

Initial Management of the Injured Patient

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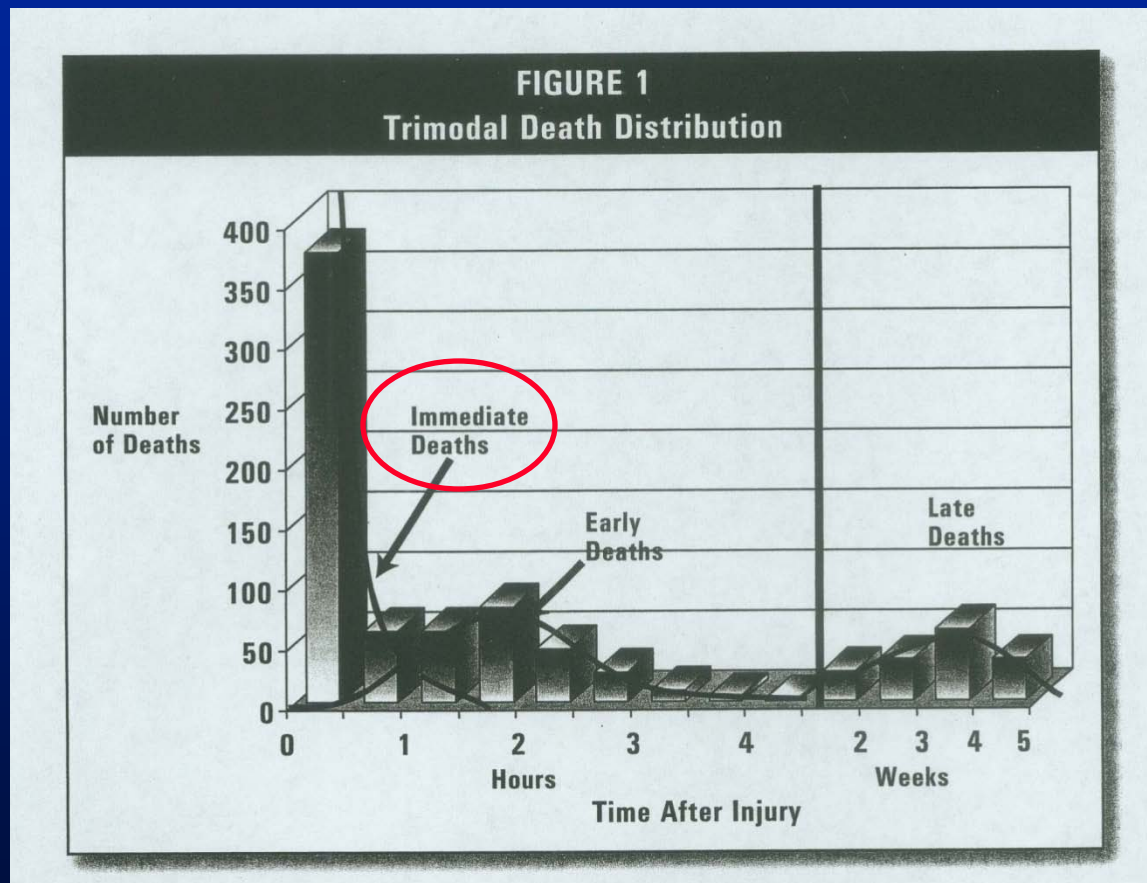
No Disclosures.

Why the ABCs?

- Trauma = leading cause of death for age 1-44 yrs
- ABCs during the Golden Hour
 - preventable deaths
 - problem recognition
 - management

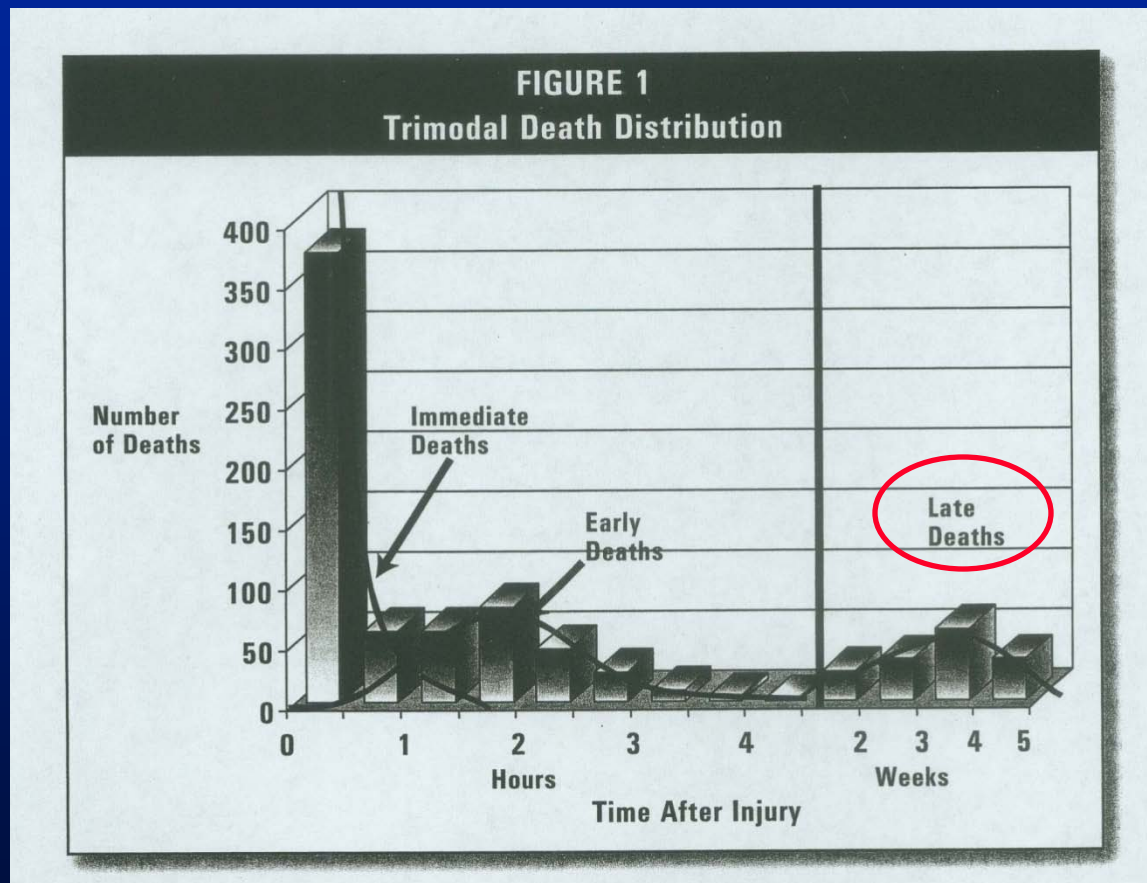


Trauma Deaths



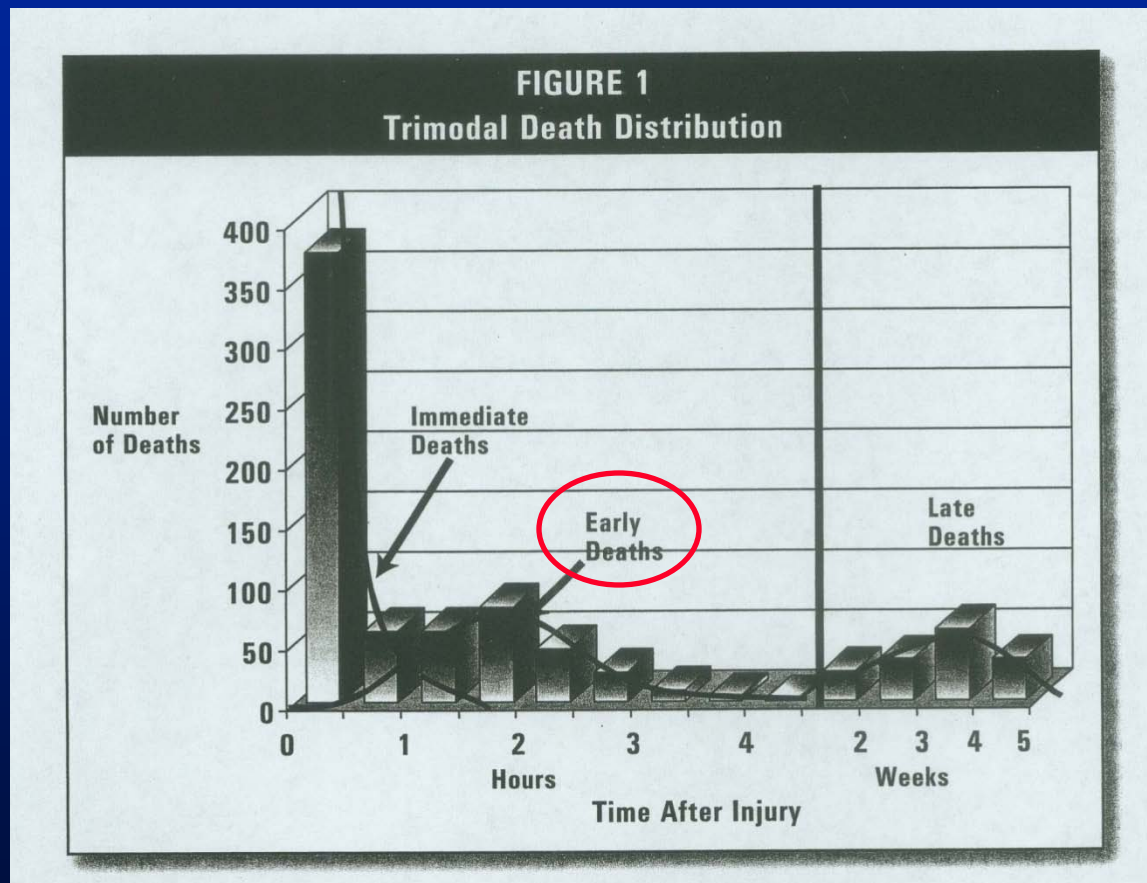
Trimodal distribution of trauma deaths.

Trauma Deaths



Trimodal distribution of trauma deaths.

Trauma Deaths



Trimodal distribution of trauma deaths.

The Golden Hour

- Treat the greatest threat to life
- Treat without a definitive dx
- Treat without a complete hx
- Rapid assessment
- Prompt resuscitation

**ABC
Approach**

The Golden Hour

- **A** = **A**irway with c-spine protection
- **B** = **B**reathing
- **C** = **C**irculation, stop the bleeding
- **D** = **D**isability/Neurologic status
- **E** = **E**xposure and Environment

Starting with the ABCs

A = Airway

Airway: Problem Recognition

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



Airway: Problem Recognition

- **Altered Consciousness**
 - **closed head injury**
 - **intoxication**
- **Maxillofacial Trauma**
 - **hemorrhage**
 - **dislodged teeth**
 - **mandible fracture**



Airway: Problem Recognition

- **Penetrating Neck Trauma**
 - laceration of trachea
 - hemorrhage with deviation
 - pt may initially maintain airway
- **Blunt Neck Trauma**
 - disruption of the larynx
 - hoarseness
 - subcutaneous emphysema

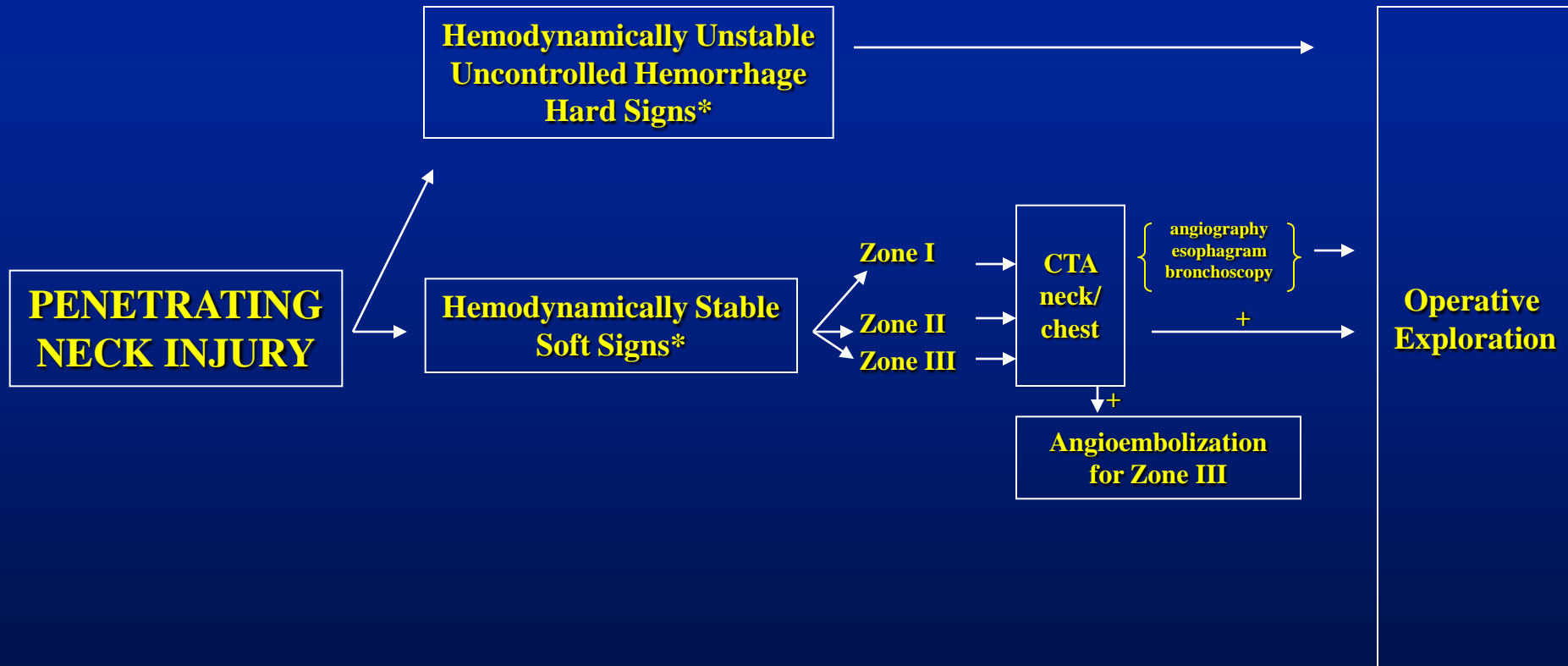


Penetrating Neck Injuries



* Hard signs = expanding hematoma
massive hemoptysis

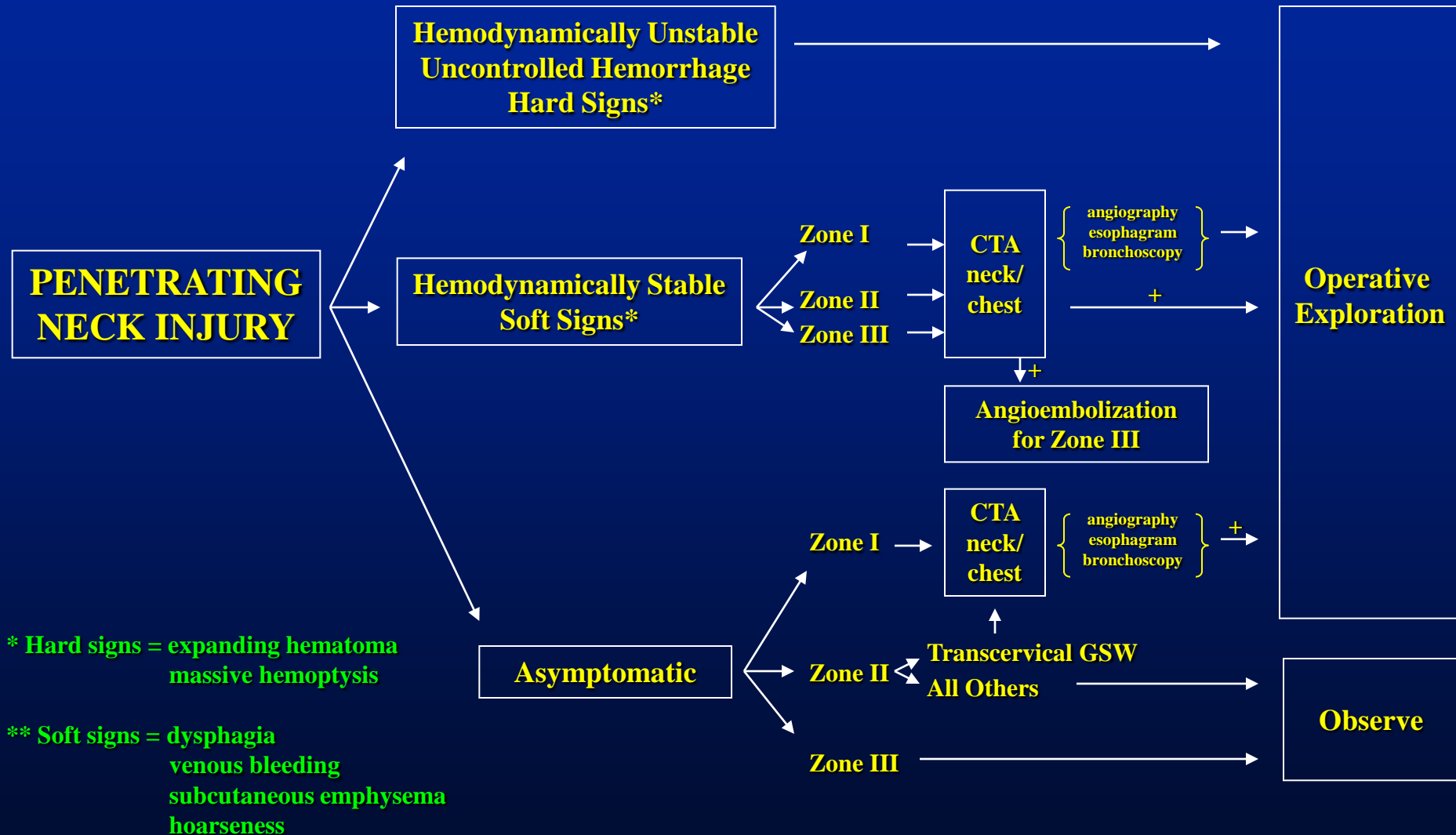
Penetrating Neck Injuries



* Hard signs = expanding hematoma
massive hemoptysis

** Soft signs = dysphagia
venous bleeding
subcutaneous emphysema
hoarseness

Penetrating Neck Injuries

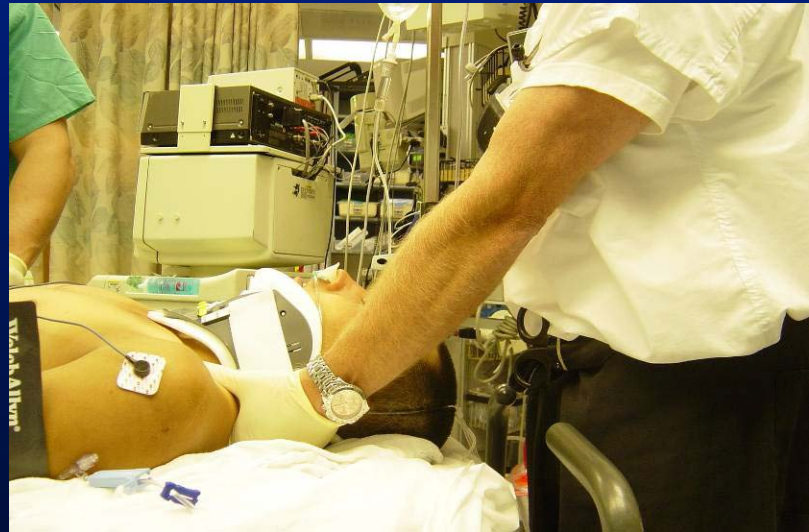


KEY CONCEPT

A always includes
C-spine immobilization!



Assume this.

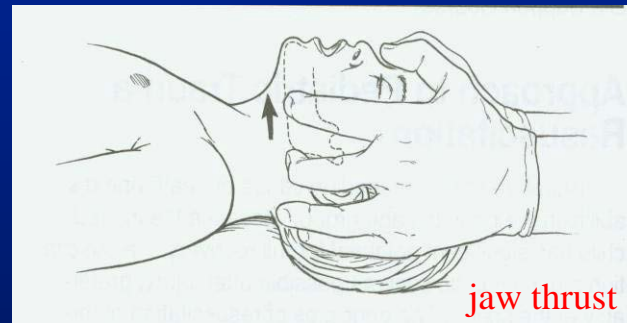


Do this.

Airway: Management

- Airway Maintenance Techniques:

- chin lift
- jaw thrust
- oral airway
- nasal trumpet

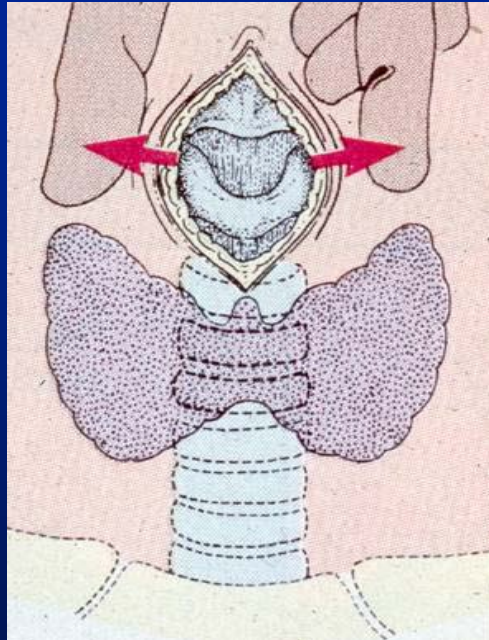


- Definitive Airway:

- oral or nasal intubation
- surgical airway

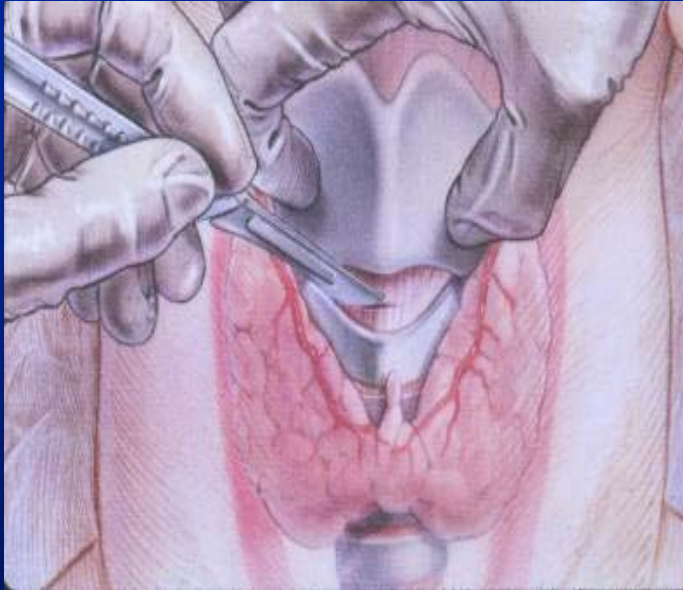


Airway: Cricothyroidotomy



Vertical skin incision – make it longer than you think you need....

Airway: Cricothyroidotomy



**Incise the cricothyroid membrane.
Consider a trach hook to stabilize.**

Airway: Cricothyroidotomy



Place a 6-0 endotracheal tube.

Airway: Take Home Points

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



Starting with the ABCs

B = Breathing

Breathing: Preventable Deaths

- Assess = “Look - Listen - Feel”
- 9 Thoracic Injuries:
 - pneumothorax
 - hemothorax
 - flail chest/pulmonary contusion
 - cardiac tamponade
 - blunt cardiac injury
 - aortic disruption
 - diaphragm rupture
 - tracheobronchial injury
 - traversing mediastinal wounds



Breathing: Problem Recognition

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



KEY CONCEPT

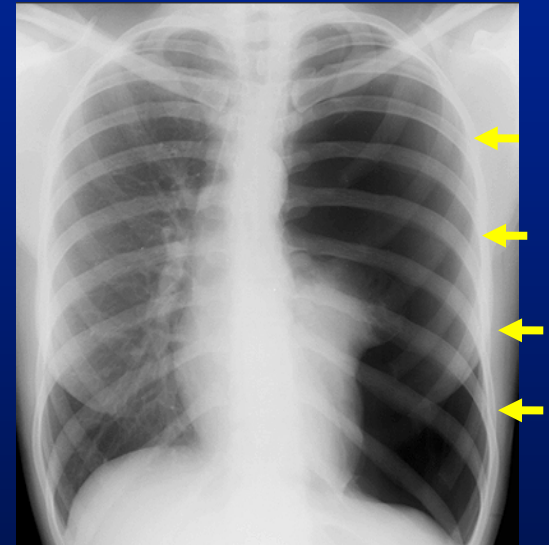
The patient's
hemodynamic status
dictates imaging and management.

If unstable → U/S, chest tube

If stable → CXR

Tension Pneumothorax

- “One-way-valve” air leak
- Blunt or penetrating mechanism
- Absent breath sounds
- Hemodynamic instability

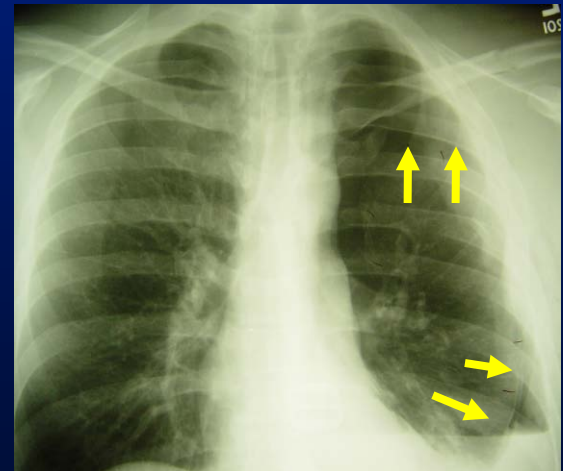


CLINICAL DIAGNOSIS

– immediate decompression

Simple Pneumothorax

- Lung laceration with air leakage
- Penetrating or blunt mechanism
- Decreased breath sounds
- Hyperresonance
- BP stable
- Tx = small chest tube



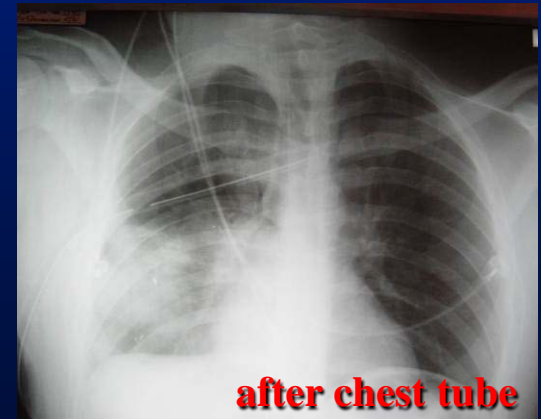
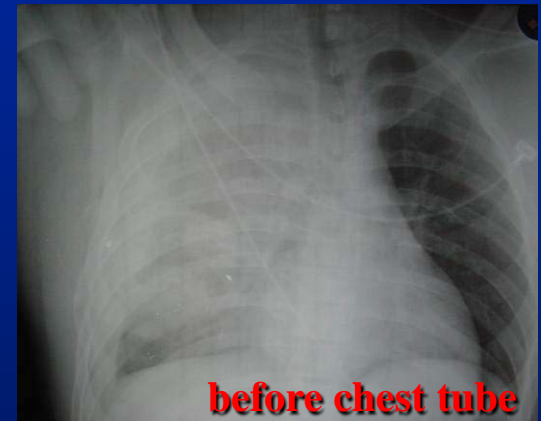
Open Pneumothorax

- Defect of chest wall
- Air passes preferentially through defect
- Hypoxia & hypercarbia
- Tx = occlusive dressing on 3 sides until CT placed



Hemothorax

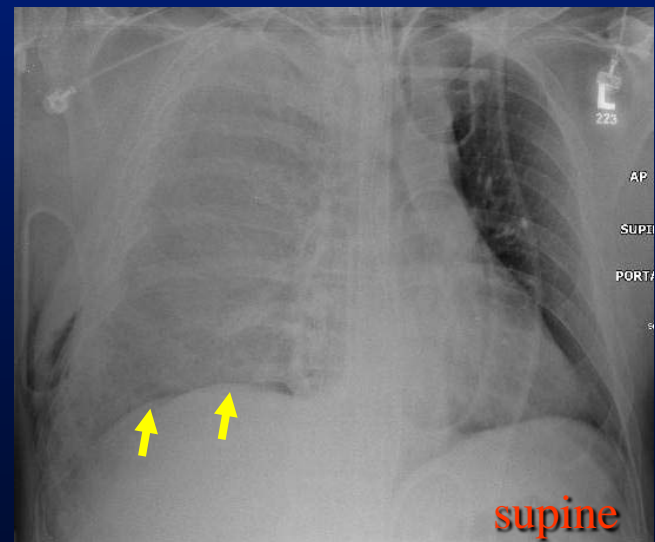
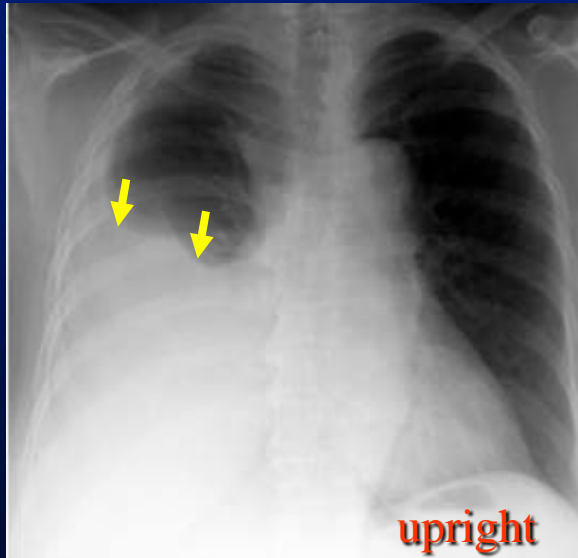
- Lung laceration or intercostal vessel
- Diminished breath sounds
- Bleeding often self-limited
- <10% require thoracotomy
- Tx = 28 Fr chest tube
If > 1000cc (penetrating) or 1500cc (blunt) → thoracotomy



KEY POINT

Upright film – layering.

Supine film – generalized opacity.



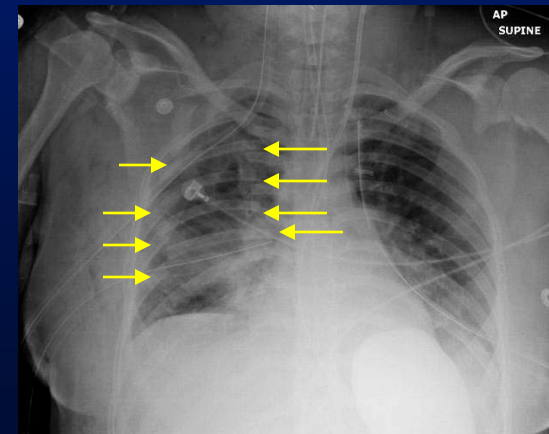
PITFALL

**Always check a follow-up film.
Make sure blood is evacuated.**



Flail Chest / Pulmonary Contusion

- Segment without bony continuity
 - Asymmetric movement
 - Crepitus
 - Contusion → cause of hypoxia
-
- **Tx = pain control,
intubation if marked hypoxia**



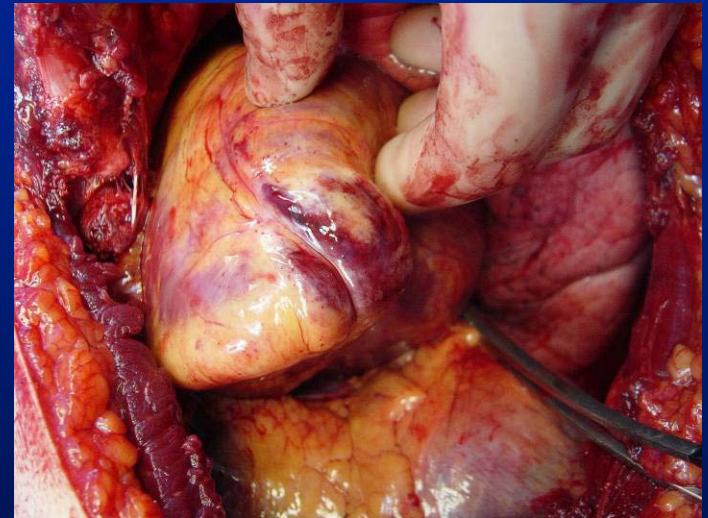
Cardiac Tamponade

- Penetrating mechanism is most common
- Diagnosis with ultrasound
- CVP line if in question
- Tx = pericardiocentesis then OR



Blunt Cardiac Injury

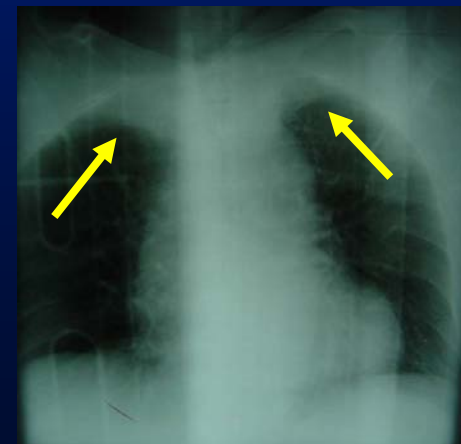
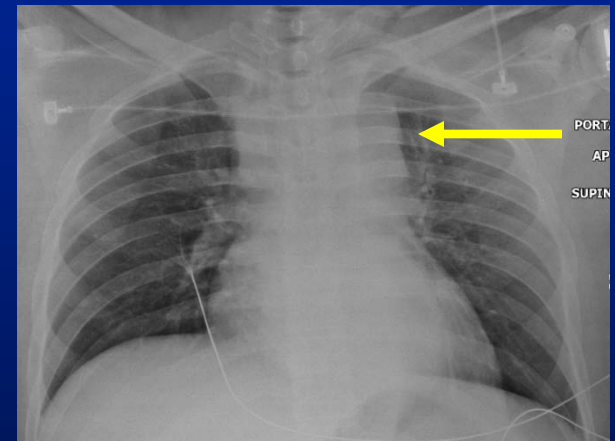
- Contusion to any chamber
- Rarely rupture
- Tachycardia common
- EKG



- Tx = 24° of telemetry,
management of arrhythmias, cardiogenic shock

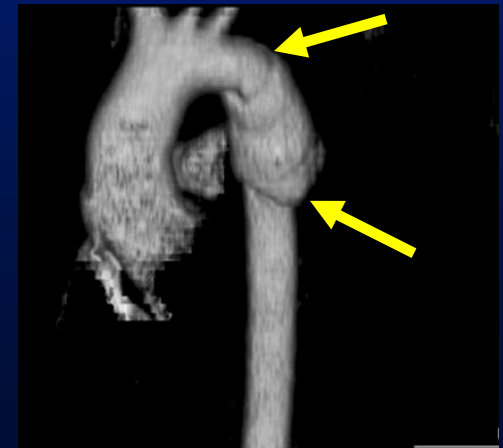
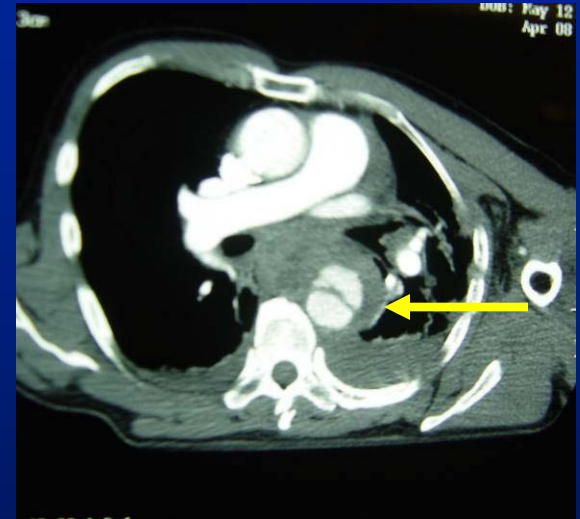
Descending Torn Aorta

- Incomplete tear near ligamentum arteriosum
- Contained hematoma
- X-ray findings:
 - wide mediastinum
 - obliterated aortic knob
 - deviation of trachea
 - depressed left bronchus
 - deviation of esophagus
 - apical capping



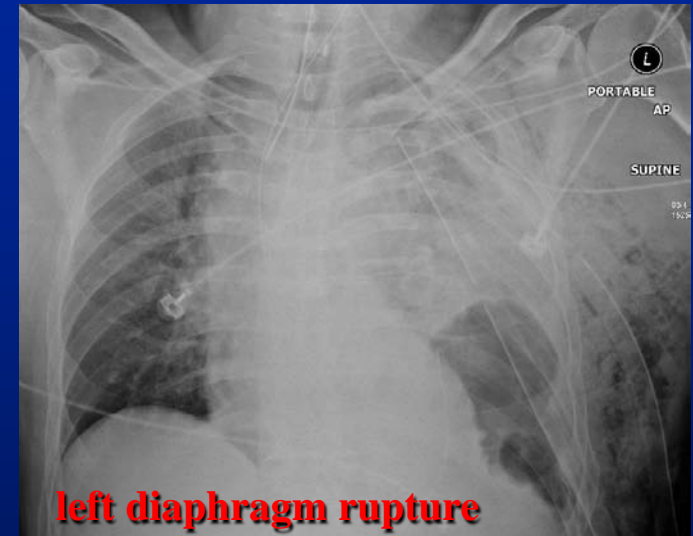
Descending Torn Aorta

- Empiric treatment in ED
 - esmolol gtt with goal
SBP < 100, HR ~ 60
- Multislice helical CT scan
- Tx = operative repair vs.
stent graft



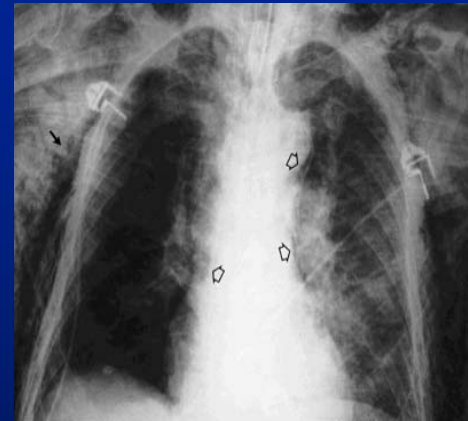
Diaphragm Rupture

- Blunt = radial tear, often on left
- Penetrating = linear lac
- CXR for diagnosis
- Tx = operative repair via the abdomen



Tracheobronchial Injury

- Within 1 inch of carina
 - Hemoptysis, subQ emphysema
 - Persistent PTX, continuous air leak
 - Bronchoscopy
-
- Tx = watch vs. glue vs. operate



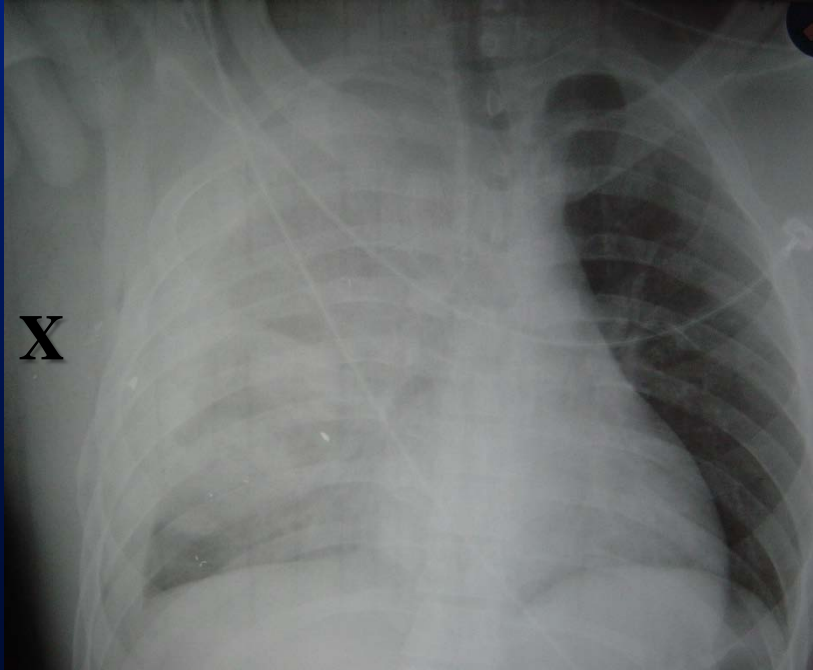
Transmediastinal Wounds

- Location of external wounds
- CXR and abdominal film
- ABCs, neuro exam
- Hemodynamics determines imaging:
 - stable – CTA, triple eval
 - unstable – OR



PITFALL

Injured space plus 1 above/below.



Breathing: Take Home Points

- Look, listen, feel
- Adequate airway \neq adequate ventilation
- HD status determines imaging
- Tension PTX = clinical dx
- Chest tube is often definitive therapy



Starting with the ABCs

C = Circulation

Circulation: Causes of Shock

- Hypovolemic = Hemorrhage:
 - 5 spaces = scalp/street, chest, abdomen, pelvis, long-bones

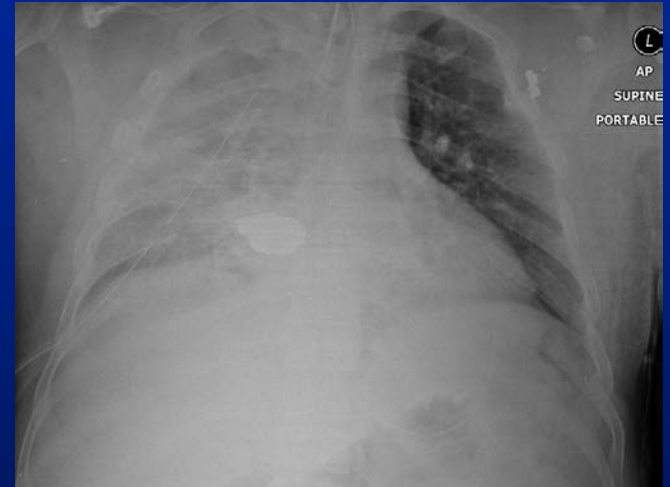
Fractures:

- rib = 100-200 cc
- tibia = 300-500 cc
- femur = 800-1200 cc
- pelvis = 1500 cc and up



Circulation: Causes of Shock

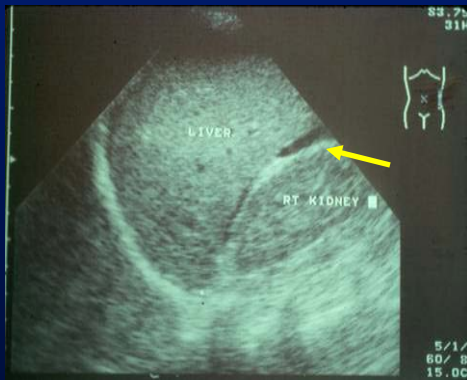
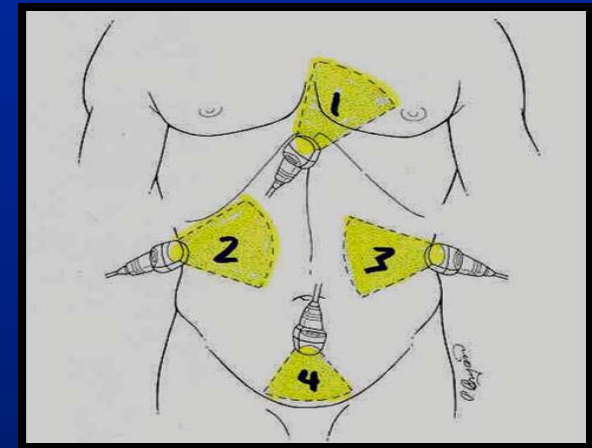
- **Cardiogenic:**
 - **tension PTX**
 - **cardiac tamponade**
 - **blunt cardiac injury**
 - **air embolism**
 - **primary cardiac disease**
- **Neurogenic:**
 - **spinal cord injury**
- **Septic**



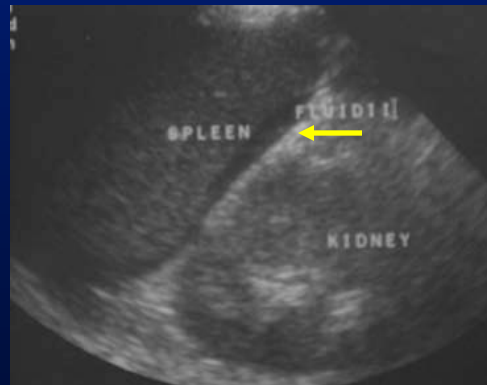
**Differentiate these with
PE, FAST, EKG, films**

FAST Exam

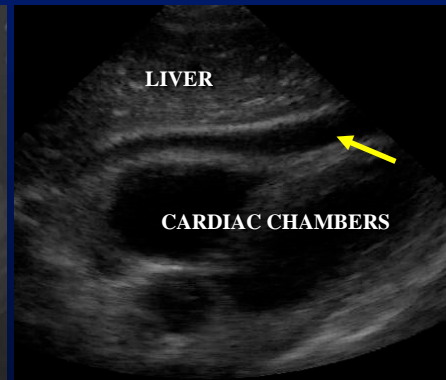
- 4 views of abdomen
- >200cc of fluid
- Single snapshot



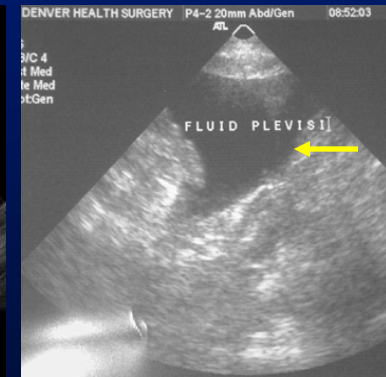
Right Upper Quadrant



Left Upper Quadrant



Pericardial



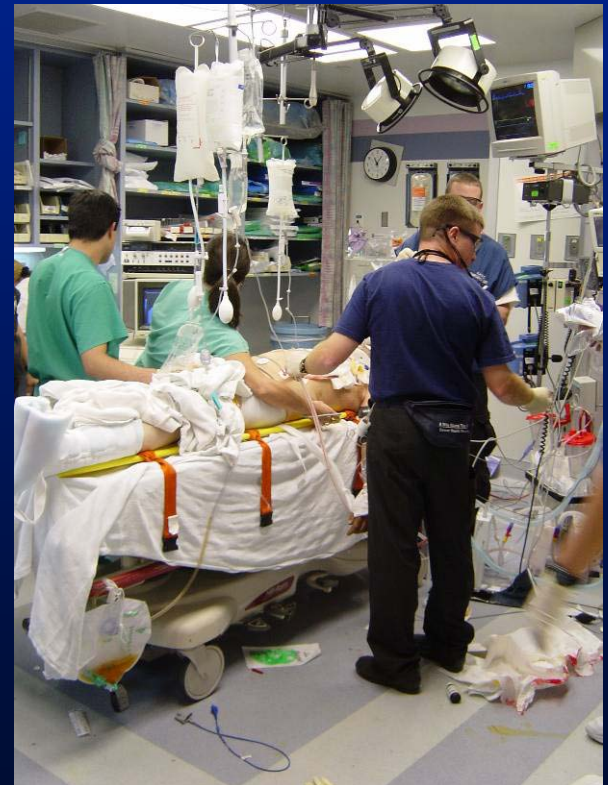
Pelvis

PITFALL

**If persistent or
recurrent hypotension,
remember FAST isn't
100% accurate!**

Circulation: Preventable Deaths

- **Hypotension = Hemorrhage**
- **Assess:**
 - level of consciousness
 - pulse / skin color
- **Address:**
 - massive hemothorax
 - cardiac tamponade
 - external bleeding
 - massive hemoperitoneum
 - unstable pelvic fracture



KEY CONCEPT

**Patient in shock →
crystalloid infusing?
massive transfusion protocol?**



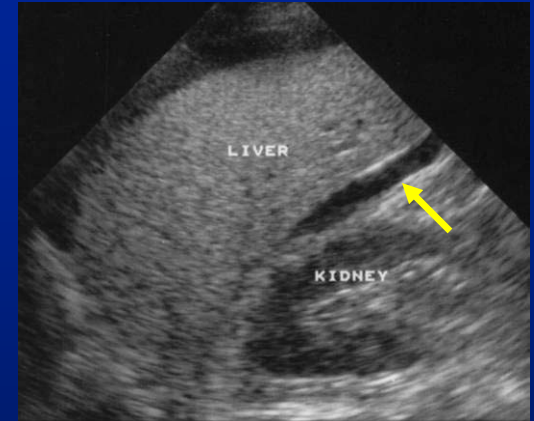
External Hemorrhage

- Apply direct manual pressure
- Don't indiscriminately use clamps
- Tourniquet if amputation



Massive Hemoperitoneum

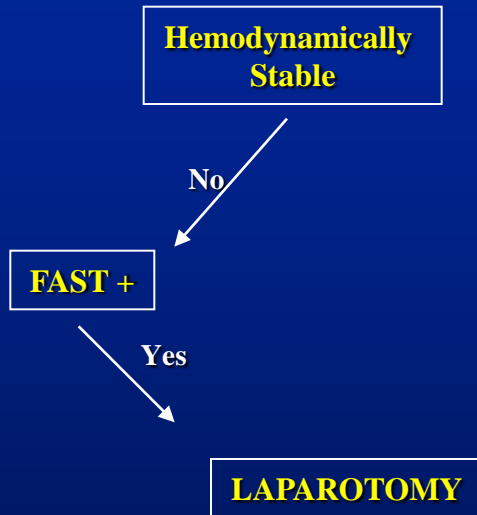
- Consider mechanism
 - **X-rays if penetrating**
- FAST is often diagnostic
- DPA if patient remains unstable
- **Tx = emergent OR**



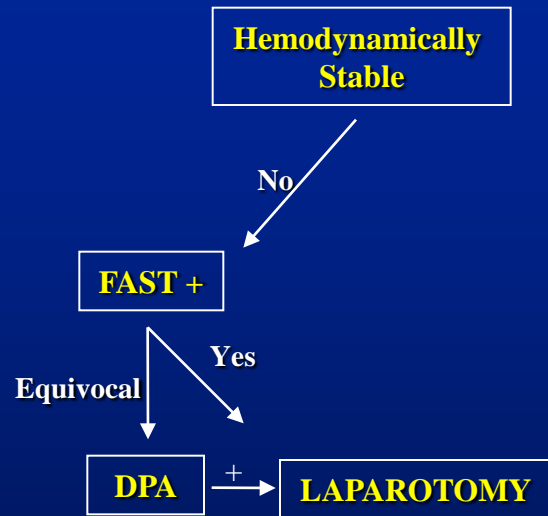
Blunt Abdominal Trauma

**Hemodynamically
Stable**

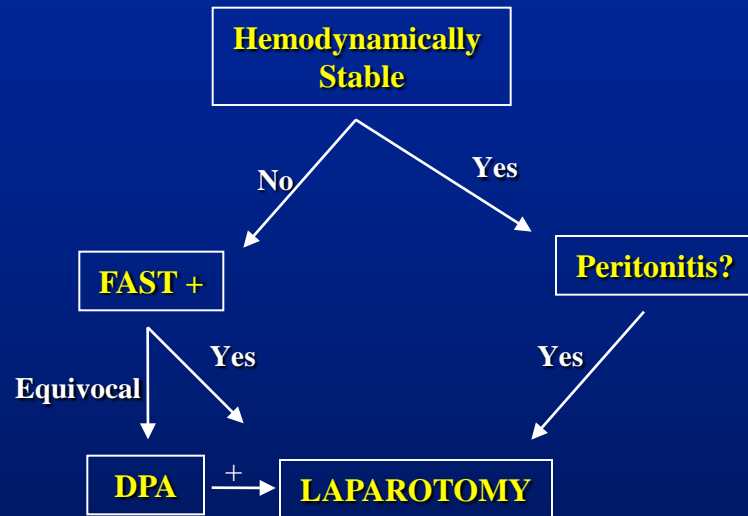
Blunt Abdominal Trauma



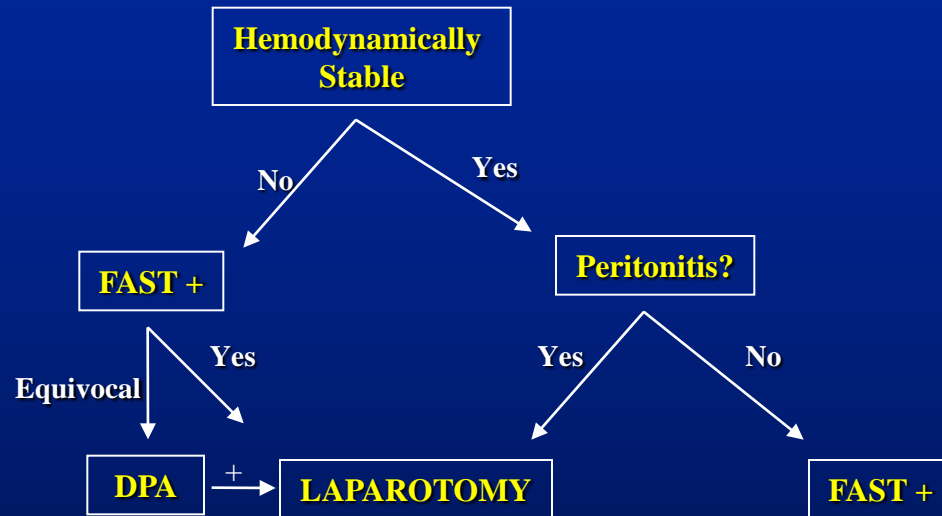
Blunt Abdominal Trauma



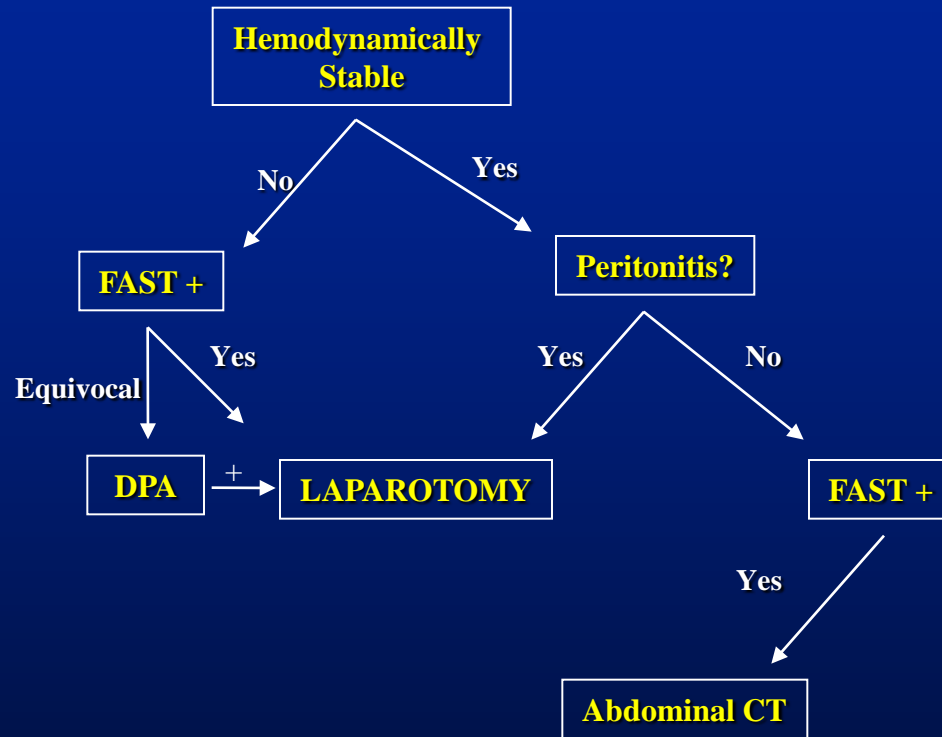
Blunt Abdominal Trauma



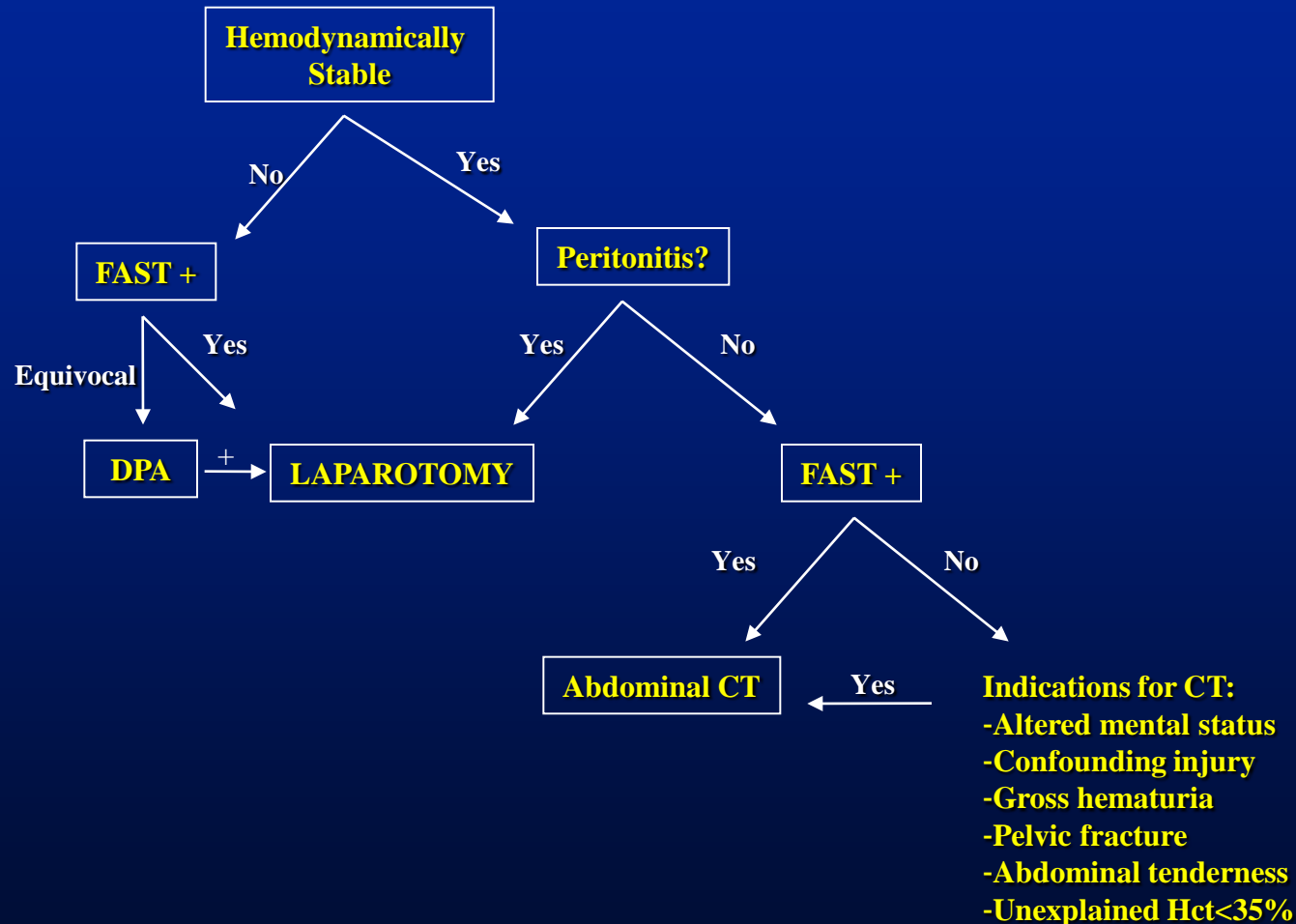
Blunt Abdominal Trauma



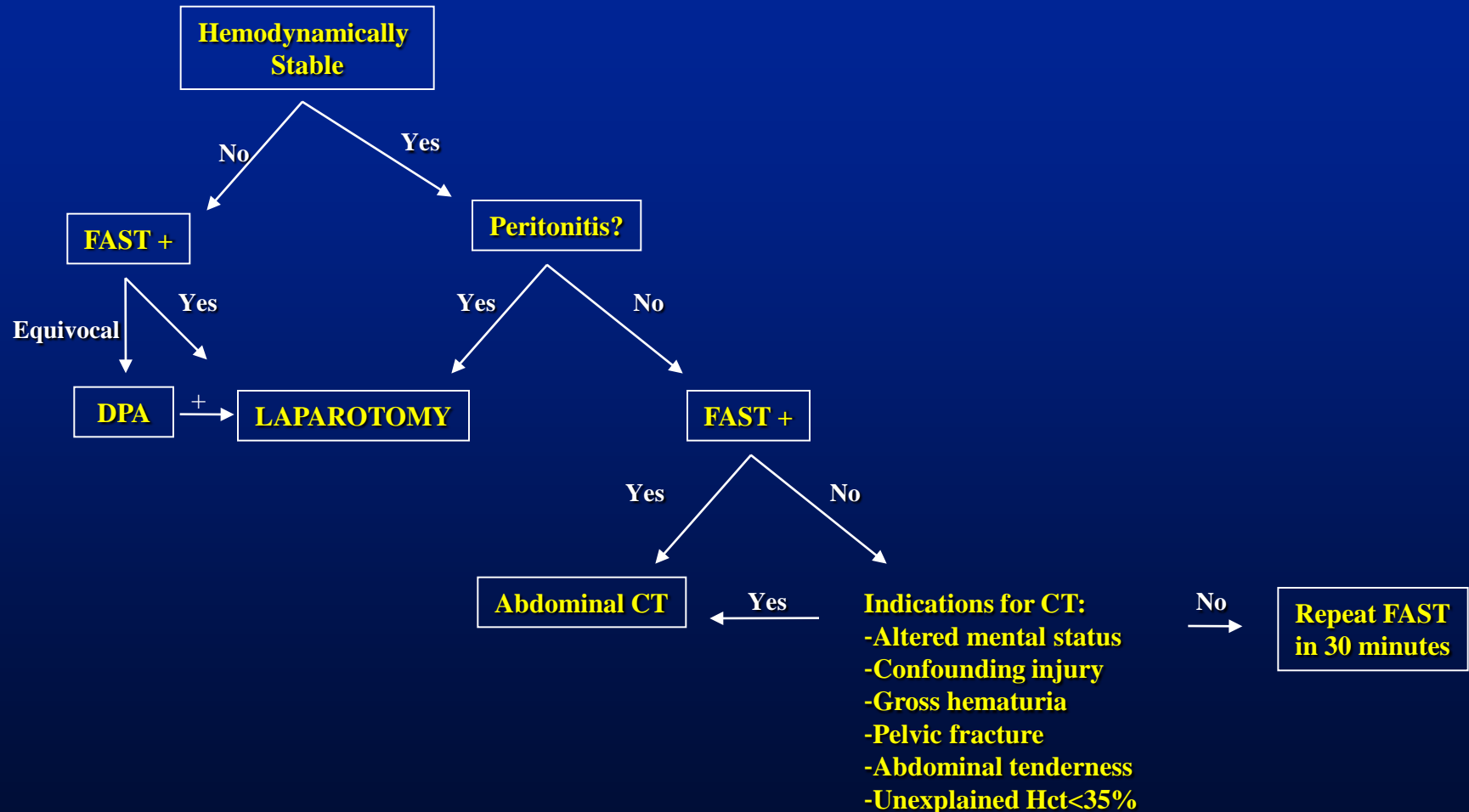
Blunt Abdominal Trauma



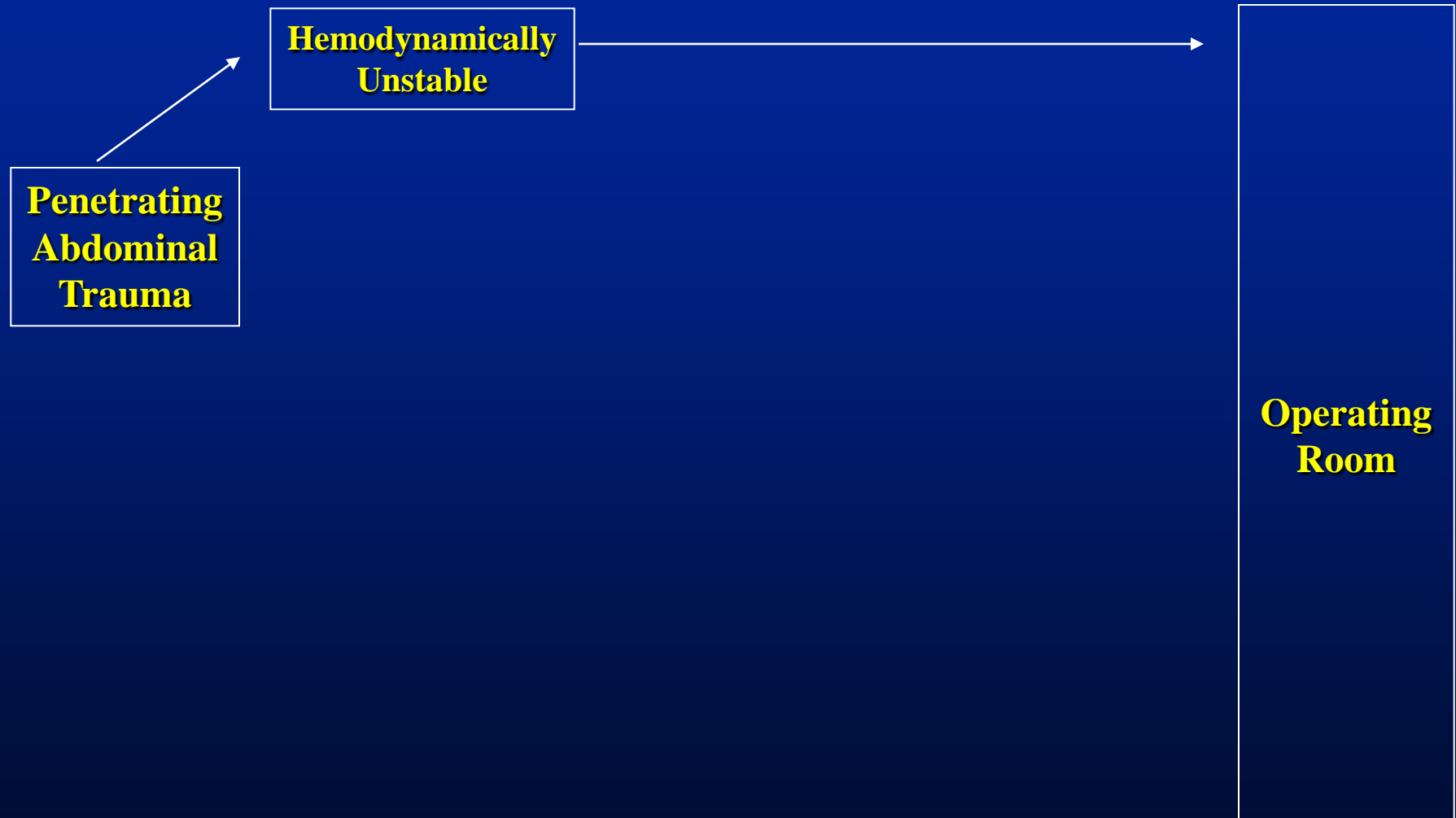
Blunt Abdominal Trauma



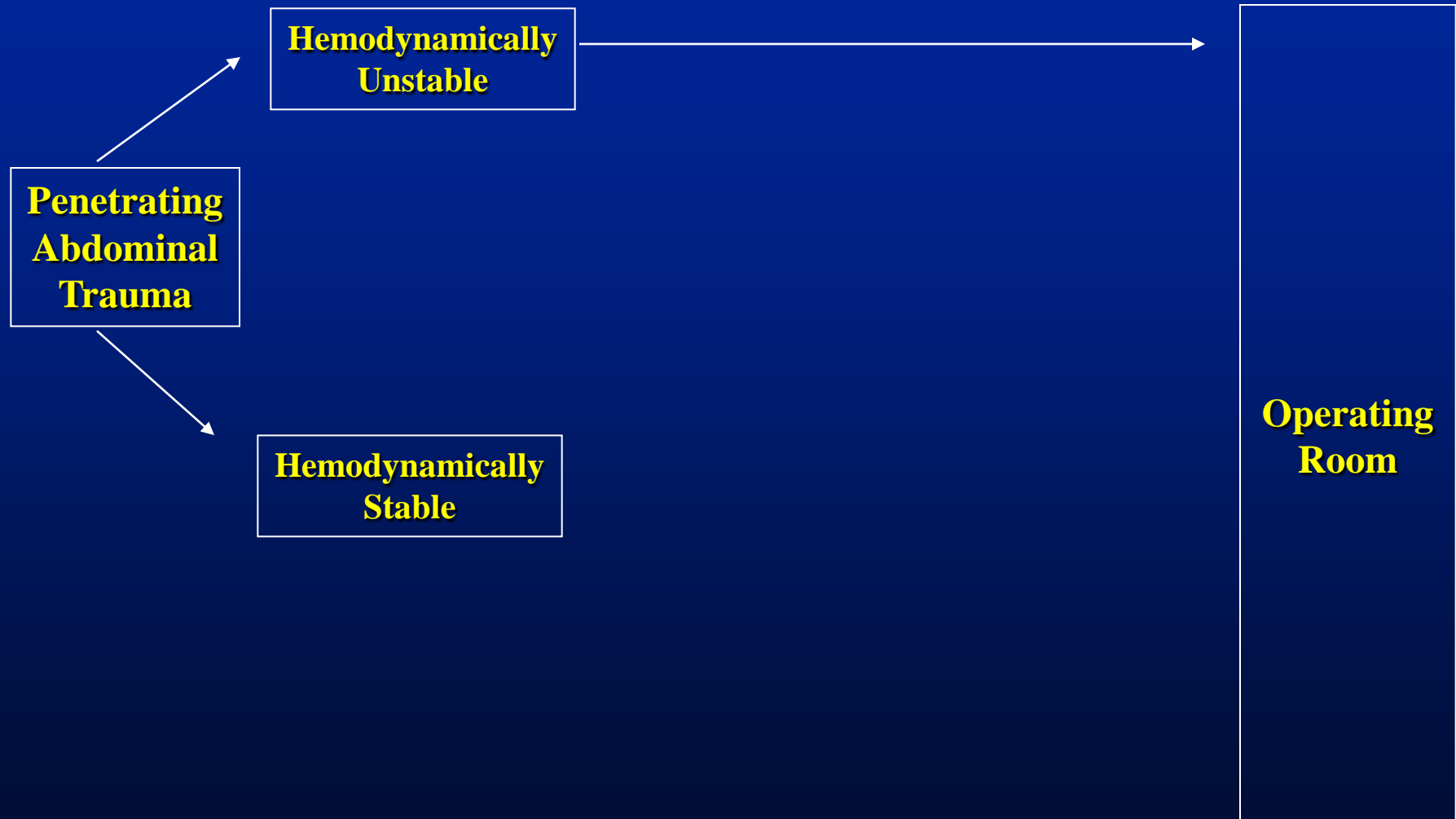
Blunt Abdominal Trauma



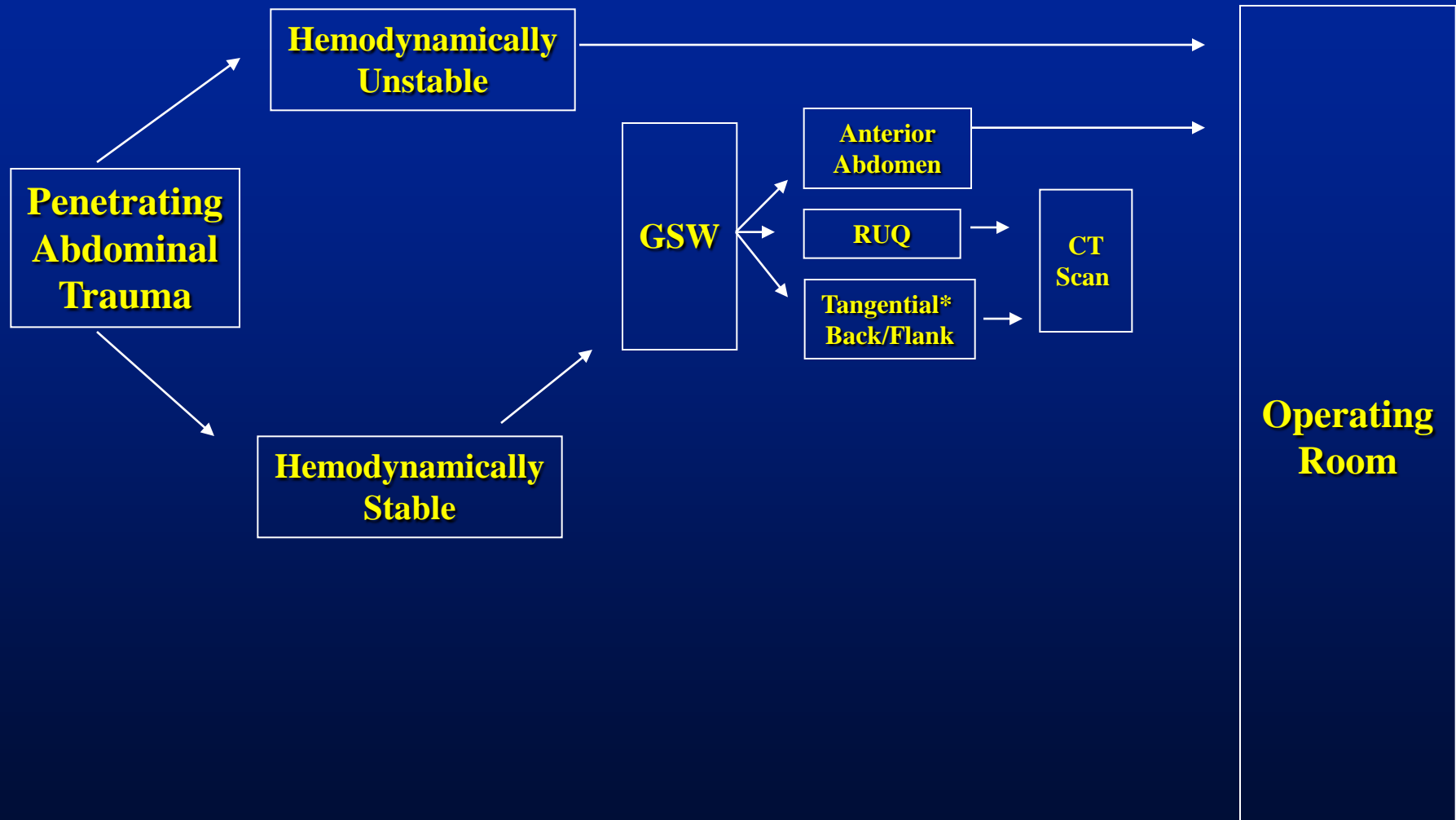
Penetrating Abdominal Trauma



Penetrating Abdominal Trauma

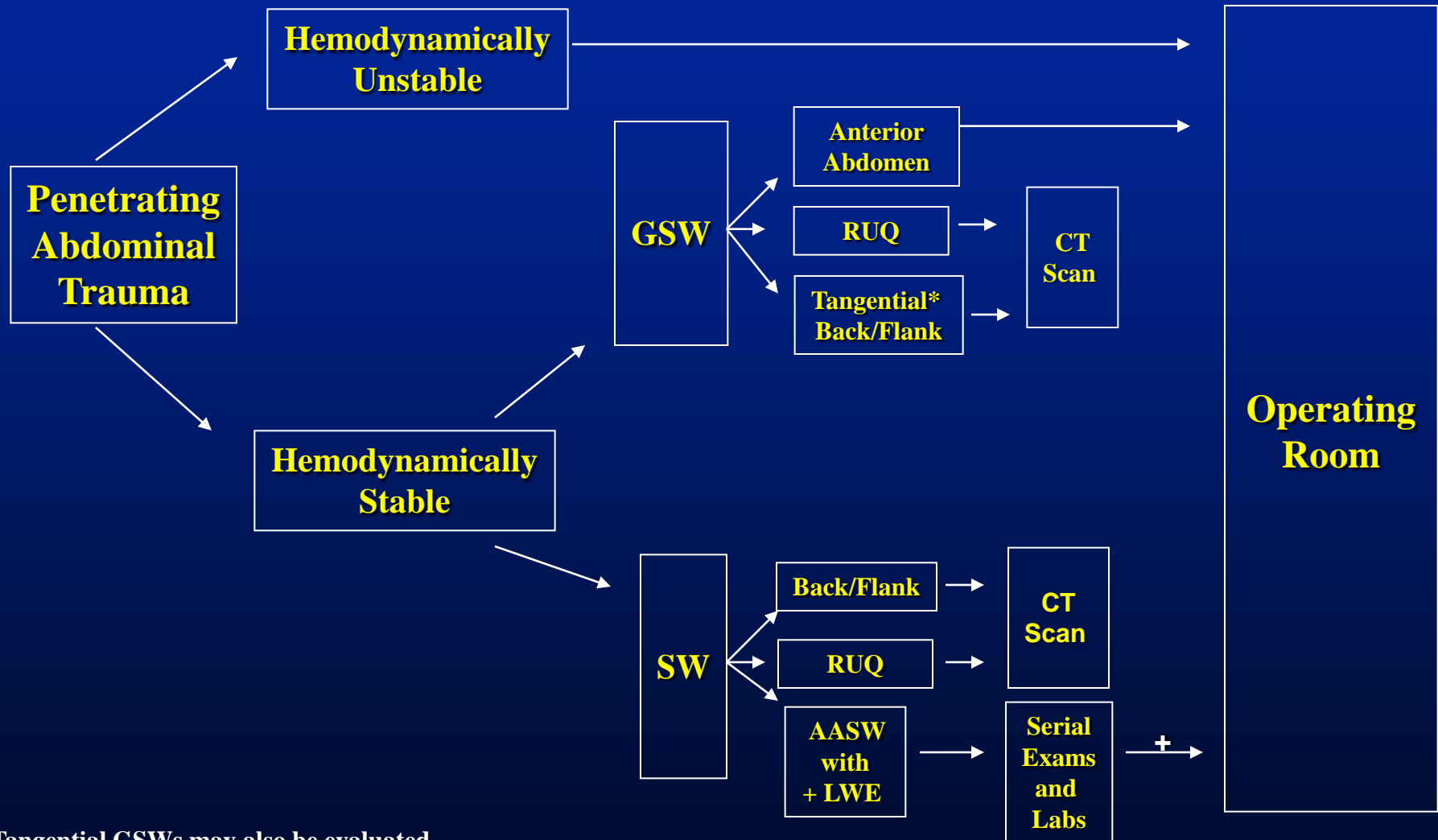


Penetrating Abdominal Trauma



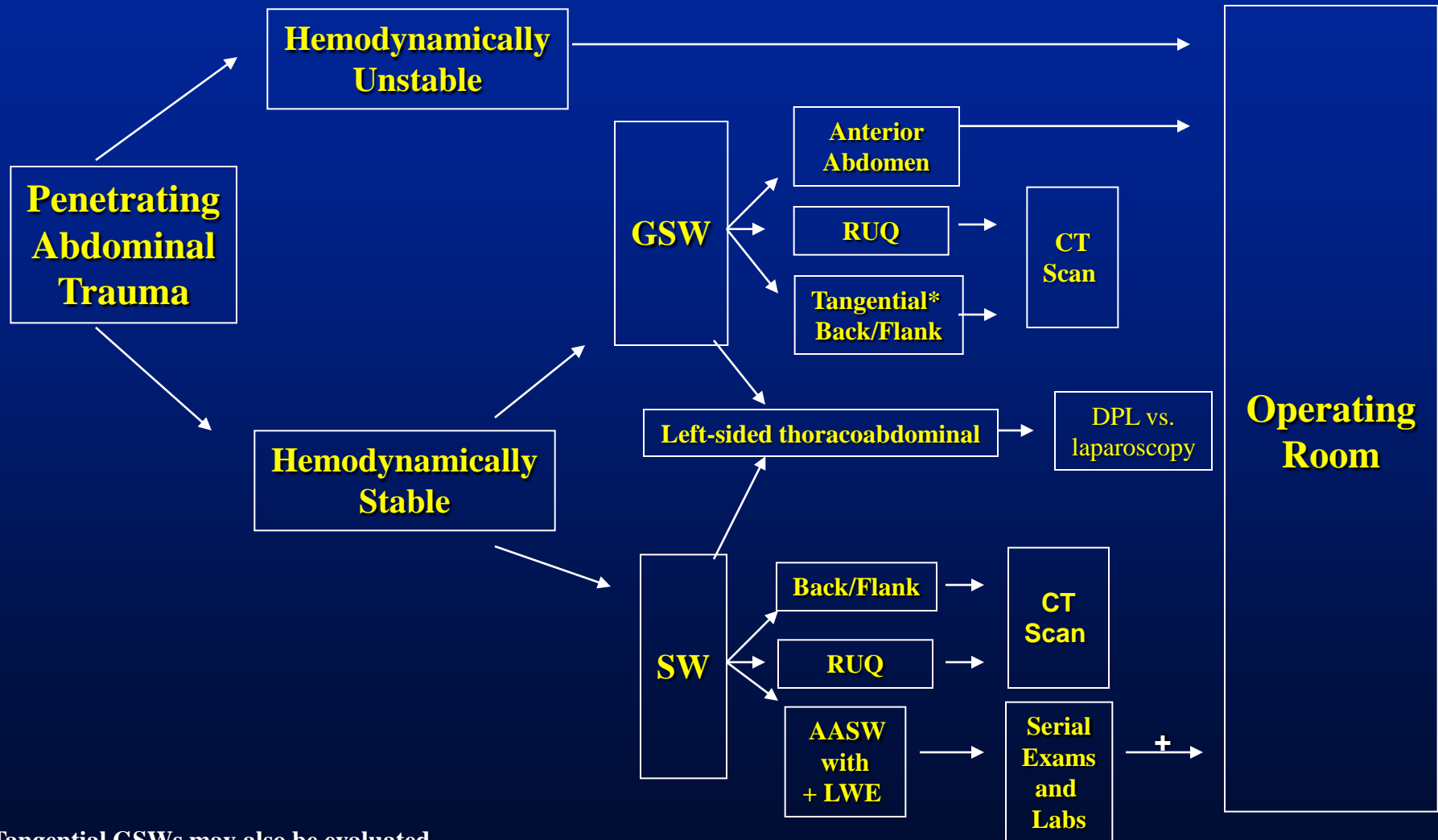
*Tangential GSWs may also be evaluated with diagnostic laparoscopy.

Penetrating Abdominal Trauma



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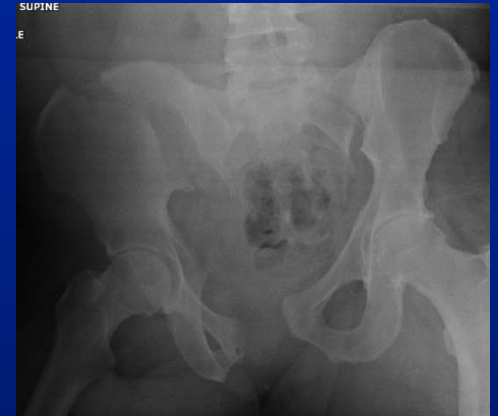
Penetrating Abdominal Trauma



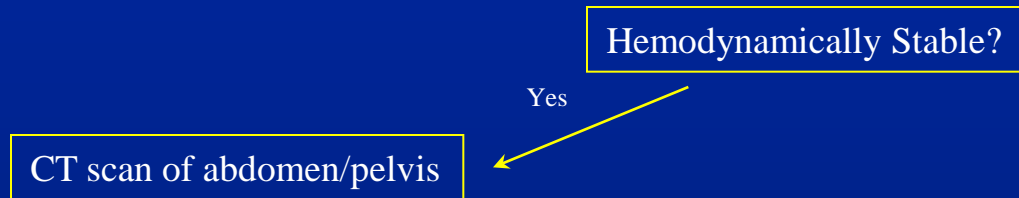
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Unstable Pelvic Fracture

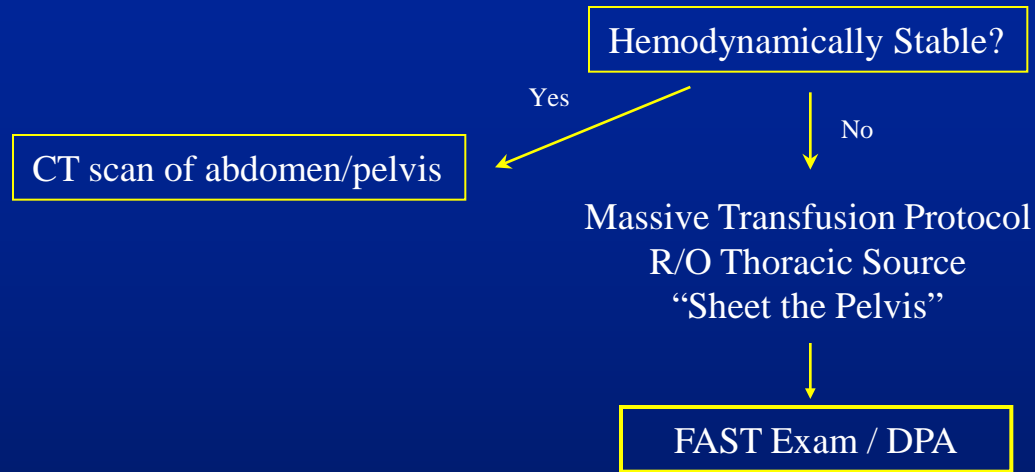
- Exam/film PLUS shock
- “Sheet” the pelvis
- R/O associated injuries:
 - rectal exam → bone? blood?
 - vaginal exam → lacerations?
 - GU exam → bladder/urethral injury?
 - perineal exam → degloving? open fx?



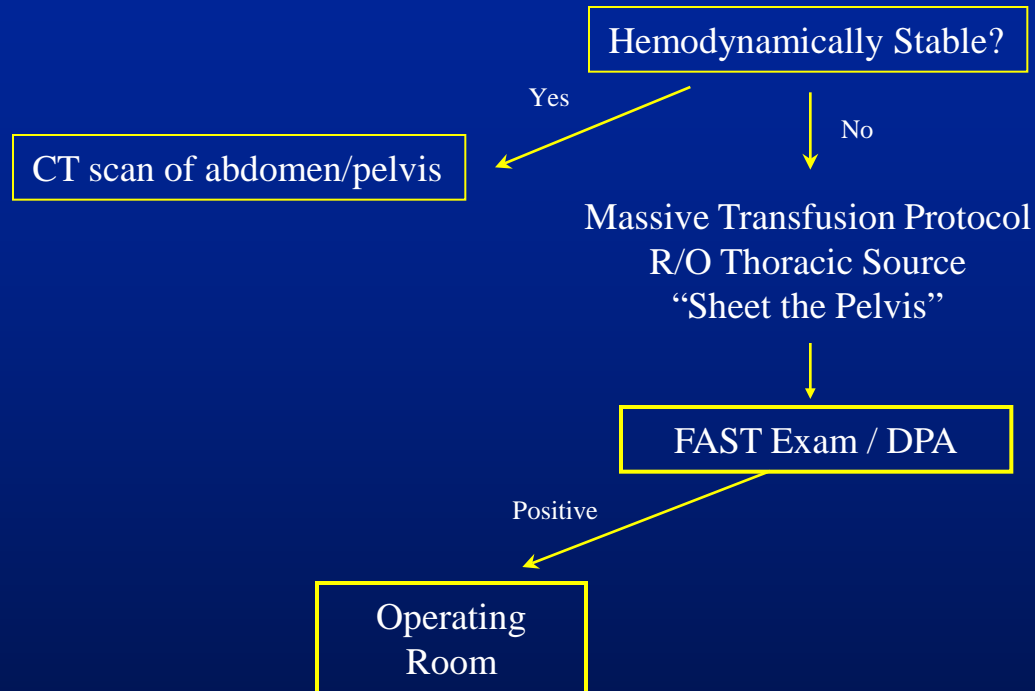
Pelvic Fracture Protocol



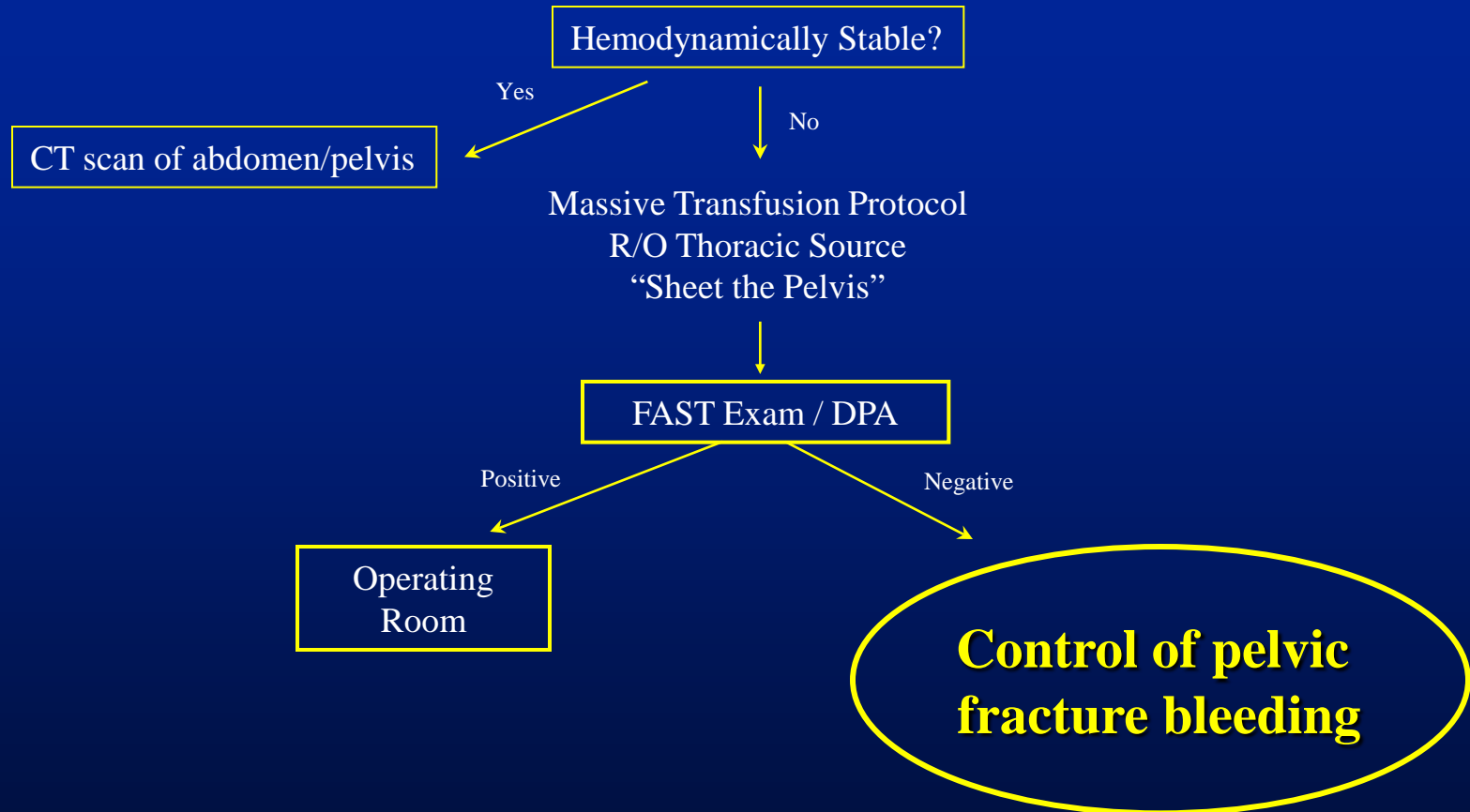
Pelvic Fracture Protocol



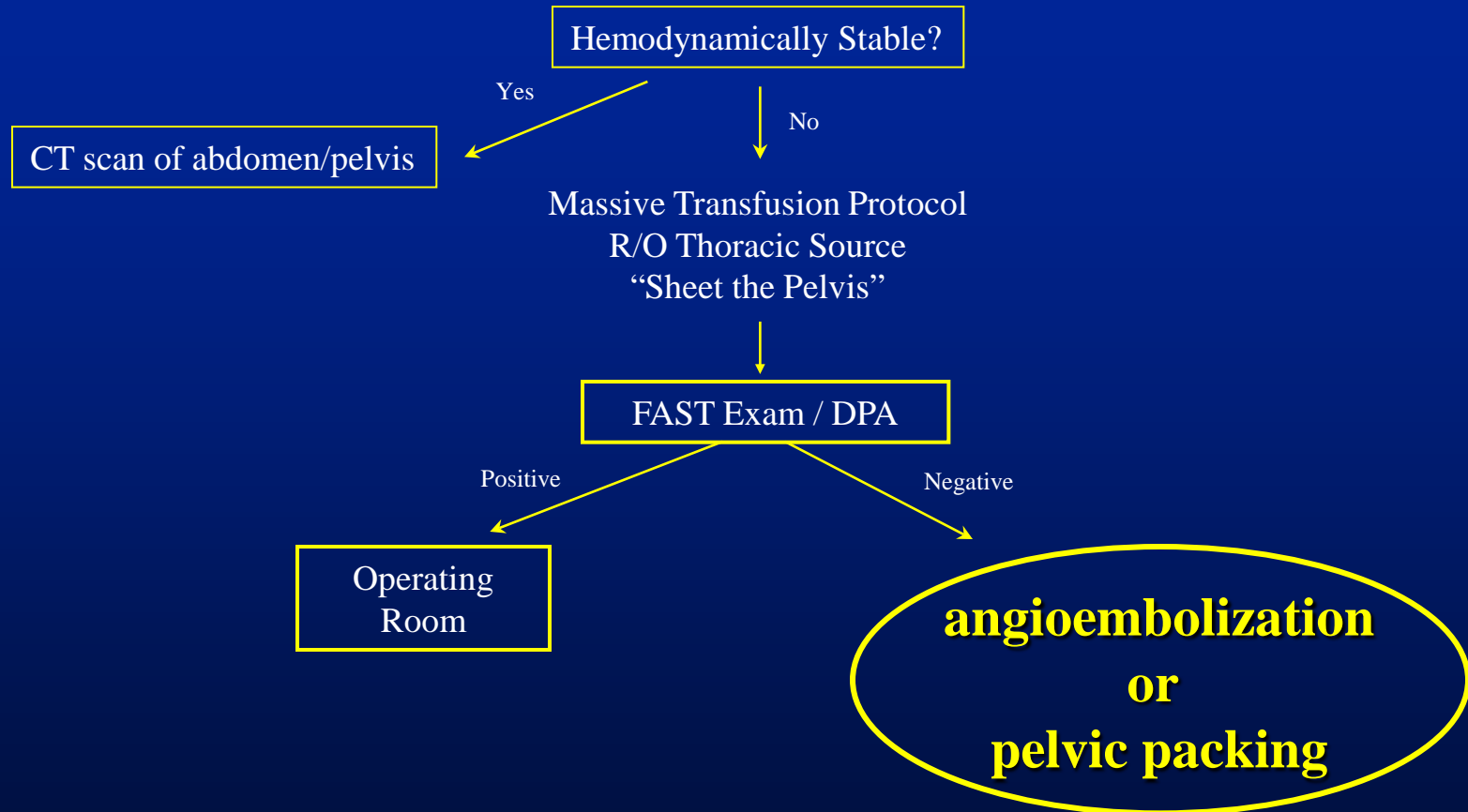
Pelvic Fracture Protocol



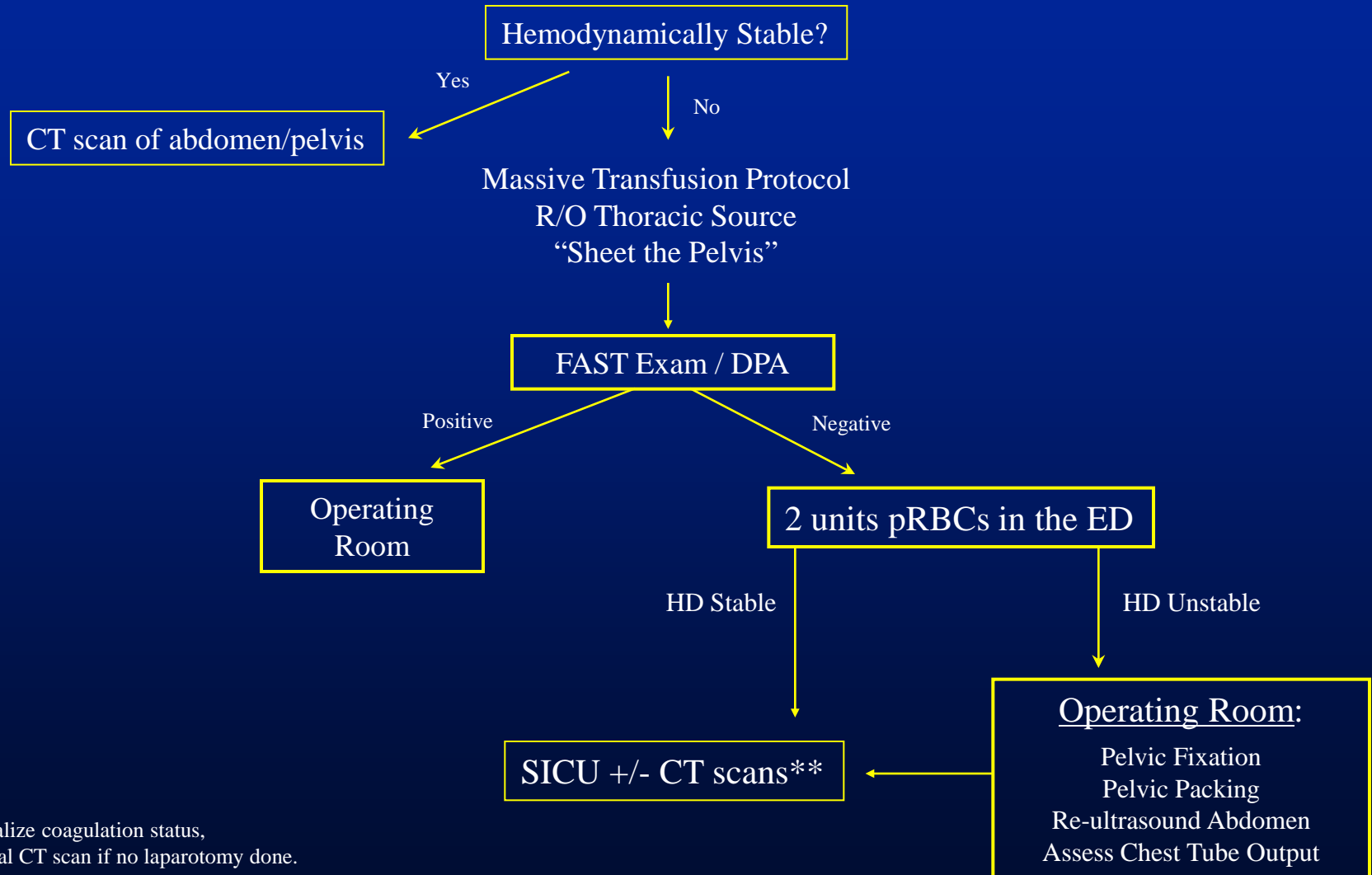
Pelvic Fracture Protocol



Pelvic Fracture Protocol



Pelvic Fracture Protocol

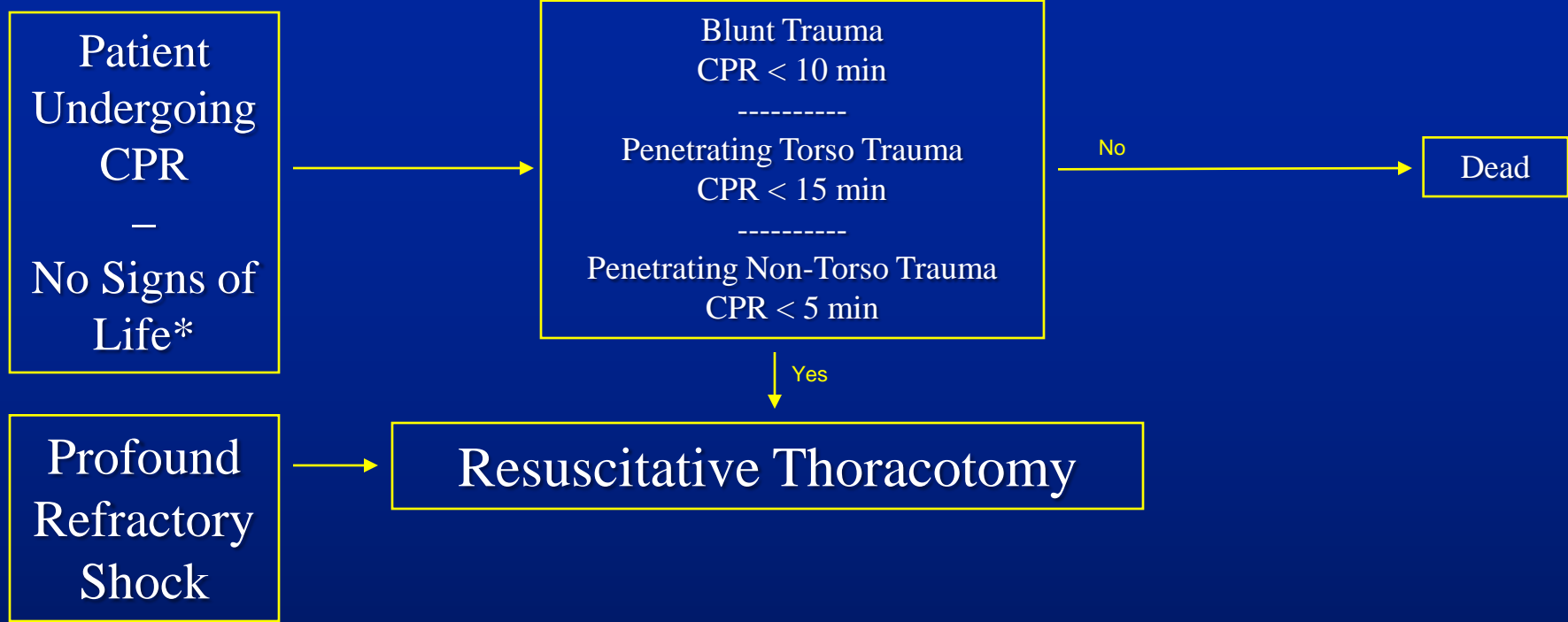


** normalize coagulation status,
abdominal CT scan if no laparotomy done.

PITFALLS

- **Elderly – limited reserve**
- **Children – abundant reserve, decompensate late**
- **Athletes – “relative” tachycardia**
- **Drugs – Rx and illegal**
- **Be wary of the transient responder.....**

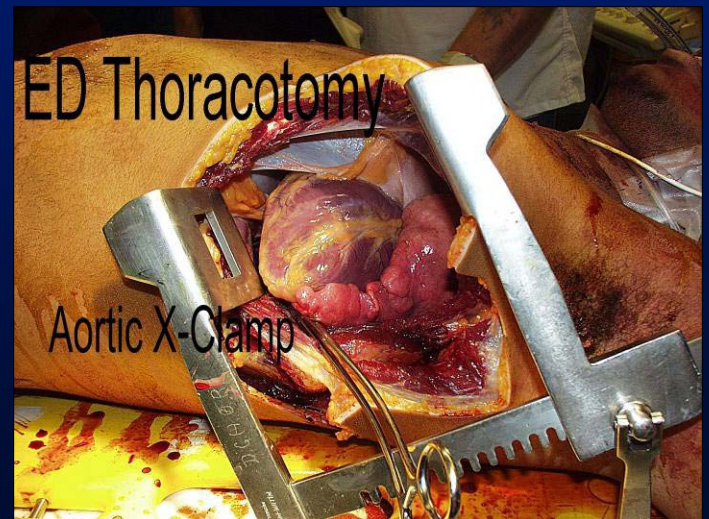
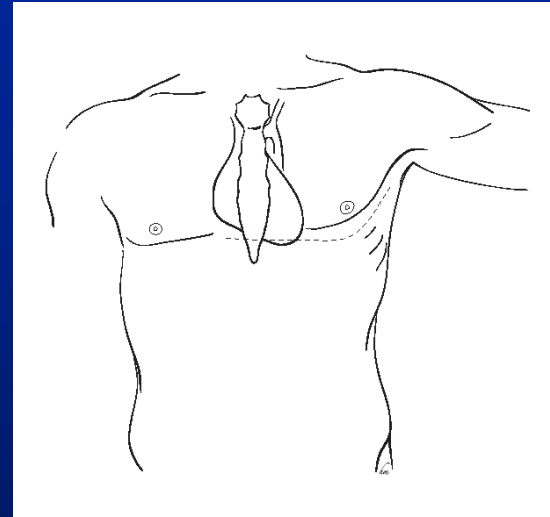
Resuscitative Thoracotomy



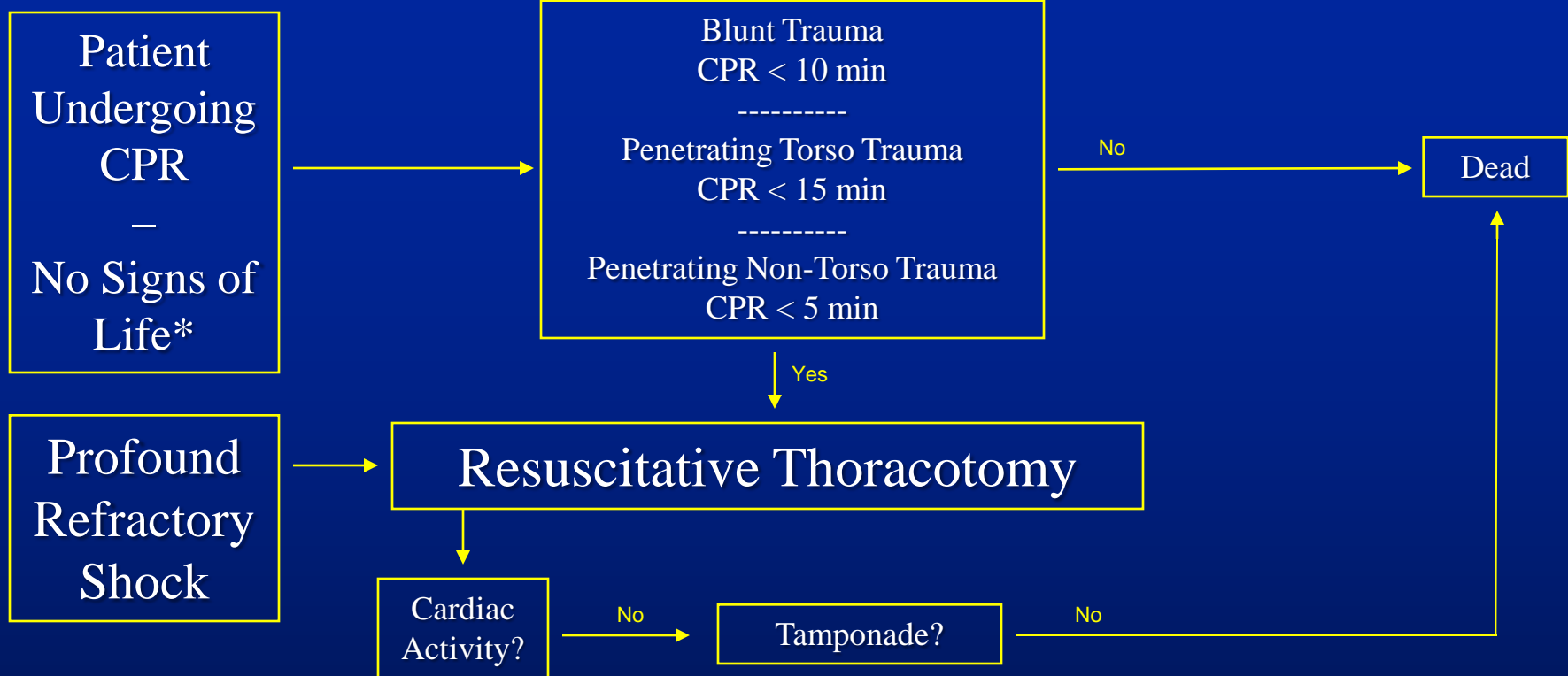
*no respiratory
or motor effort,
electrical
activity, or
pupillary
activity

Resuscitative Thoracotomy

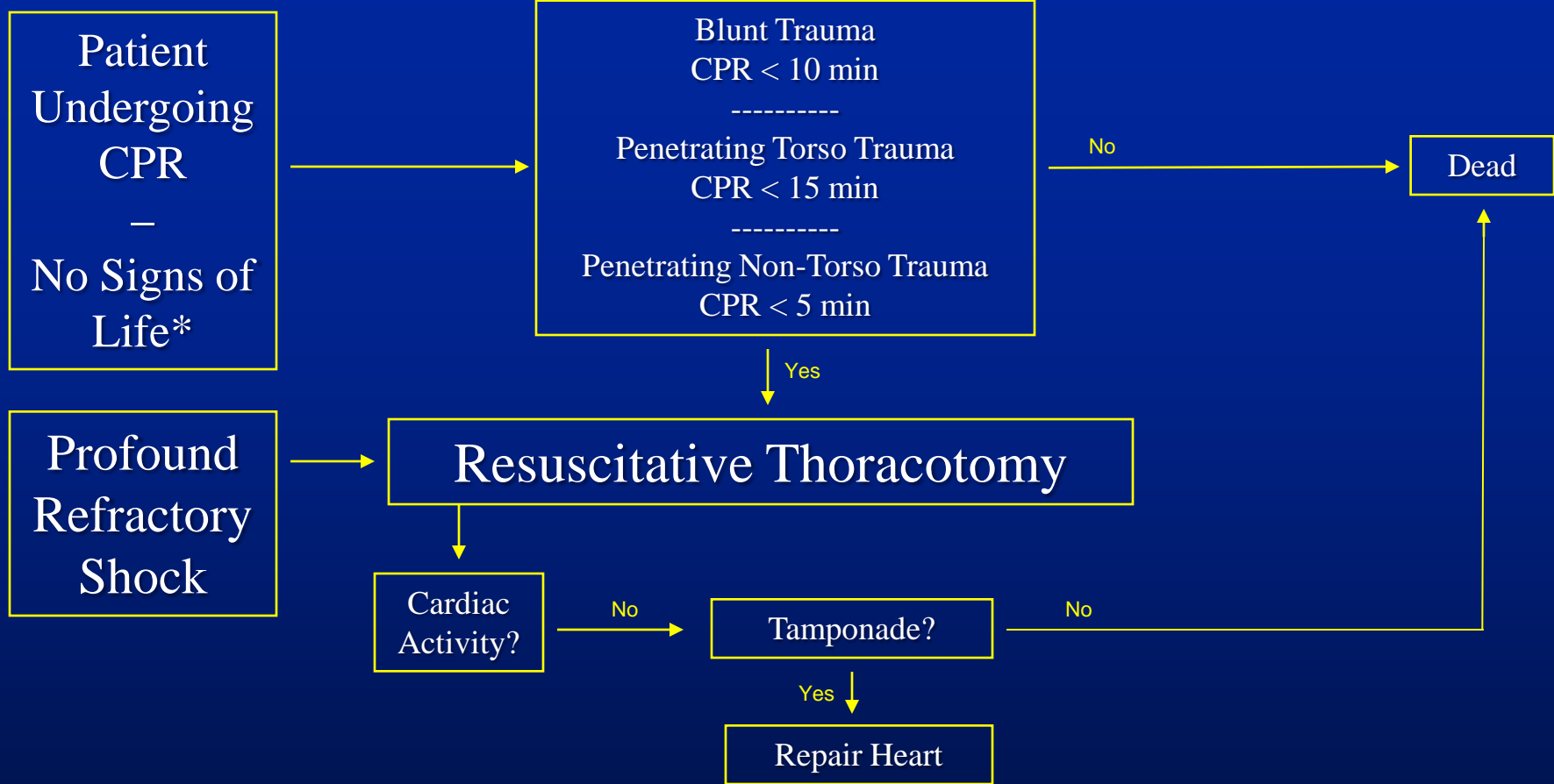
- Arm over head
- Generous incision
- Curve into axilla
- Correct position of rib spreader



Resuscitative Thoracotomy

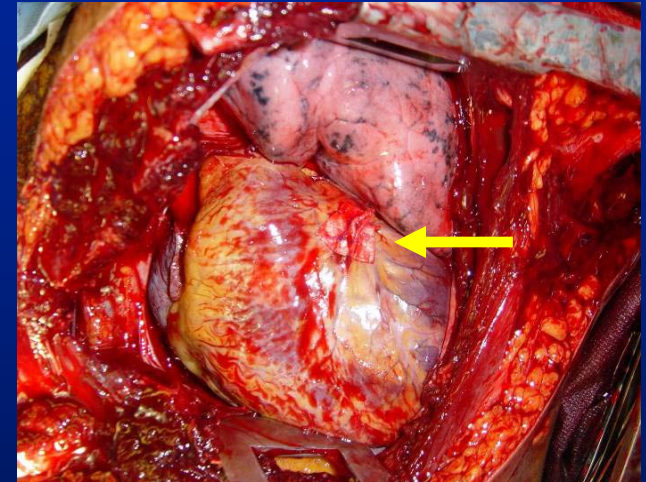


Resuscitative Thoracotomy



Cardiac Injuries in the ED

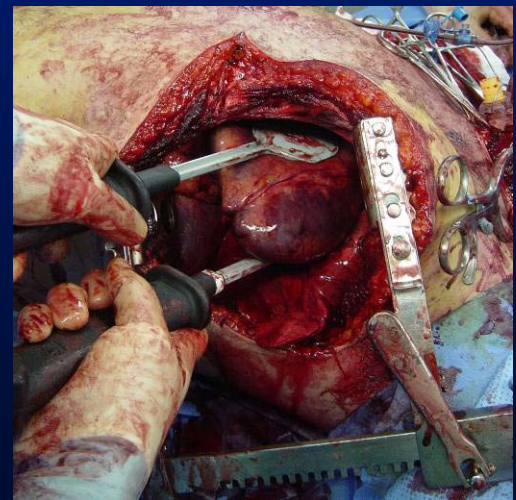
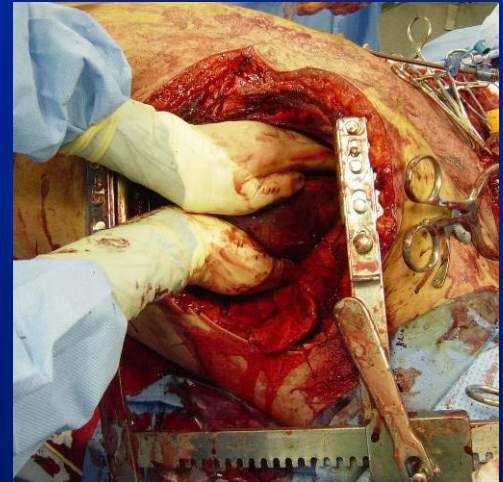
- Suture repair
- Pledgets optimal
- Staple repair LV if linear wound
- Avoid ligating a coronary
- If asystole → repair then defibrillate



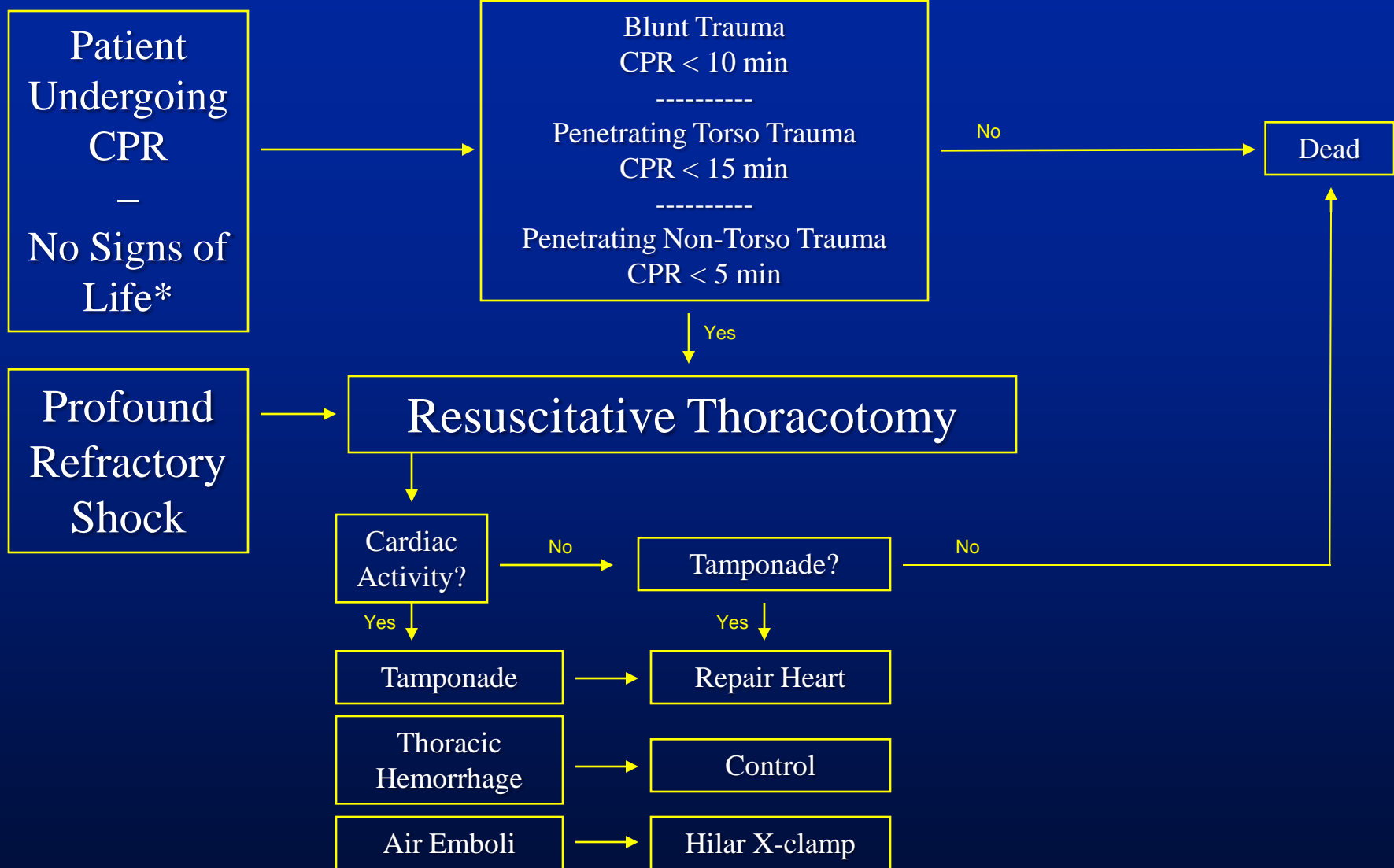
PITFALLS

Don't forget:

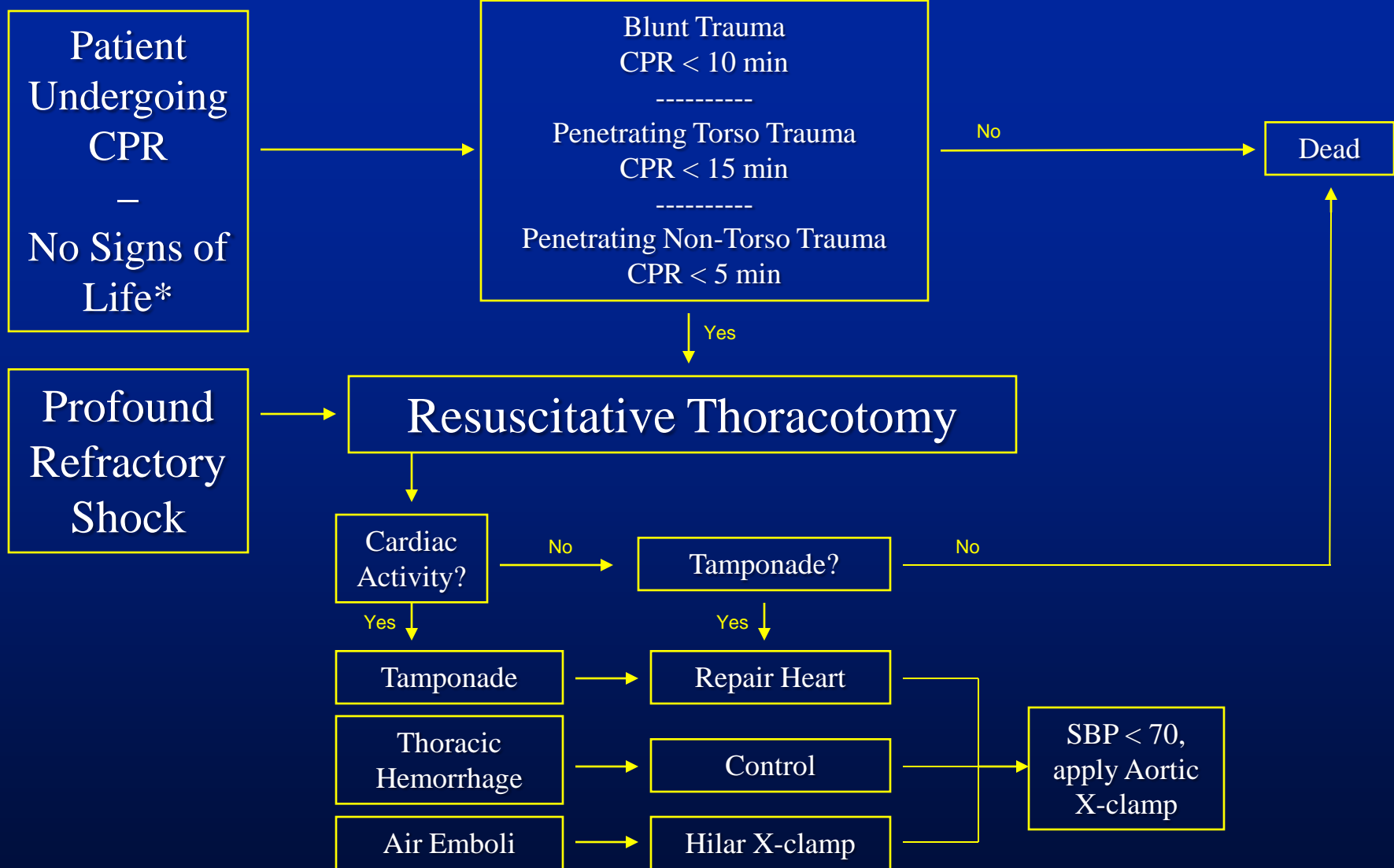
- **proper hand position for cardiac massage**
- **internal cardioversion paddles**
- **intracardiac epi**



Resuscitative Thoracotomy

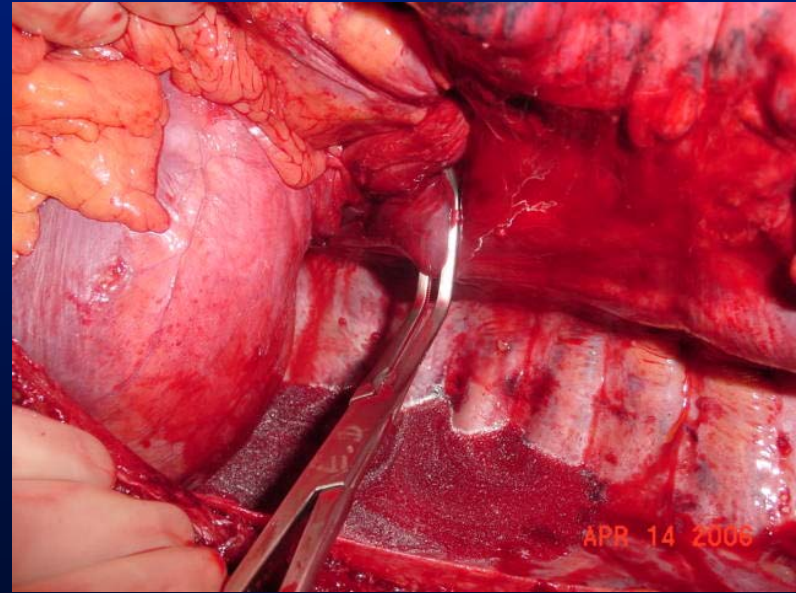
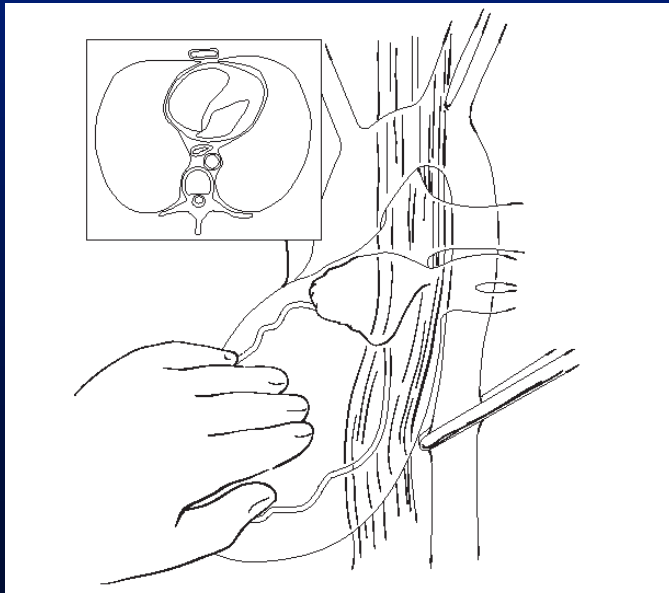


Resuscitative Thoracotomy

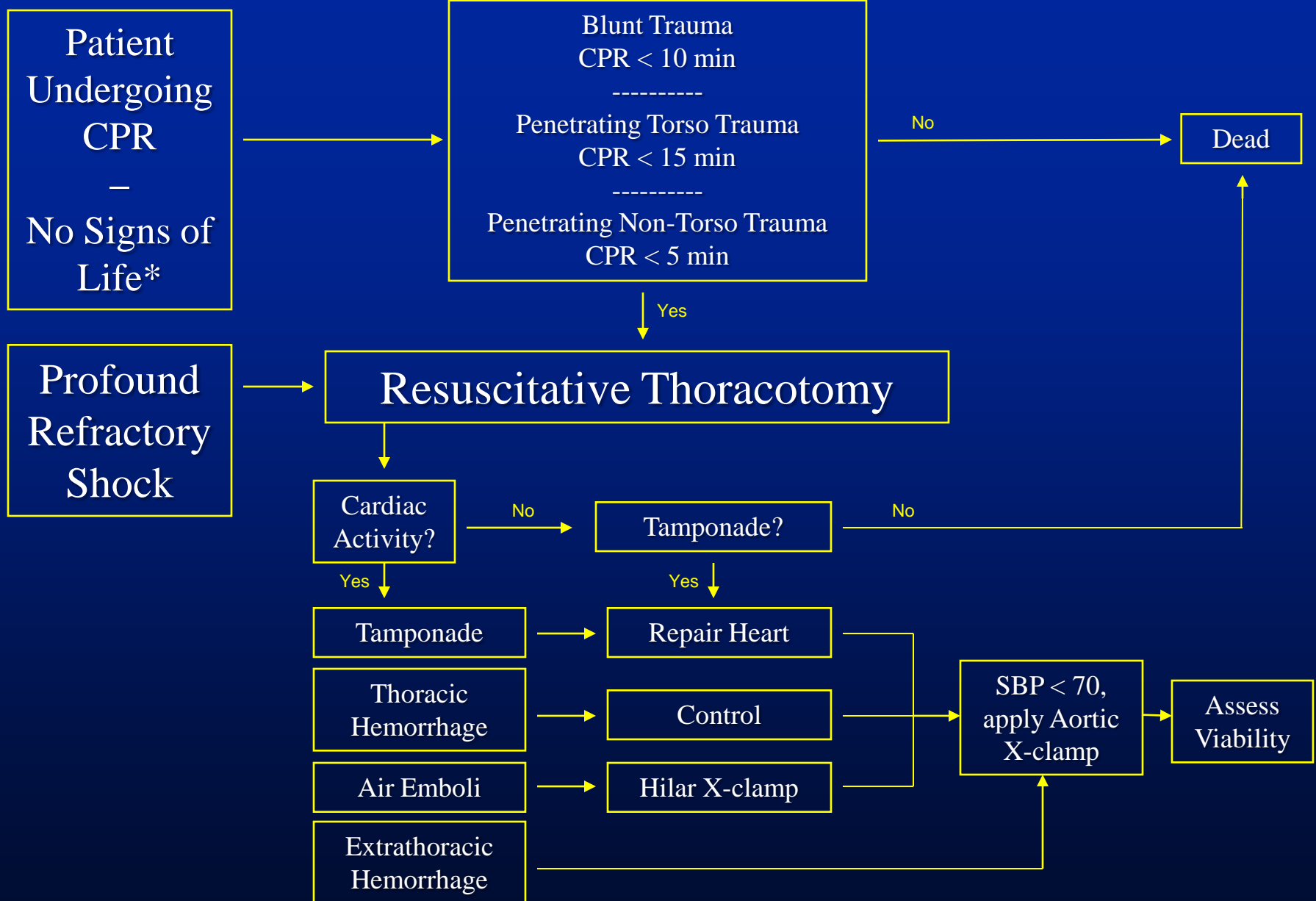


Aortic Cross-Clamp

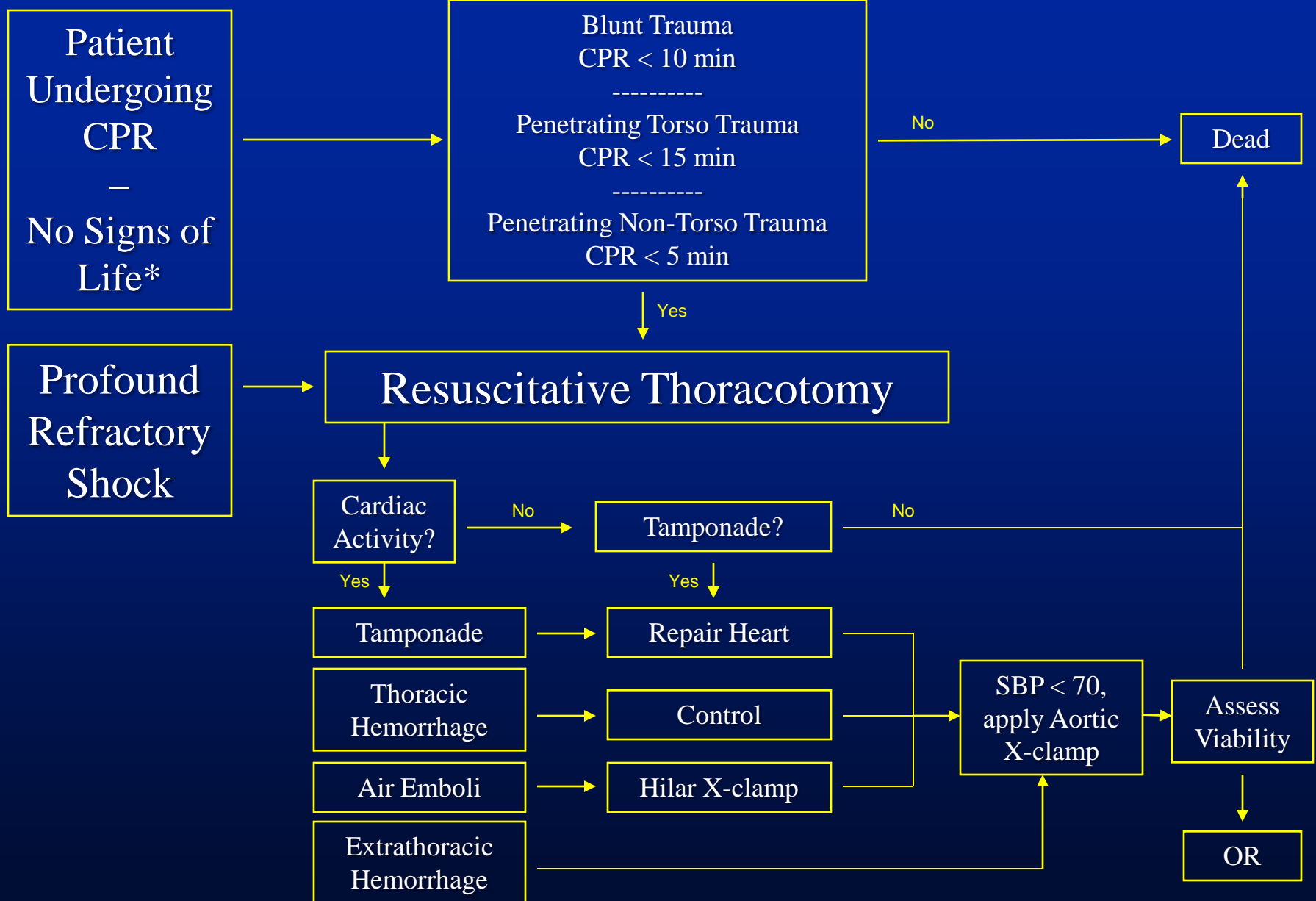
- Below pulmonary hilum
- Can use digital control or Satinsky



Resuscitative Thoracotomy



Resuscitative Thoracotomy



Circulation: Take Home Points

- Hypotension = hemorrhage
- 5 spaces for blood loss
- IV access is key!
 - 2 large-bore peripheral IVs
 - IO needle
 - central line
 - saphenous cut down

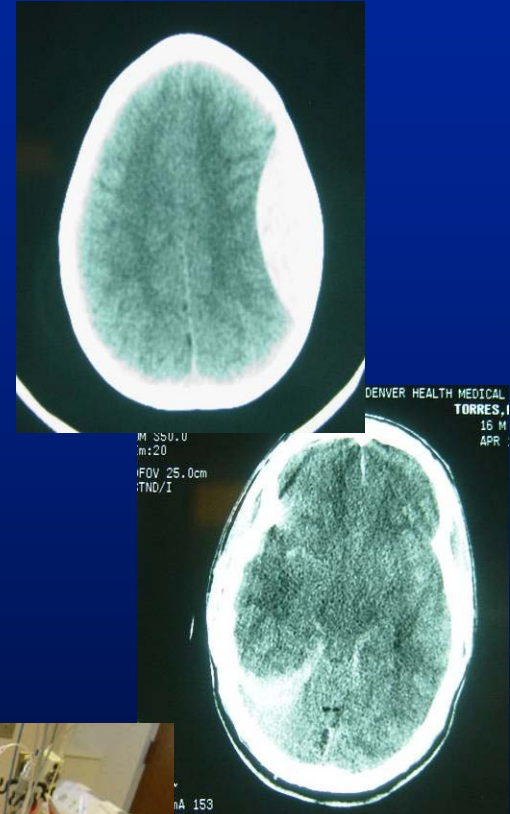


Starting with the ABCs

D = Disability

Disability: Brain Injury

- Quick neuro exam
- GCS < 8 severe head injury
- Consider empiric mannitol
- Concern for antithrombotics
- CT imaging
- **Tx = ICP monitor and management, OR**



Disability: Spine Injury

- Always protect the spine
- Log roll off the backboard
- If one fx, look for another!
- Sensory/motor loss = injury
- Neurogenic shock
 - Bradycardia
 - Tx with pressors



ABCs: Take Home Points

- **Systematic evaluation**
- **Concurrent resuscitation**
- **Management based upon hemodynamics**
- **Address life threatening injuries**
 - **airway obstruction**
 - **tension/open PTX**
 - **massive hemoperitoneum**
 - **cardiac tamponade**
 - **external hemorrhage**
 - **massive hemothorax**
 - **unstable pelvis**

Questions?