Penetrating chest trauma: Simple Solutions for complex problems

T Hardcastle

Trauma Surgeon

Durban – South Africa

Disclaimer

- All images are from my own practice at either IALCH or previously Tygerberg hospital unless otherwise mentioned
- Opinions are not necessarily those of my employer, SA Department of Health

Overview

- What complex problems are there?
- When in doubt – cut!
- Simple solutions that are cost effective
- Imaging in penetrating trauma
- Double jeopardy revisited

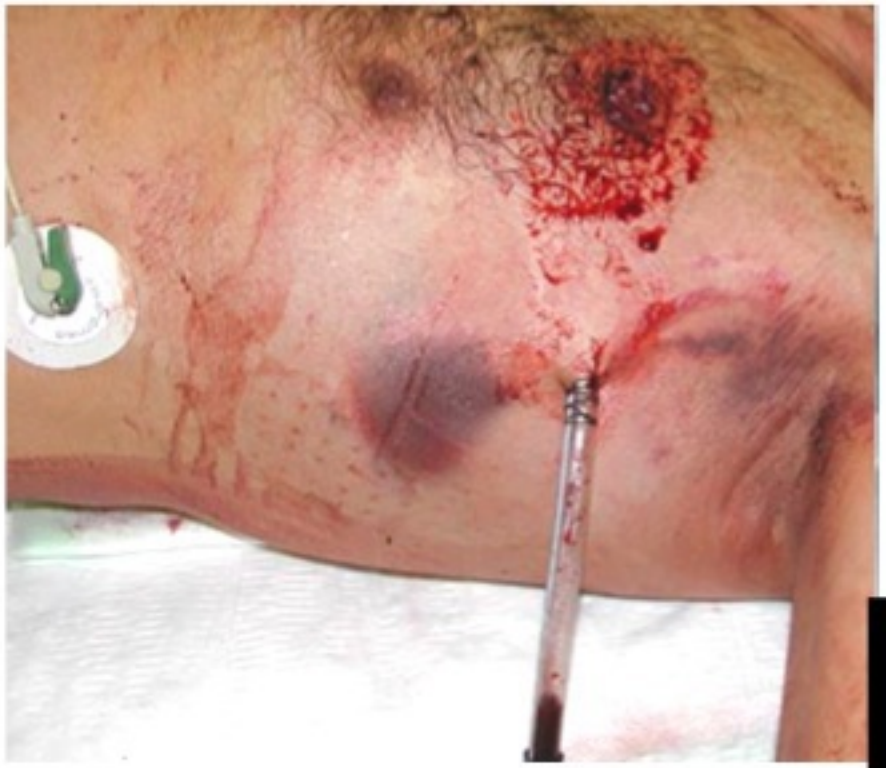
What do we mean by “complex”

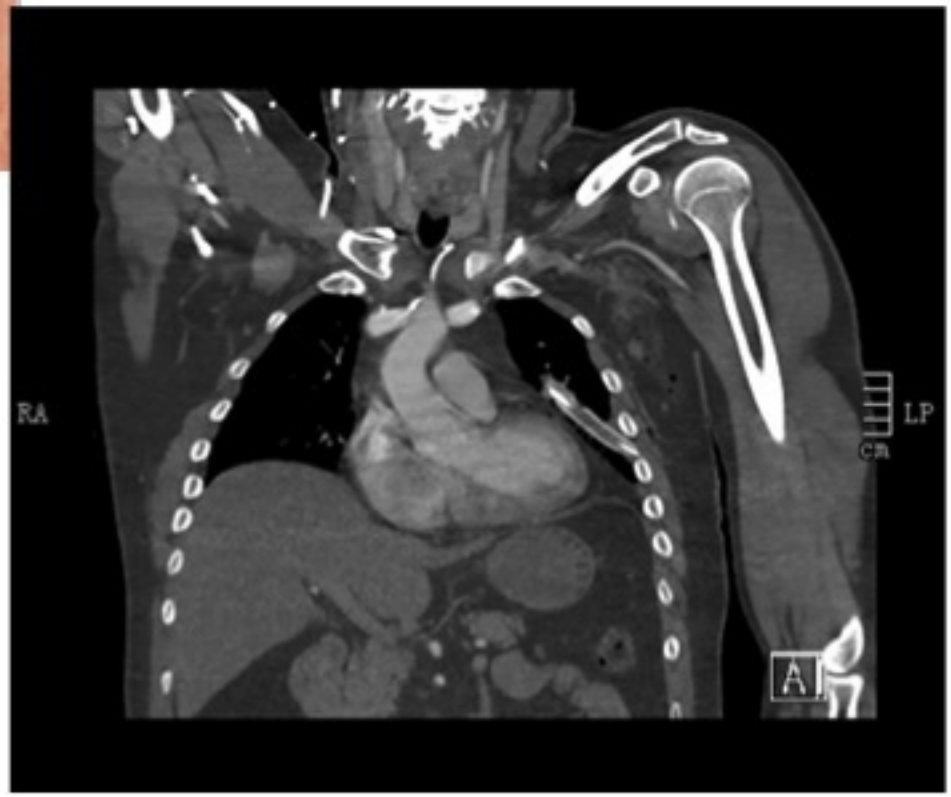
- Weird tracts
- Multiple wounds
- Transmediastinal injury
- Junctional injury
- Aerodigestive injury

Weird tracts

Case study: Close range GSW left chest

- Entry 4th ICS lateral and exit over left shoulder
- Decreased left chest air entry, BP 95mmHg
- Empiric left sided chest tube: nothing drained
  - ? Decreased left radial pulse
- Completely stale after 1L MRL
- Proceeded to CT scan to exclude vascular injury
  - EXTRAPLEURAL TRACT

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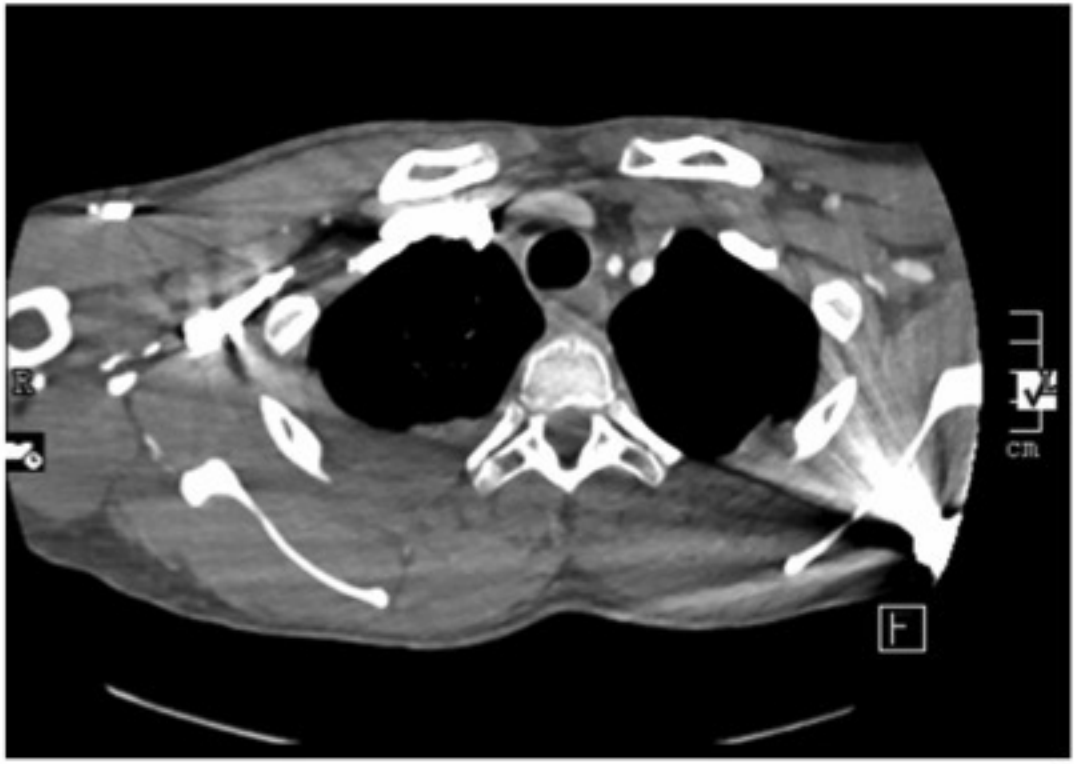
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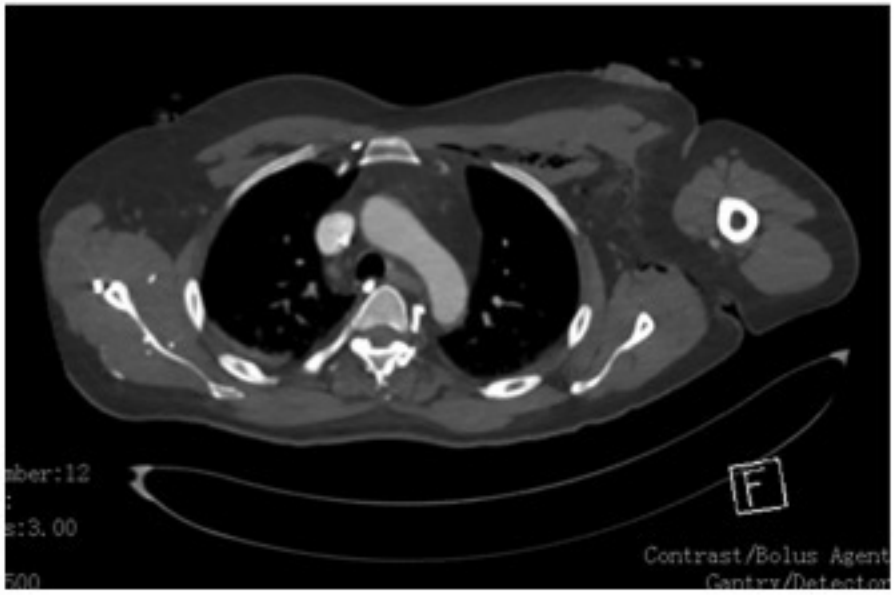
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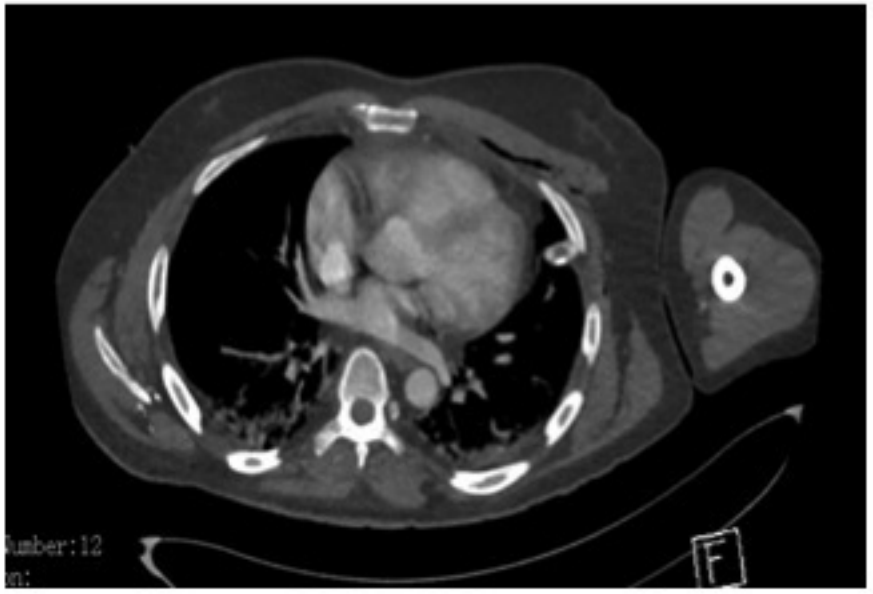
Contrast/Bolus Agent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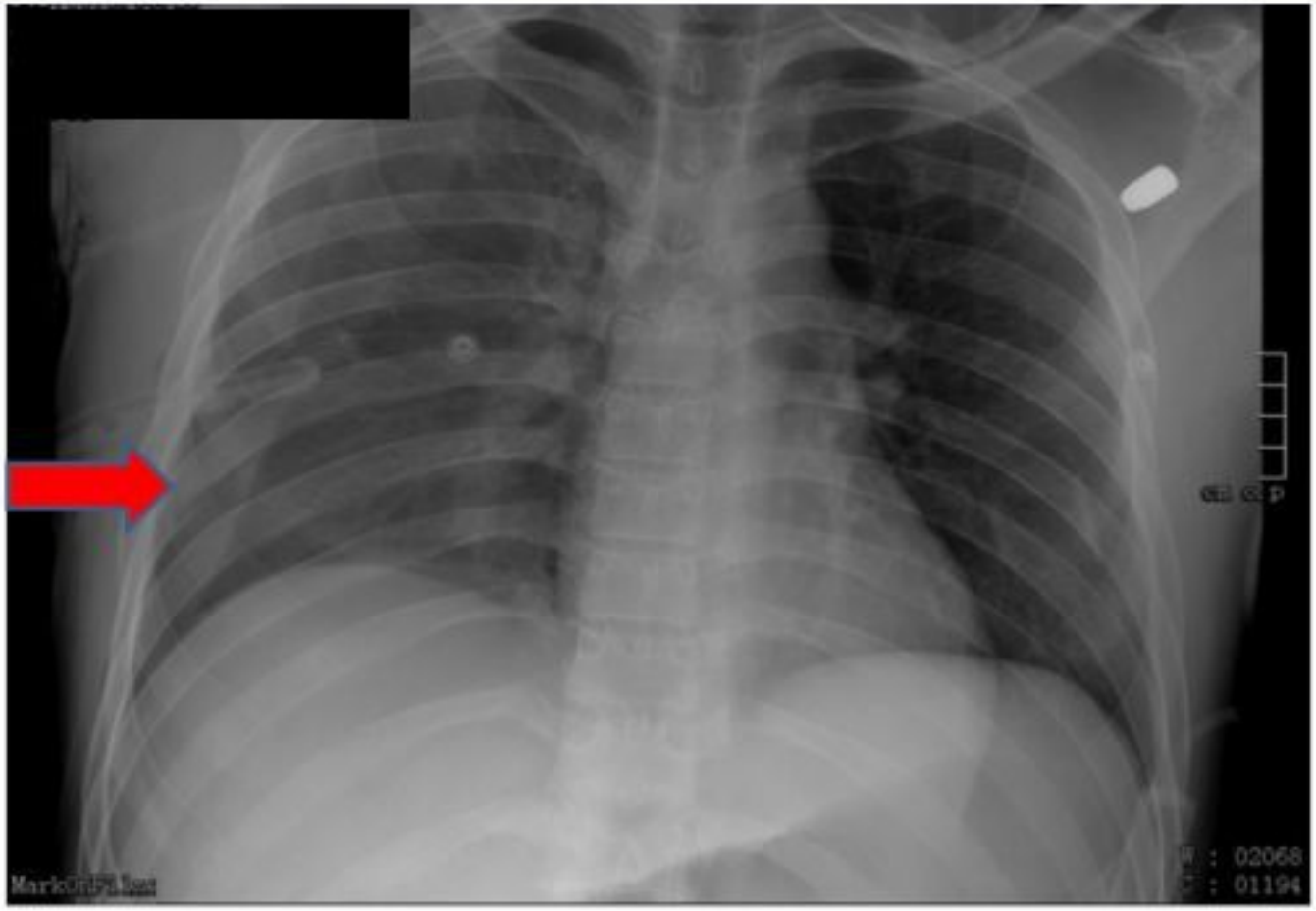
Multiple Wounds

- Most cases of multiple thoracic wounds are more externally dramatic than internally complex
- Approach with usual methods
- Treat liberally with chest tubes
- Exclude other visceral injury with liberal imaging, especially Ultrasound and contrast studies

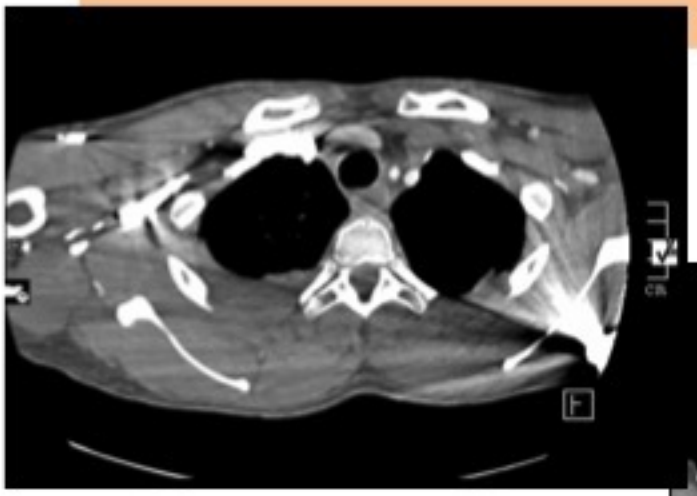
Transmediastinal Wounds

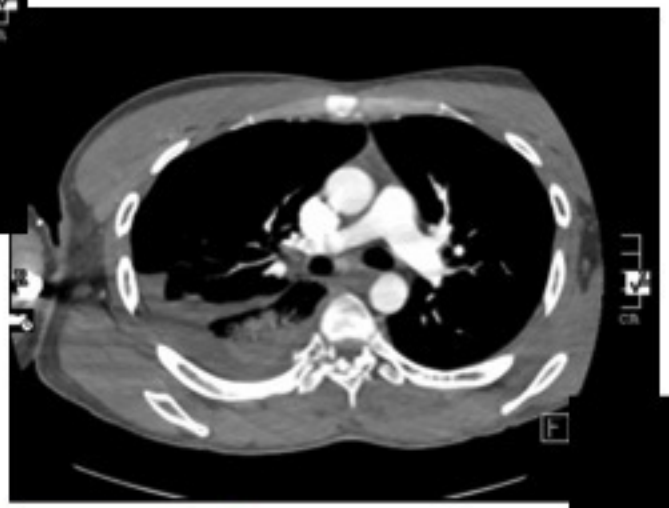
- 42 y/o male referred from a peripheral hospital to the Neurosurgery Team
  - GSW (tangential) of head, with GCS 11/15
  - GSW Chest with R-HTX (See CXR)
  - GSW Tibia with good pulses
- What is the ideal work-up?

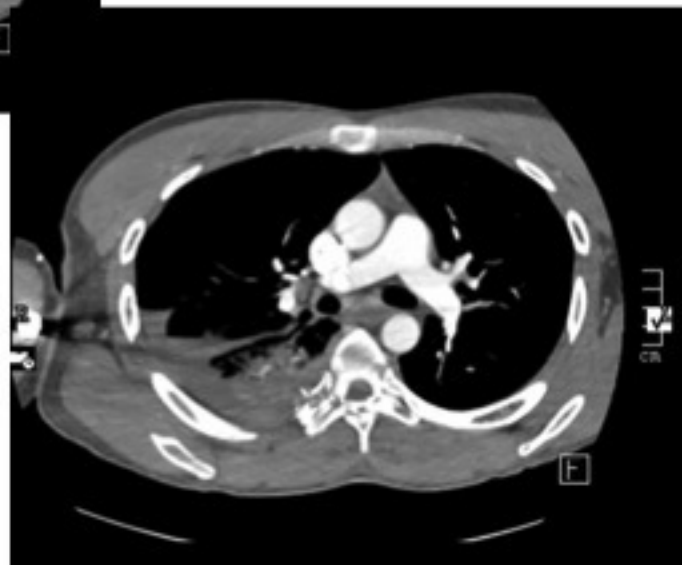
Found to be paraplegic!



CT Scan for tract evaluation







Options:

CT Angiogram of chest

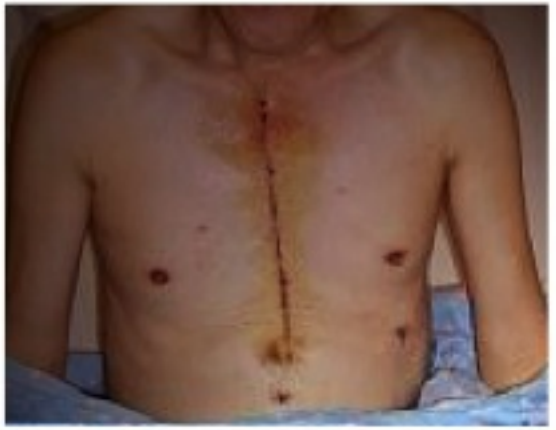
Contrast swallow if unsure

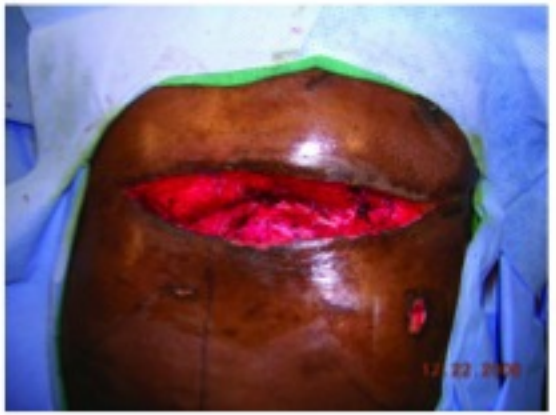
Scopes of aerodigestive tract

Formal catheter angiogram

Unstable transmediastinal

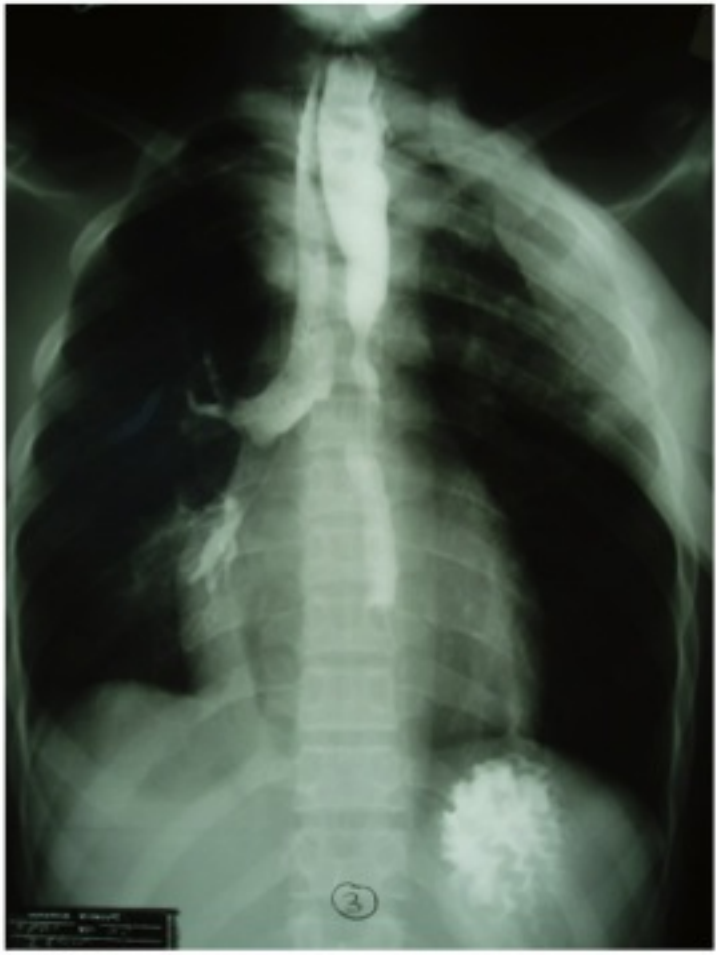
- Gain airway and IV access early
  - Don't flood the patient
  - Double lumen airway is a luxury
- Operative access
  - For major mediastinal bleeding or cardiac tamponade:
    - Median sternotomy best access
  - For pulmonary or posterior mediastinum:
    - Clamshell thoracoctomy best





Intrathoracic Aerodigestive Injury

- Present as either blowing wounds or mediastinal air
- Must exclude oesophageal injury
  - Water soluble iso-oncotic contrast is adequate*
  - CT scan can miss this injury
  - Flexible scopes may be used additionally
  - Early surgery is essential



*Nel L, Whitfield Jones L, Hardcastle TC. Emerg Med J, 2009; 26; 106 – 108

Management

Tracheal Injury

- Depends on airleak
- If less than 1/3 circumference and can ETT below – conservative
- If >1/3 diameter or low down – selective ETT and repair
- Interpose tissue if also oesophagus injury

Oesphagus Injury

- Time delays critical
- Exposure essential
- Repair without tension
- DRAIN widely
- Not a fan of exclusion
- Feeding tube passed the repair and feed early

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Cost-efficient clinical care

- Chairs may be better than beds for chest drains#
  - Early mobility, physiotherapy, drains out <24 hours
  - Tygerberg: 500 patients per year
    - Average stay under 3 days
    - Less than 24 hours for simple PTX
    - Avoid routine suction – delays mobility

Injury 1990; 21: 77, SA J Surg 1994; 32(1): 5

Cheaper equipotent equipment

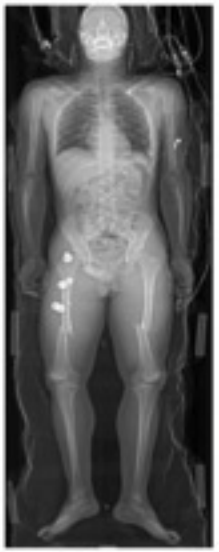
- Sinapi chest drain
  - Waterless valve device
  - R100 per patient
    - Atrium® R1200 per unit!
  - Potential for autotransfusion
  - Equivalent to standard UWD
  - Light and mobile
  - Developed through local research*

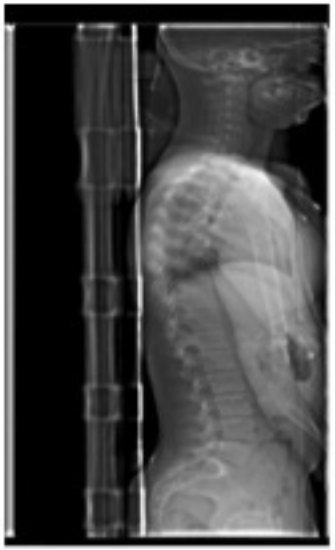
*Cooper, Hardcastle. S A J Surg 2006; 44: 132

Lodox

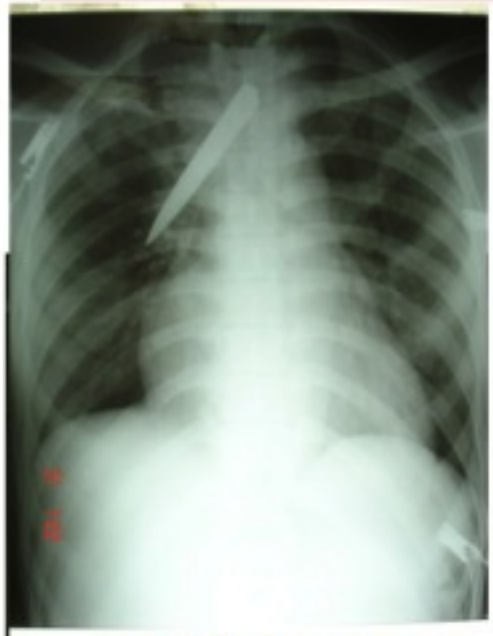
Emerg Radiol. 2003;10(1):23
Report on a new type of trauma full-body digital X-ray machine.

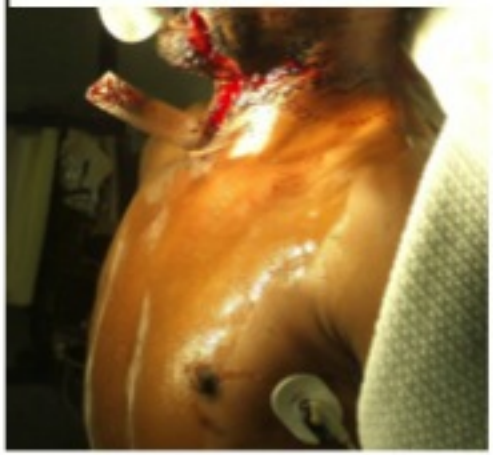
- Designed for mines – search for diamonds
- Used in trauma: rapid full-body plain film
  - 13 seconds
  - 0.12mGy
  - Good quality digital pictures
  - Can do bedside angiography
- Currently in >30 trauma units and 10 Forensic units world-wide
- Cost effective – R2.7M





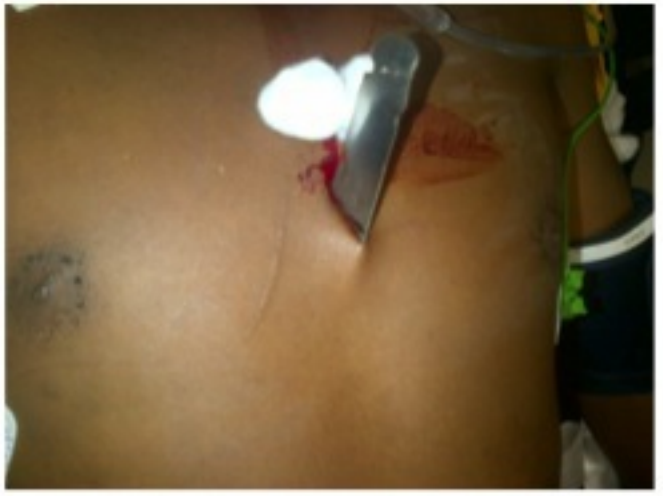
Junctional Injury – Double Jeopardy



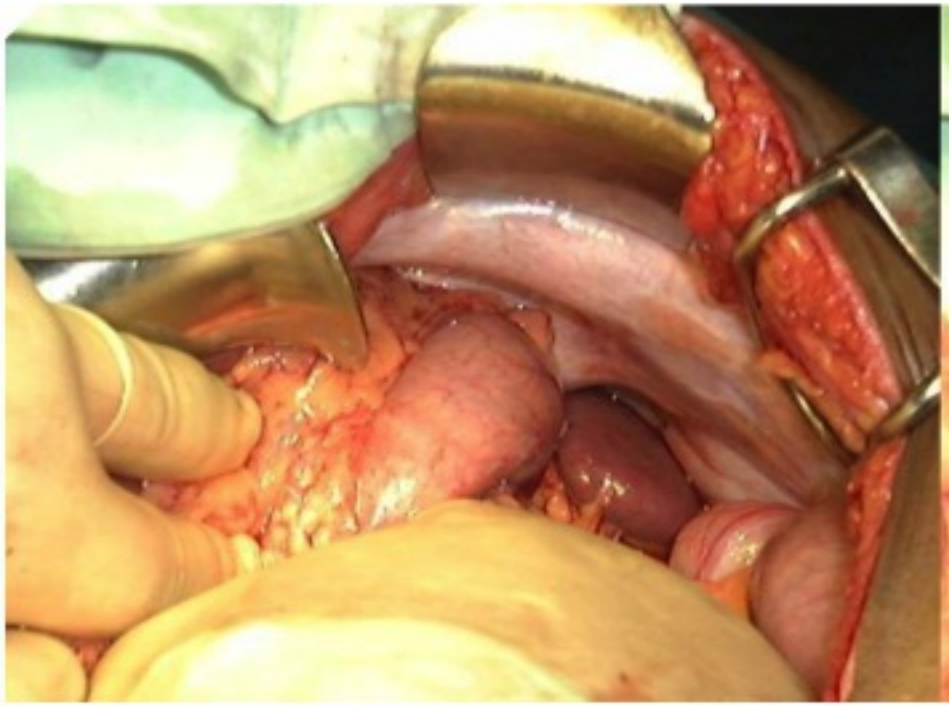


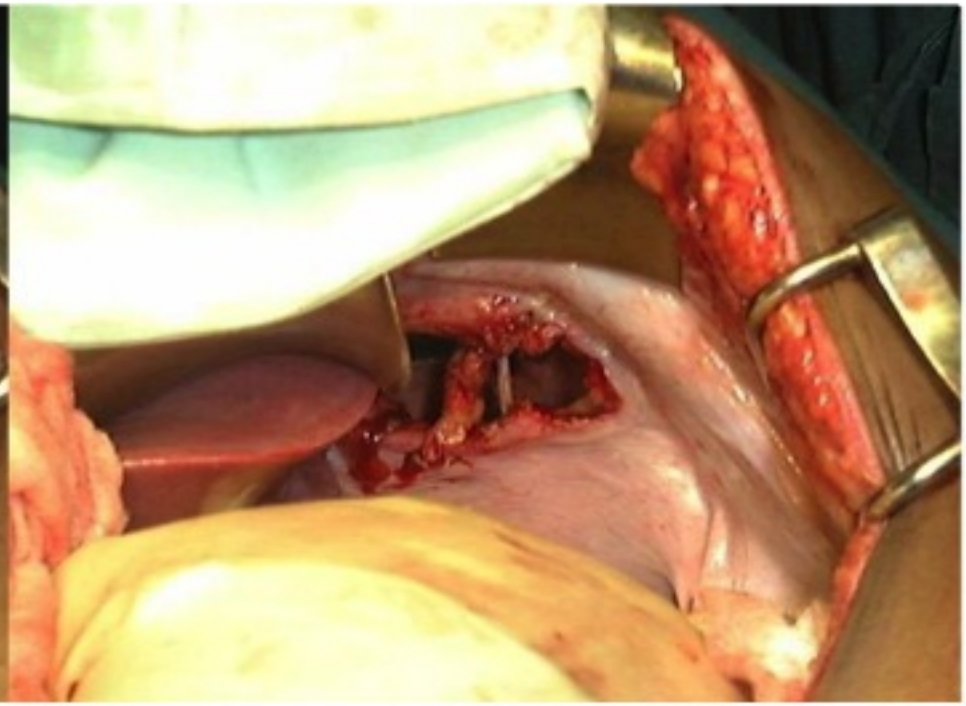
Thoracic inlet and thoraco-abdominal regions

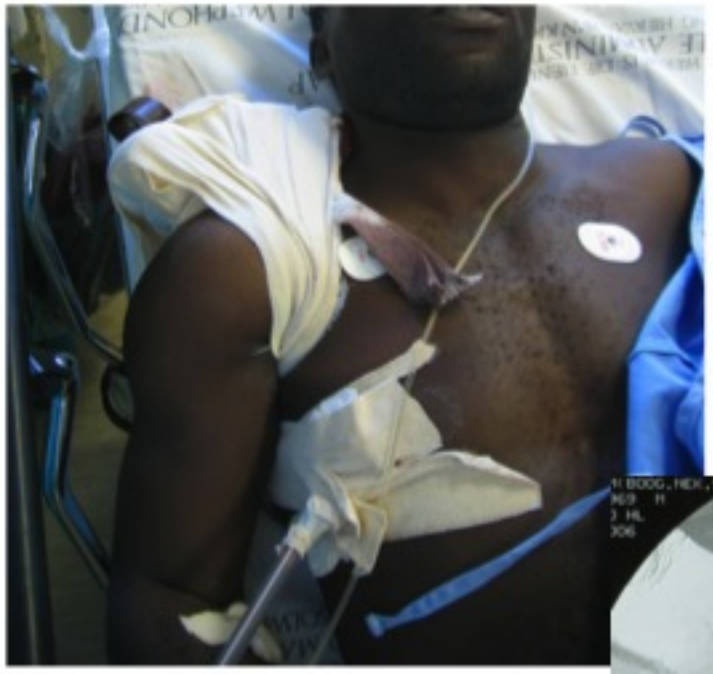
- Injuries often less accessible, difficult access
- Image the stable patient
- Drape widely for the unstable
- Follow tracts
- Default options

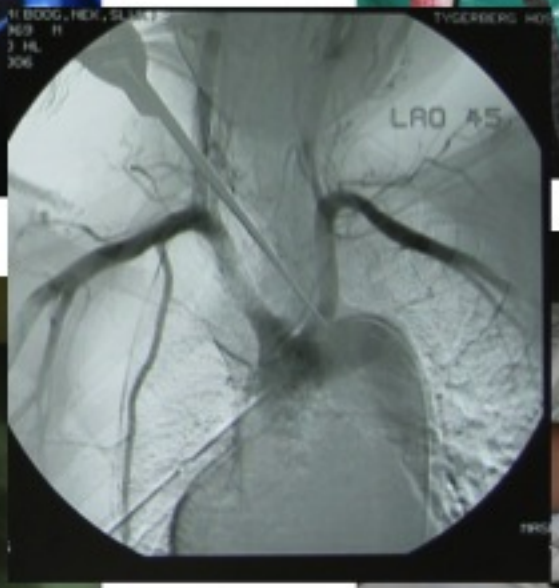


Don’t forget the diaphragm





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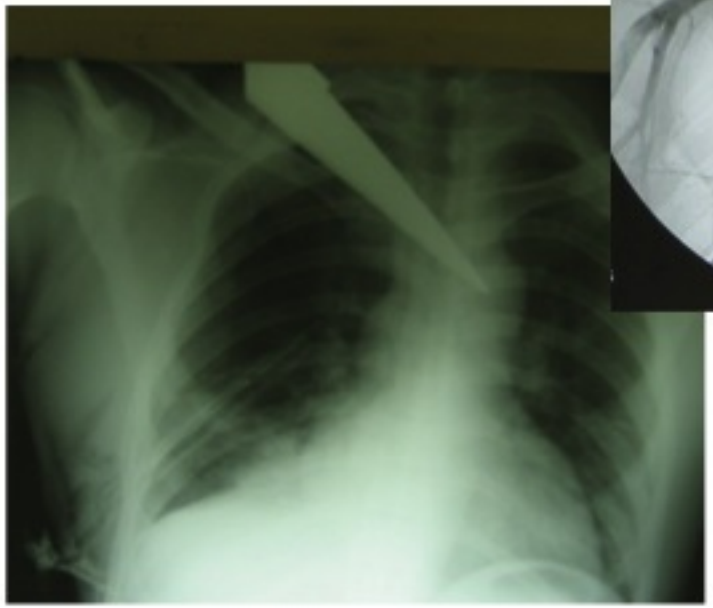

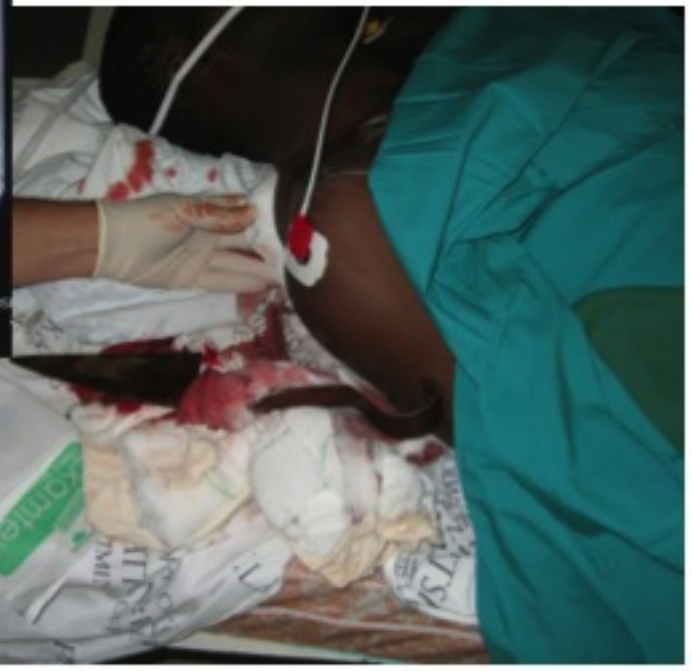

The weird and rare

Chylothorax

- Injury to thoracic duct
- Often present later
- Haemothorax becomes Chylous
- Est managed with MCT diet or TPN
- Small percentage will require ligation best done via a Thoracoscopy