Spontaneous Pneumothorax in Children

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See also: Chest injury in major trauma for management of traumatic pneumothorax

**Background**

- Small asymptomatic pneumothoraces may be an incidental finding on a chest x-ray

**Primary pneumothorax**

- Occurs when there is no underlying lung disease
- More common in boys in the adolescent age group but equal occurrence younger children.
- Typically occurs when at rest or with minimal exertion.
- Large pneumothorax may cause sudden onset sharp chest pain and dyspnoea, sometimes preceded by a popping sensation

**Secondary pneumothorax**

- complication of underlying lung disease, such as Cystic Fibrosis, asthma, FB aspiration, infection, interstitial lung disease

**Assessment**

**Signs of tension pneumothorax (LIFE THREATENING)**

- Tracheal deviation (away from side of pneumothorax)
- Tachycardia
- Cyanosis
- Hypotension
- Quiet heart sounds

Immediately:

- move to resus and alert most senior CED clinician
- give 15L high flow oxygen via non rebreathe mask
- Attach a syringe of sterile water to a large bore cannula (14g or 16g)
- Insert into the 2nd anterior intercostal space in the midclavicular line at 90° to skin, being careful to avoid the neurovascular bundle by going over the top of the 3rd rib.
- Aspirate the syringe until you are in the pleural space (air bubbles in syringe)
- Remove syringe and needle and secure cannula. Proceed to chest drain insertion (usually under GA in theatre) ASAP. Refer urgently to Paediatric Surgery Registrar

History / examination / investigations:

Ask about:

- Onset of symptoms – chest pain which may radiate to shoulder tip, dyspnoea, cough
- Recent infections
- Foreign body inhalation
- Use of recreational drugs (especially inhaled)
- In neonate - birth history (traumatic delivery)

Look for:

- Reduced chest movement
- Hyper-resonant on percussion
- Decreased vocal fremitus
- Tachypnoea
- Increased work of breathing

Investigate

- **Chest x-ray essential**

  Estimating pneumothorax size:
  - In adolescents using measuring tool to measure widest part of pneumothorax (in cm) on chest x-ray. Rim of air >2cm = large.
  - In younger children estimate percentage of hemithorax the pneumothorax fills (small = less than 30%, large= more than 30%)

Management

See flow chart on page 3
Ensure ALL patients are on continuous 0₂ sats monitoring

Treatment depends on size of pneumothorax, level of respiratory distress and any underlying lung pathology.

Deliver oxygen via non-rebreath mask (**not nasal cannula**) as this enhances the reabsorption of air in the extra-pleural space.

Summary:

1. **Small pneumothorax in stable patient** - conservative management with minimum 12 hours observation.
2. **Large pneumothorax in stable patient** - needle aspiration* and admission.
3. **Pneumothorax in unstable patient** - urgent chest drain and admission.
4. **Recurrent pneumothorax** (previous history of pneumothorax) - chest drain and admission.
5. **Pneumothorax in patient with underlying respiratory disease** - chest drain if large pneumothorax, conservative management if small and patient stable.

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**Risk Factors**
- Male
- Tall and thin
- Smoking (tobacco or cannabis)
- Cocaine inhalation
- Family history
- Connective tissue disorders e.g. Marfan’s, Ehlers-Danlos syndrome
Pneumothorax on Chest X-ray

Unstable? Significant dyspnoea, pain or hypoxic?

- YES: Emergency chest drain
  - Facial O₂
  - Admit

- NO: Recurrent pneumothorax? (Ipsilateral or contralateral)

  - YES: Chest drain
    - Facial O₂
    - Admit
  
  - NO: Large pneumothorax? (>2cm rim of air or >30% of hemithorax)

    - YES: Underlying respiratory disease e.g. asthma, CF, ILD?
      - YES: Chest drain
        - Admit
        - Facial O₂
        - Optimize treatment of underlying respiratory disease
      
      - NO: Needle aspiration*
        - Admit
        - Facial O₂
        - Repeat CXR in 12-24 hours

    - NO: Conservative management
      - Observe for minimum 12 hours
      - Facial O₂
      - Treat any underlying respiratory conditions
      - Repeat CXR in 12 hours

Symptomatic improvement AND repeat CXR shows lung re-expansion?

- NO: Refer to surgical team on call at RACH if patient requires a chest drain or anaesthetic for needle aspiration.

- YES: Consider if suitable for discharge
  - Arrange follow up in 2-4 weeks
Needle aspiration for large primary pneumothorax in stable patient:
- Insert a large bore cannula with a three-way tap attached into the 2nd intercostal space in the mid-clavicular line.
- Air is withdrawn manually until no more can be removed.
- Once no more air can be aspirated secure the cannula to the chest wall.
- If there is continuous aspiration of air this indicates an air leak and chest drain may be required.
- Observe for minimum of 24 hours and repeat chest x-ray.
- If re-accumulation of pneumothorax has occurred the patient will require a chest drain.

Follow up

On discharge, advise patient to return to hospital if increasing breathlessness develops.

- Refer patients who required admission or chest drain to respiratory team
- Advise avoidance of air travel until full resolution, and diving permanently unless the patient has undergone bilateral surgical pleurectomy and has normal lung