The Secondary Survey

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Outlining the Resuscitation

- ABCs Completed
  - adjuncts to the 1° survey
  - start 2° survey

- History/Mechanisms of Injury

- Examination:
  - injury identification
  - intervention and treatment
  - management pitfalls

- Take Home Points
Outlining the Resuscitation

Resuscitation

Primary Survey  Secondary Survey  Definitive Treatment

Reassessment
PITFALL

Be wary of the transient responder.....
Adjuncts to the ABCs

• ECG monitoring
  – tachycardia
  – dysrhythmias
  – ST segment changes

• Fetal monitoring
  • > 26 weeks
  • high-risk for 24°
Adjuncts to the ABCs

• Catheters
  – foley
  – NG tube
PITFALL

- Suspect urethral injury
  - blood at meatus
  - perineal bruising
  - high-riding prostate
  - pelvis fracture
PITFALL

- Appropriate NG tube use:
  - may precipitate gagging
  - emesis/aspiration
  - avoid nasal route in patients with facial fx
Adjuncts to the ABCs

• Portable X-rays:
  – blunt trauma = “Big 3”
    • AP chest
    • AP pelvis
    • lateral c-spine
Adjuncts to the ABCs

- **Portable X-rays:**
  - penetrating = “injured space plus 1 above/below”
Adjuncts to the ABCs

- FAST exam:
  - 4 views of abdomen
  - >200cc of fluid
If persistent or recurrent hypotension, remember FAST isn’t 100% accurate!
Secondary Survey: History

- **A = Allergies**
- **M = Medications**
- **P = Past illnesses/Pregnancy**
- **L = Last meal**
- **E = Events around injury**
Secondary Survey: History

- **Prenatal history:**
  - PIH, DM, CHD
  - preterm labor
  - placental abruption/previa
  - fetal movement

- **Fundal height ➔ fetal age**
Secondary Survey: History

- **Blunt Mechanisms:**
  - seat belt/helmet use
  - vehicle damage
  - steering wheel deformation
  - impact direction
  - passenger ejection
  - deaths at the scene
Secondary Survey: Mechanism

- **Front impact:**
  - C-sp fx, rib fx ± PTX, liver/spleen lacs, post hip dislocation

- **Side impact:**
  - C-sp fx, rib fx ± PTX, diaphragm rupture, pelvis fx

- **Ejection:**
  - increased risk
Secondary Survey: Mechanism

- **Penetrating trauma:**
  - body region
  - GSW: distance from weapon to wound, velocity, caliber, presumed path
  - SW: length of object, impact direction
  - associated blunt trauma?
PITFALL

If the weapon is in the patient, allow the surgeon to remove it under controlled conditions!
Secondary Survey: Exam

Head to Toe

“Every Nook and Cranny”
Exam: HEENT

- Head:
  - scalp lacerations or contusions
  - skull fractures
Exam: HEENT

- **Eye:**
  - pupil exam
  - globe intact?
  - visual acuity?

- **Ears:**
  - blood? CSF leak?
  - intact?
Exam: HEENT

• **Nose/Mouth/Throat:**
  – airway issues paramount
  – bony step-off
  – bite feels normal?
  – bleeding from nose/mouth
Penetrating Neck Injuries

** Penetrating Neck Injury **

- Hemodynamically Unstable
  - Uncontrolled Hemorrhage
  - Operative Exploration

- Hemodynamically Stable
  - Symptomatic**
    - Zone I: CT neck/ chest { CTA esophagram bronchoscopy } +
    - Zone II: Angio +
      - Zone III: IR embo

- Asymptomatic
  - Zone I: CT neck/ chest { CTA esophagram bronchoscopy } +
  - Zone II: Transcervical GSW
  - Zone III: All Others

** symptoms = expanding hematoma
airway compromise
dysphagia
subcutaneous emphysema
hoarseness
Exam: HEENT

- The Brain!
  - evaluation part of ABCDEs
  - calculate GCS
    - GCS < 8 severe head injury/coma
  - Dx = CT scan, ICP monitor
Exam: Spine

• Cervical/Thoracic/Lumbar:
  – always protect the spine
  – safely off the backboard
• if one fx, look for another!
• sensory/motor loss = injury
• remember steroids
• complication = neurogenic shock
Exam: Thoracic Injuries

- 8 Lethal Injuries:
  - pneumothorax
  - hemothorax
  - pulmonary contusion
  - blunt cardiac injury
  - aortic disruption
  - diaphragm rupture
  - tracheobronchial injury
  - traversing mediastinal wounds
Exam: Thoracic Injuries

- **Simple pneumothorax**
  - penetrating and blunt
  - lung laceration with air leakage
  - ↓ breath sounds
  - hyperresonance

- Tx = chest tube
Exam: Thoracic Injuries

- **Hemothorax**
  - lung laceration or laceration of intercostal vessel
  - bleeding self-limited
  - <10% require thoracotomy

- \( Tx = \text{chest tube} \)
- If > 1500cc out initially → thoracotomy
PITFALL

Make sure blood is evacuated – R/O caked hemothorax.
Exam: Thoracic Injuries

- **Pulmonary contusion**
  - most common injury
  - develops over time
  - present without rib fx in children

- **Tx = intubation if significant hypoxia**
Exam: Thoracic Injuries

- **Blunt cardiac injury**
  - contusion to any chamber
  - occasional rupture
  - clinical symptoms:
    - tachycardia
    - arrhythmias
    - abnormal ECHO

- **Tx = 24° of Telemetry**

  Swan if ECHO abnormal, patient unstable
Exam: Thoracic Injuries

- Aortic disruption
  - complete transection – typically DOA
  - incomplete tear – potentially salvageable
  - injury near ligamentum arteriosum
  - contained hematoma
Exam: Thoracic Injuries

- **Aortic disruption**
  - few symptoms
  - **X-ray findings:**
    - wide mediastinum
    - obliterated aortic knob
    - deviation of trachea
    - depressed left bronchus
    - deviation of esophagus
    - apical capping
Exam: Thoracic Injuries

- Aortic disruption
  - empiric treatment in trauma bay
    - esmolol SBP < 100, HR < 100
  - screening helical CT scan
  - angiography is the gold standard
- Tx = operative repair vs. stent graft
Exam: Thoracic Injuries

- **Diaphragm rupture**
  - more common on left
  - blunt = radial tear
  - penetrating = linear lac

- **Diagnosis**
  - gastric bubble in chest
  - liver in the chest
  - NGT coiled in chest
Exam: Thoracic Injuries

- Dx = CT scan can be confirmatory
- Tx = operative repair via the abdomen
Exam: Thoracic Injuries

- **Tracheobronchial Injury**
  - within 1 inch of carina
  - often lethal
  - hemoptysis, subQ emphysema, tension pneumothorax
  - persistent air leak
  - bronchoscopy

- **Tx = watch vs. glue vs. operate**
Exam: Thoracic Injuries

- **Transmediastinal Wounds**
  - external wounds + Xray

- **Tx = determined by hemodynamics**
  - stable – CT, triple eval
  - unstable – OR

- **Mortality > 20-40%**
KEY POINT

Rule out the 8 lethal chest injuries.
Exam: Abdominal Injuries

- **Blunt trauma = crushing injury**
- **Penetrating = laceration**
- **Organ injuries**
  - blunt = spleen → liver → bowel
  - SW = liver → bowel → diaphragm
  - GSW = bowel → colon → liver
Exam: Abdominal Injuries

• **Diagnostic tools:**
  - FAST exam → blood in the abdomen?
  - Plain film → retained bullet?
  - DPA/DPL → blood? bowel contents?
  - CT scan → specific injury?
Blunt Abdominal Trauma

Hemodynamically Stable

No

Yes

FAST +

Peritonitis?

Yes

No

FAST +

LAPAROTOMY

DPA

Equivocal

Yes

No

Abdominal CT

Yes

No

Indications for CT:
- Altered mental status
- Confounding injury
- Gross hematuria
- Pelvic fracture
- Abdominal tenderness
- Unexplained Hct<35%

No

Repeat FAST in 30 minutes
Penetrating Abdominal Trauma

- Penetrating Abdominal Trauma
  - Hemodynamically Unstable
    - GSW
    - Anterior Abdomen
  - Hemodynamically Stable
    - SW
    - Back/Flank
    - AASW with + LWE
    - Tangential Back/Flank
    - RUQ
    - CT Scan
    - Serial Exams
    - Operating Room
Exam: Abdominal Injuries

Blunt liver injury:

Penetrating liver injury:
Exam: Abdominal Injuries

Blunt spleen injury:
Exam: Abdominal Injuries

Blunt pancreatic/duodenal injury:
Exam: Abdominal Injuries

Blunt bowel injury:
Exam: Abdominal Injuries

Penetrating vascular injury:

SW to inferior vena cava

GSW to left external iliac artery
Exam: Pelvic Injuries

- **Exam**
  - stable pelvic ring?

- **Pelvis film**
  - intact circle?
  - rami intact?
  - acetabulum smooth?
Exam: Pelvic Injuries

- If patient has a pelvic fracture
  - rectal exam → bony fragments?
  - vaginal exam → lacerations?
  - GU exam → bladder/urethral injury?
  - perineal exam → degloving?
Pelvic Fracture KCP

FAST Exam

Positive
- Operating Room
  - Laparotomy, Pelvic Fixation, Pelvic Packing
    - Hemodynamically Stable?
      - No
        - Angiography
        - SICU
      - Yes
        - SICU +/- CT scans**

Negative
- 2 units PRBCs/ED trauma bay
  - HD Stable
    - HD Unstable
      - Operating Room
        - Pelvic Fixation and Pelvic Packing
          - Ongoing Transfusion Requirements?
            - Yes
              - Angiography
              - SICU
            - No
              - SICU

** normalize coagulation status, abdominal CT scan if no laparotomy done.
Exam: Extremity Injuries

• Exam
  • deformity?
  • open fracture?
  • intact motor/sensory exam?
  • pulses?

• Stop bleeding with pressure
• Measure A-A gradient
• Traction/splints
2º Survey: Take Home Points

- Systematic evaluation
- Recognize and treat life threatening injuries
- Ongoing resuscitation
- Diagnostic tests
- Watch for pitfalls