DESATURATION ON OLV

THORACICS WORKSHOP
OVERVIEW

- Incidence
- Physiology
- Updates
- Management
TAKE HOME MESSAGE

“Attempt to rapidly diagnose the problem, whilst simultaneously providing general management, until specific management can be implemented”

- 100% O₂ (hand ventilate)
- Confirm SpO₂ / scan: BP/etCO₂/AWP/ECG/FiO₂
- Auscultate / Check equipment
- Check position of DLT / confirm with FOB
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

TAKE HOME MESSAGE

› Apply PEEP to ventilated lung
› Apply CPAP to non-ventilated lung
› Intermittent two lung ventilation
› Consider clamping PA to non-ventilated lung
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

INCIDENCE

DESATURATION ON OLV

1950 1980 1990 2010

0 12.5 25 37.5 50
APPRAOCH TO DESATURATION ON ONE LUNG VENTILATION

PHYSIOLOGY
PREDICTION

- Right-sided surgery
- Prior contralateral resection
- Supine position
- Normal FEV1
- Poor oxygenation on TLV
- High A-a gradient for CO₂
Hypoxaemia associated with one-lung anaesthesia: new discoveries in ventilation and perfusion

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APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT

- 100% $O_2$ (hand ventilate)
  - exclude disconnection / oxygen failure
  - determine compliance
  - assess need for suctioning secretions
- Confirm $SpO_2$ / scan: BP/etCO$_2$/AWP/ECG/FiO$_2$
- Auscultate / Check equipment
- Check position of DLT / confirm with FOB
SHUNT: BOTH LUNGS VENTILATED

Operated lung

Ventilated (dependent) lung
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

SHUNT: OPERATED LUNG NOT VENTILATED

78%

91%

Ventilated (dependent) lung
SHUNT: REDUCED DUE TO GRAVITY / HPV / COMPRESSION
SHUNT: FURTHER DESATURATION WITH DEPENDENT LUNG V/Q
SHUNT: TREAT WITH RECRUITMENT/PEEP – SHUNT MAY INCREASE
MANAGEMENT - VENTILATED LUNG

- Increase FiO₂ to 0.6 - 1.0, check compliance
- Increase minute ventilation:
  - Vt 6-8 ml/kg (10ml/kg) or Paw
  - Increase RR to maintain low-normal etCO₂
- Check DLT position - obstruction (too far)
- Suction
- Improve perfusion (fluid / vasopressors)
- Apply/adjust PEEP
MANAGEMENT – VENTILATED LUNG

- Apply/adjust PEEP
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT - NON-VENTILATED LUNG

- Preoxygenation
  - fill FRC of non-ventilated lung
  - increase time to desaturation
  - increase rate of lung collapse
  - reduces shunt fraction as lung collapses
- Insufflate oxygen via a suction catheter
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT – NON-VENTILATED LUNG
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT – NON-VENTILATED LUNG

P. Slinger (ed.), Principles and Practice of Anesthesia for Thoracic Surgery
Approach to desaturation on one lung ventilation

Management - Non-ventilated Lung

- Apply CPAP

© Elsevier Science 2005
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT - NON-VENTILATED LUNG

- Apply CPAP - discuss with surgeon first
- via suction catheter or CPAP circuit
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

MANAGEMENT - NON-VENTILATED LUNG

- Jet ventilation:
  - “jet” ventilate with HME and oxygen source
  - HFJV

- Intermittent two lung ventilation

- Clamping of pulmonary artery to non-ventilated lung

- nitric oxide / almitrine
# Hypoxaemia during one-lung anaesthesia

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Justiaan Swanepoel MB ChB FRCA FCA(SA) MMed

## Table 1 Management of hypoxaemia during OLV

<table>
<thead>
<tr>
<th>Problem area</th>
<th>Example</th>
<th>Action</th>
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<tbody>
<tr>
<td>Gas delivery</td>
<td>Anaesthetic machine, e.g. problem with oxygen supply</td>
<td>Check pipeline pressure and gas analyser</td>
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<tr>
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<td>Disconnection of breathing system</td>
<td>Reconnection of breathing system</td>
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<tr>
<td>High airway pressure</td>
<td>Malposition of double-lumen tube causing incomplete lung ventilation</td>
<td>Reposition double-lumen tube, with bronchoscope if required</td>
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<tr>
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<td>Malposition of endobronchial blocker leading to airway obstruction</td>
<td>Deflate blocker, bronchoscope to reposition</td>
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<td>Sputum and blood</td>
<td>Suction</td>
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<tr>
<td></td>
<td>Bronchospasm</td>
<td>Bronchodilators if needed</td>
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<td></td>
<td>Air trapping with dynamic hyperinflation</td>
<td>Decompress by disconnection of breathing system from tracheal tube</td>
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<td>Pneumothorax of the ventilated lung</td>
<td>Emergency decompression with surgical assistance</td>
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<td>Coughing due to inadequate muscle relaxation</td>
<td>Re-paralyse</td>
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<tr>
<td>Physiological</td>
<td>Shunt in non-ventilated lung</td>
<td>Oxygen insufflation to non-ventilated lung</td>
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<tr>
<td></td>
<td></td>
<td>CPAP to non-ventilated lung</td>
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<tr>
<td></td>
<td></td>
<td>Intermittent two-lung ventilation</td>
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<td></td>
<td></td>
<td>Encourage early clamping of pulmonary artery to non-ventilated lung</td>
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<td></td>
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<td>(during planned lung resection)</td>
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<td></td>
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<td>Optimize haemoglobin, cardiac output, and hence oxygen delivery</td>
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<td>If total lung collapse is not required and if prevention of cross-</td>
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<td>contamination is not an issue, the application of high-frequency jet</td>
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<td>ventilation to both lungs may be considered</td>
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<td>PEEP to ventilated lung</td>
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<td>Consider increase in driving pressure to ventilated lung</td>
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</tbody>
</table>
APPROACH TO DESATURATION ON ONE LUNG VENTILATION

QUESTIONS?

www.onelung.org.uk

www.thoracic-anesthesia.com

www.openanesthesia.org/one_lung_ventilation

openairway.org