



University of California
San Francisco



ZUCKERBERG
SAN FRANCISCO GENERAL
Hospital and Trauma Center

Multiply Injured Patients: Stabilizing Fractures and Transferring Patients

Jennifer Tangtiphaiboonatana, MD
Assistant Professor

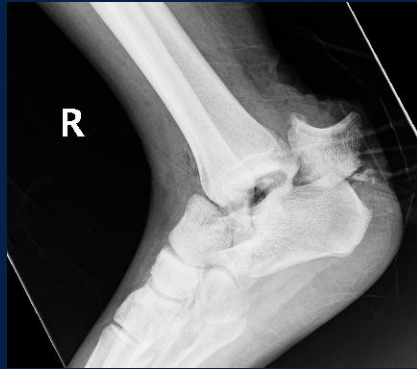
10/1/2022



28M s/p MCC



34F s/p MVA





**KEEP
CALM
AND
CHECK YOUR OWN
PULSE FIRST**

Objectives

- ATLS protocol
- Address life/limb threatening orthopaedic injuries
 - Pelvic ring injuries
 - Long bone fractures
 - Unstable spine fractures
- Review open fracture management
- Evaluate for compartment syndrome and vascular injuries

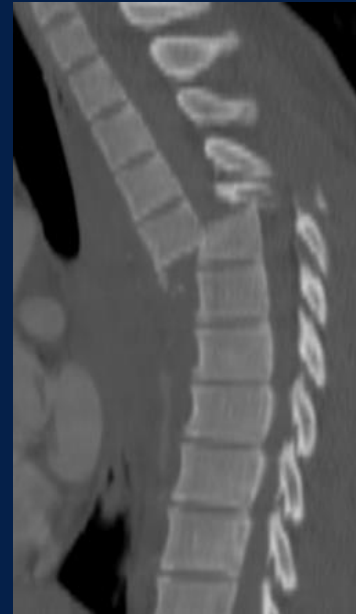
ATLS protocol

Primary survey

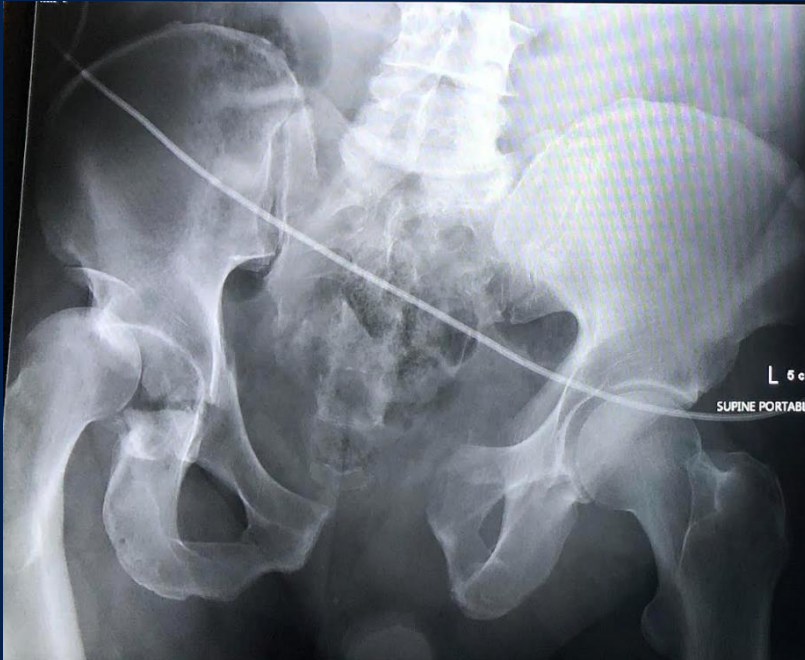
- Airway maintenance with cervical spine protection
- Breathing and ventilation
- Circulation and hemorrhage control
- Disability: neurologic status
- Exposure/Environmental control

Life threatening orthopaedic injuries

- Pelvic ring fractures
- Unstable spine injuries
- Long bone fractures



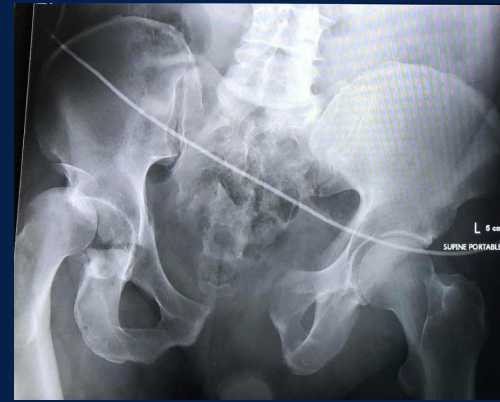
Pelvic Ring Fractures



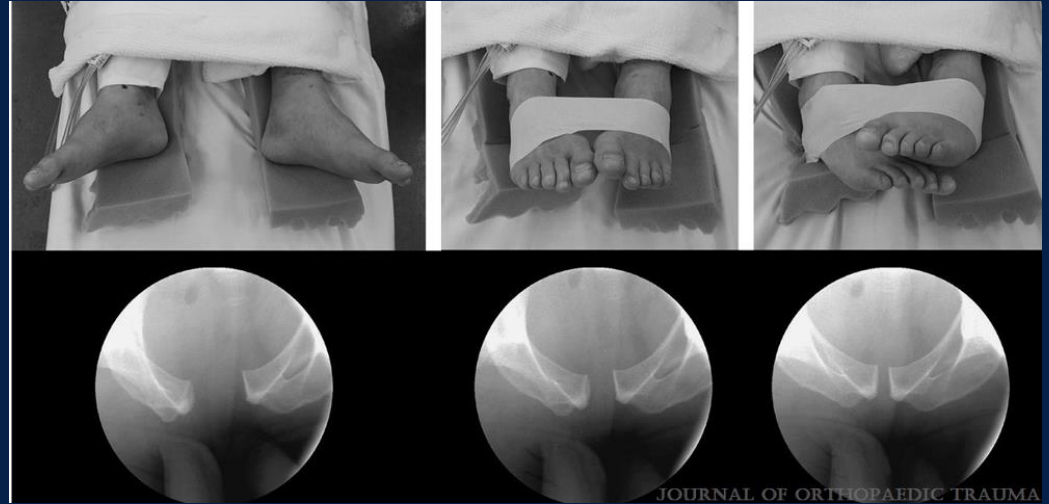
1. Reduce the hip
2. “Wrap, warm, and fill”
3. Foley placement
 - 6-15% incidence of urologic injury
4. Still unstable?
 - IR embolization vs pelvic packing

“Wrap” the pelvis

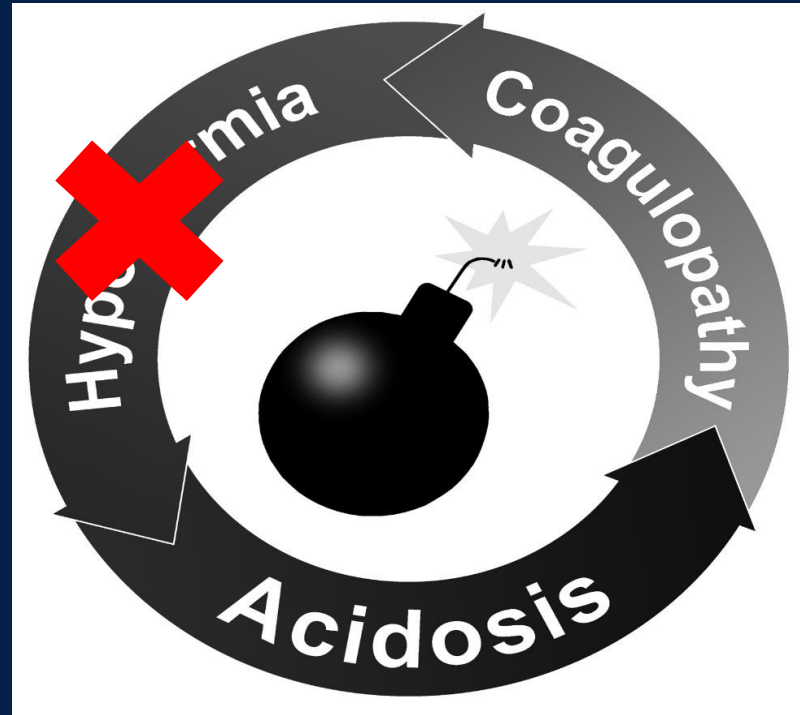
Centered over greater trochanters



“Wrap” the pelvis

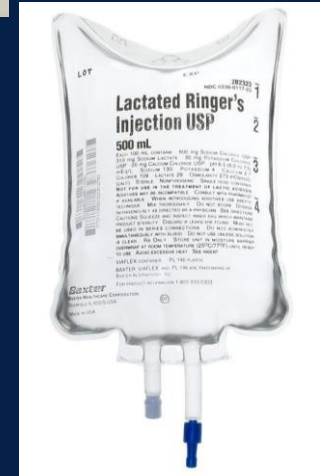


Warm the patient



“Fill” the patient

- Pelvic ring injuries bleed!
 - Mostly due to venous plexus injury
 - Fracture pattern is associated with risk of hemorrhage and transfusion requirement
 - APC > VS > LC



Open Fractures

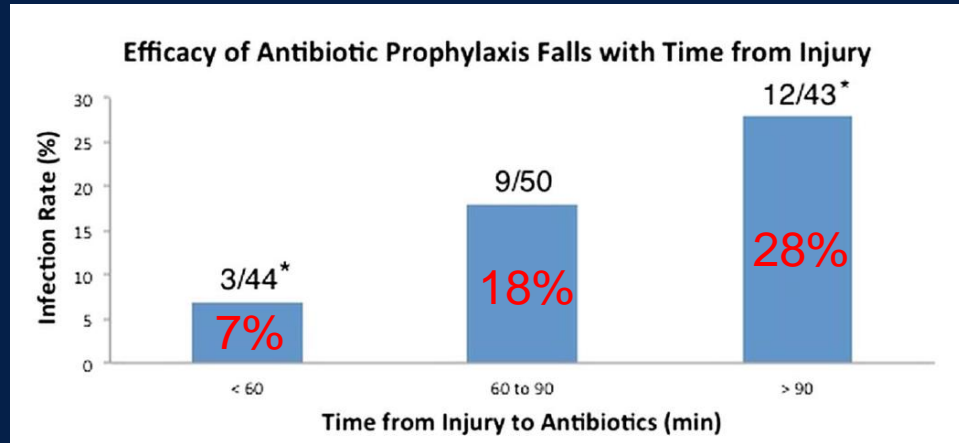


Timely administration of antibiotics

Type III Open Tibia Fractures: Immediate Antibiotic Prophylaxis Minimizes Infection

William D. Lack, MD, Madhav A. Karunakar, MD,† Marc R. Angerame, MD,†
Rachel B. Seymour, PhD,† Stephen Sims, MD,† James F. Kellam, MD,† and Michael J. Bosse, MD†*

- Retrospective study of 137 patients



P = 0.01

Timely administration of antibiotics

- ACS TQIP recommendation
 - Antibiotics and tetanus within 60 mins of arrival
 - Continued for 24hrs

Gustilo-Anderson Type I and II Fractures

Preferred: Cefazolin 2 g (3 g if > 120 kg) IV q8h¹

Severe beta-lactam allergy: Clindamycin 900 mg IV q8h

Gustilo-Anderson Type III Fractures

Preferred: Ceftriaxone 2g IV q24h

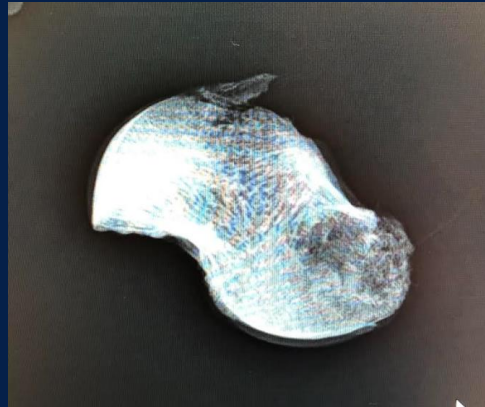
Severe Beta-lactam allergy: Clindamycin 900 mg IV q8h + levofloxacin 500 mg IV q24h¹

Exceptional Cases

- Soil or Fecal Contamination: Vancomycin 15mg/kg IV q8-24h² + Ertapenem 1g IV q24h¹
- Standing Water Contamination: Piperacillin/ tazobactam (Zosyn) 4.5g IV q6h^{1,3}
- Known MRSA colonization: Add vancomycin 15 mg/kg IV q8-24h²

Open Fracture Management

1. Irrigation in ER to remove gross debris
2. Keep large bone fragments and articular pieces
3. Reduce dislocated joints
4. Cover with clean, moist dressing (saline or betadine gauze)
5. Splint extremity



Timely Debridement

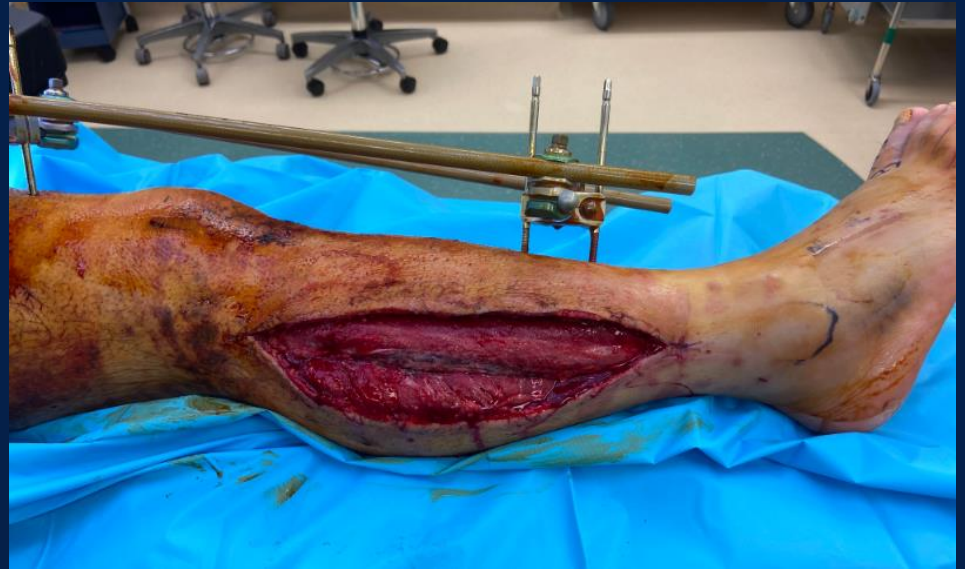
- **Debridement is key!**
- OR debridement within 24hr, ASAP for grossly contaminated wounds
- Ex-fix limb
- Cover with sterile occlusive dressing
 - WVAC or ioban



Compartment Syndrome

Time is muscle!

- Must be addressed prior to transfer!
- Ex-fix the limb
- Release compartments
 - Single vs dual incision
 - Cover with sterile, occlusive dressing



Vascular Injuries

- Reduce any dislocations or pull limb out to length
- Deflate tourniquet and reassess for a pulse
- $ABI < 0.9 \rightarrow$ CT angiogram
- Do you have a vascular surgeon?
 - Yes \rightarrow vascular repair + ex-fix
 - No \rightarrow immediate transfer



Summary

- Remember ATLS protocol
- Address life/limb threatening orthopaedic injuries
 - Pelvic ring fractures – “wrap, warm, fill”
 - Long bone fractures – splint vs ex-fix
 - Unstable spine fractures – c-collar, logroll
- Open fractures – appropriate antibiotics within 60 minutes
- Address compartment syndrome and vascular injuries

Thank you



University of California
San Francisco