Kevin R. Ward, John B. Holcomb, Florian F. Schmitzberger

PMID: 38300880 DOI: 10.55460/v057-2PCH

- Can Controlled Extremity Reperfusion (in vivo and ex vivo) help us buy more time for limb salvage?
- Applies to traumatic vascular injury and age-related extremity ischemia
- 'LimbEx'
  - Macro/microvascular reperfusion
  - Controlled Reoxygenation
  - Blood filtration
  - Therapeutic hypothermia
  - Targeted drug delivery

Thank you

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