RAMBAM Health Care Campus

Lessons Learned on Treating Major Military and Civilian Vascular Trauma from the October 7th Attack on Israel and its Combat Aftermath

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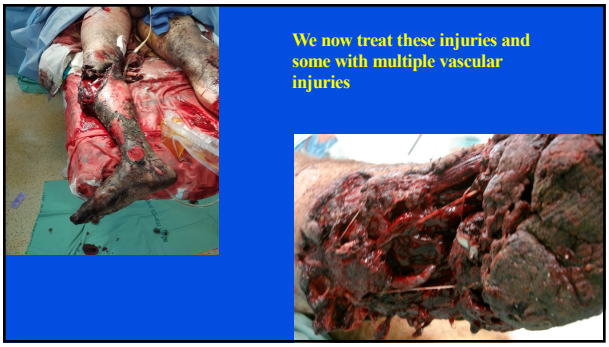
Military and Civilian Vascular Trauma

- The incidence of combat vascular injuries in trauma and terror is increasing: from 0.2-4% in Vietnam *(DeBakey M, Rich N, Mattox W)* to 6-8% in Iraq and Afghanistan *(Clause, Starnes, Rasmussen TE)* and recently up to 10-12%.
- The reason is primarily due to a change in weaponry (from guns to explosive devices, missiles and recently drones) as well as medical care (in the battlefield and hospitals).

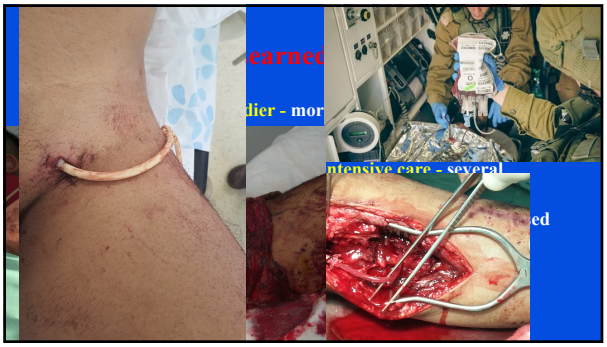


Military and Civilian Vascular Trauma

- Dead: 1,886
  - Soldiers: 849 Civilians: 1047 5% Medical staff
    Women 372, Children 103, elders 96
- Wounded: 21,307
  - Soldiers 11,309 Civilians: 9,992
  - Severe: 3,005 (~14%)
- Case Fatality Rate: 6.7%

Injuries According to Anatomy

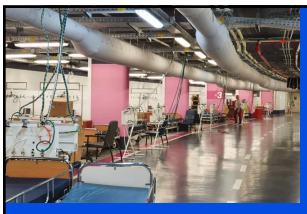
- Head & Neck 12%
- Abdomen & Pelvis 13%
- Upper Extremities 24%
- Lower Extremities 51% 75%
- 91% penetrating injuries



Lessons Learned - Hospital

- Fortified underground emergency hospital
- Triage and distribution officers
- Equipment trolleys
- Liberal use of CTA
- Enforced surgical teams
- Multidisciplinary team work

A 2,000 bed, fully equipped, fortified underground emergency hospital

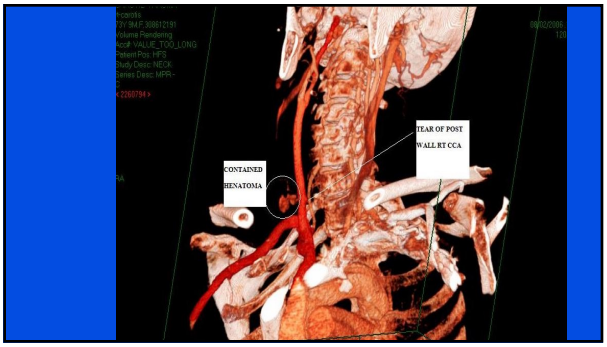


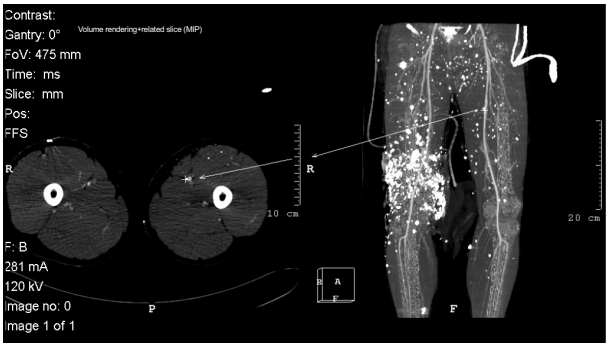
Vascular assessment

- Check for hematoma (bleeding). Hard and soft signs
- Check for pulses (ischemia). Use a hand held Doppler
- Liberal use of CTA for diagnosis and treatment choice
- Choose treatment option. Truncal – endo, Extremities-open
- Setting treatment priorities. Mostly, vascular team first. In extremities as well, unless comminuted and unstable extremity, followed by orthopedic and plastic surgeons.

Vascular assessment

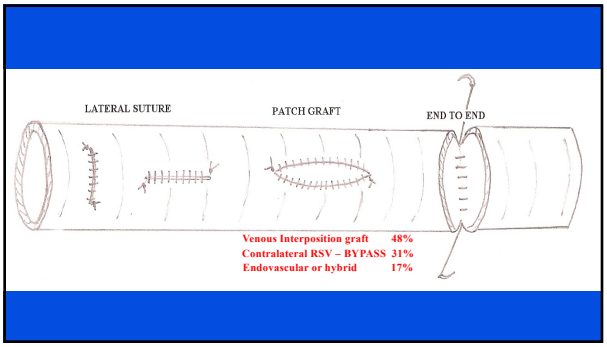
Hard signs	Soft signs
Active arterial bleeding	History of a moderate hemorrhage
Expanding or pulsating hematoma	Hypovolemic shock
Ischemia (pallor, pulselessness, paresis/paralysis)	Decreased but present peripheral pulses
Thrill/Bruit	Peripheral neurologic deficit
	Proximity to a named artery

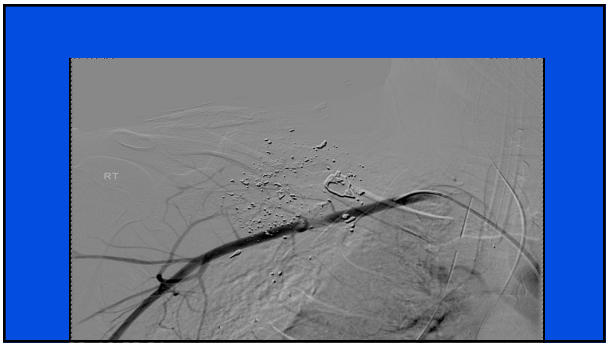




Lessons Learned – Vascular treatment

- Stop bleeding. Occluding balloons. Hybrid
- Liberal use of anticoagulants
- Vascular repair. Arterial (A: proximal and distal control far from the injured tissues. B: favor repair over MESS score calculation. C: sometimes two bypasses.) and venous (major veins and simple repairs)
- Always, cover bypass with healthy tissues
- Fasciotomy (better safe than sorry)

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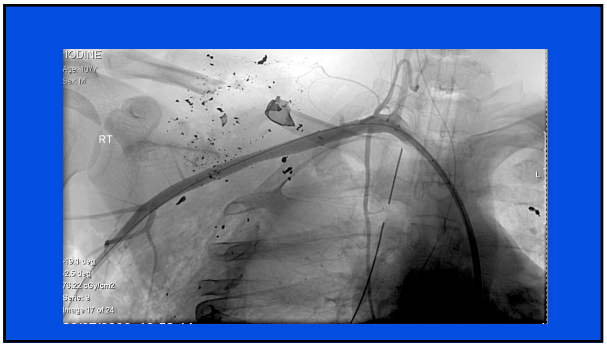
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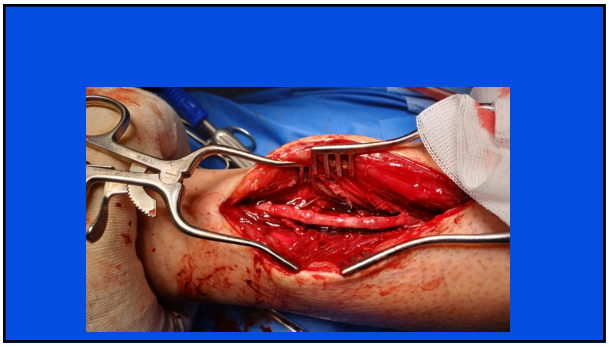

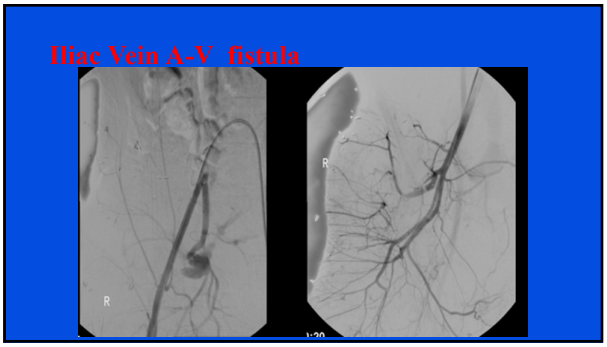
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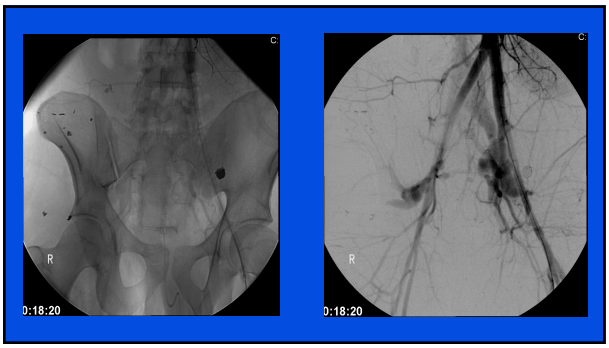
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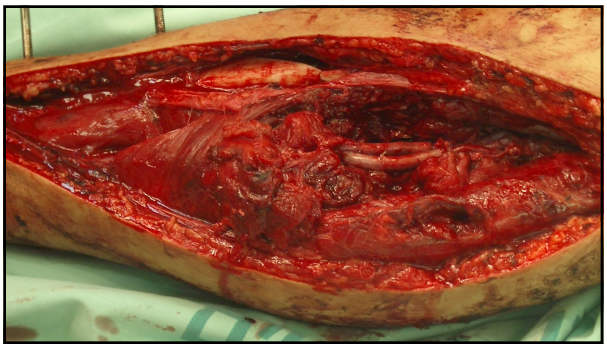
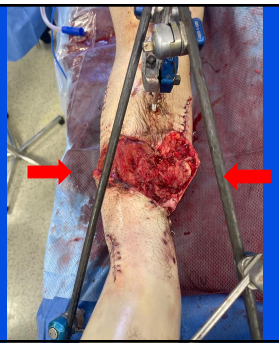


Double Bypass



Lessons Learned – Post-op

- ICU
- Pain control
- Antiaggregants
- Anticoagulants until patient is mobile
- Close graft & wound surveillance
- Recurrent debridement (if necessary)
- Early physiotherapy & rehab

CONCLUSIONS

- Recent use of weapons of mass destruction results in more severe and complicated vascular injuries.
- Newer battlefield medical and surgical treatments coupled with quick evacuation times increases survival.
- Multidisciplinary team effort and dedicated meticulous vascular treatments results in both life and limb salvage.


THANK YOU