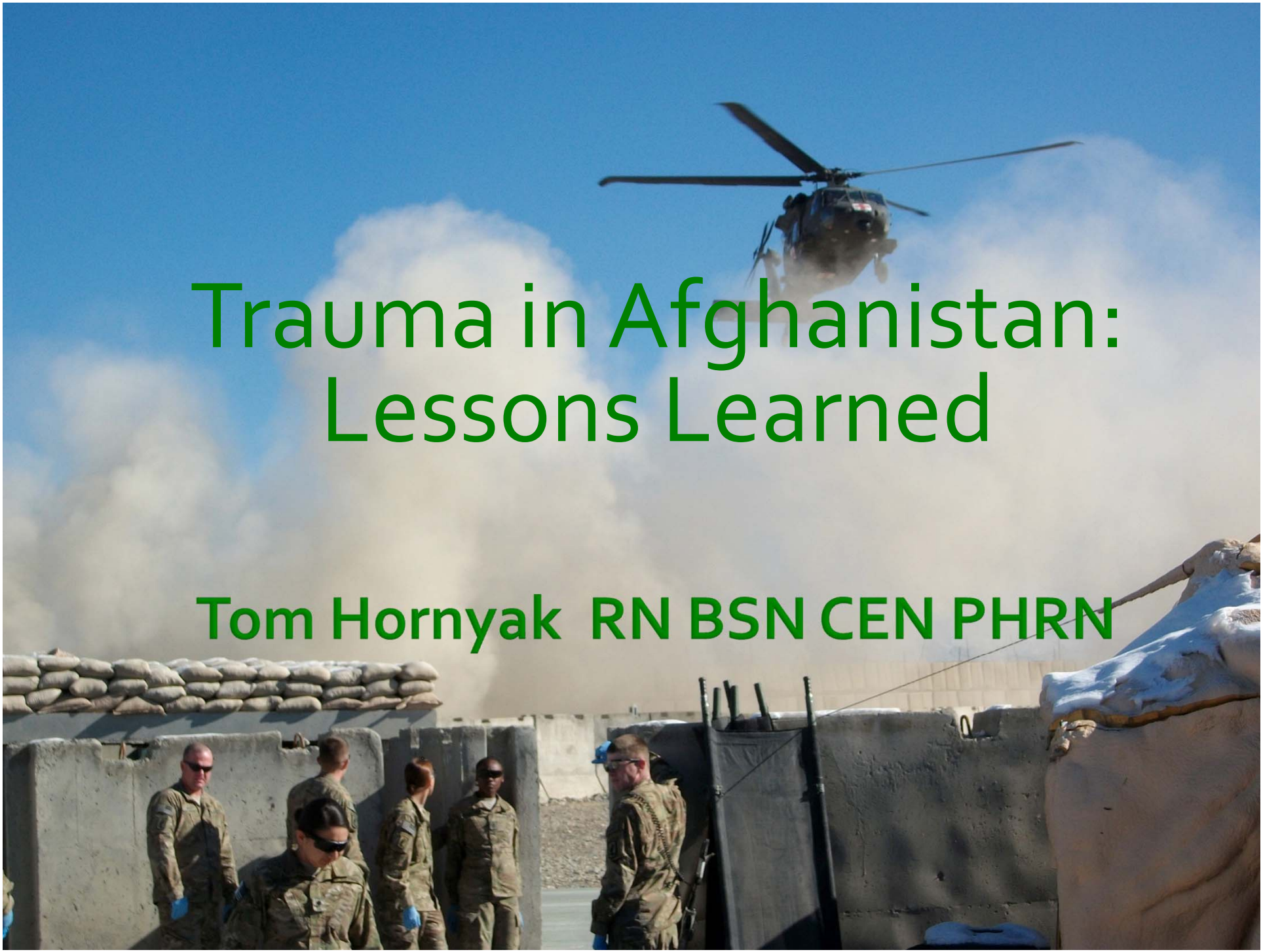

Trauma in Afghanistan: Lessons Learned

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Learning Objectives

- Review of the pathophysiology involved in trauma
- Review current trends in trauma treatment and changes in massive transfusion practice
- Discuss the trauma nurse's role in caring for injured patients, in both a combat and civilian environment

Disclosure

- Faculty/Presenters/Authors/Content Reviewers/Planners disclose no conflict of interest relative to this educational activity.

Successful Completion

- To successfully complete this course, participants must attend the entire event and complete/submit the evaluation at the end of the session.
- Society of Trauma Nurses is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

Forward Surgical Team Video

What is an FST?

- FST (Forward Surgical Team)
  - Developed in the mid 1990's
  - Mission is **damage control surgery and resuscitation**
  - Can be set up and ready to accept a patient within 90 minutes - "Light-weight, rapidly deployable, forward unit"
  - Consists of:
    - 3-bed ER/Trauma area
    - 2-bed OR
    - 3-bed ICU/PACU

What is an FST?

- Command Staff
  - Commander
  - Executive Officer
  - Detachment NCO
- Physicians (Rotate every 90 days)
  - 3 General Surgeons
  - 1 Ortho Surgeon
- 2 CRNA's (Rotate every 90 days)
- ER/Trauma
  - 1 ER/Trauma RN
  - 3 Combat Medics
- OR
  - 1 OR RN
  - 3 OR Techs
- ICU
  - 1 ICU RN
  - 3 LPN's

Military Medical Experience in Iraq and Afghanistan

- Significant clinical experience in dealing with blast and explosive injuries
- U.S. Military medical personnel have been quick to seek and adopt new strategies in treating hemorrhage, the leading cause of **preventable** death
- Mortality rates are dramatically lower for the current conflicts, and there are many survivors of massive multiple trauma

Historical Comparison : U.S. Military Medical Experience

Death Rates After Wounding :

- Revolutionary War/Civil War : 42 %
- World War II : 30 %
- Korean War : 25 %
- Vietnam War : 25 %
- Persian Gulf War : 25 %
- Iraq/Afghanistan : < 3%

Principles of Damage Control Surgery and Resuscitation

- Quickly stop the bleeding/Begin Massive Transfusion Protocol
- Limit Crystalloid use
- OR (if necessary at at the FST)

Principles of Damage Control Surgery and Resuscitation

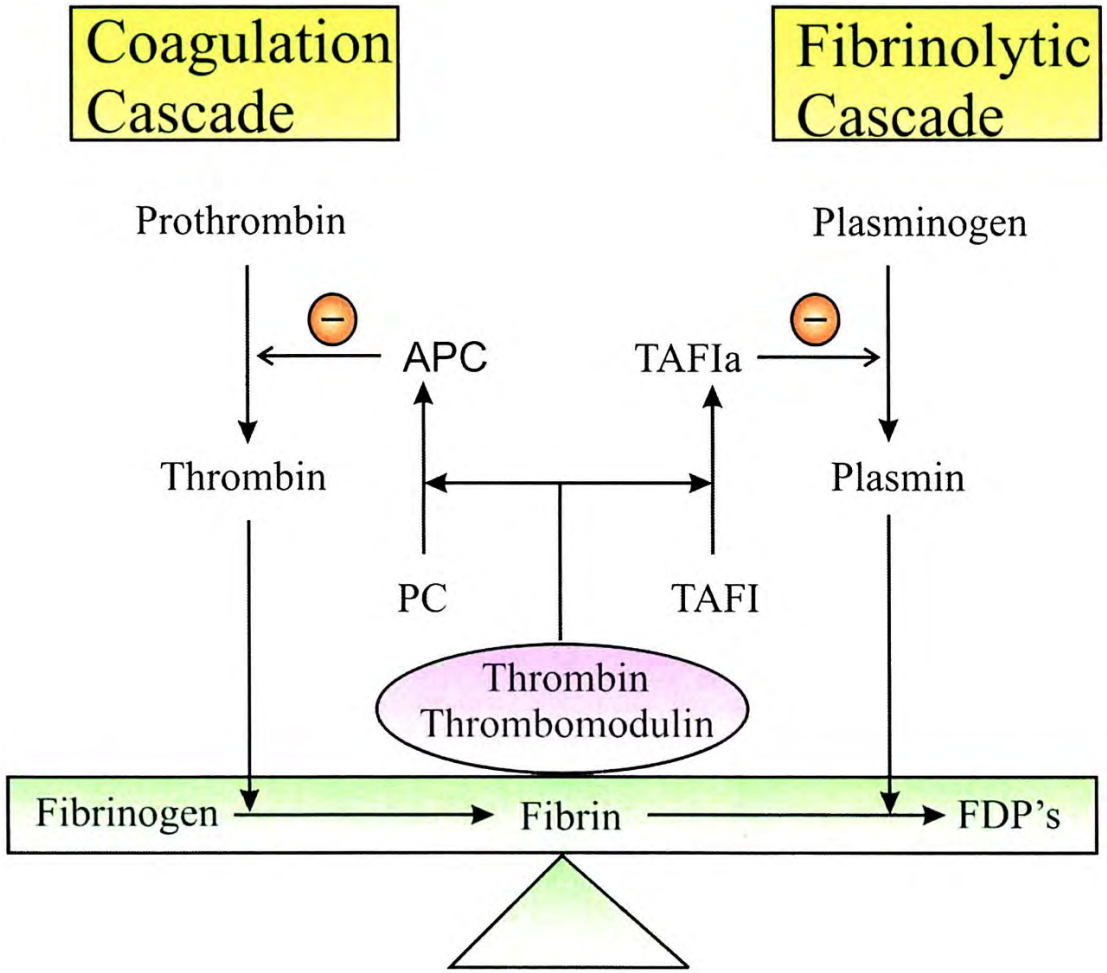
- Return to Operating Room in 12 to 18 hours for definitive surgery
  - In the FST setting, this will be performed at the next higher echelon of care
  - Ideally transferred out ASAP after patient is stabilized

Lesson Learned: Damage Control Surgery and Resuscitation

Central Tenet: avoid "Lethal Trauma Triad":

- Acidosis – results from blood loss and inadequate tissue perfusion
- Hypothermia – results from exsanguination and loss of intrinsic thermoregulation
- Coagulopathy – results from hypothermia, acidosis, platelet and clotting factor consumption, blood loss, and tissue injury (Multiple step process towards DIC/TIC)

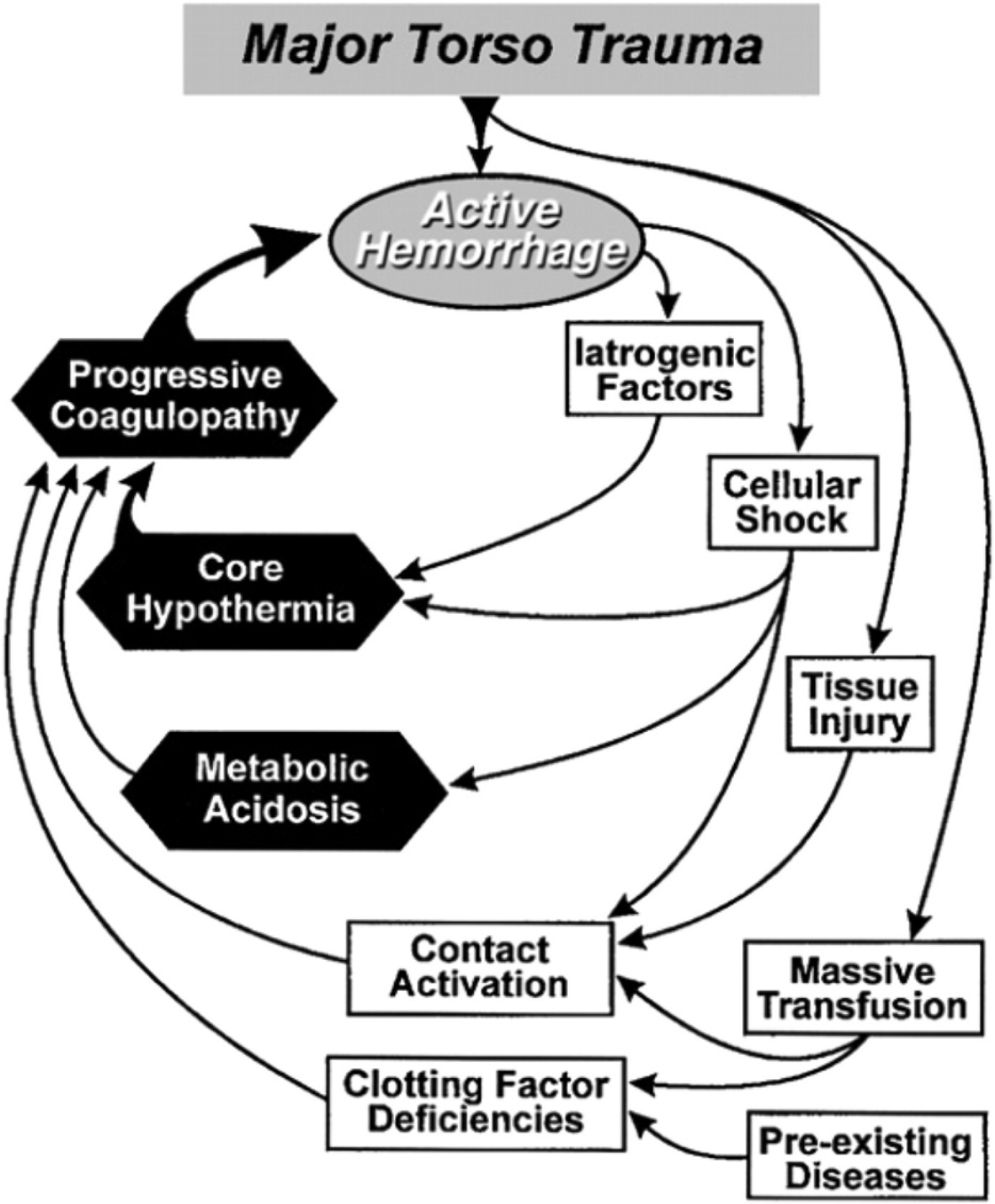
Fibrinolytic Pathway



The 3 D's of Coagulopathies in Trauma

- **Depletion** – Uncontrolled hemorrhage
- **Dysfunction** – Acidosis and hypothermia
- **Dilution** – Aggressive crystalloid infusion, large amounts of Packed Red Blood Cells (PRBC)

"THE BLOODY VICIOUS CYCLE"



Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- Massive Transfusion (MT): Defined as the use of 10 or more units of PRBC's in a 24-hour time period.

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- The major principle in damage control resuscitation is to prevent **coagulopathy** due to dilution of factors needed to provide hemostasis.

- In order to support this, we must provide components at an appropriate ratio throughout the resuscitation

- The goal in transfusion of the patient with need for massive transfusion deliver **a ratio of 1:1:1 of PRBC's, FFP, and platelets**

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- Limit crystalloid use: Can have inflammatory, acidotic, coagulopathy effects

“Avoid fluids that do not clot or carry oxygen!!”

….EMCRIT Webcast

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- Risk factors for MT in critically injured patients
  - SBP < 110
  - HR >105
  - HCT < 32
  - pH < 7.25
  - INR > 1.4
- These are based on current Afghanistan CPG's
- Guidelines only, decision to begin MT is based on the clinical judgment of the physician

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- Cryoprecipitate: may be added to component therapy to enhance replacement of fibrinogen, and other clotting factors.

- FFP and platelets do not have adequate amount of fibrinogen
  - 1 unit of platelets contains 80mg of fibrinogen
  - 1 unit of FFP contains 400mg of fibrinogen
  - 10 unit pack of cryoprecipitate contains 2500mg of fibrinogen
  - Not needed in FWWB as 1 unit contains 1000mg

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- FWWB (Fresh Warm Whole Blood): used based on discretion of the physician or when one of the blood components is not available
  - Offers an appropriate ratio of components, excellent platelet activity, and field availability
  - Treatment option currently not FDA-approved due to slight risk of transmission infection

- Retrospective data shows potential survival benefit when FWWB is used during resuscitation in severely injured combat patients

Lessons Learned : Intravenous Fluid Aspects for Hemostasis

- TXA (Tranexamic Acid)
  - Anti-fibrinolytic that blocks the action of plasminogen, an enzyme that dissolves blood clots
  - Been used in surgical procedures since approved in 1986, but recently used in trauma patients
  - Administer as soon as possible after injury, but ideally no later than 3 hours post-injury
  - 1g loading dose currently being given at POI (Point of Injury) by Combat Medics

Hemostasis : Permissive Hypotension

- Patients in hemorrhagic shock should be fluid resuscitated to a minimal acceptable BP
- Helps keep traumatically severed blood vessels in a low flow, low pressure state until surgical control of bleeding is performed
- Helps prevent “popping” the clot
  - Occurs when elevating the BP in previously injured vessels, that spontaneously clotted in a low flow state , dislodges the clot and begin bleeding again

Tourniquets

- Tourniquets:
  - Fell out of favor in the later part of the 20th century
  - Use liberally for any significant extremity hemorrhage
  - No adverse events seen
  - Use early : “first resort not last resort”
  - Every soldier carries at least one at all times

Tourniquets

CAT TOURNIQUET

SOF TOURNIQUET

Hemostatic Dressings

- Causes rapid localized coagulation and formation of a stable clot
- Does not absorb into the body and safe to leave in place until further care is available
- Does not produce heat

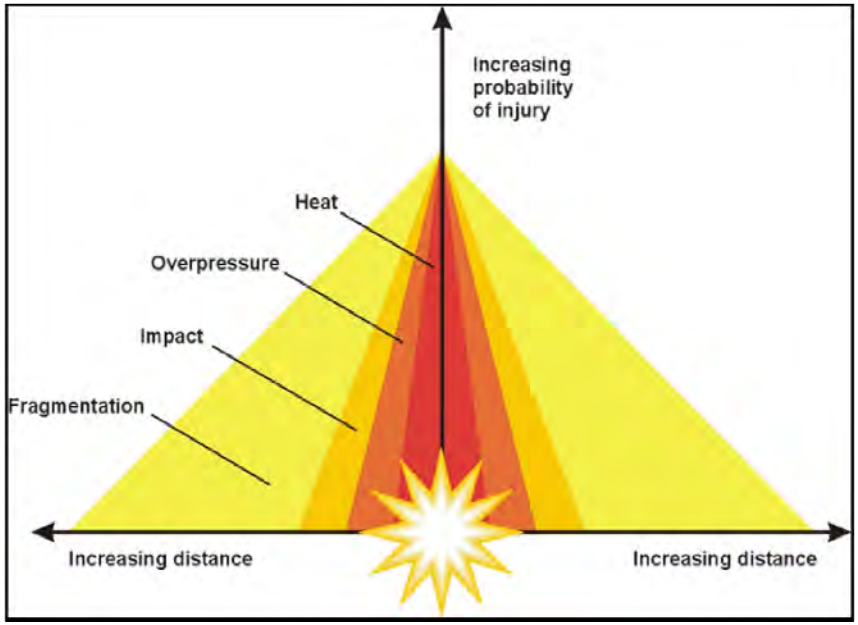
IED

- What do we mean when the term IED is used?
- Improvised Explosive Device
- It’s a generalized term used to describe any explosive device
  - Roadside bomb (Placed in trash, animal carcasses, etc.)
  - Landmine
  - Suicide Bomber
  - Vehicle bomb

Injuries from Explosive Munitions and IED's

- High percentage of current injuries
- Often severe, multisystem
- Multiple limb amputations
- Secondary injury from being thrown
- Eardrum rupture common
- Occult injuries may be present : "blast lung," bowel rupture, closed head injury

Blast Injury Mechanisms



- The closer the victim is to the explosion, the greater increase in severity of injuries
- Victim does not have to be close to the blast for injuries to occur
- Pay close attention to non-apparent injuries

Blast Lung

What importance comes from studying IED blast injuries?

Joint Theater Trauma Registry (JTTR)

- Largest trauma database in the world
- Used to research, evaluate, and improve current treatments, procedures, and Clinical Practice guidelines in Operation Enduring Freedom
- Each U.S. medical unit in Afghanistan is responsible for entering data on all patients
- Quality improvement on all levels of care

Other Trends in Trauma..

- Closer attention to mild traumatic brain injuries (mTBI)
- Increased use of hypertonic saline in regards to head injuries
- Decreasing NSAID use in combat troops
- Post Traumatic Stress Disorder (PTSD)

Afghanistan

FOB Shank

ER/Trauma

ER/Trauma

OR

ICU

Radiology in the FST

Flight Line

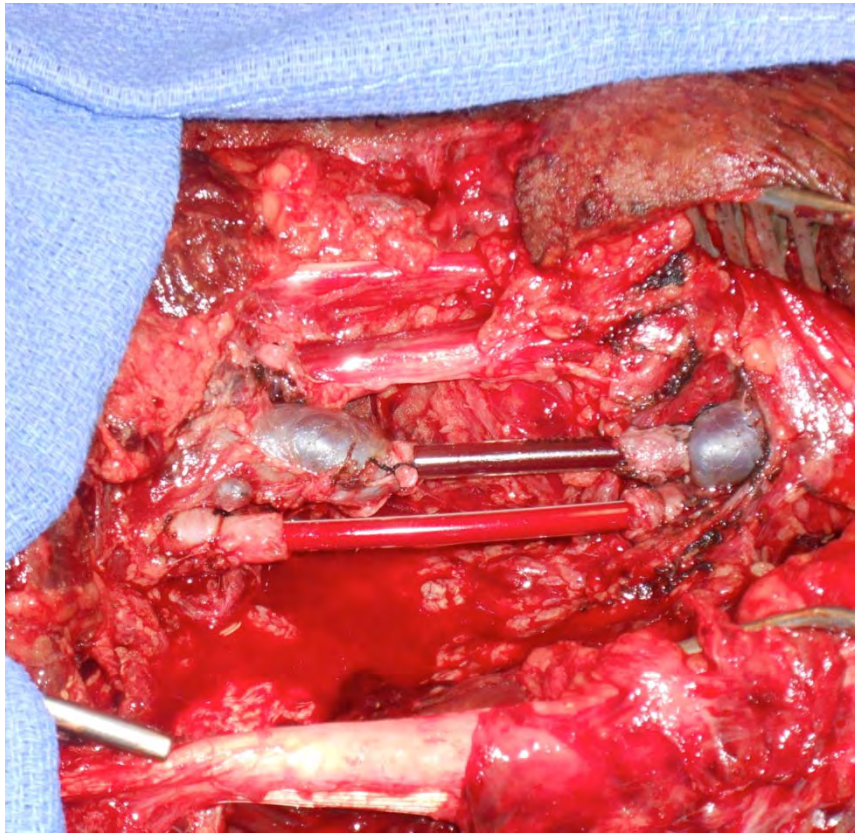
Incoming Flight

Incoming Flight

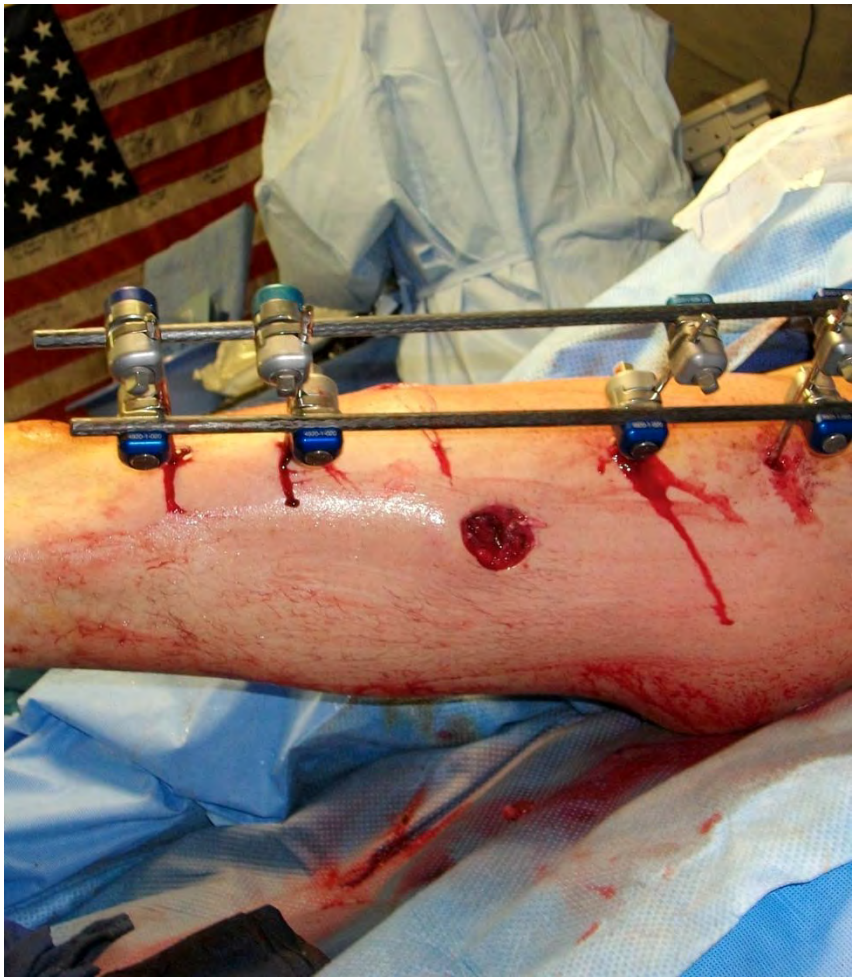
IED Injuries: Lower Ext's

IED Injuries: Lower Ext's

VASCULAR SHUNTING



IED Injuries: Lower Ext's



Exploratory Laparotomy

High Caliber GSW Rt Femur

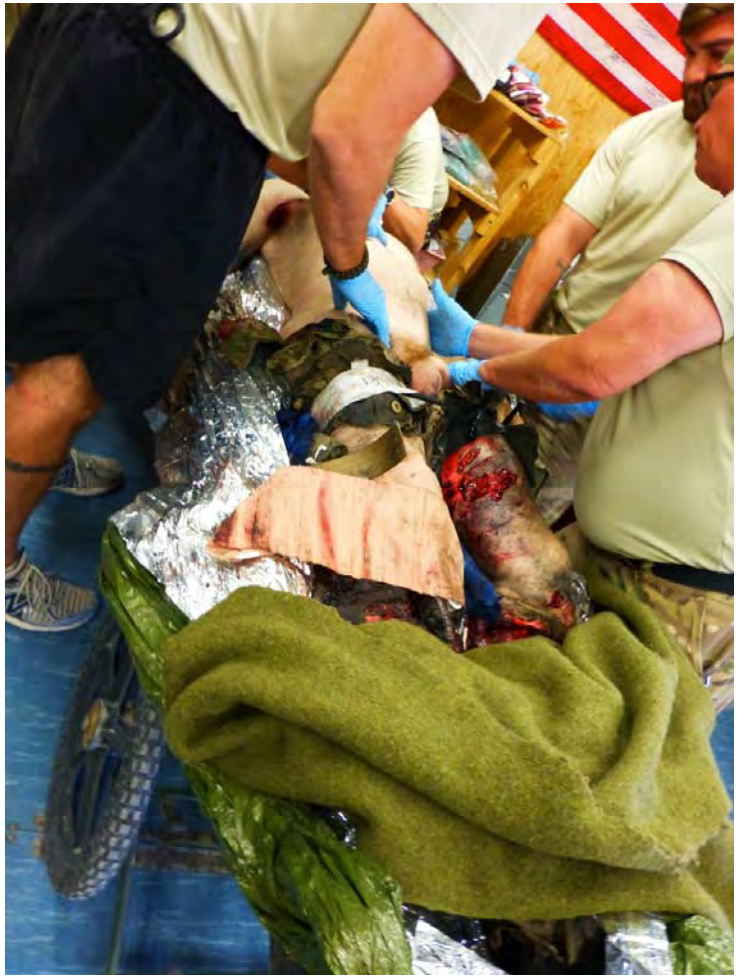
High Caliber GSW Rt Femur

Traumatic Amputations: Feet

Traumatic Amputations

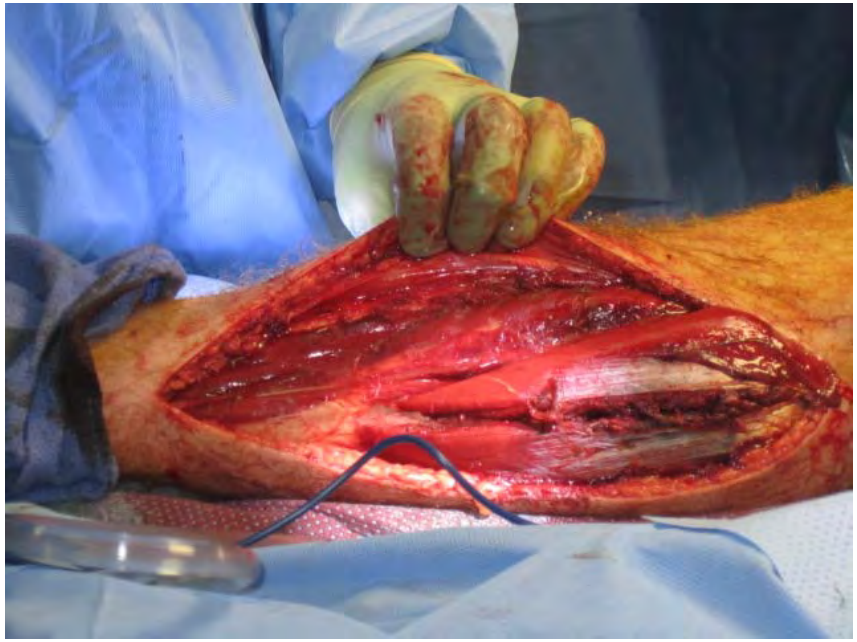
Traumatic Amputations

Traumatic Amputations



Shrapnel Injuries

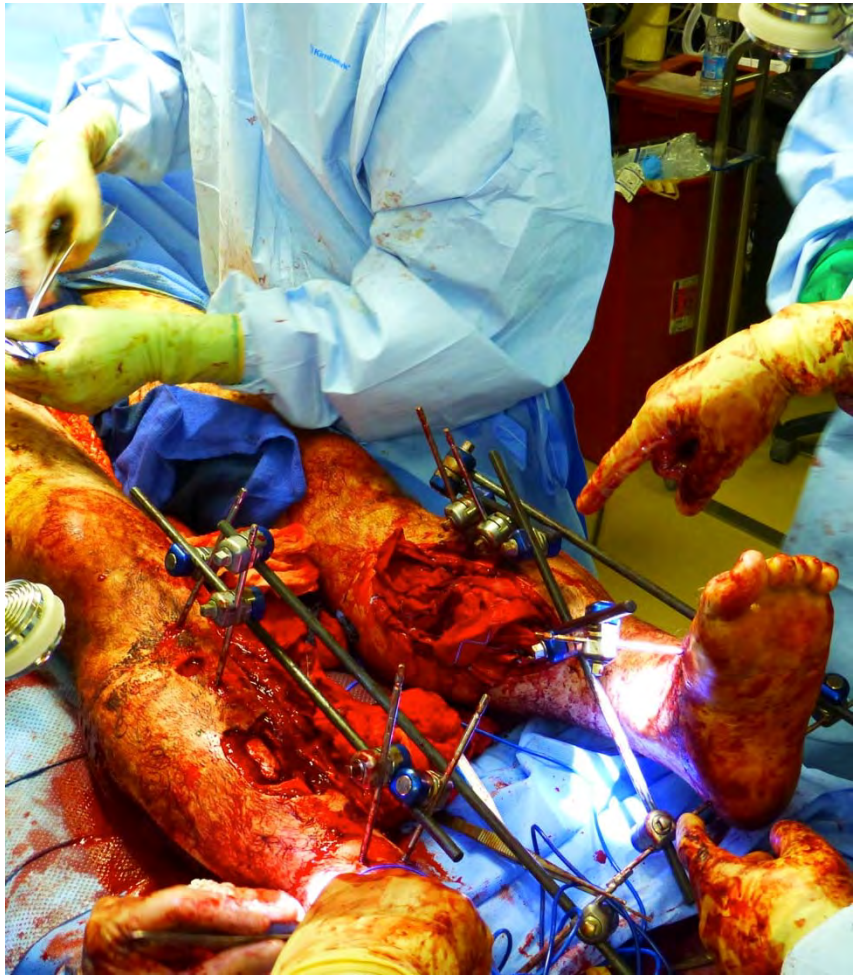
Fasciotomy

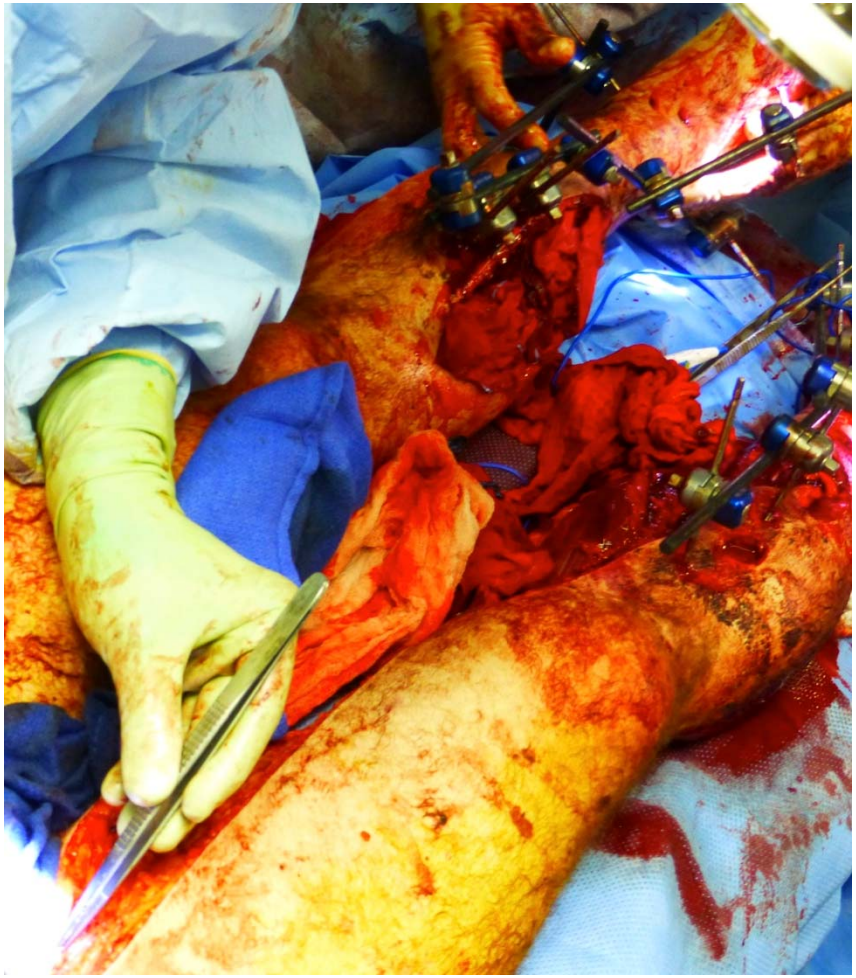


Shrapnel Injuries

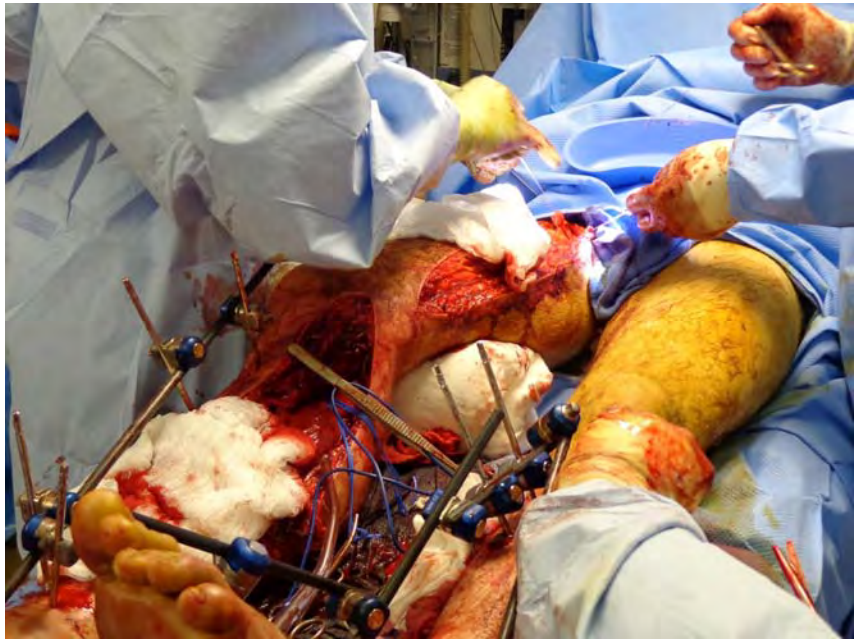
Shrapnel Injuries

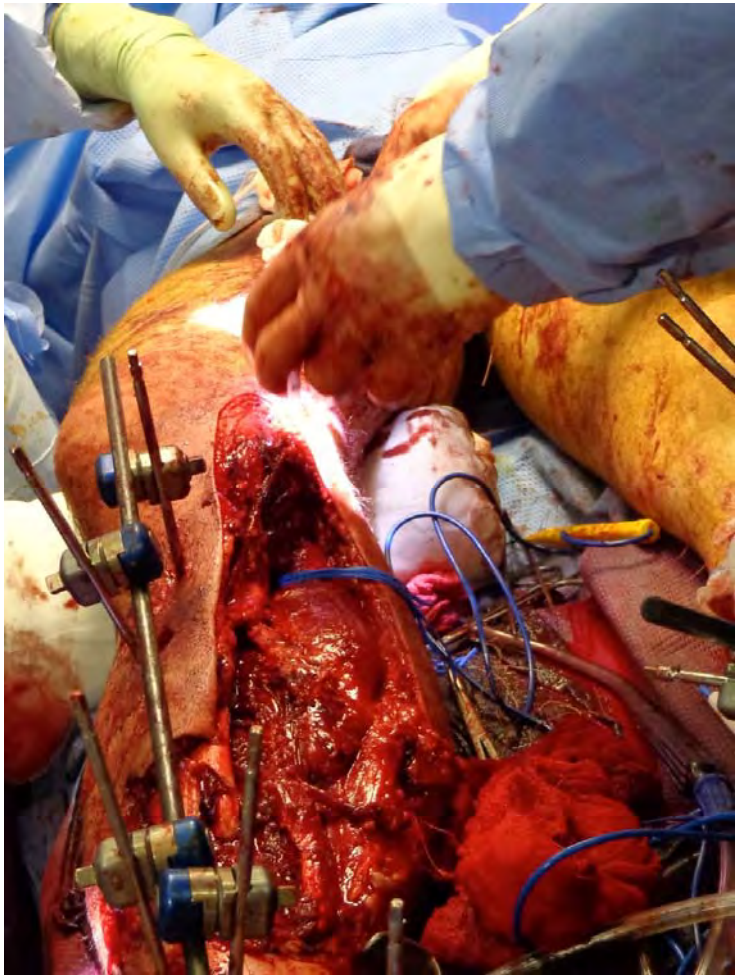
Shrapnel Injuries





Shrapnel Injuries





Penetrating Chest Wound: Hemothorax

Surgical Amputations

Surgical Amputations

Athos

Athos

Athos

Athos

Fallen Heroes

Caring for Trauma Patients

Caring for Trauma Patients

Caring for Trauma Patients

Rocket/Mortar Attacks

Rocket/Mortar Attacks

Base Attack with a Truck Bomb

Base Attack with a Truck Bomb

The 624th FST

The End


MYRON COPE'S OFFICIAL
The
terrible
towel
TSBURGH ORIGINAL
U.S. ARMY

Resources

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Resources

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