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 veinous 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

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

Cardiovascular
- Enlarged neck veins (unless co-existing hypovolaemia)
- Tachycardia
- Shock with narrowing pressure, vasoconstriction and falling blood pressure (late sign)
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 2nd 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 4th intercostal space in mid-axillary line
  - 2nd 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 4th intercostal space and mid-axillary line
▶ Possible role of ultrasound in the future
Questions?

Tony Smith, Medical Director