APPROACH TO TRAUMA

تروما ؛ دومین عامل مرگ در ایران

نگاهي به كشتار روزانه مردم در تصادفات رانندگي

- ۲۳۵ هزار كشته و بيش از ۲ ميليون مجروح طي ۱۰ سال تصادفات كشور.
- روزانه ۲۰ ميليارد تومان هزينه تصادفات كشور
- مرگ زودرس برای " آینده سازان " !
- روزانه ۷۶ قربانی در حوادث رانندگی

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Objectives: Trauma Resuscitation

- Review approach
- Review knowledge and technical skills
- Discuss appropriate investigations
- Discuss transfer of care

Initial Assessment and Management

- An effective trauma system needs the teamwork of EMS, emergency medicine, trauma surgery, and surgery subspecialists
- Trauma roles
  - Trauma captain
  - Interventionalists
  - Nurses
  - Recorder

Goals of trauma resuscitation

- Maintain:
  - Systemic oxygenation
  - Systemic perfusion
  - Neurologic function

Approach to unstable trauma patient

- Primary survey
  - Detect and manage life threatening injuries

Examples: Hypoxia, tension pneumo, shock, tamponade, herniation

- Secondary survey

How: ABCD

  - Detect other injuries and formulate treatment plan

Examples: All other injuries or fractures

How: Expose patient

Head-toe exam

Investigations

Airway

The first step is assessing the adequacy of the airway

Ventilatory inadequacy may result from the
a mechanical obstruction of the airway e.g. tongue, foreign body, vomitus, food, blood, or from inadequate ventilatory effort.

A partially obstructed airway is indicated by:

1. Noisy and laboured breathing (stridor)
2. Use of accessory muscles of breathing (sternomastoid)
3. Soft tissue retraction of the intercostal, supraclavicular,and suprasternal areas.
4. Paradoxical or "seesaw " breathing. Normally in the unobstructed airway the chest and abdomen rise and fall together. If the airway is partially or completely obstructed and cardiac arrest has not occurred, the chest is sucked in as the abdomen rises.
5. Cyanosis. A circulating reduced Hb level of < 5gms% is associated with cyanosis- this is a late sign of hypoxia esp if the pt is anemic.

Ventilatory failure is noted by
minimal or absent chest or abdominal movement
and an inability to detect air movement through the mouth or nose.

The most important step for successful resuscitation is immediate opening of the airway , establishing an adequate airway and maintaining adequate ventilation

AIRWAY MANAGEMENT

- Head tilt
- Chin lift
- Mandibular thrust- forward displacement
- Oropharngeal airway-only in unconscious/stuporous pt
- Bag and mask

Intubation

Indications -

- Apnea / Hypoxia
- Inability to protect airway (GCS < 8)
- Facial or cervical trauma / burns
- Persistent shock

Esophageal obturator- comotose pts
Nasotracheal – in suspected cervical Fx, neck injuries as neck need not be extended, seizures

Can be done with pt awake, without producing gagging, retching, straining or vomiting

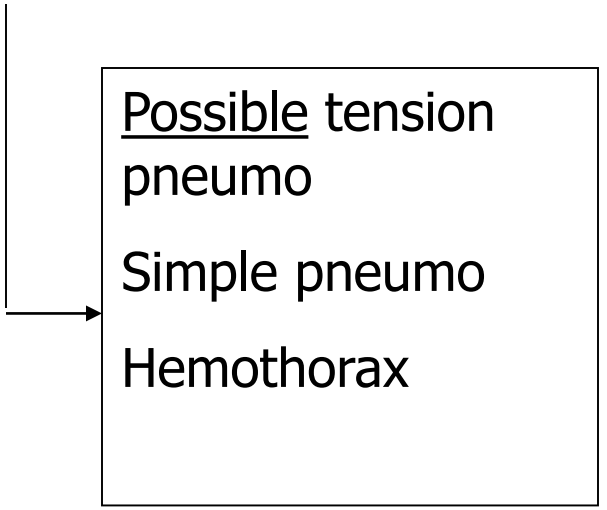
Oropharyngeal- most rapid. Cricoid pressure.
Stomach decompression should be done with NG tube

- Surgical
  Cricothyroidotomy
  Tracheostomy

Difficult Airway

Breathing

- Knowledge
  - Indications for inserting chest tube
- Skills
  - Needle thoracostomy
  - Chest tube insertion



Pneumothorax

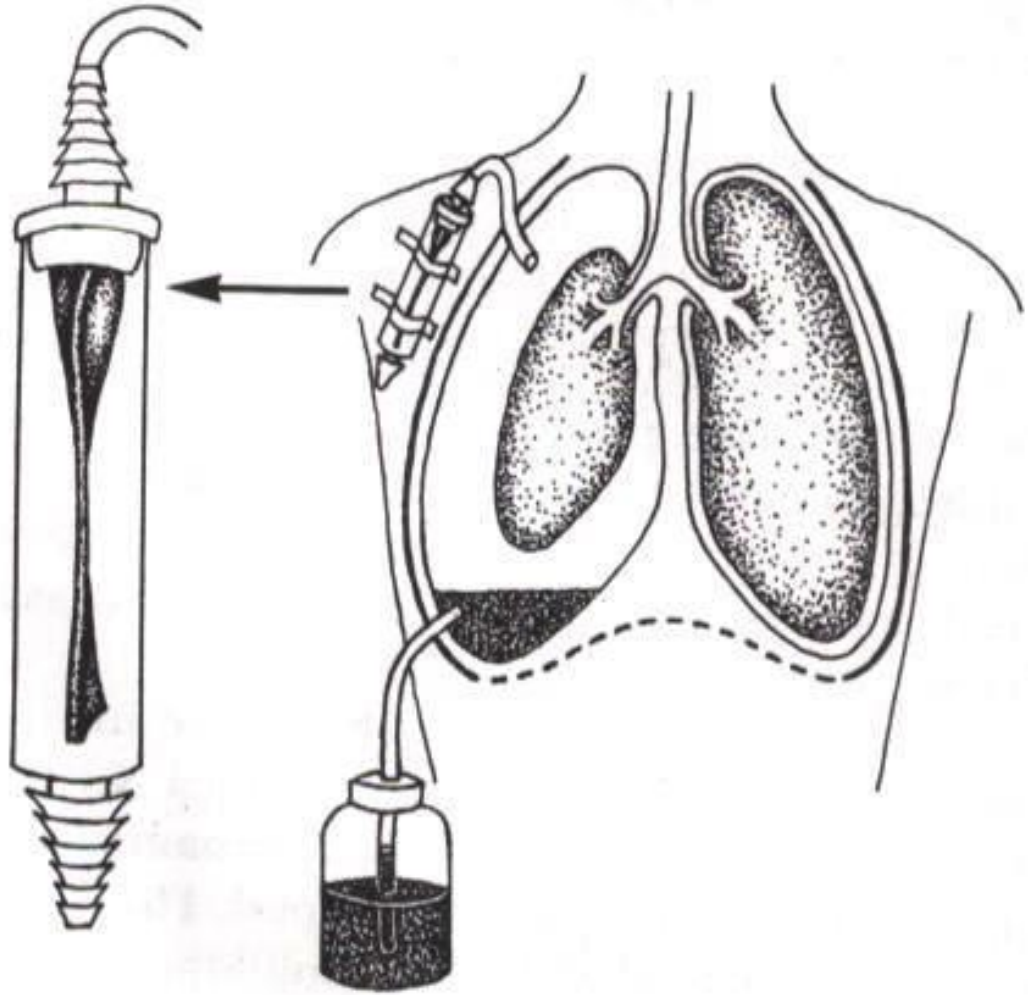


Figure 8–3. The upper anterior chest tube is attached to a Heimlich one-way valve useful in transport of a patient with a pneumothorax. The lower chest tube provides dependent drainage for a hemothorax and is attached to a conventional underwater drainage system.

Flail Chest

Subcutaneous Emphysema

Circulation

- Knowledge
  - Differential diagnosis of shock in trauma
    - Hemorrhagic / hypovolemic
    - Obstructive (tension pneumo, tamponade)
    - Neurogenic
    - (usually not cardiogenic, septic, or anaphylactic)
  - Fluid resuscitation
    - 2L crystalloid, then blood (uncrossmatched or matched)
- Skills
  - IV
  - Central line (femoral)
  - Interosseus line
  - Cut down
  - Arterial puncture (femoral)

C- Circulation

- Hemorrhagic shock should be assumed in any hypotensive trauma patient
- Rapid assessment of hemodynamic status
  - Level of consciousness
  - Skin color
  - Pulses in four extremities
  - Blood pressure and pulse pressure

Classification of Hemorrhage

- Class1- 15% blood volume- normal BP, min inc in pulse and resp, blanching of nail capillaries by pressure may be increased indicating peripheral vasoconstriction,Tilt test neg– pt sits up for 90secs without vertigo or dec BP

  Give crystalloid – 3:1rule- 3 times as much crystalloid is given as estimated volume loss.
- Class 2 – 20-25% blood loss-Hypotension, tachycardia and tachypnoea, Tilt test +, capillary blanch +. Give blood if there is continued blood loss eg pelvic / femur fractures
- Class 3 – 30-40% blood loss- Shock. Give crystalloid 3:1 and blood
- Class 4- 40-50% blood loss- Pt obtunded

Hemorrhagic Shock

- External bleeding
  - Control with direct pressure / staples / sutures
  - Fluid resuscitation usually successful
- Internal bleeding
  - May be from thorax, abdomen, or pelvis
  - Usually requires surgical intervention if fluid resuscitation unsuccessful

Disability

- Knowledge
  - Familiarity with GCS & basic neuro exam
  - Managing raised ICP
    - Hyperventilate (pCO_2 28-30)
    - Mannitol 1g / kg IV
    - Gently raise head of bed
- Skills
  - Applying a collar
  - (Most of us cannot do burr holes)

D- Disability

- Abbreviated neurological exam
  - Level of consciousness
  - Pupil size and reactivity
  - Motor function
  - GCS

Glasgow Coma Scale

Motor Response	Verbal Response	Eye Openinig
Obeys command-6	Oriented-5	Opens spont-4
Localizes to pain-5	Confused -4	Opens to speech- 3
Withdraws from pain-4	Inappropriate words-3	Opens to pain-2
Flexor posturing-3	Unintelligible -2	No eye opening-1
Extensor posturing-2	No sounds - 1	
No movement -1		

Disability Interventions

- Spinal cord injury
  - High dose steroids if within 8 hours
- ICP monitor- Neurosurgical consultation
- Elevated ICP
  - Head of bed elevated
  - Mannitol
  - Hyperventilation
  - Emergent decompression

Evaluation-Secondary Survey

- Exposure – cut clothing
- Head to toe exam
- Assess pelvic stability
- Log roll
- DRE (high riding prostate, blood, tone)
- Foley insertion
- NG insertion (prevent aspiration, look for blood)
- Applying a pelvic brace if indicated(bedsheet)

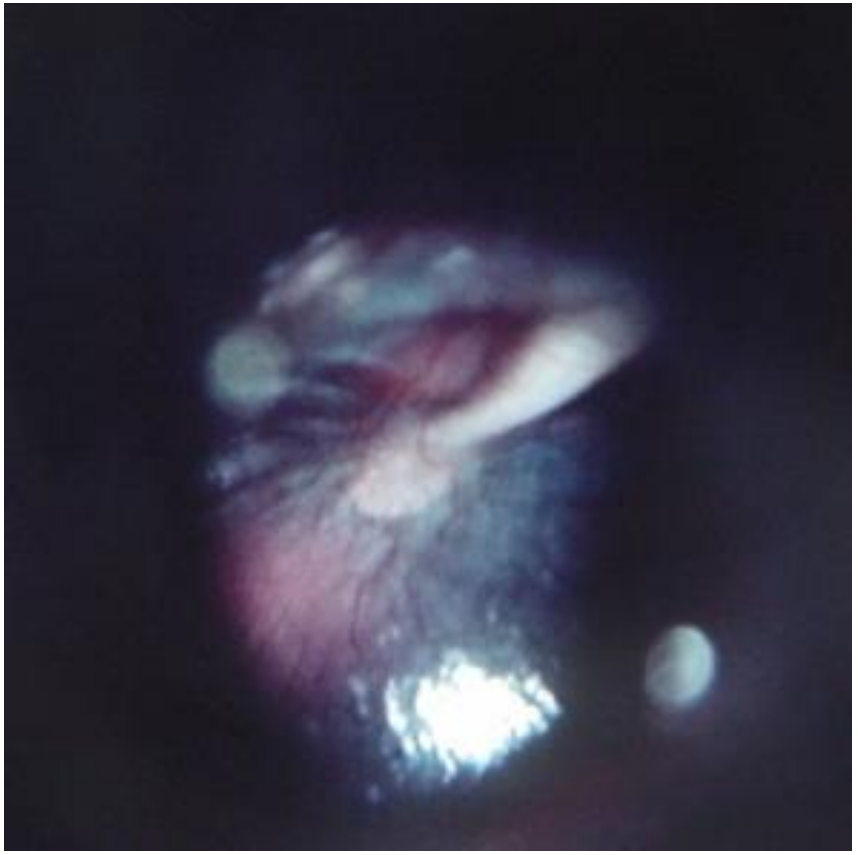
Always Inspect the Back

Secondary Survey

- AMPLE history
  - Allergies, medications, PMH, last meal, events
- Physical exam from head to toe, including rectal exam
- Frequent reassessment of vitals
- Diagnostic studies at this time simultaneously
  - X-rays, lab work, CT orders if indicated
  - FAST exam

HEENT

What are the names of these signs?



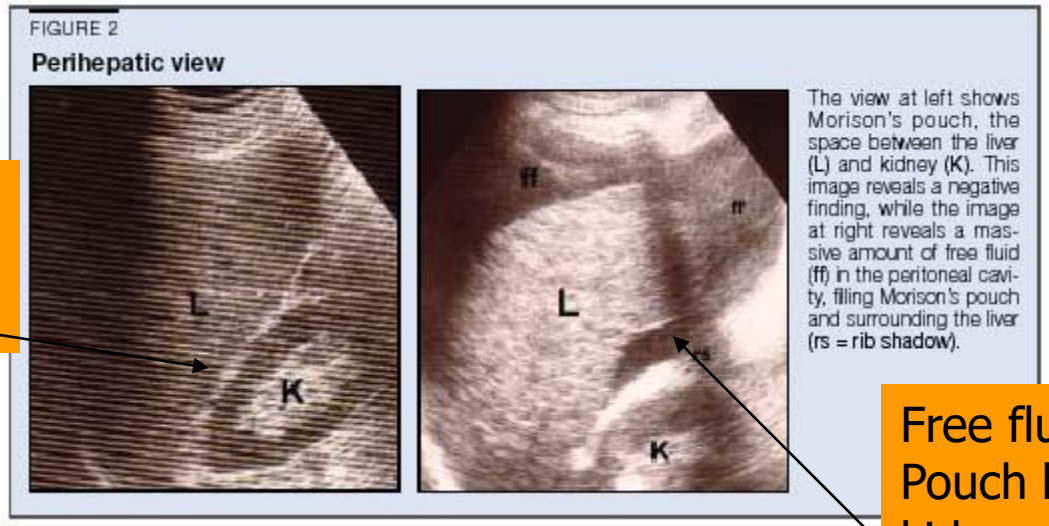
Seatbelt Sign

Diagnostic Aids

- Standard trauma labs
  - CBC, K, Cr, PTT, Utox, EtOH, ABG
- Standard trauma radiographs
  - CXR, pelvis, lateral C-spine (traditionally)
- CT/FAST scans
- Pt must be monitored in radiology
- Pt should only go to radiology if stable

FAST Exam

- Focused Abdominal Scanning in Trauma
- 4 views: Cardiac, RUQ, LUQ, suprapubic
- Goal: evaluate for free fluid



See normal Liver and kidney

Free fluid in Morrison's Pouch between liver and kidney

FIGURE 3

Perisplenic view

Perisplenic free fluid (ff) can be seen to the left of the spleen (S), or it can appear in the subdiaphragmatic space.

FIGURE 1

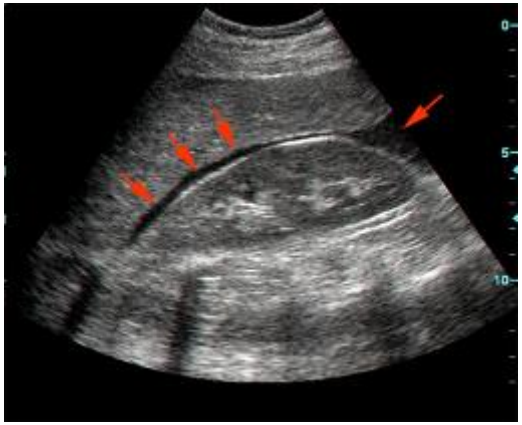
Pericardial view

Fluid in the pericardial sac is seen as a black stripe (f) that separates the visceral and parietal pericardial layers.

FIGURE 4

Pelvic view

The bladder (B) is seen clearly in this normal pelvic image. No free fluid is seen.



Morrison's pouch

Summary

- Trauma is best managed by a team approach (there's no "I" in trauma)
- A thorough primary and secondary survey is key to identify life threatening injuries
- Once a life threatening injury is discovered, intervention should not be delayed
- Disposition is determined by the patient's condition as well as available resources.

Remember…

Managing an unstable trauma patient can be stressful.

Following the "primary / secondary survey" approach will help you organize your thoughts and prioritize management.

FRACTURES

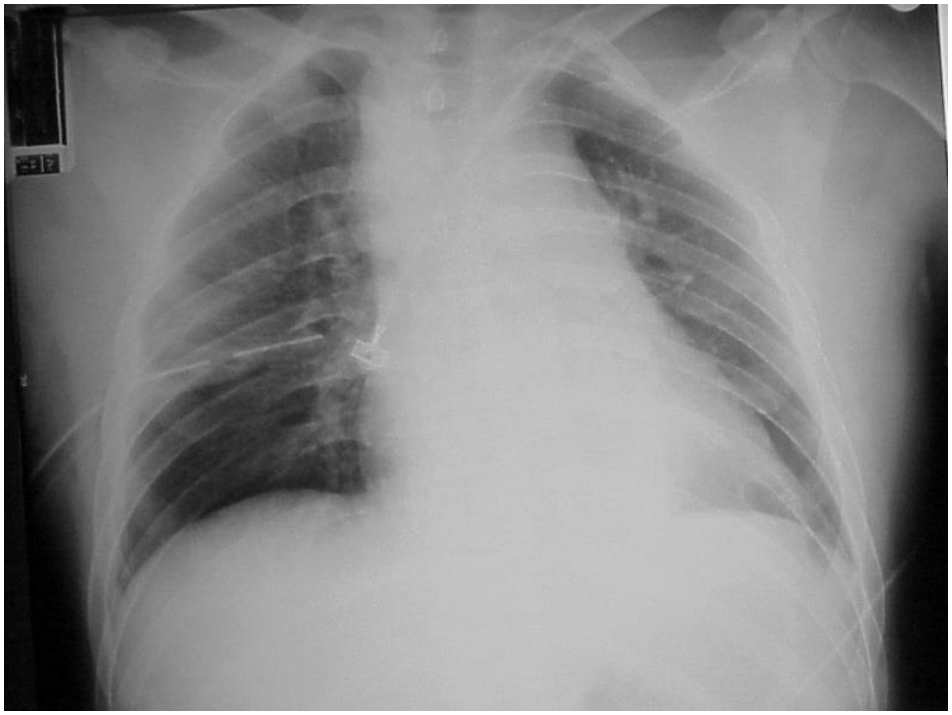
Stablisation

Investigations

1) Blood work (including cross match)
2) CXR
3) Pelvic X-ray

- In unstable patient, do not usually need further X-rays or CT prior to transfer
- In stable patient, further investigations as indicated

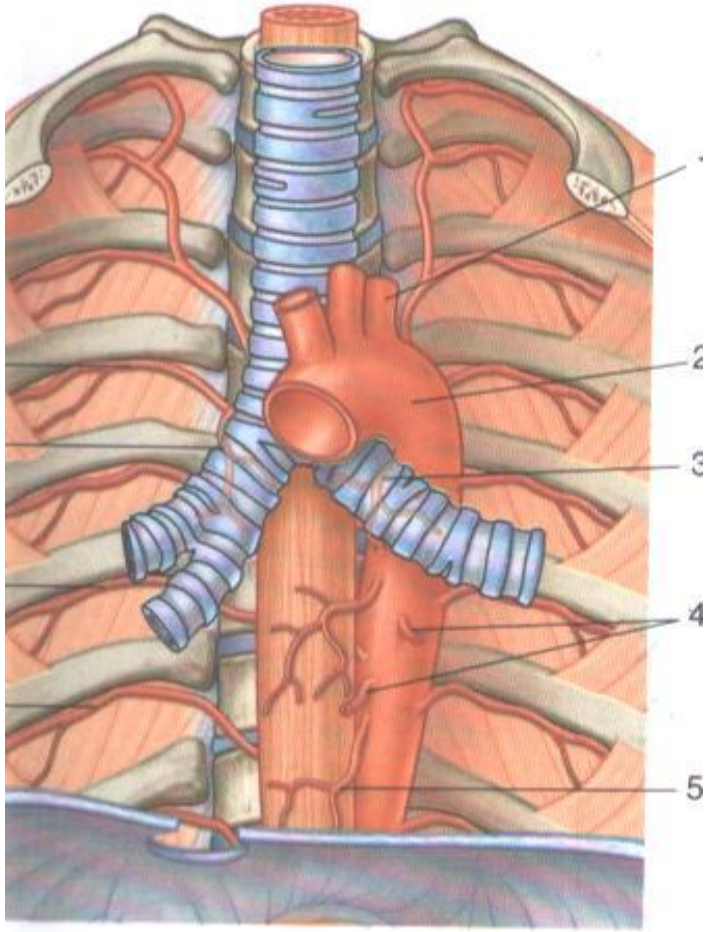
Interpretation of CXR



Look for:

1) Widened mediastinum (>8cm at aortic knob)
2) Loss of aortopulm window
3) Pneumomediastinum
4) Displaced NG
5) Displaced Left mainstem bronchus
6) Pleural cap
7) Rib # (esp 1st / 2nd)
8) Diphragmatic hernia
9) Hemo-pneumothorax
10) Line placement

Ruptured Aorta



- Just distal to subclavian artery in 95% cases
- 30-50% having aortography for widened mediastinum will have aortic rupture
- Of those who reach the hospital alive early death caused by completion of tear of the aorta occurs in 30% in 6 hrs and 60% in 48 hrs

Blunt vs. penetrating trauma

Blunt vs. penetrating trauma

- Similar management
- If implement still present (eg, knife), leave it in place, should be removed intra-op
- Look for "entry" and "exit" sites
- Give tetanus if indicated

Transfer of unstable patient

- Call for help early
- Prior to transfer, carefully consider need to intubate or insert chest tubes
- Ensure adequate IV access
- Send with blood
- Send with trained personel
- Send with CXR / pelvic X-ray if possible
- Unnecessary investigations will delay transfer

Summary - Knowledge

- Indications for intubation
- Indications for chest tube insertion
- Approach to shock / fluid resuscitation
- Familiarity with GCS
- Managing raised ICP

Summary - Skills

- Intubation
- Surgical airway (needle cricothyrodotomy)
- Needle thoracostomy or chest tube insertion
- Intravenous
- Central line insertion
- Interosseus insertion
- Arterial stab
- Applying a C-spine collar
- Foley / NG
- Applying a pelvic brace
- (FAST or DPL to look for intra-abdominal bleeding – usually in trauma centre or by local surgeon)

Scenarios

45M self-inflicted gunshot wound to hard palate

Intoxicated

Squatting, attempting to maintain open airway

Hemodynamically stable

Neuro intact, obeying commands

Least appropriate method of airway control:

- Surgical cricothyroidotomy
- Tracheostomy
- Needle cricothyroidotomy
- Oral tracheal intubation
- Nasotracheal intubation

16M driver car accident

At scene: SBP 80, HR 120

Alert, complains of chest pressure, good breath sounds

SBP 60, HR140

Distended neck veins

Most likely diagnosis:

- Tension pneumo
- Tracheal tear
- Intra-abdominal bleeding
- Mycardial contusion, cardiogenic shock
- Pericardial tamponade

SESAP 12, Trauma Q54

22M car accident

Deformity and crepitus left chest, sats good, bilateral air entry

SBP 80, HR 140 despite 2L resuscitation

GCS 7, moving 4 limbs

Obvious deformity femur

Most likely cause for persistent hypotension:

- Intracranial hemorrhage
- Neurogenic shock
- Tension pneumo
- Femur fracture
- Intra-abdominal hemorrhage

SESAP 12, Trauma Q40

20M falls onto left chest

Alert, saturating well
SBP 90
Neuro intact

CXR – left hemo/pneumo
Left chest tube inserted
Initial drainage 500cc
Then 250cc/hr x 4 hours
Intermittent hypotension
CT abdo / pelvis negative

Appropriate management:

- Insert 2nd chest tube
- Aortic arch angio
- Intubate and observe
- Vasopressors
- Emergency thoracotomy

SESAP 12, Trauma Q17

6oM head-on-collision, ejected

Tachypneic, RR=28
SBP 80, HR 120
GCS 8

Intubated, 2L crystalloid
Remains hypotensive

Scalp laceration with small hematoma
Distended abdomen
Shortened and externally rotated left lower limb
CXR – normal
Pelvic x-ray – femoral neck fracture

Next most important management step:

- Albumin resuscitation
- CT head, abdomen, pelvis
- Traction splint
- DPL
- Laparotomy

SESAP 12, Trauma Q32

27M motorcycle crash

Respiratory distress, decreased breath sounds left chest, intubated and left chest tube placed

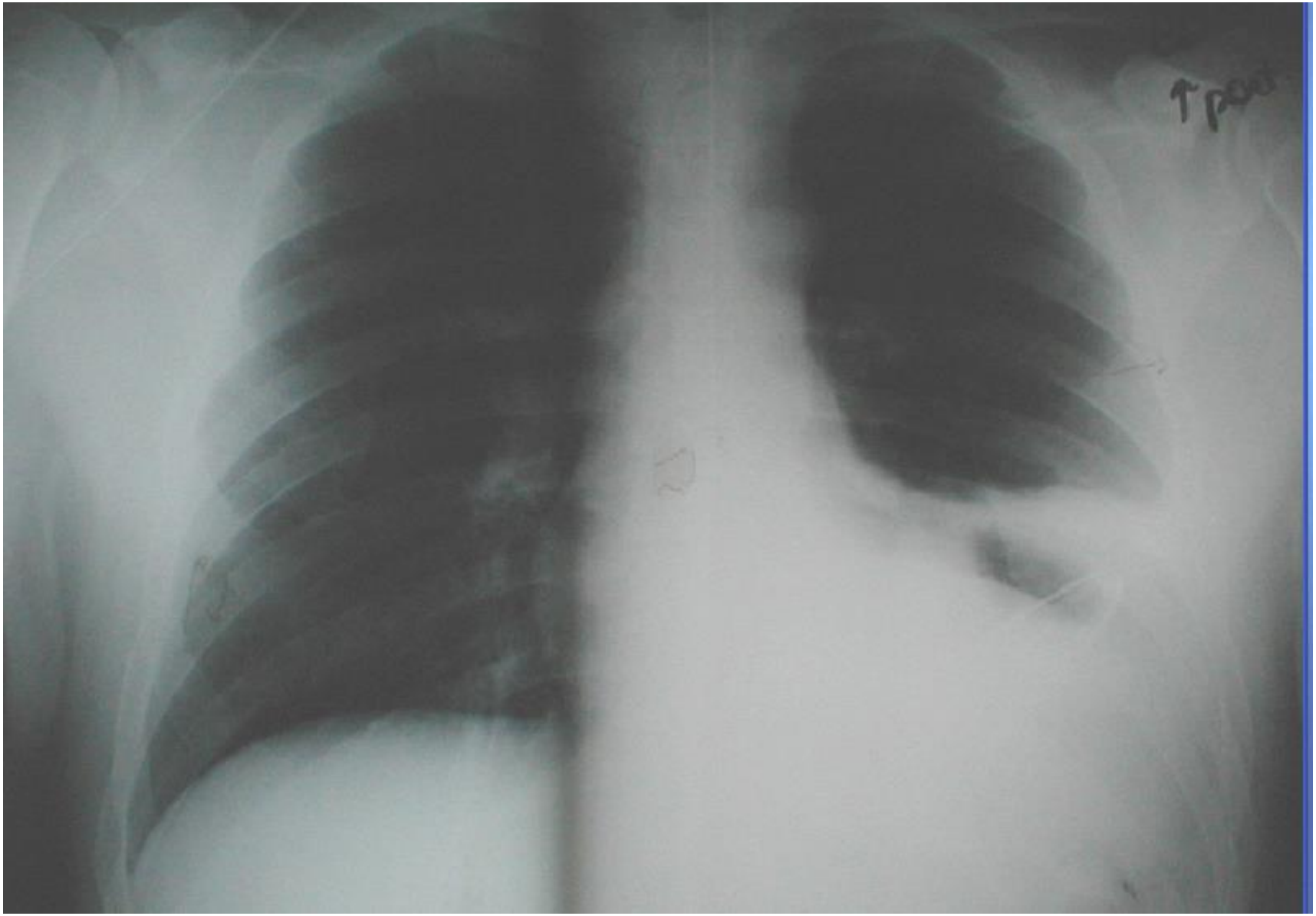
SBP 85, HR 120 after 2 litres of crystalloid

Neuro intact, obeying commands

CXR – next slide

Next step in management:

- CT head
- FAST
- DPL
- CT abdo / pelvis
- Laparotomy



SESAP 12, Trauma Q2

27M motorcycle crash

Unresponsive

Hypotensive SBP 60

Intubated by EMS, good breath sounds, oxygen saturation good

CXR – next slide

In addition to resuscitation, the next step should be:

- Immediate thoracotomy
- Aortic arch angio
- CT chest
- TEE
- FAST

SESAP 12, Trauma Q15