COMPLEX RESPIRATORY PROBLEMS IN OBESE PATIENTS
Abnormal ventilation perfusion relations

Dr Nick Oscroft MD MRCP
Respiratory Support and Sleep Centre

Papworth Hospital NHS
NHS Foundation Trust
Conflict of Interest

- Unrestricted research grants and equipment from ResMed, Respironics and B and D Electromedical
- Sponsorship to attend educational events ResMed and UCB Pharma
Prevalence of smoking among adults aged 16 and over by social class 1974-1998

Source: General Household Survey 1998
Growth rate of obesity in different BMI categories

% increase (1986 = 100%)

Acute Management Issues

- Transport and positioning
- Procedural difficulties e.g. vascular access, surgery, urinary catheterisation
- Airway management
- Aspiration risk
- Altered pharmacokinetics
- Resuscitation
- Pressure areas
Key Messages:

- What are the normal values of parameters such as \( \text{PaO}_2 \) in the context of significant obesity?
- Significant obesity often places constraints on the ability to perform and accurately interpret investigation of the respiratory system.
- The additional impact of obesity on other underlying respiratory co-morbidities may be underestimated.
- Severe and long-standing sleep apnoea and nocturnal hypoventilation are often present and may complicate acute presentation and long-term management.
Relationship between measures of obesity and arterial blood gas values

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Chest radiograph in obesity
Diagnostic Dilemma

- Pneumonia
- Pulmonary oedema
- Interstitial process
- Pulmonary embolus
- “Just ” Obesity
CT scanning in obesity

- Table limits versus aperture diameter
- Contrast timing and increased blood volumes
- Increased dosage of radiation
- Degradation of image quality leading to difficulties in interpretation
  a) Lung compression vs ILD
  b) Breathing artefact
  c) Fat artefact
Munisamy S et al. BMJ Case Rep 2013
Obesity and Respiratory Disease

- Asthma
- COPD
Effects on Pulmonary Mechanics

- Abnormal ventilation perfusion relations
- Small airway dysfunction and expiratory flow limitation
- Decreased chest wall and lung compliance
- Increased work and oxygen cost of breathing
Prevalence of obesity in adults (%) vs. Year

- Solid line: Prevalence of obesity
- Dotted line: Prevalence of asthma


Prevalence of obesity: 0, 5, 10, 15, 20, 25, 30, 35

Prevalence of asthma: 0, 5, 10, 15

Asthma

- Effects of obesity on pulmonary physiology
- Obesity related systemic inflammatory state mediates the metabolic and cardiovascular complications of obesity
- Elevated TNF alpha and IL6 associated with steroid resistance in asthma
COPD

- Higher prevalence of COPD in obesity

- Increased incidence of reduced exercise capacity

- Overlap syndrome with increased incidence of ventilatory failure

- Obesity paradox
Obstructive sleep apnoea and Obesity hypoventilation

RSSC experience:

- >8500 patients on CPAP
- Every month 100 patients start CPAP
- > 1500 on non-invasive ventilation
- Approximately one third have OHS and another 15-20% require NIV due to a combination of factors including obesity
A Case History

- 42 year old female smoker
- No significant co-morbidities, no previous hospital admissions, self caring
- BMI 72
- Admitted to hospital with RLL pneumonia (CURB65 = 1) and required intubation
- Extubated and discharged from ITU “no requirement for on-going ventilatory support”
- Pulmonary hypertension – treated with sildenafil
- Epworth score 10
- ABG: PaO₂ 10.5 kPa, PaCO₂ 5.9kPa, Bicarbonate 32 mmol/l
**PAPWORTH HOSPITAL NHS TRUST**  
**REGIONAL PULMONARY PHYSIOLOGY LABORATORY**

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**Technicians Comments:**

Patient inhaled Atrovent and Ventolin 3 hours prior.

Patient had a variable Spirometry technique and did not have a sufficient breath in on the tests which had the best PEF.

Best effort with a sufficient breath in quoted.

BM
To Summarise

- Obesity epidemic
- Significant impact on the provision of acute care with special considerations for respiratory medicine
- Growing requirement for facilities to manage morbidly obese patients
- Consideration of chronic co-morbidities such as sleep related hypoventilation to reduce acute admissions