

CHEST TRAUMA

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M A R C H

- ▣ MASSIVE HEMORRHAGE
- ▣ AIRWAY OBSTRUCTION
- ▣ RESPIRATORY DIFFICULTY
- ▣ CIRCULATION
- ▣ HEAD INJURY/MENTATION

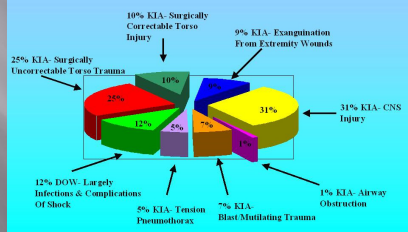
Battlefield Death: 3 most common causes

- ▣ SEVERE INTERNAL HEMORRHAGE/TORSO TRAUMA (most surgically uncorrectable)
- ▣ SEVERE/MASSIVE HEAD INJURY
- ▣ EXSANGUINATION FROM EXTREMITY WOUND

Battlefield Death: 3 most common preventable causes

- ❑ EXSANGUINATION FROM EXTREMITY WOUND (2500;10%) (6 hours)
- ❑ TENSION PNEUMOTHORAX
- ❑ AIRWAY OBSTRUCTION

How People Die In Ground Combat (From COL Ron Bellamy)



About 15 percent of the casualties that die before reaching a medical treatment facility can be saved if proper measures are taken.

Stop severe bleeding (hemorrhaging)

Relieve tension pneumothorax

Restore the airway

OIF Fatality

- ❑ Marine shot in leg in Iraq
- ❑ Pulsatile femoral artery bleeding
- ❑ Corpsman arrived 10 minutes later
- ❑ Attempted to use hemostatic material - failed
- ❑ IV attempted - failed
- ❑ Tourniquet *finally applied*
- ❑ Casualty died

If during the next war you could do only two things, (1) place a tourniquet and (2) treat a tension pneumothorax, then you can probably save between 70 and 90 percent of all the *preventable deaths* on the battlefield."

-COL Ron Bellamy



FACTS

- ❑ 85-90% of all thoracic injuries can be treated successfully with chest tube(s) alone
- ❑ exception: severe pulmonary contusion
- ❑ exception: cardiac/great vessel/arterial injury
- ❑ exception: tracheobronchial, diaphragmatic, esophageal injuries
- ❑ exception: loss of chunk(s) of chest wall

Chest Trauma: The Lethal Six

- ❑ airway obstruction
- ❑ tension pneumothorax
- ❑ open pneumothorax ("sucking chest wound")
- ❑ massive hemothorax
- ❑ flail chest
- ❑ cardiac tamponade

Airway Obstruction

- ❑ tongue obstructs airway in unconscious patient
- ❑ blood/clot, secretions/mucus, tissue
- ❑ distortion of laryngotracheal anatomy: fracture, edema, hematoma
- ❑ Dx: stridor, air hunger, apnea, cyanosis
- ❑ Tx: sweep pharynx manually; jaw thrust/chin lift, nasal airway; surgical airway (cricothyroidotomy), intubation

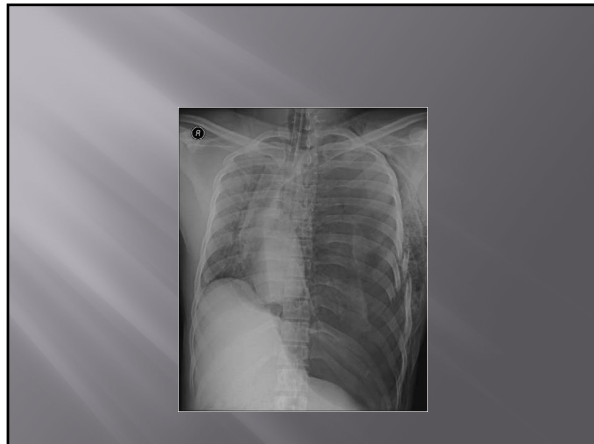


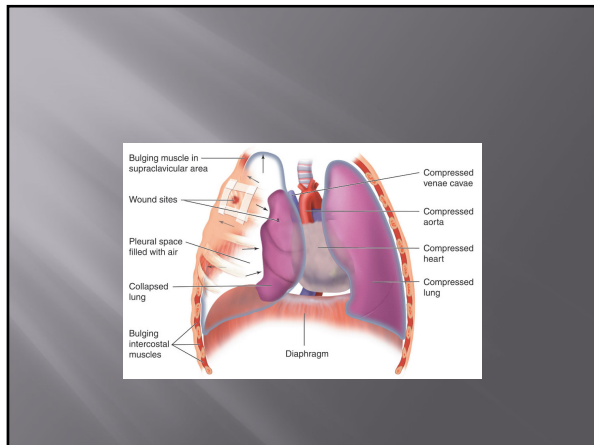
A Survivable Airway Problem

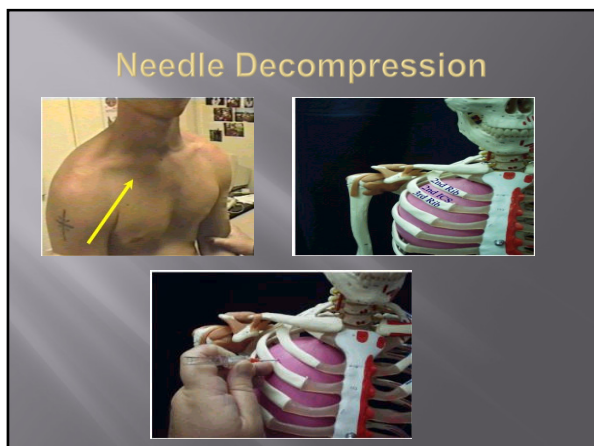


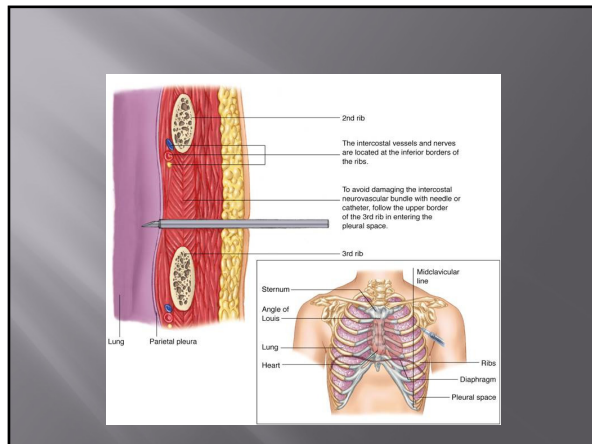
Tension Pneumothorax

- ❑ penetrating trauma
- ❑ blunt trauma with lung injury
- ❑ **unilateral penetrating trauma + progressive respiratory distress = lightbulb**
- ❑ Dx: severe resp. distress, no breath sounds, hypotension, JVD, tracheal deviation
- ❑ Tx: emergency needle decompression (with flutter valve – e.g., glove finger) is life-saving
- ❑ needle: 14 (or 12) ga./3.25-3.5 in.



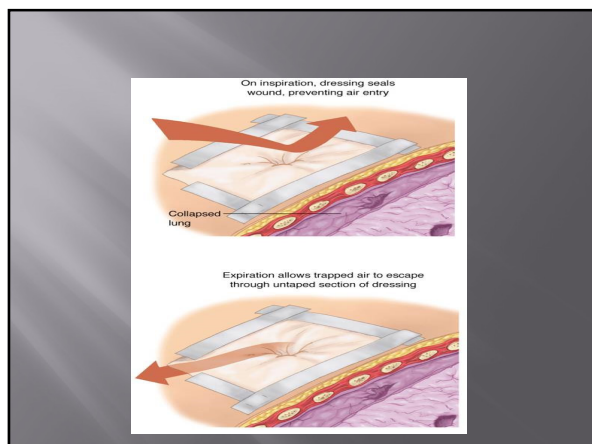




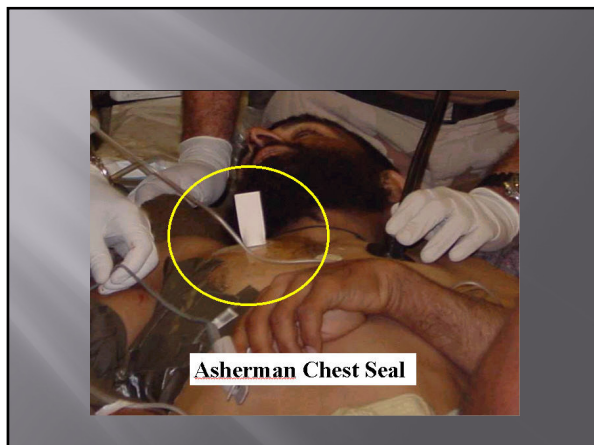


Open Pneumothorax

- ❑ “sucking chest wound” – destructive penetrating wound or impalement
- ❑ if defect = or > 3 cm: equalization of pressures
- ❑ rapid onset of hypoventilation/hypoxemia
- ❑ Dx: chest wall defect; bloody frothing with expiration; cyanosis; air hunger
- ❑ Tx: Asherman dressing (if seal 4 sides, can produce tension pneumothorax)





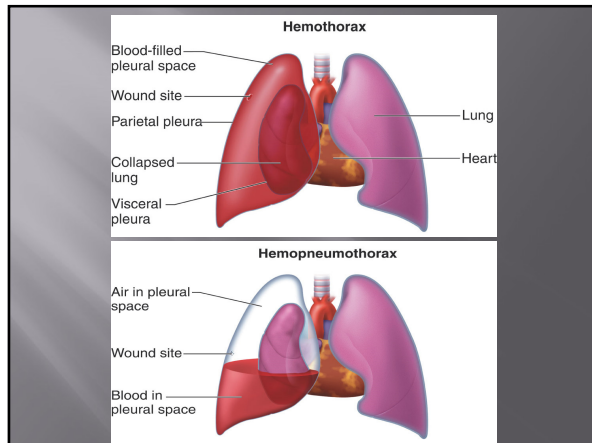


Asherman Chest Seal

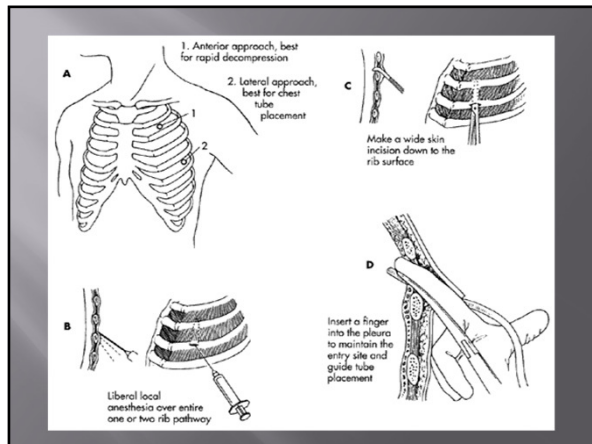


Massive Hemothorax

- ▣ severe penetrating injury with hilar or arterial hemorrhage
- ▣ crush injury with arterial hemorrhage
- ▣ how much blood? – up to 3 L. (% TBV?)
- ▣ Dx: severe hypotension, resp. distress, flat neck veins. (**Note:** can develop tension hemothorax)
- ▣ Tx: large-bore IV, volume/blood replacement (autotransfusion, if available); chest tube(s); surgery

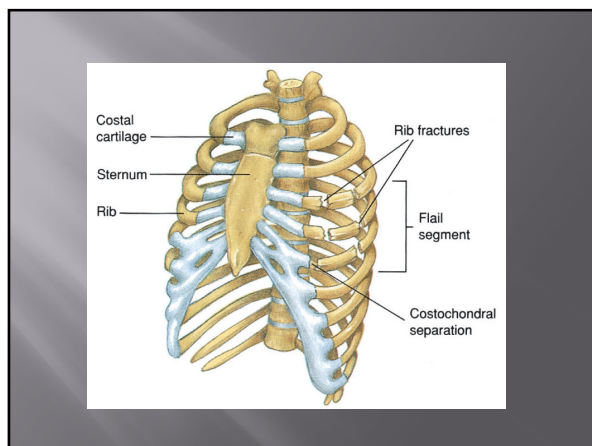


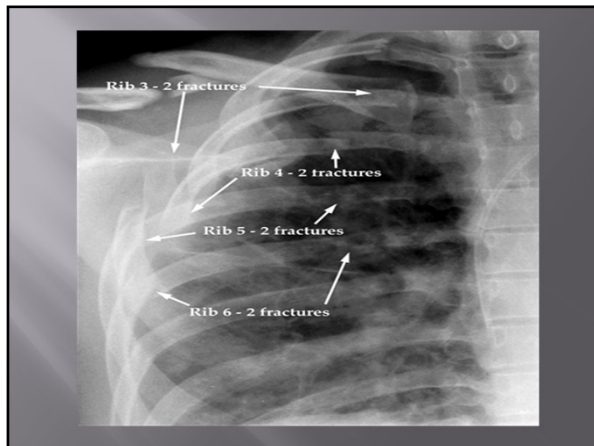


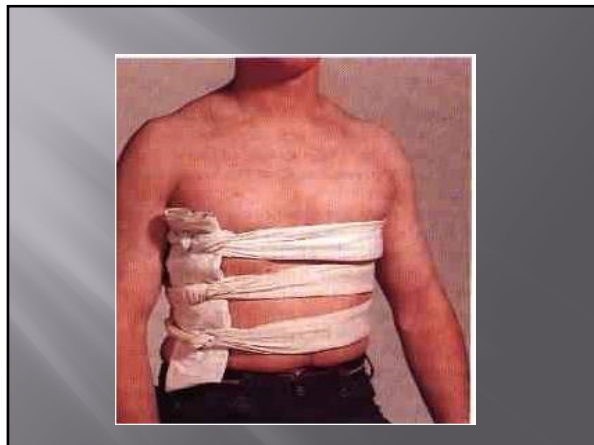


Flail Chest

- ❑ severe blunt chest-wall trauma
- ❑ 2 or more ribs fractured in 2 or more locations
- ❑ paradoxical motion of the flail segment
- ❑ Dx: rib motion, crepitus, ecchymosis, resp. distress, pain
- ❑ Tx: pain control, stabilization of flail segment, close observation for deterioration
- ❑ severe underlying pulmonary contusion & hypoxemia is life-threatening pathology (42%)
- ❑ high risk of pneumothorax/hemothorax



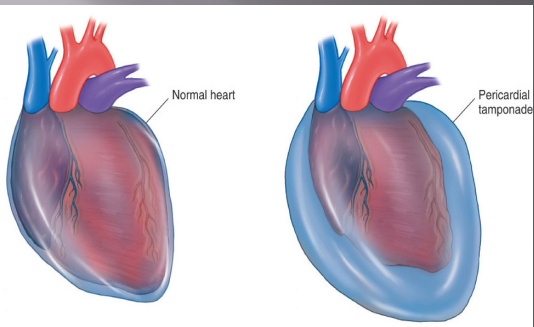


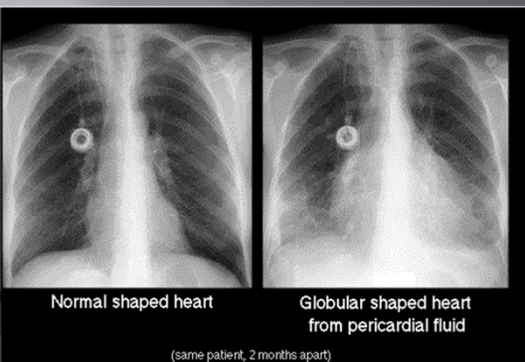




Cardiac Tamponade

- penetrating trauma in proximity of “the box”
- cardiac or great vessel injury
- Dx: resp. distress, tachycardia/tachypnea, Beck’s triad
- Tx: IV fluid to temporize → surgery for decompression/repair





Chest Trauma: The Hidden Six

- ▣ traumatic aortic rupture – most die at scene
- ▣ major tracheobronchial injury – ditto
- ▣ blunt cardiac injury/contusion – tx like MI; high IOS with sternal fx, precordial ecchymosis
- ▣ pulmonary contusion – potentially lethal
- ▣ diaphragmatic tear – high IOS with blunt trauma
- ▣ esophageal perforation – ditto

The Lethal Triad

- ▣ HYPOTHERMIA
- ▣ ACIDOSIS
- ▣ COAGULOPATHY

The Lethal Triad

- ▣ 1. Hemorrhagic shock → decreased cellular perfusion/oxygenation → inadequate heat production → hypothermia → coagulopathy
- ▣ 2. Hemorrhagic shock → decreased cellular perfusion → lactic acid → metabolic acidosis → interferes with coagulation mechanism
- ▣ Exposure, blood loss, vasoconstriction
- ▣ Hypotensive fluid resuscitation (“permissive hypotension”) – COL J. Holcomb, CPT F. Butler
- ▣ *Resultant vicious cycle: great definitive repair of the severely injured patient, followed by MSOF and high mortality → damage control

Medical Innovation Is Ongoing

- ▣ CLS (Combat Life Saver) Program
- ▣ Self-aid and Buddy-aid
- ▣ Forward Surgical Teams
- ▣ CAT
- ▣ Hemostatic Dressings
- ▣ 68W transition – all EMT cert./LPN qual.
(91W = 91B + 91C)
- ▣ MRI – OTSG

Combat Life Saver

- ▣ start IV's
- ▣ fluid resuscitation – Hextend; 7.5% NaCl ("hot salt") with 6% Dextran-70
- ▣ needle decompression for tension pneumo
(large needle – 12 or 14 ga. 3.25-3.5 in.)
- ▣ traction splinting for long bone fx
- ▣ protect yourself

Combat Medic

- ▣ nasopharyngeal airway
- ▣ endotracheal intubation
- ▣ laryngeal-mask airway
- ▣ cricothyroidotomy
- ▣ needle thoracostomy / decompression
- ▣ apply tourniquet
- ▣ start IV's (and insert intraosseous needle?)
- ▣ administer morphine
- ▣ splint fractures
- ▣ administer antibiotics
- ▣ perform CPR
- ▣ apply bandages
- ▣ protect yourself

Battlefield Injuries: Shock

- ▣ massive hemorrhage from extremity wound(s): mechanical – tourniquet
- ▣ massive internal hemorrhage from torso injury: lethal
- ▣ decreased blood return due to cardiac displacement – restore the anatomy/physiology
- ▣ cardiac injury: probably lethal; needs surgery
- ▣ obvious long bone fx/dislocation: splint

Battlefield Injuries: Ventilatory/Hypoxic

- ▣ airway obstruction: mechanical – relieve or “bypass” obstruction
- ▣ lung compression: mechanical – decompress; restore the anatomy/physiology
- ▣ hole in the chest: mechanical – seal it
- ▣ severe head injury (sTBI) – may be lethal
- ▣ severe torso crush injury – supportive tx

Battlefield Injuries: Adjunctive Measures

- ▣ keep the casualty warm (remember: the Lethal Triad)
- ▣ IV fluid for shock (with “permissive hypotension” until definitive surgical tx)
- ▣ antibiotics – oral vs. intravenous
- ▣ psychological support
- ▣ rapid evacuation

Thank You

- ▣ I salute each one of you for your dedication, commitment, patriotism, and sense of duty
- ▣ No one who has not been there will ever really understand what you do or how you feel
- ▣ "We sleep warmly in our beds at night because" George Orwell
- ▣ "..... and the protected will never know."
- ▣ Take care of each other; avoid complacency
- ▣ God bless you all and keep you safe.
And God bless your families who wait for your return.

QUESTIONS?
