Trauma Evaluation and Management

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MS-3 Lecture

Why is Trauma Care Important?

• Leading cause of death in those <35 yo
• 3rd leading cause of death in all ages
• Significant loss of work force productivity

Background

• Trimodal distribution of death
  • 50% die at scene
  • What do they die of?
  • 50% survive to hospital but then die
    • 30% die during “golden hour”
    • 20% die after prolonged hospital course

General Approach

• Assume all patients are dying until proven otherwise
• Plan to operate on everyone and use diagnostic studies only to convince you not to

Classes of shock

| I | Up to 15% blood loss  
  | Almost no clinical signs |
|---|------------------------|
| II | 15-30% blood loss  
   | Tachycardia, narrowed pulse pressure |
| III | 30-40% blood loss  
    | Hypotension |
| IV | ≥ 40% blood loss  
    | Mental status changes |

How do you Triage?

• What if a patient has multiple injuries, all of which could be life threatening?
• What if multiple patients present, all of whom are injured?
Initial Assessment

A
AIRWAY
• Can they protect their airway?
B
BREATHEING
• How can you tell if they are adequately ventilating?
C
CIRCULATION
• Are they in shock?
D
DISABILITY
• What is their neurologic exam?
E
ENVIRONMENT/EXPOSURE
• Fully disrobe but keep them warm

Primary Survey

• Evaluate ABCs
• Begin resuscitation
• Adjunctive studies:
  • Trauma series (CXR, pelvis, lat C-spine)
  • Evaluation of abdomen in unstable patients
  • Lab work

Secondary Survey

• Detailed head to toe exam
• Additional diagnostic studies
• Evaluation of the abdomen in stable patients

Evaluation of the Abdomen

Who needs objective evaluation of the abdomen after blunt trauma?
• Unstable patients
  • To identify a source of hemorrhage
• Stable patients with an unreliable exam
  • Altered mental status
  • Major distracting injury
  • Need for general anesthesia
  • Complaints of abdominal pain

Evaluation of the Abdomen

In unstable patients (SBP<90):
• Focused Assessment using Sonography in Trauma (FAST)
• Diagnostic Peritoneal Lavage (DPL)

• CT contraindicated if unstable

FAST

• Advantages
  • Fast
  • Noninvasive
  • Can be performed while resuscitation ongoing
  • Can be very sensitive
• Disadvantages
  • Not specific
  • Operator dependent
  • Body habitus may limit quality/sensitivity
**DPL**

- **Advantages**
  - Sensitive
  - Specific
  - Can be performed while resuscitation ongoing

- **Disadvantages**
  - Invasive
  - Slow
  - Risk of secondary injury, particularly in patient with previous laparotomy

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**Abdominal CT**

- **Advantages**
  - Noninvasive
  - Fairly sensitive and specific
  - Additional information on musculoskeletal, retroperitoneal injuries

- **Disadvantages**
  - Inexperienced radiologist (or surgeon) may miss injuries
  - A bad place to be if patient “crashes”

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**Case #1**

- 35 yo F unrestrained driver in high speed roll-over MVC
- Field VS: HR 120, BP 100/50, RR 30. Patient intubated for respiratory distress
- ER vital signs: HR 120, BP 90/50

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**Case #2**

- 6 yo M, rear seat passenger in high speed MVC restrained only with a lap belt
- VS: HR 100, BP 95/40, c/o abdominal pain

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**Case #3**

- 58 yo M, s/p single self-inflicted GSW to the R chest, just below the nipple
- Field VS: HR 90, BP 130/70, RR 20
- Mild respiratory distress, not intubated. ER VS: HR 82, BP 140/80

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**Penetrating Abdominal Trauma**

- **Penetrating Injury**
  - **Unstable**
  - **Stable**
    - High Velocity
      - Guns
      - Rifles
    - Low Velocity
      - Stabs
      - Impalements
    - Local wound +/- Intrapertoneal exam
Case #4

• 24 yo M s/p single stab wound to the L flank in the anterior axillary line
• Field VS: HR 90, SBP 120/70
• ER VS: HR 85, BP 140/80

Penetrating Abdominal Trauma

Local wound exploration
Fascial penetration?

NO

HOME

YES

DPL

Admit and Observe

Stable Low Velocity

Penetrating Neck Injury

• 50 yo M, s/p single stab wound to R neck, at level of the larynx, overlying the SCM muscle
• VS: HR 110, BP 130/80. No respiratory distress

Thoracic Trauma

• 18 yo M stabbed with a beer bottle in the 4th intercostal space, just left of the sternum
• Intubated for respiratory distress
• Field VS: HR 130, BP 80/50
• ER VS: HR 140, BP 70/50

Thoracic Trauma

• How do you diagnose a tension pneumothorax?
  • Remember that it is a clinical diagnosis
  • Level of suspicion based on mechanism needs to be high

  Needs immediate decompression!

Thoracic Trauma

• How do you diagnose cardiac tamponade?
  • Also a clinical diagnosis but the “classic” signs may not be present
  • Level of suspicion needs to be high based on mechanism

  Needs immediate pericardial drainage!
Thoracic Trauma
- 20 yo M s/p multiple stab wounds to the R chest
- Field VS: 100/50, HR 110
- Intubated, flutter valve in place
- ED VS 90/50, HR 120
- R chest tube placed with 800cc bloody output

Severe Pelvic Fracture
- 50 yo F thrown from her horse and then crushed underneath it
- Field VS: HR 120, BP 100/50
- ER VS: HR 130, BP 80/40
- Pelvis unstable on exam

Closed Head Injury
- 40 yo M assaulted with a 2x4 to the head
- Patient found unconscious, unresponsive, GCS=5
- Intubated for airway protection

Glasgow Coma Score
- E=eye opening
  - Best score 4
- V=verbal response
  - Best score 5
- M=motor response
  - Best score 6

TBI classification
- How is brain injury classified?
  - GCS >=13: Mild
  - GCS 9-12: Moderate
  - GCS <=8: Severe

  All those with GCS 8 or lower need to be intubated for airway protection

Secondary Brain Injury
- What is secondary brain injury?
- What can be done to prevent it?
Intracranial hypertension

• What is intracranial hypertension?
• Why does it occur?
• What can be done to decrease the pressure?
  • Hyperventilation for impending herniation
  • Diuretics only if hemodynamically stable
  • Keep HOB up
  • Keep well sedated
  • Ventriculostomy
  • Operative decompression

Closed Head Injury

• 14 yo M tackled during football practice and had a brief LOC
• GCS 15 on medic arrival and in ER. Hemodynamically stable.
  • Does he need a head CT?

Crush Injury

• 35 yo F suffers a crush injury to both legs when pinned by a heavy pallet that fell off a forklift. It took 25 minutes to extricate the patient.
• She is c/o severe pain in her legs. HR 120, BP 150/90.
  • How should she be monitored for compartment syndrome?
  • What is myoglobinuria and how should it be managed?

Rhabdomyolysis

• Hydrate, hydrate, hydrate
• Goal UOP about 100 cc/hr
• If poor UOP despite adequate fluid resuscitation, start diuretics
  • Need CVP line to assess preload

Spinal Cord Injury

• 50 yo F struck by a car and thrown 30 feet
• Found unresponsive with GCS=3, intubated
• BP 90/40, HR 120
• Evaluation in the ER reveals a fracture dislocation at C5/6
• CXR and pelvis XR negative