The ABCs of Trauma

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Outlining the ABCs

• Why do we need such an approach?

• The Golden Hour

• ABCs – The Specifics
  – preventable deaths
  – problem recognition
  – management

• Take Home Points
Why the ABCs?

• Annual trauma costs exceed $400 billion

• Trauma = leading cause of death for age 1-44 yrs

• Inconsistent delivery of care prior to 1980 → ATLS course initiated
Why the ABCs?

- Goals of the ATLS Course
  - appropriate and timely care
  - algorithm based
  - focus on the first hour
  - train practitioners who do not daily care for trauma patients
Trimodal distribution of trauma deaths.

Sauaia et al., J Trauma 1994
Truma Deaths

Trimodal distribution of trauma deaths.

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Trauma Deaths: Prevention

- Immediate (1\textsuperscript{st} peak)
  - injury prevention
  - rapid prehospital transport

- Early (2\textsuperscript{nd} peak)
  - rapid assessment
  - prompt resuscitation

- Late (3\textsuperscript{rd} peak)
  - ICU care

\textit{“Golden Hour”}
The Golden Hour

- Treat the greatest threat to life first
- Treat despite lack of a definitive diagnosis
- Treat despite complete history

ABCDE Approach
The Golden Hour

- **A = Airway with c-spine protection**
- **B = Breathing**
- **C = Circulation, stop the bleeding**
- **D = Disability/Neuro status**
- **E = Exposure and Environment**
The Golden Hour

- **ABCDE** – Primary Survey
  - sequential yet actually simultaneous
  - includes resuscitation efforts
  - normalization of vital signs

- **Secondary Survey**
  - AMPLYE history
  - head-to-toe and x-rays
Starting with the ABCs

A = Airway
Airway: Preventable Deaths

- Failure to recognize need
- Inability to establish
- Incorrectly placed airway
- Displacement
- Failure to ventilate
- Aspiration
Airway: Problem Recognition

- Objective Signs – Airway Obstruction:
  - agitation, cyanosis = hypoxia
  - obtundation = hypercarbia
  - abnormal sounds
  - tracheal location
  - external trauma
Airway: Problem Recognition

- Altered Levels of Consciousness
  - closed head injury
  - intoxication

- Maxillofacial Trauma
  - hemorrhage
  - dislodged teeth
  - mandible fx
Airway: Problem Recognition

- **Penetrating Neck Trauma**
  - laceration of trachea
  - hemorrhage with tracheal deviation/obstruction
  - patient may initially maintain airway
  - prophylactic intubation?
Airway: Problem Recognition

- **Blunt Neck Trauma**
  - hemorrhage with tracheal deviation/obstruction
  - disruption of the larynx
    - hoarseness
    - subcutaneous emphysema
    - palpable fracture
  - prophylactic intubation?
Clothes-line Injury to the Neck
Airway: Management

A always includes C-spine in-line immobilization!

assume this therefore, do this
Airway: Management

• **Airway Maintenance Techniques:**
  – chin lift
  – jaw thrust
  – oral airway
  – nasal trumpet

• **Definitive Airway:**
  – orotracheal or nasotracheal intubation
  – surgical airway
Airway: Cricothyroidotomy

Vertical skin incision – make it longer than you think you need….
Airway: Cricothyroidotomy

Use the trach hook to stabilize.
Incise the cricothyroid membrane.
Airway: Cricothyroidotomy

Place a 6-0 endotracheal tube.

< 11yo, cric is contraindicated – do a trach.
Airway: Take Home Points

- Suspect impending airway obstruction
- C-spine immobilization
- Provide definitive airway
- Check patency, tube position
- Intubation unsuccessful → surgical airway

Address life threatening injuries!
Starting with the ABCs

B = Breathing
Breathing: Preventable Deaths

- **Assess** = “Look - Listen - Feel”

- **Address:**
  - Tension PTX
  - Open PTX
  - Flail chest
  - Massive hemothorax
    (really part of C)
Breathing: Problem Recognition

- **Objective Signs – Inadequate Ventilation:**
  - asymmetric chest rise
  - labored breathing
  - absent breath sounds
  - tachypnea
  - pulse oximeter
    (indirect measure)
Breathing: Problem Recognition

- **Tension PTX:**
  - “one-way-valve” air leak
  - blunt or penetrating mechanism
  - absent breath sounds

- CLINICAL DIAGNOSIS
- immediate decompression
Breathing: Problem Recognition

- Open PTX:
  - defect of chest wall
  - air passes preferentially through defect
  - hypoxia & hypercarbia
  - occlusive dressing on 3 sides until CT placed
Breathing: Problem Recognition

• **Flail Chest:**
  - *segment without bony continuity*
  - *asymmetric movement*
  - *crepitus*
  - *pulmonary contusion*
    → *hypoxia*
The patient’s hemodynamic status dictates imaging and management.
Breathing: Management

- Chest tube, chest tube, chest tube
- Occlusive dressing
- Ventilatory support
- Thoracotomy?
Breathing: Take Home Points

• Look, listen, feel

• Adequate airway ≠ adequate ventilation

• HD status determines imaging

• Tension PTX = clinical dx

Address life threatening injuries!
Starting with the ABCs

C = Circulation
Circulation: Preventable Deaths

- **Hypotension = Hemorrhage**

- **Assess:**
  - level of consciousness
  - pulse / skin color

- **Address:**
  - external bleeding
  - massive hemothorax
  - cardiac tamponade
  - massive hemoperitoneum
  - unstable pelvic fracture
# Circulation: Classes of Shock

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Example:
- 1 year old falls through a window
- “lost ¾ cup of blood”
- blood volume = 70cc/kg x 10kg
- EBL = ¾ cup → 6 oz → 180cc
- 180cc / 700cc = 25% blood loss
- class II/III shock
Circulation: Causes of Shock

- Hypovolemic = Hemorrhage:
  - 5 spaces = chest, abd, pelvis, long-bones, street

- Fractures:
  - rib = 100-200 cc
  - tibia = 300-500 cc
  - femur = 800-1200 cc
  - pelvis = 1500 and up
Circulation: Causes of Shock

• Cardiogenic:
  – tension PTX
  – cardiac tamponade or contusion
  – air embolism
  – primary cardiac disease

• Neurogenic:
  – spinal cord injury

• Septic
Circulation: Problem Recognition

- **External Hemorrhage:**
  - apply direct manual pressure
  - don’t indiscriminately use clamps
  - tourniquet if amputation
Circulation: Problem Recognition

- Massive Hemothorax:
  - 1500 cc blood
  - 1/3 blood volume in a child
  - blunt trauma → rib fx, intercostal artery, lung lac
  - penetrating trauma → systemic or hilar vessels
Circulation: Problem Recognition

- **Cardiac Tamponade:**
  - **penetrating = most common**
  - **diagnosis:**
    - Beck’s triad = uncommon
    - CVP line
    - Ultrasound
  - **pericardiocentesis**
Massive Hemoperitoneum:

- Consider mechanism
  - X-rays if penetrating

- FAST is often diagnostic

- DPA if patient remains unstable, FAST –

- Emergent OR
Circulation: Problem Recognition

- **Unstable Pelvic Fracture:**
  - Exam PLUS hypotension
  - R/O associated injuries
  - “sheet” the pelvis
  - If transfusing blood consider intervention: IR vs. OR
Circulation: Pitfalls

- Elderly – limited reserve
- Children – abundant reserve, decompensate late
- Athletes – “relative” tachycardia
- Drugs – Rx and illegal
Circulation: Management

- **IV access:**
  - 2 large-bore peripheral IVs
  - central line
  - saphenous vein cut down
  - IO needle

- **2 liter bolus**
Circulation: Management

- Tube thoracostomy
- Pericardiocentesis
Circulation: Management

- “Wrap the pelvis” to close down volume

wrapped in ED  C-clamp  external fixator
Circulation: Management

- **ED Thoracotomy:**
  - penetrating torso < 15 min CPR
  - penetrating non-torso < 5 min CPR
  - blunt < 5 min CPR
Circulation: Management

- Hilar Injuries:
  - satinsky clamp
  - hilar twist
  - digital compression
• **Cardiac Injuries:**
  - pledget repair RV
  - staple repair LV if linear wound
  - suture repair LV
  - avoid ligating a coronary
Circulation: Management

• Cross-clamp aorta:
  – after pericardium
  – do first if penetrating neck/extremity injury
• Don’t forget:
  – proper hand position for cardiac massage
  – internal cardioversion paddles
  – intracardiac epi
Circulation: Take Home Points

- Hypotension = hemorrhage
- Class III shock before ↓ BP
- 5 spaces for blood loss
- IV access is key!

Address life threatening injuries!
ABCs: Take Home Points

- Systematic evaluation

- Address life threatening injuries
  - airway obstruction
  - tension/open PTX
  - massive hemoperitoneum
  - cardiac tamponade
  - external hemorrhage
  - massive hemothorax
  - unstable pelvis

- Resuscitation without specific diagnosis

- Following this, proceed with 2° survey
Starting with the ABCs