CHEST TRAUMA
THE RADIOLOGIST’S PART

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Emergency unit

- Coordinator
- Traumatologist: extent, primary focus, sequence of procedures, selection of pts.
- Anesthesiologist: life functions
- Radiologist: US, RTG
- Chest surgeon
- Other staff
Basics

• 25% trauma-related deaths (2nd after head)

• Incidence of injuries:
  1. head
  2. extremities
  3. chest

• High mortality rate:
  cardiac and large vessel injury
  tracheobronchial tree
  oesophagus

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Radiologist at the Emergency

- Ultrasound: the FAST protocol
  Fluid chest yes/no
  Abdomen yes/no

- RTG: pneumothorax TENSION?
  Hemothorax
  Tubes and lines malposition

Traumatologist’s decision

- Operation now
- or
- CT

Radiologist is a part of the resuscitation team

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CT

• CT protocol:
  - Brain
  - C spine
  - IV contrast
  - Whole body scan, ca. 35 s

• Image postprocessing:
  - MPR in 3 planes (windows?)
  - MIP or volume rendering if needed

• Speed of report

• Practical issues: transferring planes, view on the patient, monitors, tubes, IV lines, suspends for fluids, lead jackets, fixation devices, tables, gloves, wipes, chest tubes

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Structures

- Penetrating injury x closed blunt trauma
- Pneumothorax, haemothorax
- Parenchyma: contusion, bleeding, laceration
- Mediastinal structures: trachea, bronchi, heart, vessels, oesophagus
- Skeletal structures: spine, ribs, sternum, clavicle, shoulder
- Diaphragm
- Abdominal and other organs

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Life threatening injuries

- Airway obstruction
- Laryngotracheal injury
- Tension pneumothorax
- Open pneumothorax
- Flail chest
- Massive pulmonary contusion
- Massive hemothorax
- Cardiac tamponade
Pneumothorax

- 15-40% blunt chest trauma (CT)
- 10-50% of PNOs not seen on Chest X-ray

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Pneumothorax

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Pneumothorax

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- 10-50% of PNOs not seen on Chest X-ray
- Chest tube needed?
- CAVE! Tension PNO
Haemothorax

- Blood in pleural space (blood density 35-70 HU)
- From lungs, wall, heart, mediastinal vessels
- From abdominal organs with ruptured diaphragm
- Massive haemothorax ≥1l
Haemothorax

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- Sonography volume estimation:
  1 cm ~ 100 ml
Pulmonary contusion

- 17-70% of chest injuries
- Coup and countrecoup
Pulmonary contusion

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- Coup and countrecoup
- CT immediately, CXR 6+ hrs
Pulmonary contusion

- 17-70% of chest injuries
- Coup and countrecoup
- CT immediately, CXR 6+ hrs
- Patches appearing > 1 day are probably not contusion
- CAVE! Aspiration, pneumonia, fat embolism
Pulmonary laceration

- Filled with air, blood or both

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Pulmonary laceration

- Filled with air, blood or both
- More common in children and young adults
Pulmonary laceration

- Filled with air, blood or both
- More common in children and young adults
- Resolution in months
Lung herniation

- Chest wall defect


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• 0.2-8% of chest injury patients
• Most patients die before reaching emergency unit
Airways!

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- Persistent PNO despite chest tube - think of airway defect

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• Tracheal laceration - endoscopic control?
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• Most patients die before reaching emergency unit
• Persistent PNO despite chest tube - think of airway defect
• Complete bronchial transsection - „fallen lung sign“
• Tracheal laceration - endoscopic control?
• Complications common: obstruction, pneumonia, abscess, empyema, bronchiectasis
Oesophagus

- Extremely rare

Oikonomou A, Prassopoulos P: CT imaging of blunt chest trauma Insights Imaging. 2011 June; 2(3):
• Dangerous! Cardiac output ca. 5 l/min
• Clinical suspicion, ECG, cardiac enzymes
• ECG-gated scanning?
• 80-90% die before reaching emergency unit
• 50% of survivors die within 1 week
• Cause of 10-15% car accident deaths in the U.S.
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• Traumatic dissection: Stanford A
  Stanford B

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Other arteries

- Mammary, carotid, subclavian, intercostal
Diaphragm

• 2-6% of blunt chest injuries
Chest wall

- Common
- Fractures, hematoma, emphysema
Flail chest

- >3 ribs, each with >2 fractures
- Clinically paradoxical chest movement
Flail chest

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- Important marker of severe injury
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- >50% will have surgery
Flail chest

- >3 ribs, each with >2 fractures
- Clinically paradoxical chest movement
- Important marker of severe injury
- > 50% will have surgery
- Prolonged ventilation

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Malpositioned tubes

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Penetrating trauma


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Penetrating trauma

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Challenging cases

- Horizontal fractures
Challenging cases

- Horizontal fractures

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Challenging cases

- Small air leaks - mediastinum, pericardium

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Challenging cases

- Massive emphysema- bad visibility on ultrasound
Challenging cases

- Heart and aorta- motion artifacts
Thank you for your attention

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