

THORACICS WORKSHOP

DESATURATION ON OLV



OVERVIEW

- Incidence
- Physiology
- Updates
- Management



TAKE HOME MESSAGE

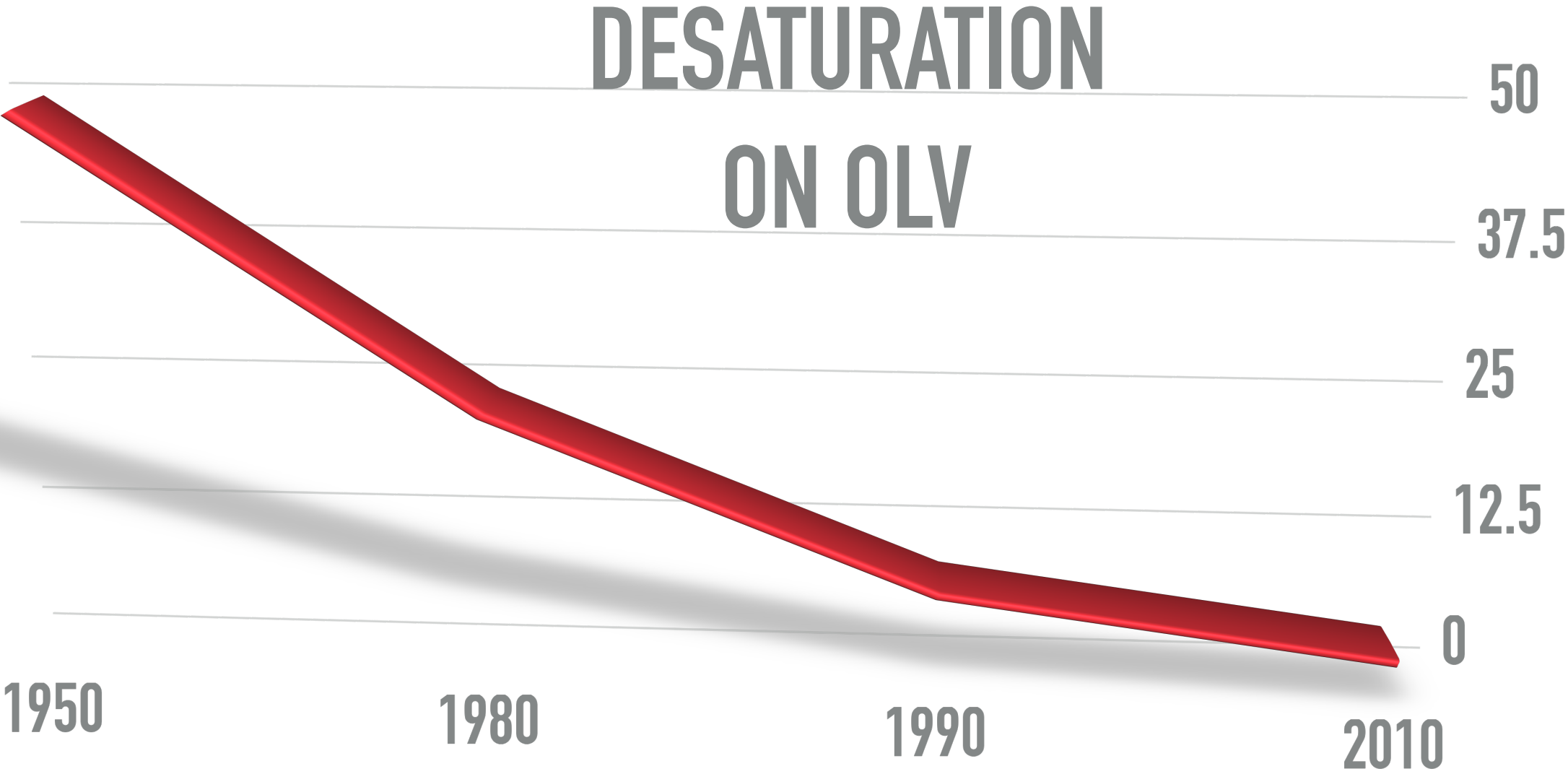
“Attempt to rapidly diagnose the problem, whilst simultaneously providing general management, until specific management can be implemented”

- ▶ 100% O₂ (hand ventilate)
- ▶ Confirm SpO₂ / scan: BP/etCO₂/AWP/ECG/FiO₂
- ▶ Auscultate / Check equipment
- ▶ Check position of DLT / confirm with FOB

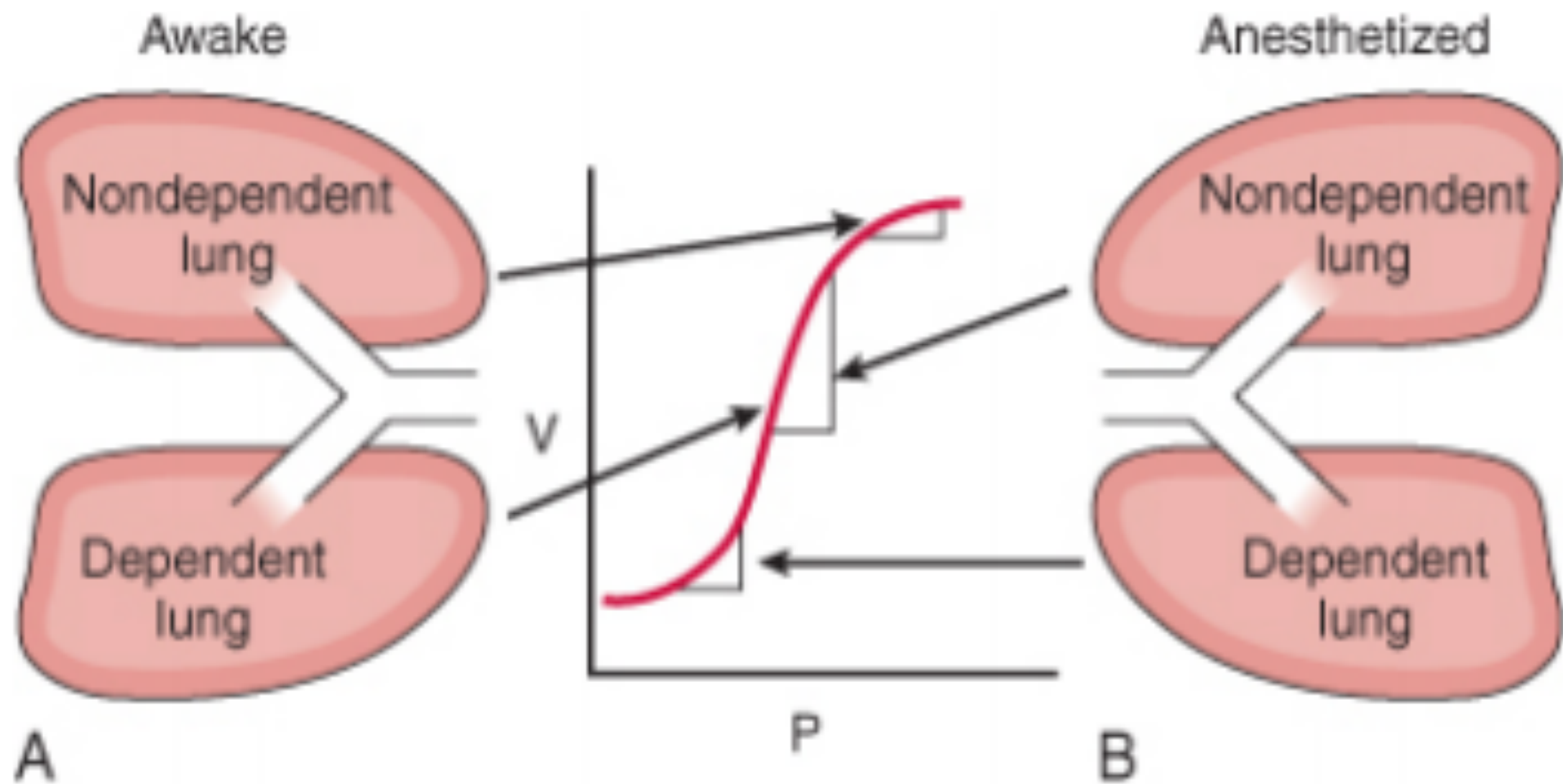
TAKE HOME MESSAGE

- ▶ Apply PEEP to ventilated lung
- ▶ Apply CPAP to non-ventilated lung
- ▶ Intermittent two lung ventilation
- ▶ Consider clamping PA to non-ventilated lung

INCIDENCE



PHYSIOLOGY



PREDICTION

- ▶ Right-sided surgery
- ▶ Prior contralateral resection
- ▶ Supine position
- ▶ Normal FEV1
- ▶ Poor oxygenation on TLV
- ▶ High $A-a$ gradient for CO_2

UPDATE



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doi:10.1093/bja/aer113

EDITORIAL



Hypoxaemia associated with one-lung anaesthesia: new discoveries in ventilation and perfusion

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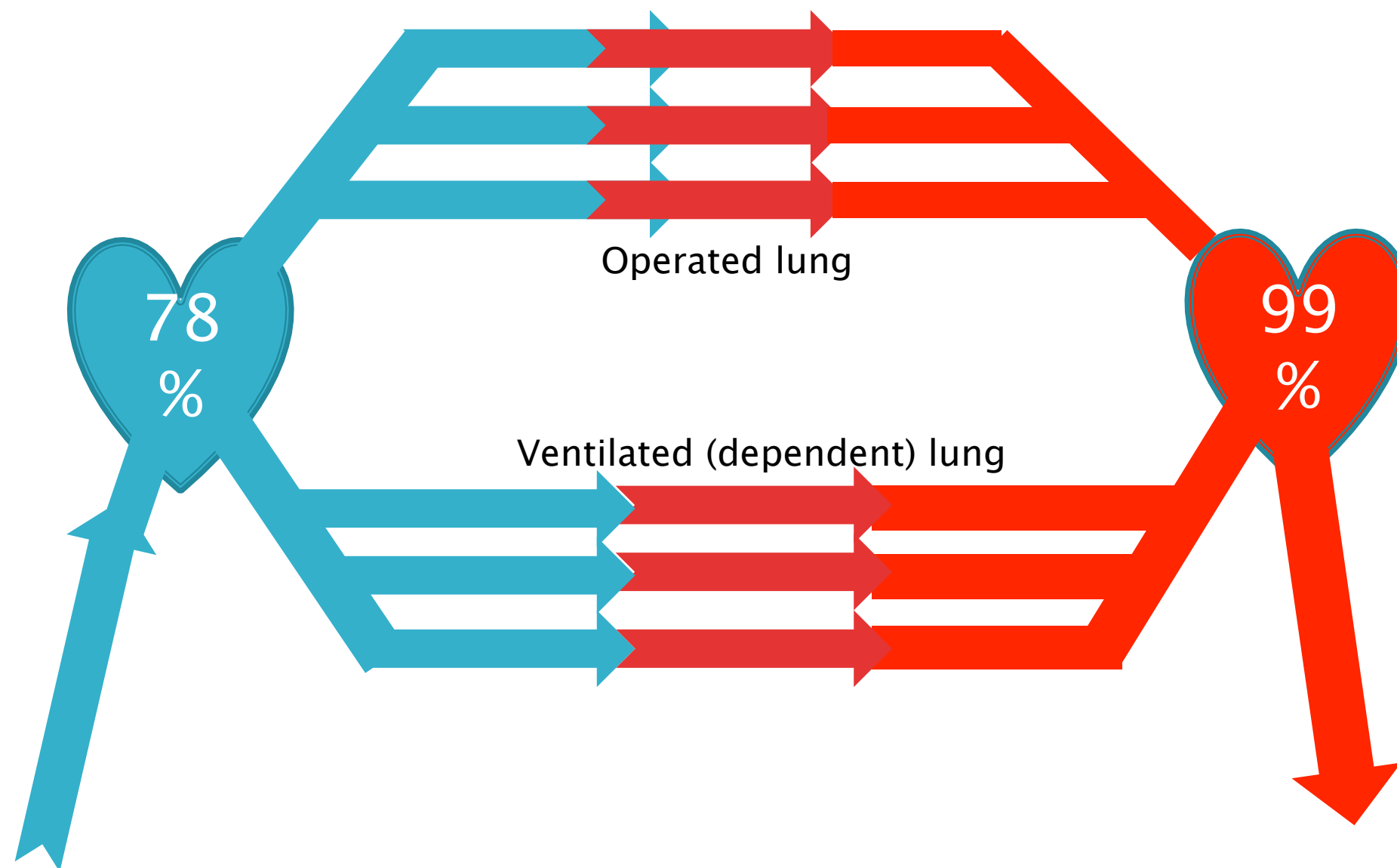
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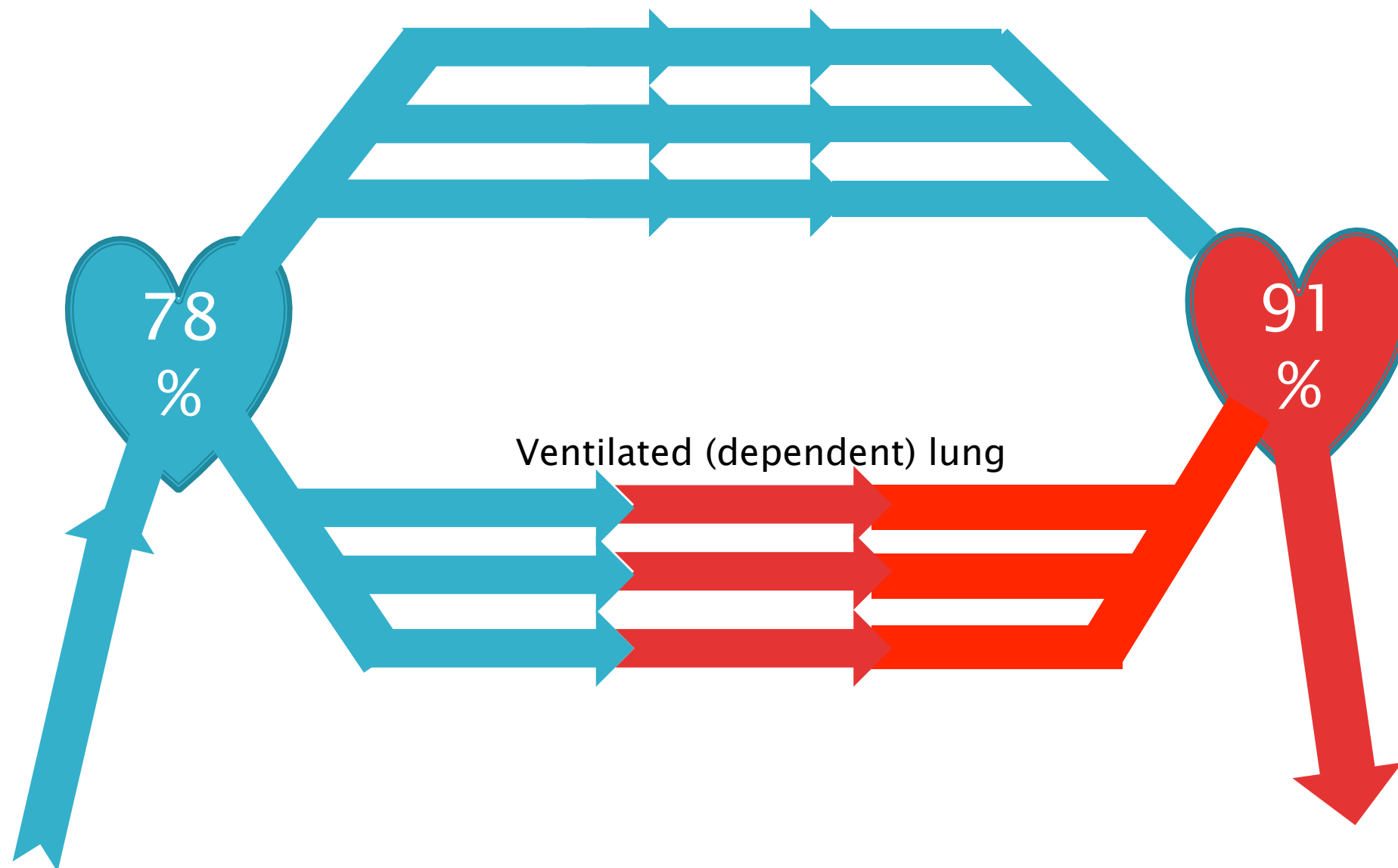
MANAGEMENT

- ▶ 100% O₂ (hand ventilate)
 - ▶ exclude disconnection / oxygen failure
 - ▶ determine compliance
 - ▶ assess need for suctioning secretions
- ▶ Confirm SpO₂ / scan: BP/etCO₂/AWP/ECG/FiO₂
- ▶ Auscultate / Check equipment
- ▶ Check position of DLT / confirm with FOB

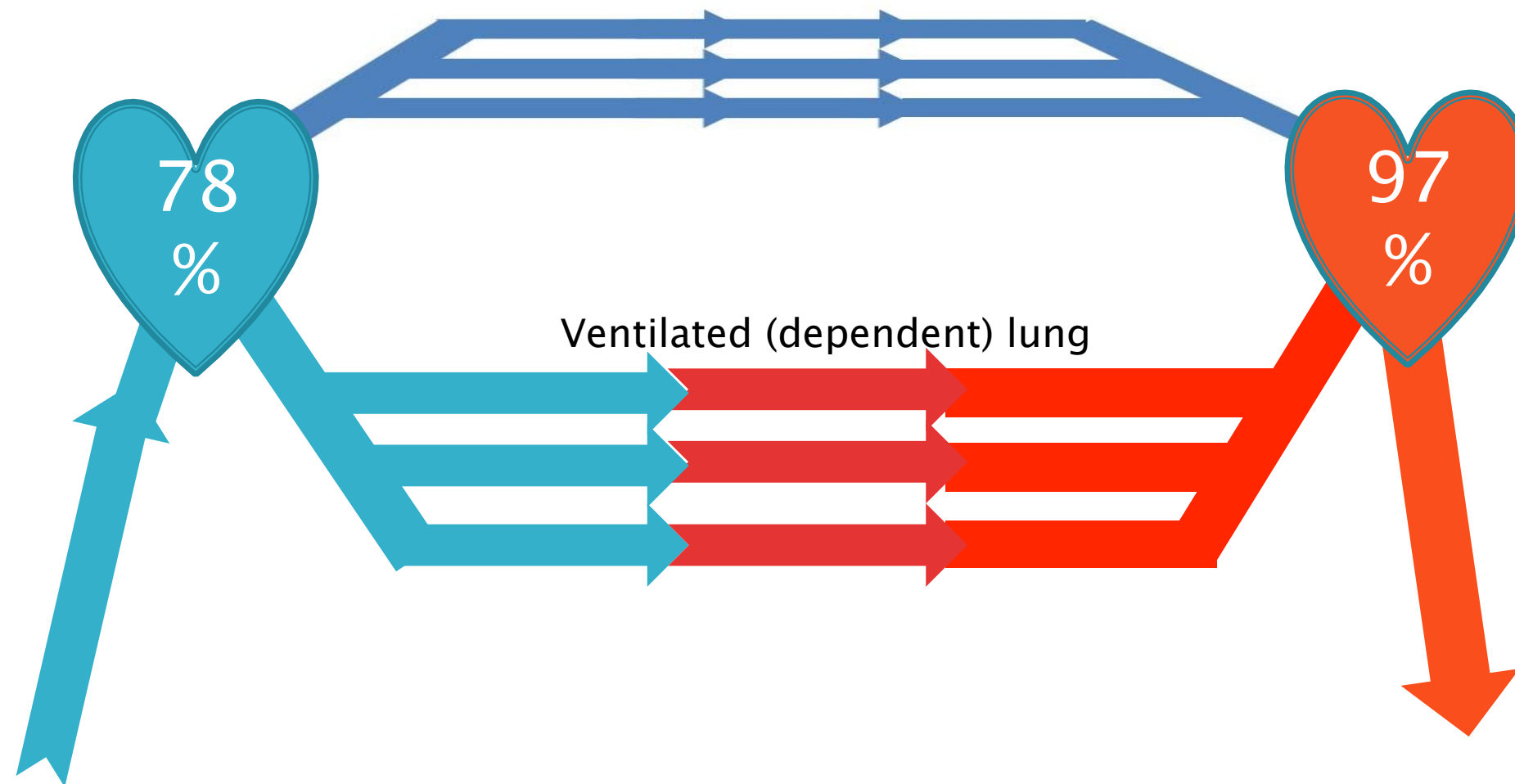
SHUNT: BOTH LUNGS VENTILATED



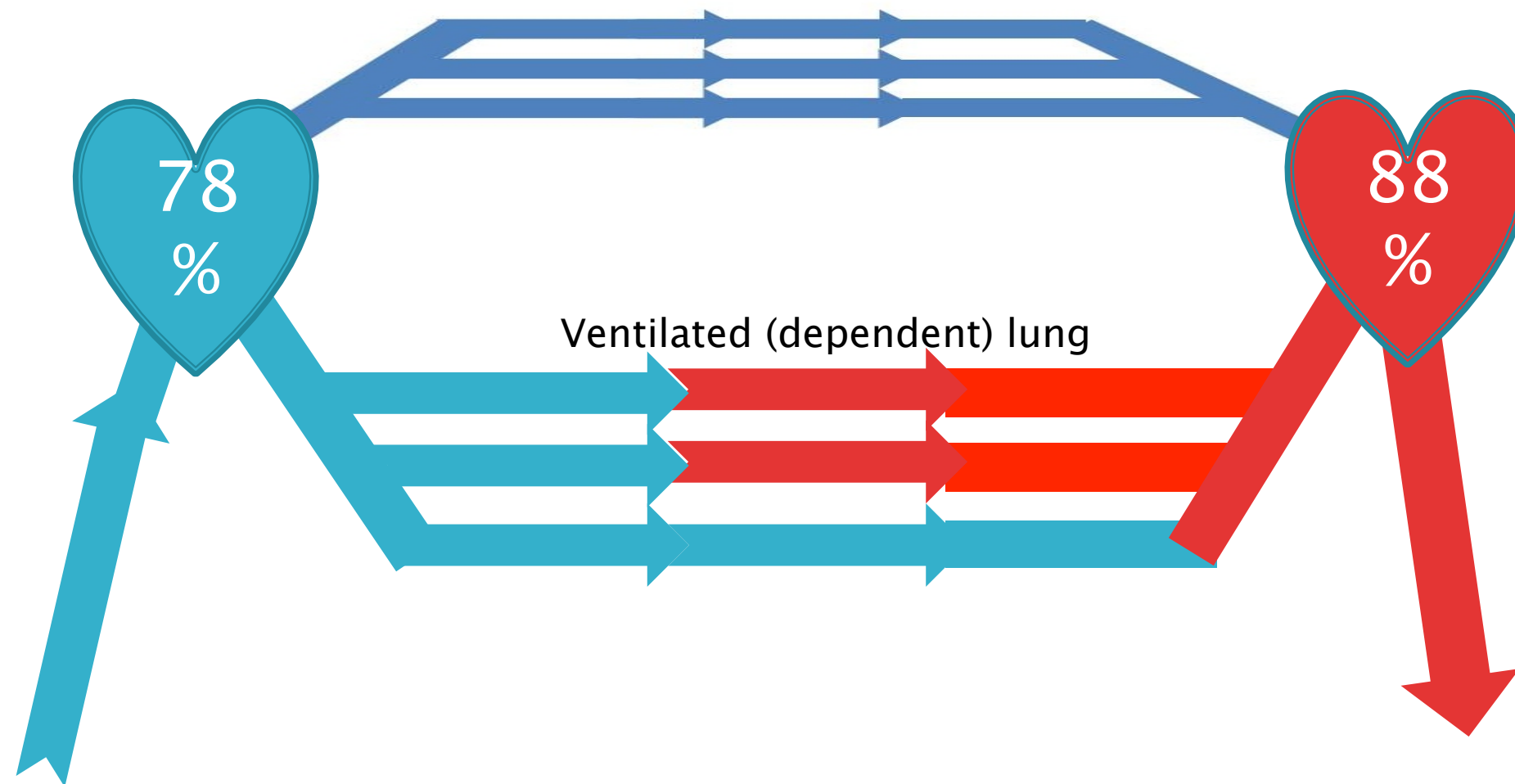
SHUNT: OPERATED LUNG NOT VENTILATED



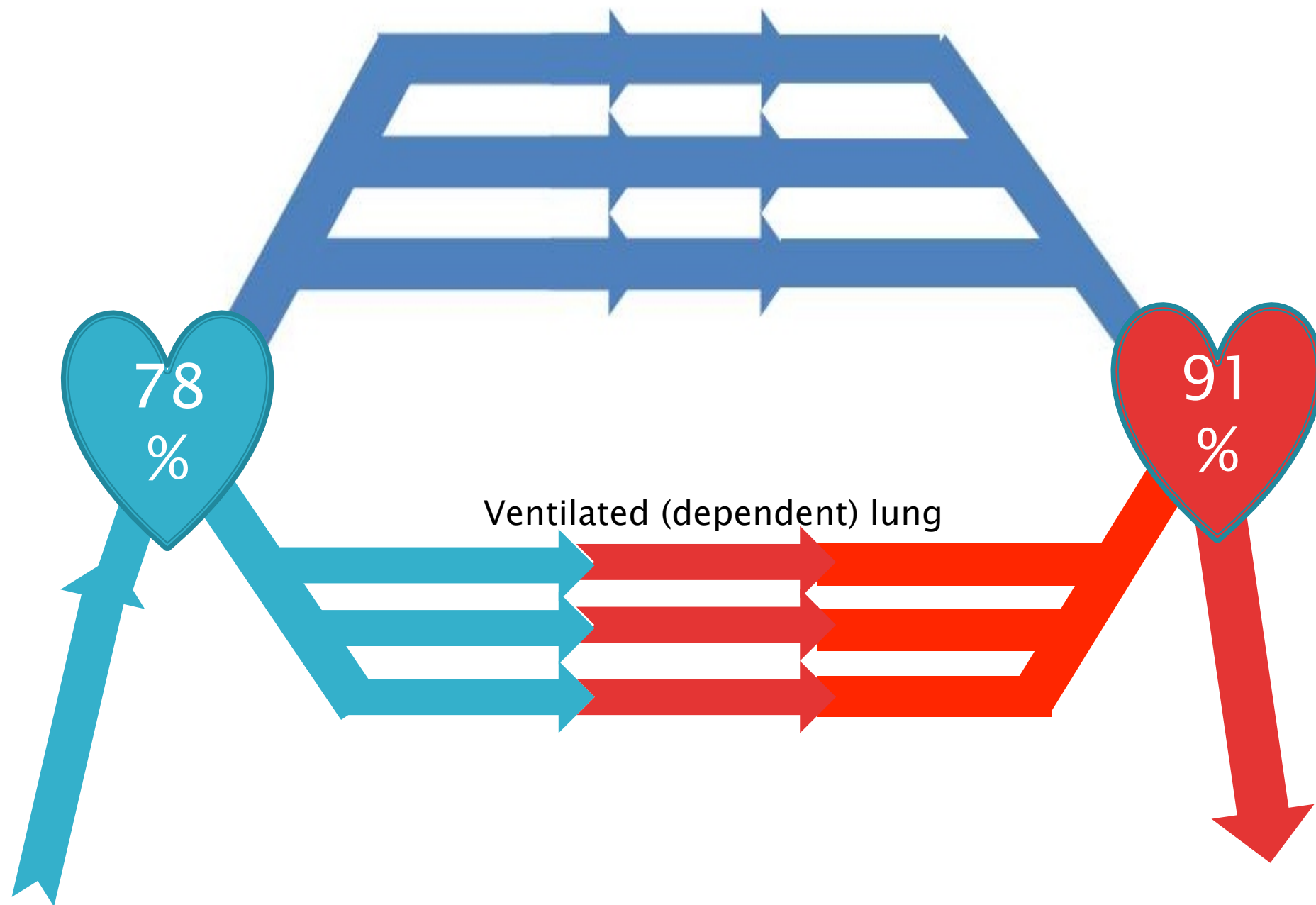
SHUNT: REDUCED DUE TO GRAVITY / HPV / COMPRESSION



SHUNT: FURTHER DESATURATION WITH DEPENDENT LUNG V/Q



SHUNT: TREAT WITH RECRUITMENT/PEEP – SHUNT MAY INCREASE



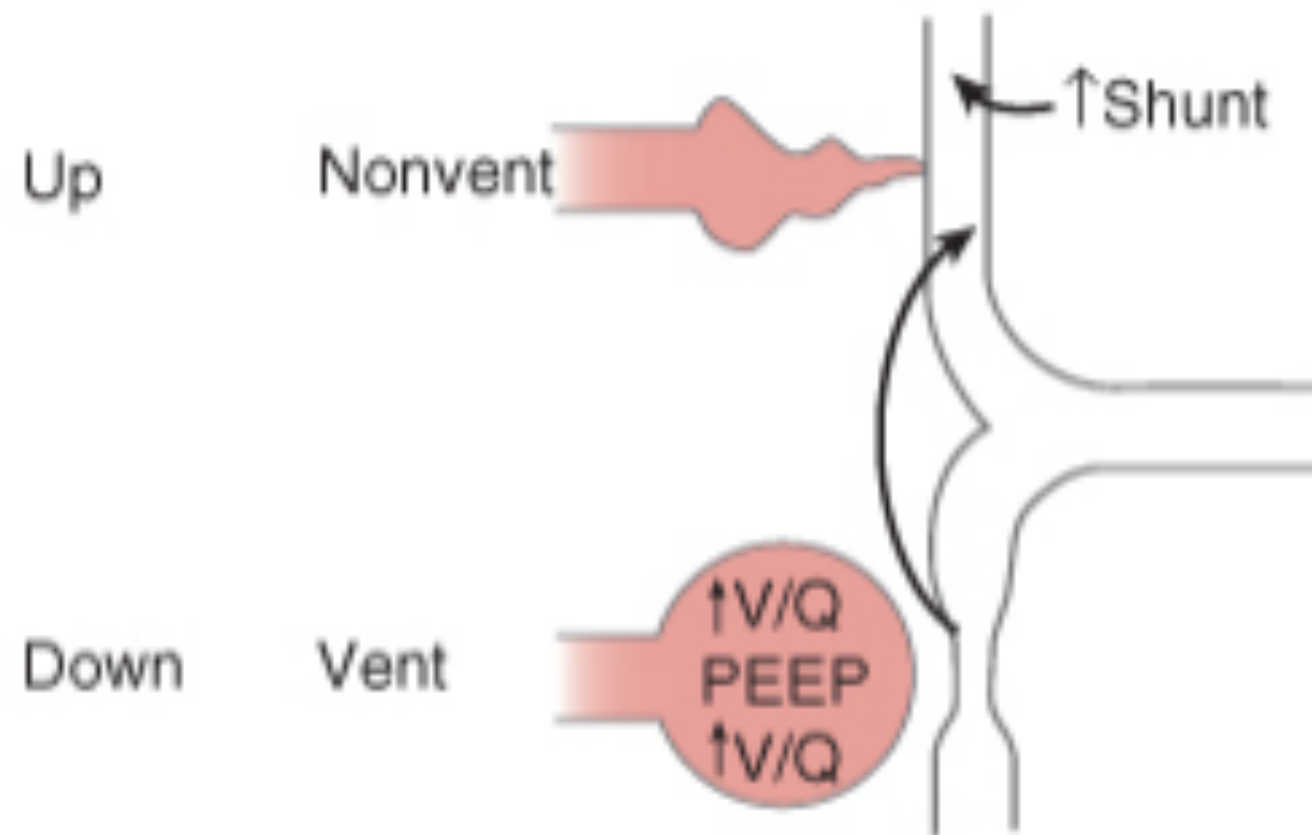
MANAGEMENT – VENTILATED LUNG

- ▶ Increase FiO_2 to 0.6 - 1.0, check compliance
- ▶ Increase minute ventilation:
 - ▶ V_t 6-8 ml/kg (10ml/kg) or P_{aw}
 - ▶ Increase RR to maintain low-normal etCO_2
- ▶ Check DLT position - obstruction (too far)
- ▶ Suction
- ▶ Improve perfusion (fluid / vasopressors)
- ▶ Apply/adjust PEEP

MANAGEMENT – VENTILATED LUNG

- ▶ Apply/adjust PEEP

One lung ventilation: Down lung PEEP



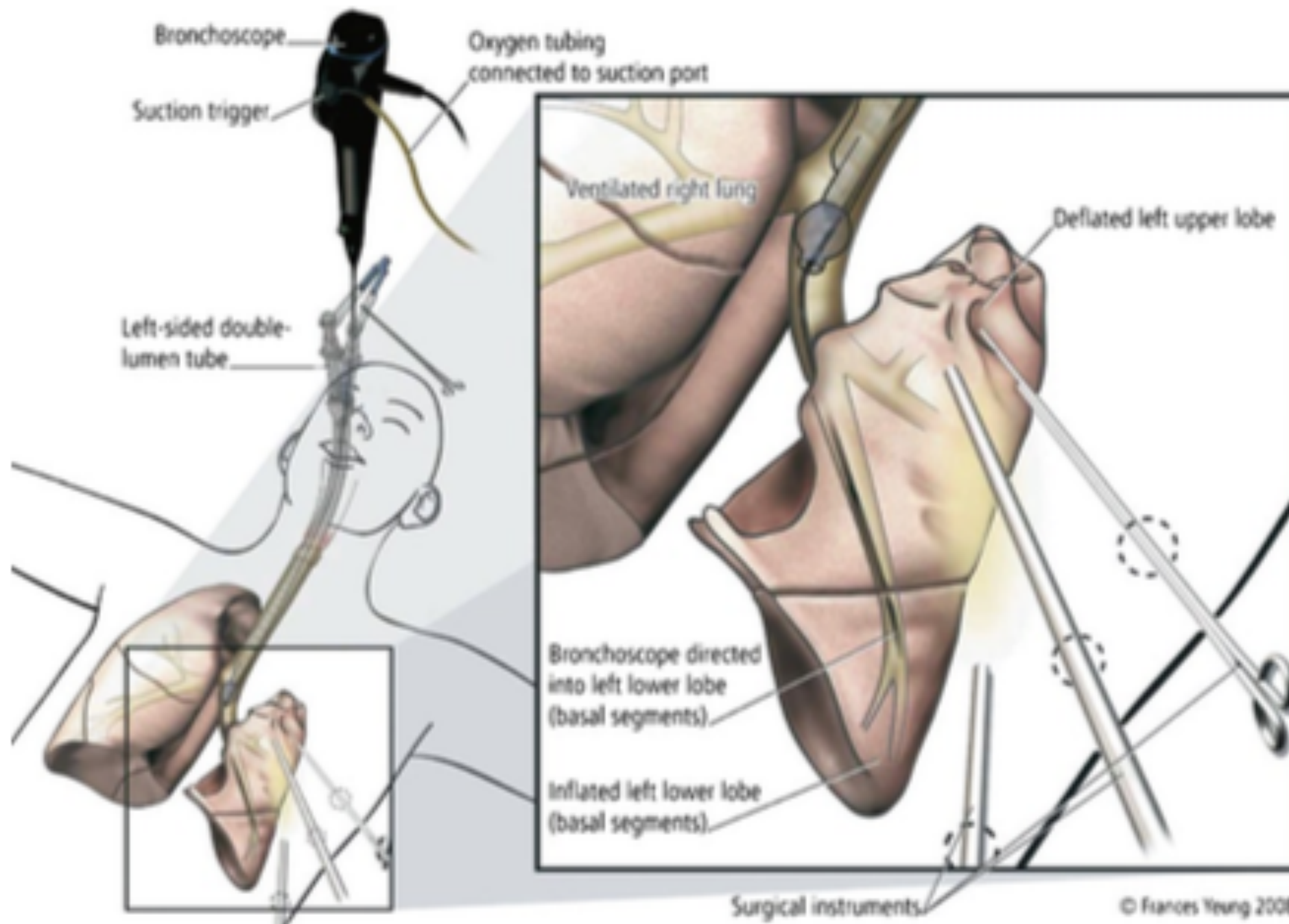
MANAGEMENT – NON-VENTILATED LUNG

- ▶ 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

MANAGEMENT – NON-VENTILATED LUNG



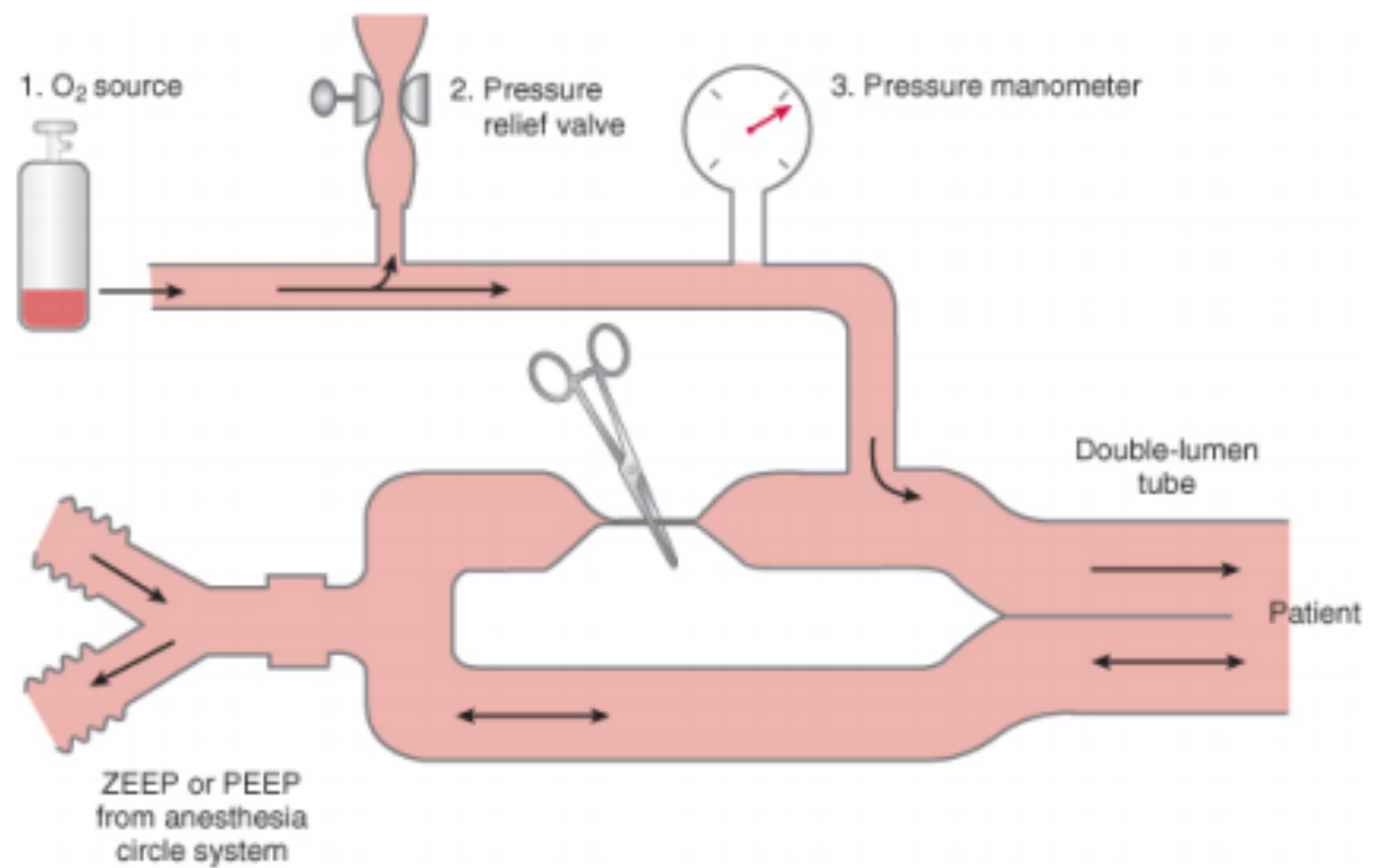
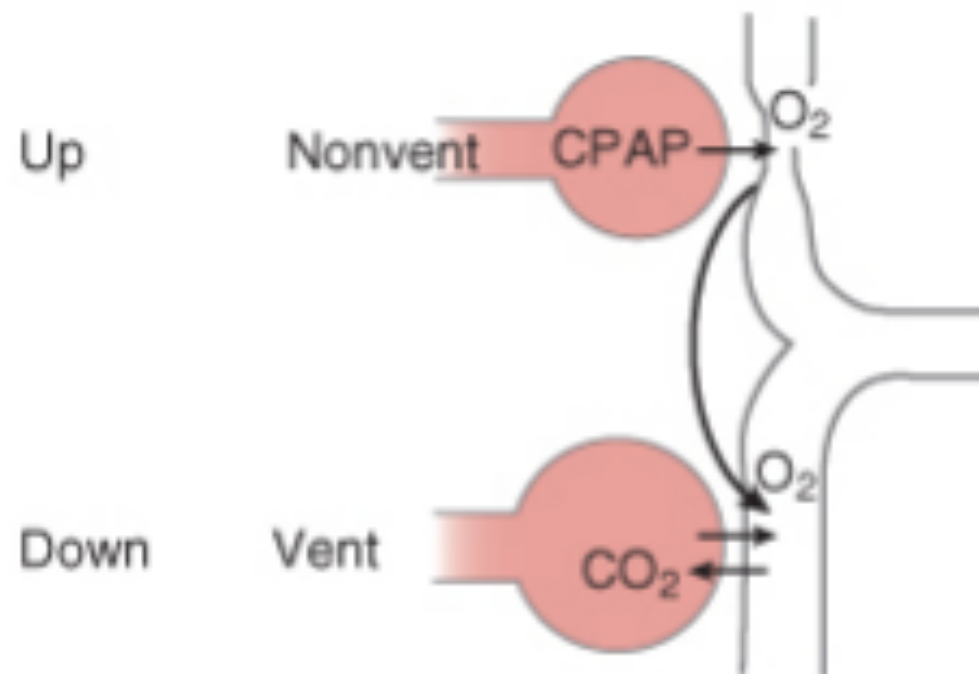
MANAGEMENT – NON-VENTILATED LUNG



MANAGEMENT – NON-VENTILATED LUNG

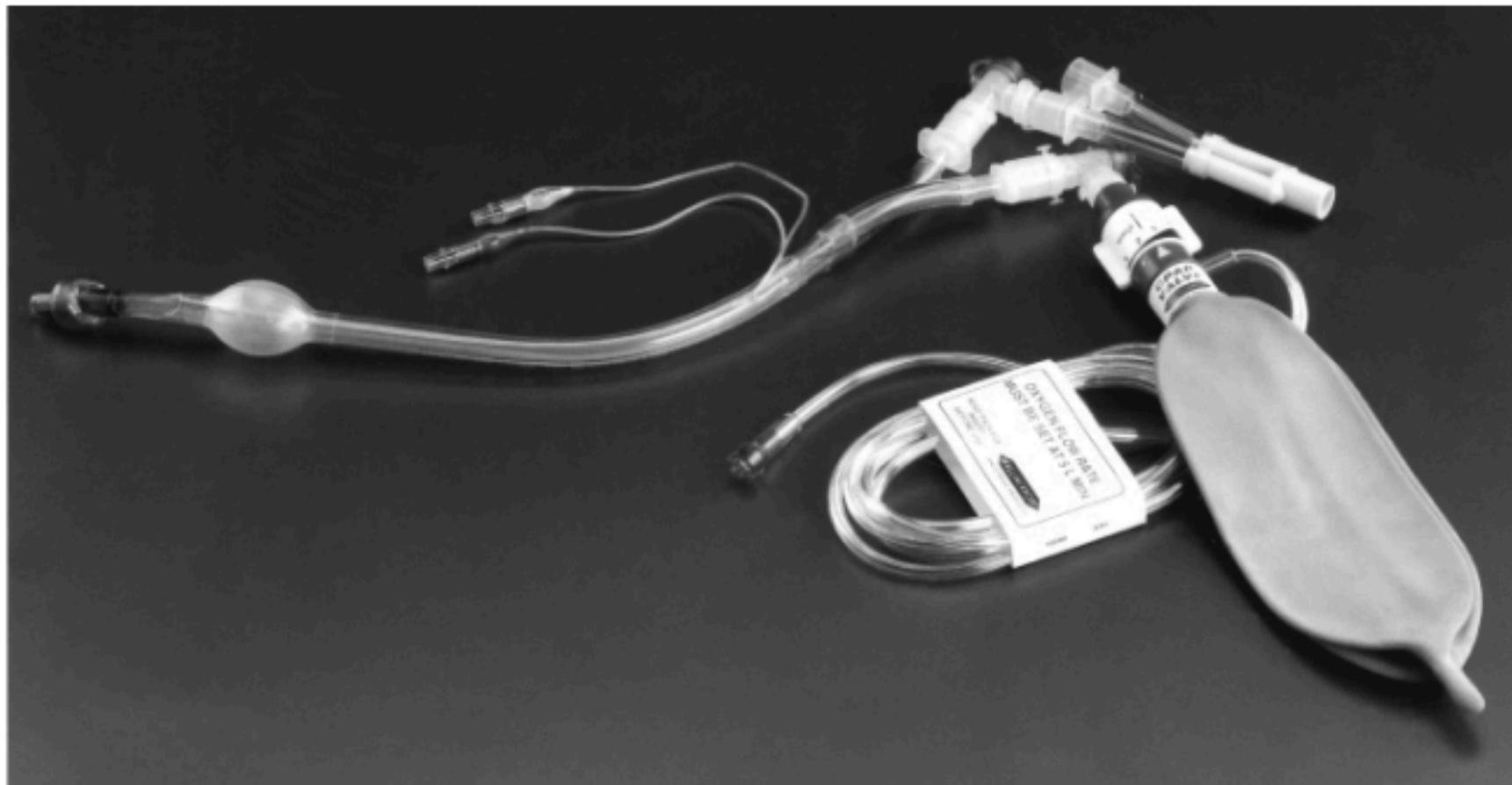
- ▶ Apply CPAP

One lung ventilation: Up lung CPAP



MANAGEMENT – NON-VENTILATED LUNG

- ▶ Apply CPAP - discuss with surgeon first
 - ▶ via suction catheter or CPAP circuit



A

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C

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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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Revalidation
FOR ANAESTHETISTS
RCA Revalidation matrix
Matrix reference 3C12

Table 1 Management of hypoxaemia during OLV

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

QUESTIONS?

www.onelung.org.uk

www.thoracic-anesthesia.com

www.openanesthesia.org/one_lung_ventilation

openairway.org

