

## Thoracic Trauma in the SECONDARY SURVEY

- Injuries you will pick up in the primary survey are immediately lifethreatening ones which have OBVIOUS physical signs.
- In the SECONDARY survey, you pick up injuries without obvious signs.

The CHEST XRAY will identify many of these

- simple pneumothorax
- hemothorax
- pulmonary contusion
- tracheobronchial tree injury
- blunt cardiac injury
- traumatic aortic disruption
- traumatic diaphragmatic disruption
- blunt oesophageal rupture

### Simple Pneumothorax

- you would prefer an upright expiratory film, but you will have a random supine film. That makes it harder to pick it up.
- IF YOU PICK IT UP, DO NOT START POSITIVE PRESSURE VENTILATION until the chest drain is inserted
- The patient cannot be transported by air until the chest drain is in
- A simple pneumothorax should be treated as always being on the verge of converting into a tension pneumothorax

### Hemothorax

- On a supine film, it usually looks like a uniformly increased perimediastinal opacity
- If its large enough to be visible on a supine film, its large enough to warrant a chest drain – a large caliber chest tube
- If 1500 ml or more comes out immediately, THE PATIENT GOES TO THEATRE
- If 200ml drains out per hour for 2-4 hours, THE PATIENT GOES TO THEATRE
- If the hemothorax patient only has a transient response to fluids and requires blood transfusion, THE PATIENT GOES TO THEATRE

If you don't evacuate the hemothorax, it will clot, causing lung entrapment, or it will get infected and develop into an empyema

### Pulmonary contusion

- The most common potentially lethal chest injury!
- Does not NEED rib fractures to happen
- Produces a gradual onset of respiratory failure; intubation and ventilation may be necessary.
- Intubation IS necessary when the patient is going to be transferred

### Tracheobronchial tree injury

- In blunt trauma, it usually happens with 1 inch of the carina.
  - Most patients who have this die at the scene
  - If they survive the trip to hospital, they usually die of all the other injuries (a hideous accident is required to cause this sort of injury)
- hemoptysis
  - subcutaneous emphysema
  - tension pneumothorax or pneumomediastinum

- YOU CANT DO MUCH ABOUT THIS IN THE EMERGENCY DEPARTMENT
- You put in a chest drain, and a large persistent air leak confirms the diagnosis
- If you can see on xray that one of the main bronchi is disrupted, try to intubate the opposite bronchus.

## Blunt cardiac injury

- This also includes slowly developing TAMPONADE

### MYOCARDIAL CONTUSION

- firstly, you cant diagnose this except by direct inspection.
- There are some features of ECG:
  - Ventricular ectopics
  - Atrial fibrillation
  - Various ST changes
  - Right bundle branch block
- There is NO EVIDENCE for the use of troponins in blunt cardiac injury
- MONITOR WITH TELEMETRY for 24 hours.
  - The risk of arrhythmia declines rapidly after the first 24hrs

## Traumatic Aortic Disruption

- This is frequently an autopsy finding.
- The ones who survive tend to have an incomplete laceration near the ligamentum arteriosum; intact d/adventitia or mass effect from the hematoma prevent sudden death
- THE ONE CHARACTERISTIC SHARED BY ALL SURVIVORS IS A CONTAINED HEMATOMA

Signs are non-specific.

Most of the suspicion comes from a DECELERATING INJURY

XRAY FINDINGS ARE THE USUAL WAY OF FINDING THIS, and they include:

- widened mediastinum
- obliteration of the aortic knuckle
- tracheal deviation to the right
- depression of left main bronchus
- elevation of the right main bronchus
- obliteration of the space between the aorta and the pulmonary artery
- deviation of the oesophagus (NG tube) to the right
- widened paratracheal stripe
- presence of an “apical cap” of blood
- left hemothorax
- fracture of the first rib, second rib, or scapula
- rarely (1-2% of the time) no xray signs are present
- SLIGHTEST SUSPICION = CT AORTOGRAM
- Transfer them early

## Traumatic diaphragmatic injury

- Blunt trauma = large radial tears = herniation of abdominal contents
- Penetrating injury = small tears = no immediate herniation

The NG tube is a diagnostic test. If it appears in the lung field on chest Xray, there may be a diaphragmatic tear.

The hemidiaphragm may appear elevated, and there will be bowel where lung should be.

Left sided tears are easier to pick up than right sided ones, because the liver blocks abdominal contents from herniating into the chest

There is no treatment other than surgical repair

## Blunt oesophageal rupture

- Sudden massive stomach compression from blunt impact causes a massive forceful expulsion of gastric contents into the oesophagus, which causes a linear tear of the oesophagus.
- The result is mediastinitis

### SUSPICION RISES WHEN:

- there is hemothorax or pneumothorax without rib fracture
- central thoracic injury with pain or instability out of proportion to the apparent injury
- there is a chest tube draining particulate matter, eg. stomach contents
- there is pneumomediastinum
- the NG tube ends up in the chest, outside the lung, somehow.

The faster this is repaired, the better the prognosis

## Other things you might pick up during the secondary survey:

- **subcutaneous emphysema**
  - usually means there is some underlying injury eg. rib fracture
  - usually doesn't require treatment, in and of itself
- **traumatic asphyxia (crush injury)**
  - findings associated with this:
    - FACIAL AND UPPER LIMB PLETHORA
    - PETECHIAE IN THE UPPER BODY
- **rib, sternum, clavicle, scapula fractures**
  - STERNAL AND SCAPULAR FRACTURES ARE PARTICULARLY INTERESTING: THEY USUALLY MEAN THERE IS SOME BLUNT CARDIAC INJURY
  - Clavicular fractures or dislocations can occasionally obstruct the airway or the vena cava
  - With rib fractures, analgesia is the main issue
  - Lower rib fractures = lacerations of liver or spleen

## Other indications for chest tube insertion:

Chest tubes are inserted into the 5<sup>th</sup> intercostal space (nipple level) anterior to the mid-axillary line, aiming posteriorly for hemothorax and superiorly for pneumothorax

- Severe lung injury in a patient transported by air
- Severe lung injury from a patient about to undergo anaesthetic
- Severe chest injury in a mechanically ventilated patient

## **NEEDLE PERICARDIOCENTESIS:**

- **Get ECG monitoring**
- **Use an 18-16 g needle- a LONG cannula**
- **Make sure there is no mediastinal shift**
- **Start 1-2cm below the xiphochondral junction, and slightly to the left of midline**
- **Point the needle 45 degrees down, and aim for the tip of the left scapula**
- **Advance carefully while aspirating**
- **If you pierce the heart muscle, you'll get a "current of injury" on the ECG: all kinds of widespread ST changes, widened QRS. This means you have to withdraw the needle**
- **Withdraw as much fluid as you can**
- **Leave the plastic cannula in there, with a tree-way tap, and tape it in place**
- **Do an xray to make sure you haven't caused a hemopneumothorax**
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