



# Needle decompression of tension pneumothorax



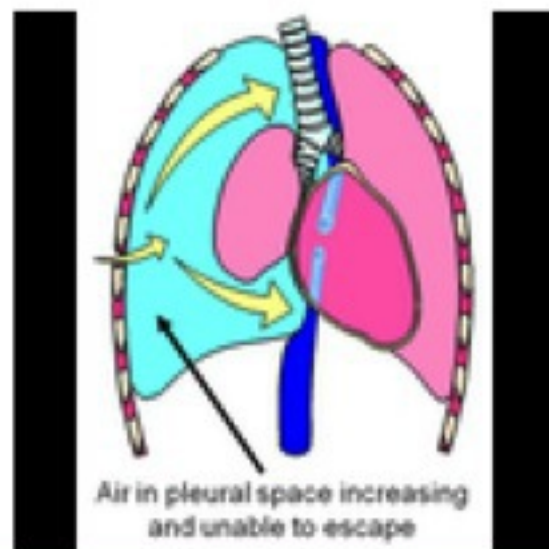
Tony Smith, Medical Director

# Tension pneumothorax

- > Very mixed audience
- > Pathophysiology
- > Clinical presentation
- > Needle decompression in pre-hospital setting
  - > The controversies and problems
  - > The alternatives
  - > How we historically did it
  - > How we are doing it now
- > What might change in the future
- > Questions

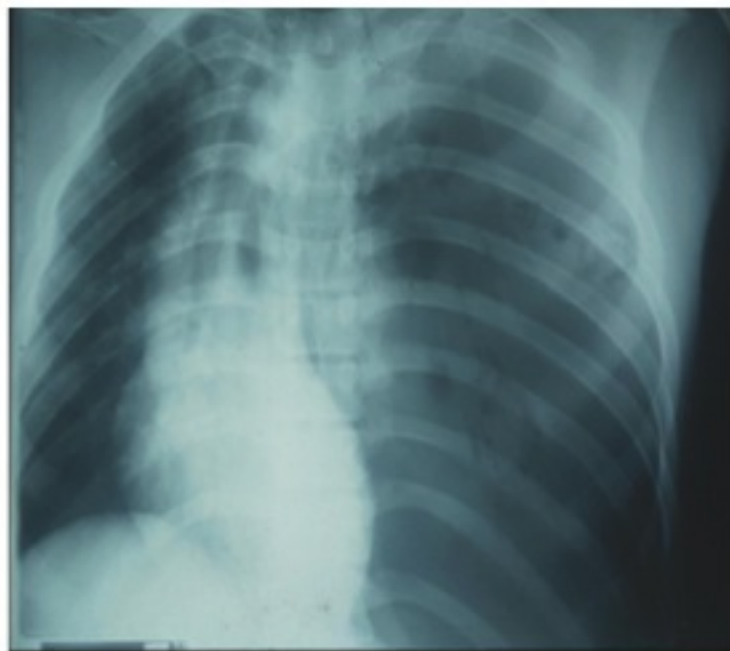
# Tension pneumothorax

- > Pneumothorax
  - > Air in the pleural space
- > Tension pneumothorax
  - > Pneumothorax under 'tension'
  - > Positive pressure in pleural space
- > Positive pressure in pleural space reduces venous return to the heart
  - > Causes shock
  - > Right ventricle becomes empty
  - > Looks clinically just like hypovolaemic shock, except for neck veins



# Tension pneumothorax

- Relatively uncommon
- Predominantly blunt trauma
  - Appears less likely with penetrating trauma
- Can lead to death if unrecognised and/or untreated



# Signs and symptoms

## > Respiratory

- > Reduced air entry
- > Tachypnoea and respiratory distress
- > Hyper-resonant percussion note
- > Impaired oxygenation (very late)
- > Deviated trachea (very late)
- > Subcutaneous air not a useful predictive sign

## > Cardiovascular

- > Enlarged neck veins (unless co-existing hypovolaemia)
- > Tachycardia
- > Shock with narrowing pulse pressure, vasoconstriction and falling blood pressure (late sign)



# Diagnosing it pre-hospital not easy

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# Needle decompression

- Some services taught a very pro-active approach
  - Decompress if suspected
  - Benefits outweigh the risks
  - Particularly if flying (also controversial)
  - The need to decompress pneumothorax if flying is overstated
- Large (usually 14G) cannula inserted into 2<sup>nd</sup> intercostal space mid-clavicular line
  - +/- syringe
  - +/- valve



# Needle decompression

- We have traditionally had a conservative approach
  - Risks can outweigh benefits
  - Can damage vessels
  - Can cause pneumothorax
  - Can cause tension pneumothorax
- Problems
  - Landmarks not always easy
  - Doesn't always reach pleural space
  - Can kink
  - Can block
  - Can fall out





# We changed our approach

- Two years ago we reviewed our approach
- We changed
  - Turkel needle
  - Preference for 4<sup>th</sup> intercostal space in mid-axillary line
  - 2<sup>nd</sup> intercostal space in mid-clavicular line if above not feasible
- Turkel needle
  - Needle protected by a moving blunt trochar
  - Longer than standard cannula
  - Green/red colour indicator
  - Multiple side holes
  - Very difficult to kink
  - Tap on the end

# Turkel needle



# Other approaches

- Thoracostomy
  - Scalpel and dissection
  - With or without a drain
- Problems
  - Takes longer
  - More painful
  - Increased infection rate
  - Drain required unless IPPV
  - Equipment (drain, valve or bottle)
- May have a role in the rapidly deteriorating patient



# The future

- Ultrasound likely to have a role
- Ultrasound can be utilised by paramedics
- Help differentiate pneumothorax vs not pneumothorax





# Summary

- Tension pneumothorax
  - Pathophysiology
  - Clinical presentation
  - Diagnosis not always easy, particularly pre-hospital
- Controversies and problems
  - Needle decompression
  - Low vs high threshold
- Our approach
  - Turkel needle
  - Preference for 4<sup>th</sup> intercostal space and mid-axillary line
- Possible role of ultrasound in the future





# Questions?



**St John**  
first to care

Tony Smith, Medical Director