

Initial and Ongoing Trauma Assessment

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Initial Trauma Assessment

- What are the ABC's of trauma?
- Airway
- Breathing
- Circulation
- Disability
- Exposure

Objectives

- List the components of the initial trauma evaluation
- Recognize the need for frequent re-evaluation of trauma patients
- Generate a differential diagnosis for mental status changes in trauma patients
- Define compartment syndrome and list components of neurovascular checks
- Be able to choose appropriate analgesia strategies in trauma patients

Airway

- What is the best way to assess the airway of a patient?
- Important caveats to trauma airways:
 - Always maintain in line C spine protection
 - Facial fractures/bleeding can compromise airway visualization and bag valve mask seal
 - Oral airways can cause vomiting
 - Nasal airways are contraindicated in skull base trauma

Case study

- 40 y/o man presents to the ED
- Scene report:
 - High speed MVC, ejected
 - GCS 10
 - BP 90/50, HR 120, sats 90% on NRB
 - Facial trauma
 - Obvious deformity of LE

Maintain in-line C spine stabilization

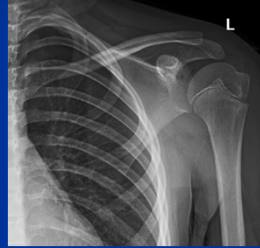


How do we secure these airways?



Can you spot the pneumothorax?

PTX on CT chest

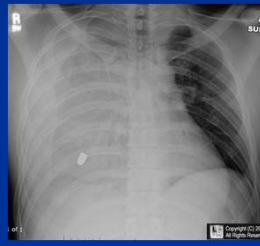


Trauma patients who need a secured airway:

- Apnea
- GCS<8, sustained seizure
- Unstable midface trauma
- Airway injury
- Large flail segment
- Respiratory failure
- Inability to maintain airway, oxygenation or ventilation

Hemothorax

Tension pneumothorax



Breathing

- Is our patient oxygenating and ventilating adequately?
- Considerations in primary trauma survey:
 - Pneumothorax
 - Hemothorax
 - Flail chest
 - Pulmonary contusion
 - Hypoventilation

Flail chest

- <http://www.youtube.com/watch?v=5QiQj8cBsAA>

Circulation

- Assess for signs of shock and obvious life threatening bleeding
- Before we even check a BP:
 - Reduced level of consciousness
 - Skin color
 - Pulse
 - Signs of life threatening external hemorrhage

Exposure/Environmental control

- Get the patient completely naked
- Keep the environment WARM
- The patient's body temperature is more important than the comfort of health care providers



Disability

- A rapid neurologic exam:
 - Patients level of consciousness (GCS)
 - Pupillary size and reaction
 - Lateraling signs
 - Spinal cord injury level

Back to our patient...

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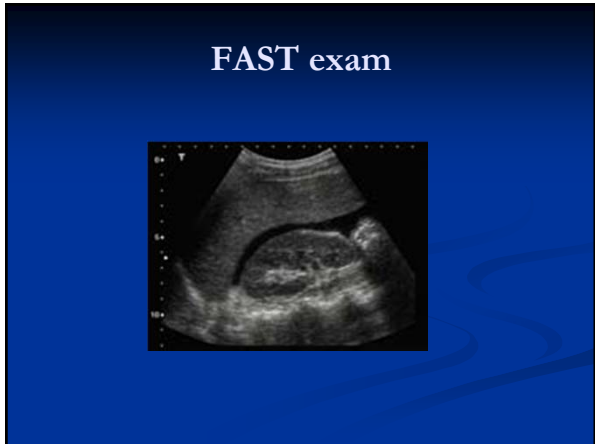
Glasgow Coma Scale

Score	Eye opening	Verbal response	Motor response
1	None	None	No movements
2	Open to painful stimulation	Incomprehensible sounds	Extends to pain
3	Open to voice	Inappropriate words	Abnormal flexion to pain
4	Open spontaneously	Confused, disoriented	Withdraws to pain
5	-	Oriented, converses	Localises to painful stimulus
6	-	-	Obeys commands

Legend: The GCS is obtained by adding the value for each category; minimal = 3, maximum = 15.

Our patient...

- ED primary assessment:
- Gurgling respirations
- Rapid, shallow breathing
- Pale, sweaty, thready pulse about 100
- Open LLE fracture with external bleeding
- Eyes open to voice (3)
- Moaning (2)
- Withdraws when LLE manipulated (4)



- ### Secondary survey
- Sats 88% on non rebreather
 - BP 85/60
 - HR 120
 - Unable to provide any history or medications
 - Midface unstable
 - Crepitus on right chest
 - Pelvis stable
 - Palpable LE pulses



- ### Our patient
- Intubated
 - Should you use a nasal or oral airway when preoxygenating?
 - Labs sent
 - Which ones?
 - Decision to go to the operating room urgently
 - What, if anything else, should be done before the operating room?
 - Antibiotics? -Tetnus?
 - NG? -Foley catheter?
 - Head CT? -pain medications?

As you are packing up for OR

- Sats drop to 70%
- What do you do now?
- What could be the cause?
 - Pulse ox malfunction/not perfusing finger
 - Hypotension
 - ET tube malposition
 - ET tube obstruction
 - Pneumothorax
 - PE

Our patient now



When there is any change in status

GO BACK TO THE ABC's

The patient goes to the OR

- Exploratory laparotomy
- Repair of small liver laceration
- Splenectomy
- Washout and splint LLE fracture

- Post op to CT, then ICU

Constant reassessment

Initial film



20 minutes later



Total injuries:

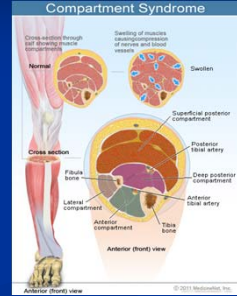
- Small sub arachnoid hemorrhage
- Zygomatic arch fx
- Bilateral rib fractures with pulmonary contusion
- Right pneumothorax
- Liver laceration
- Splenic rupture
- Open left tib-fib fx
- Acute alcohol intoxication
- History of diabetes

Patient needs Q1 hour neuro checks and neurovascular checks

- What would be appropriate analgesia for this patient at this time?
 - Short acting
 - Minimal hemodynamic suppression

Compartment syndrome

- Pressure within an osteofascial compartment of muscle causes ischemia and subsequent necrosis
- Compartment pressure > perfusion pressure



Neurovascular checks

- Essentially checking circulation and neurologic function in a specific extremity
- Inspect color
 - Pink
 - Pale/white may indicate poor arterial supply
 - Blue/cyanotic mottled may indicate poor venous return
- Check for edema

Compartment Syndrome

- Symptoms and signs (6 P's)
 - Pain
 - Earliest sign
 - Out of proportion to exam/greater than expected
 - Not relieved with change in position or medications
 - Severe, deep, constant, poorly localized
 - Made worse with passive stretch
 - Paresthesia
 - "pins and needles"

Neurovascular checks

- Feel temperature
 - Compare with contralateral extremity
- Check capillary refill
- Check sensation
 - Light touch
 - Any numbness or tingling?
- Test movement

Compartment Syndrome

- P's continued
 - Pallor
 - Paralysis
 - Pulselessness
 - Poikilothermia
- Don't let it get that far!
- Other signs
 - Tense/tight
 - Congestion of digits and increased cap refill

Check compartment pressures



Mental status changes

- There is a broad differential for mental status changes in the trauma patient beyond peri-anesthesia causes
- Lets go through some and decide which are more or less likely...

2 days later...

- Extubated
- GCS 15
- Plan for return to OR for definitive fixation of LLE
- Straight forward repair of LLE
- In PACU
- You will be with him for a while-no beds

Differential diagnosis for mental status change in trauma patient

- | | |
|-------------------------------|-----------------------|
| ■ Medications | ■ Hypoxia |
| ■ Hypoglycemia | ■ Atelectasis |
| ■ Progression of brain injury | ■ Mucous plugging |
| ■ Stroke | ■ Pneumothorax |
| ■ Fat emboli | ■ Fat emboli |
| ■ Sepsis | ■ ARDS |
| ■ Hypotension/shock | ■ TRALI |
| ■ Hypercarbia | ■ Pneumonia |
| ■ EtOH withdrawal | ■ ICU psychosis |
| ■ Hepatic encephalopathy | ■ dementia/sundowning |

Your patient

- Has been in the PACU for 2 hours
- You notice a decline in mental status
- Go Back to the ABC's!



Analgesia

What are some other analgesia strategies for this patient?

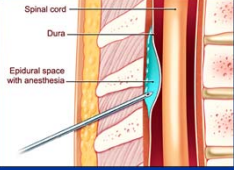

- Prn IV analgesia
- PCA
- Epidural
- Regional blocks
- PO medications
- Advantages and disadvantages of each?

Epidural Analgesia

- EAST practice guideline:
 - Level 1 “clinical application of pain management modalities to treatment of blunt thoracic trauma”



Epidural analgesia is the optimal modality of pain relief for blunt chest wall injury and is the preferred technique after severe blunt thoracic trauma.


- Level II “technical aspect”
 - Combination of narcotic (fentanyl) & local (bupivacaine)

Pain Management in Blunt Thoracic Trauma: EAST guideline. *Journal of Trauma*, 2011

Pain control: thoracic paravertebral block



Epidural Catheter

Advantages

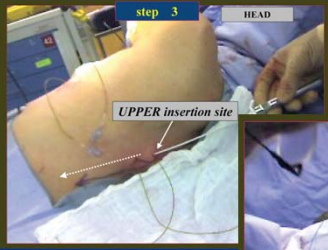
- Increased functional residual capacity (FRC), lung compliance, vital capacity
- Remain awake – pulmonary toilet

Disadvantages

- relative contraindicated:
 - Spine fracture
 - High rib fractures
 - Sedated/intubated patients
- Cause hypotension
- Infection – rare
- Hematoma
- “high block” – respiratory insufficiency
- Narcotic component
 - Nausea/vomiting

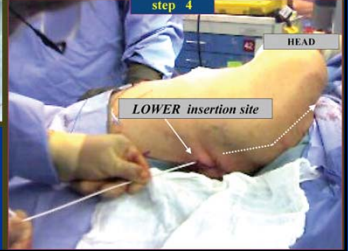
On-Q pump

step 3



UPPER insertion site

step 4



LOWER insertion site

Thoracic paravertebral block

Advantages

- Does not require painful palpation of ribs
- Not limited by scapula
- No risk of spinal cord injury
- Can be used on sedated patients
- Hypotension rare

Disadvantages

- Complications:
 - Pneumothorax
 - Vascular injury
- Lack of literature support

Comments: Thoracic Paravertebral Infusion of Bupivacaine for Pain Management in Patients With Multiple Fractured Ribs®
Kovacic et al. *Chest*, 2005, 128

Summary

- Trauma patients have special considerations for
 - Airway management
 - Analgesia
 - Differential for mental status changes
- Whenever there is an acute change in status go back to the ABC's

