

Anesthesia for Minimally Invasive Thoracic Surgery

EACTA Krakow June 2006



Peter Slinger MD, FRCPC

Increasing Spectrum of Video-Assisted Thoracic Surgery (VATS)

- ◆ Lung
- ◆ Esophagus
- ◆ Spine
- ◆ Autonomic Nerves
- ◆ Robotic Cardiac



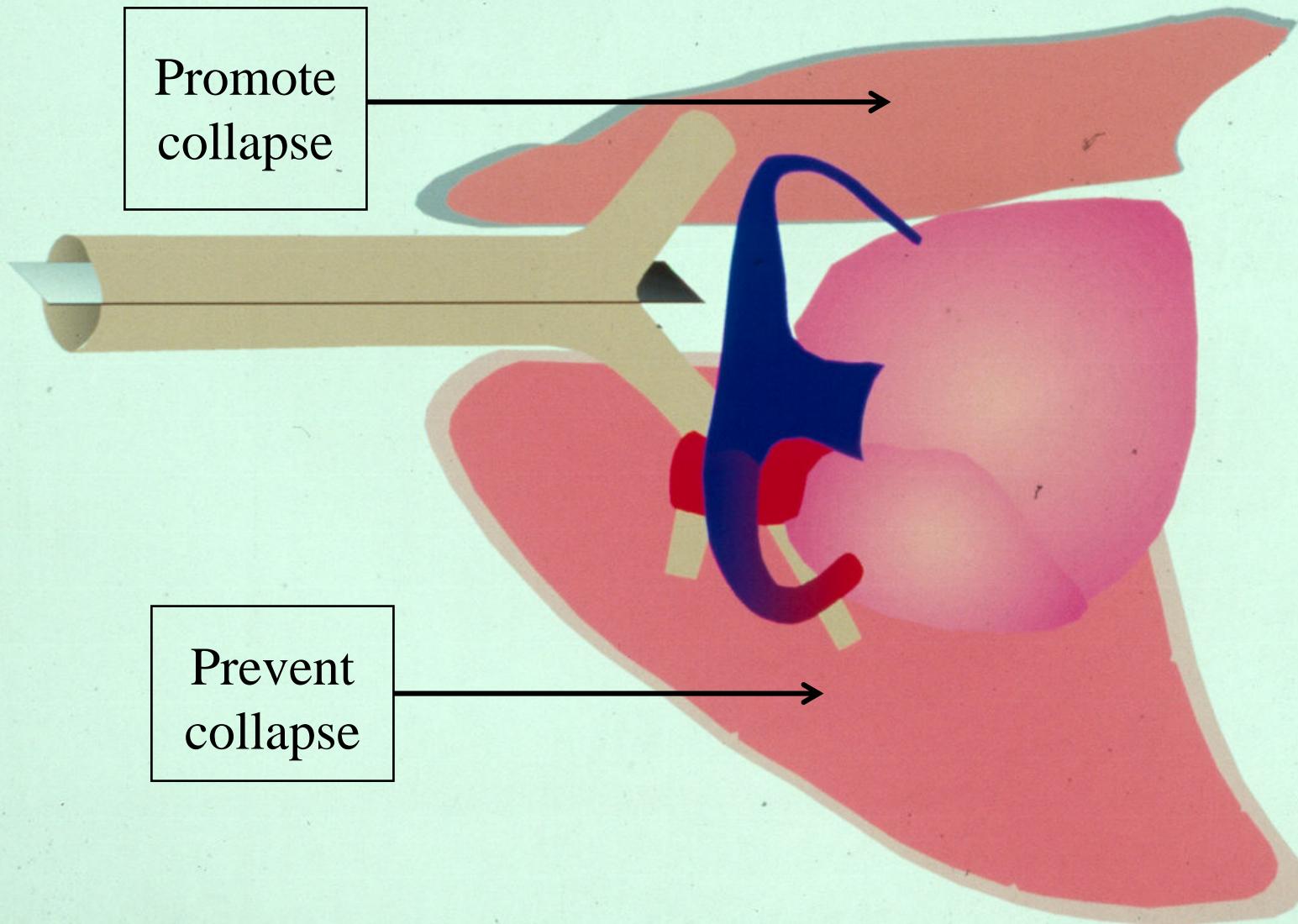
Anesthesia for Minimally Invasive Intrathoracic Surgery

- ◆ Management of OLV: Changed Strategies
- ◆ Lung Isolation: New Priorities
New Methods



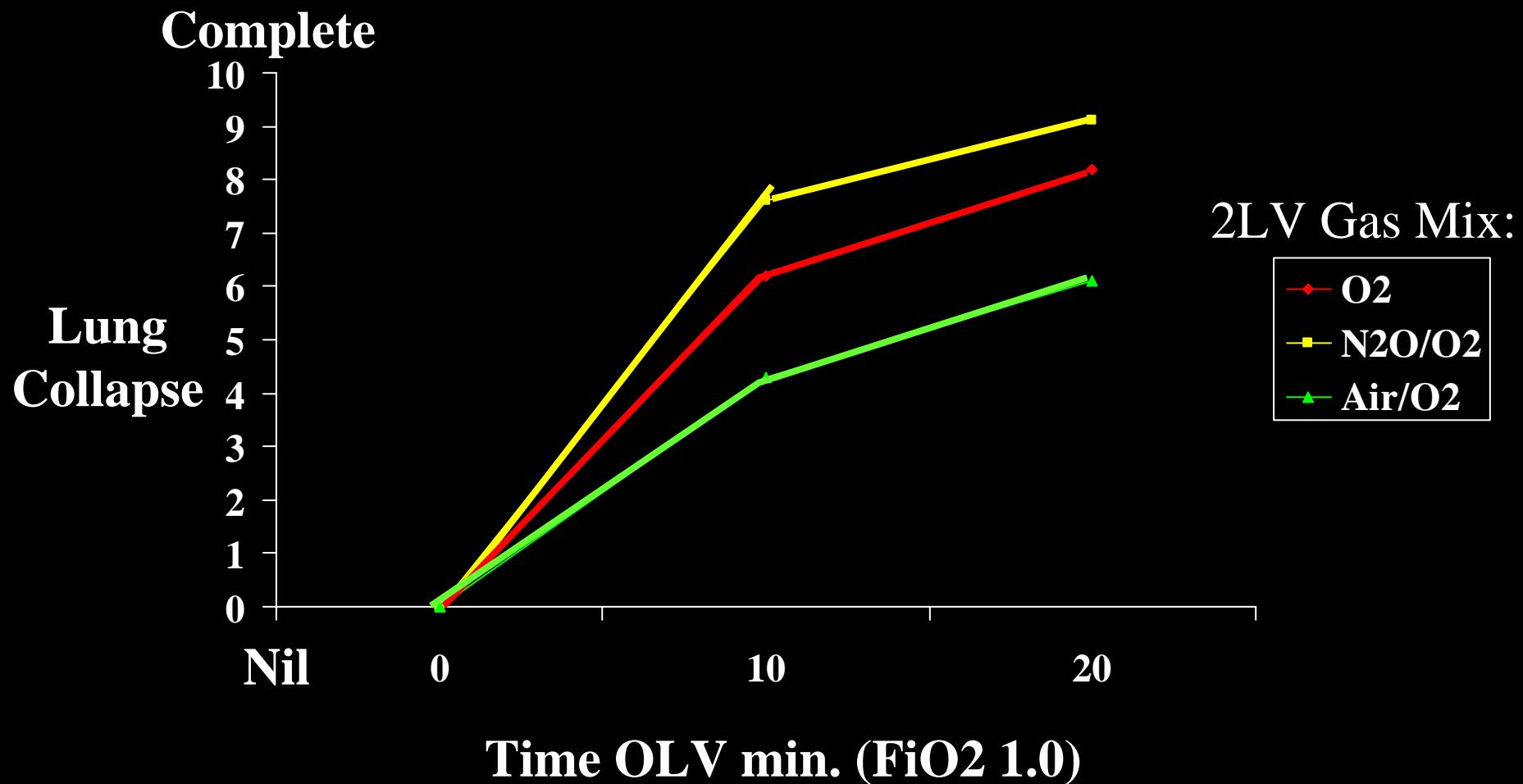
ONE-LUNG ANESTHESIA

Promote
collapse

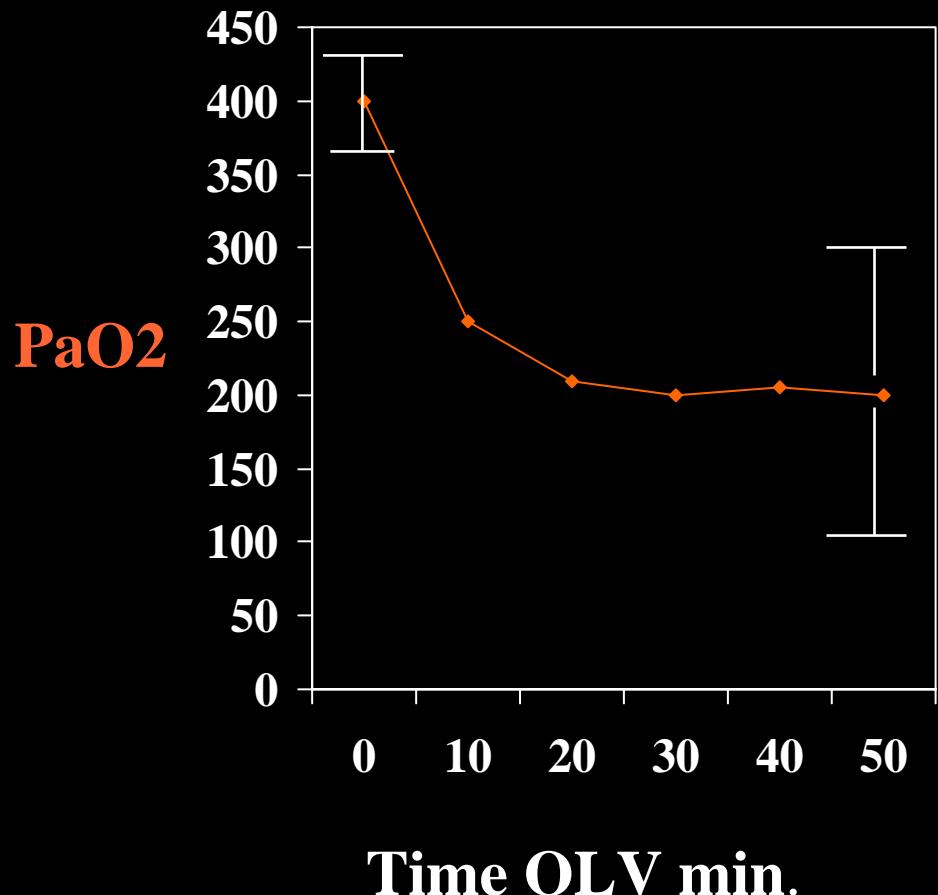


Prevent
collapse

Gas Mixture During Two-lung Ventilation vs. Lung Collapse During One-lung Ventilation

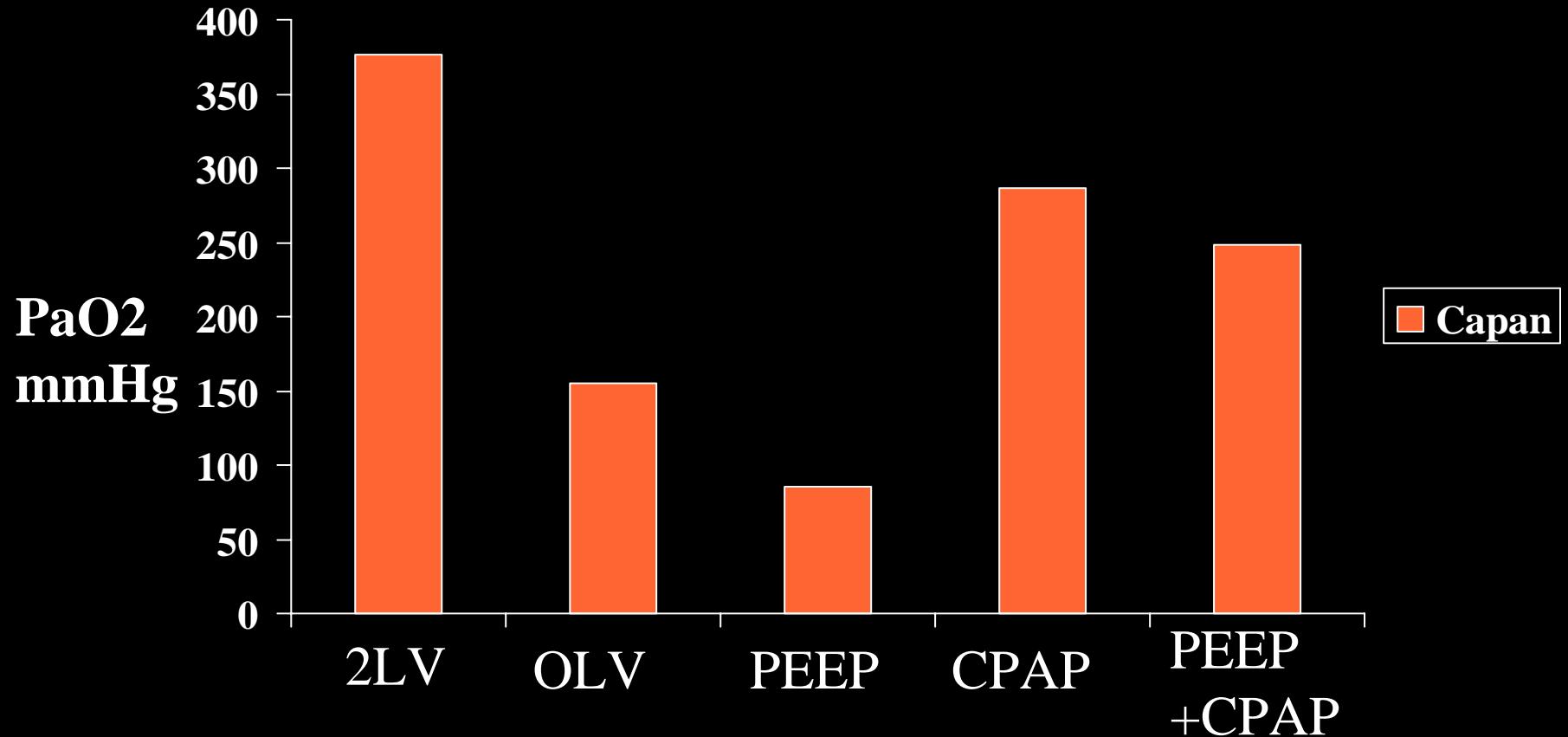


One-Lung Ventilation (OLV): Prevention and Treatment of Hypoxemia



- High FiO₂
- Continuous Positive Airway Pressure (CPAP) Non-ventilated Lung
- Positive End-Expiratory Pressure (PEEP) Ventilated Lung
- HFPPV, Partial Vent.

Treatment of Hypoxemia during One-lung Ventilation

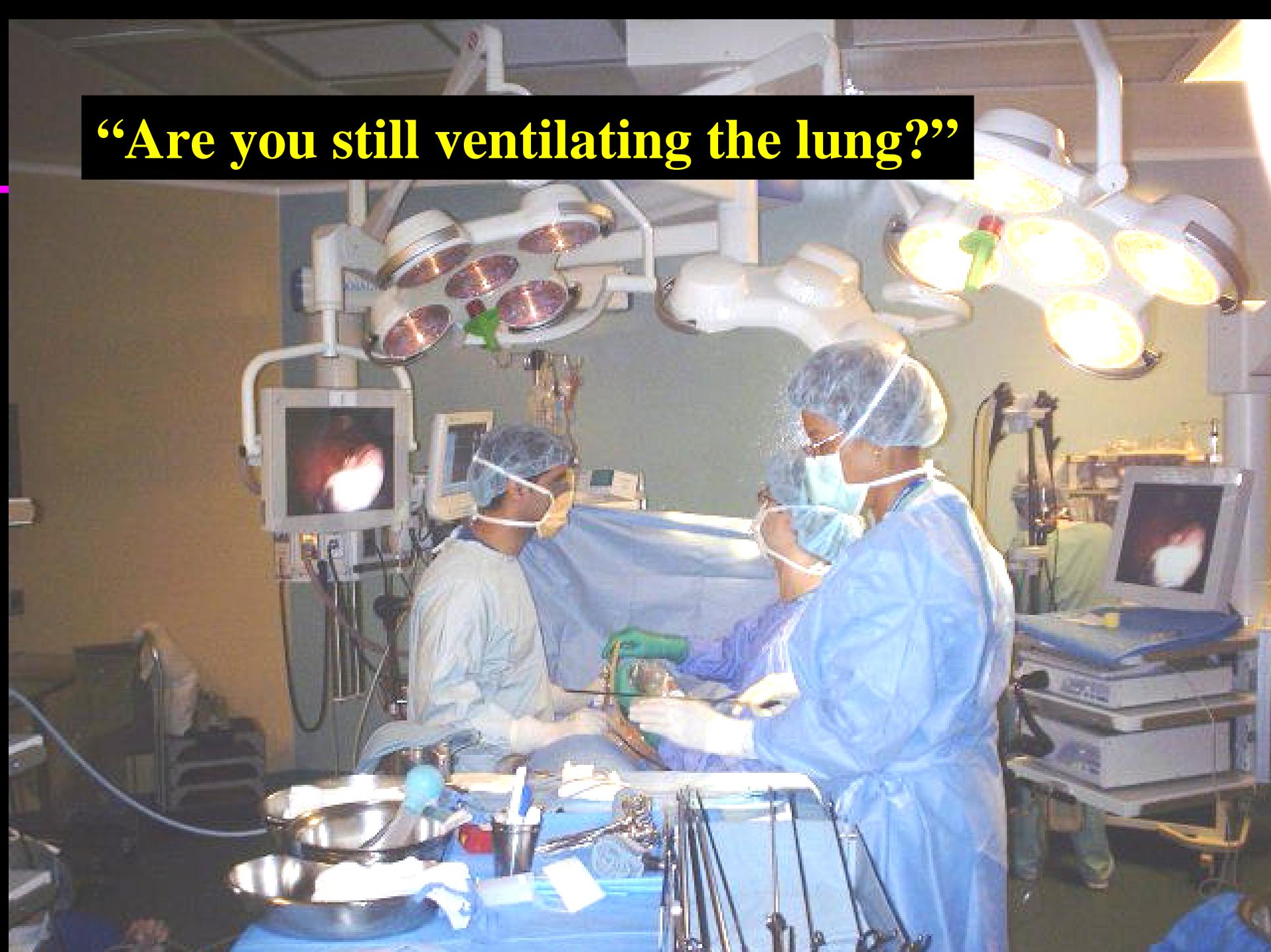


Capan L, et al. Anesth Analg 59: 847, 1980, Lung Ca., FEV1= 70%

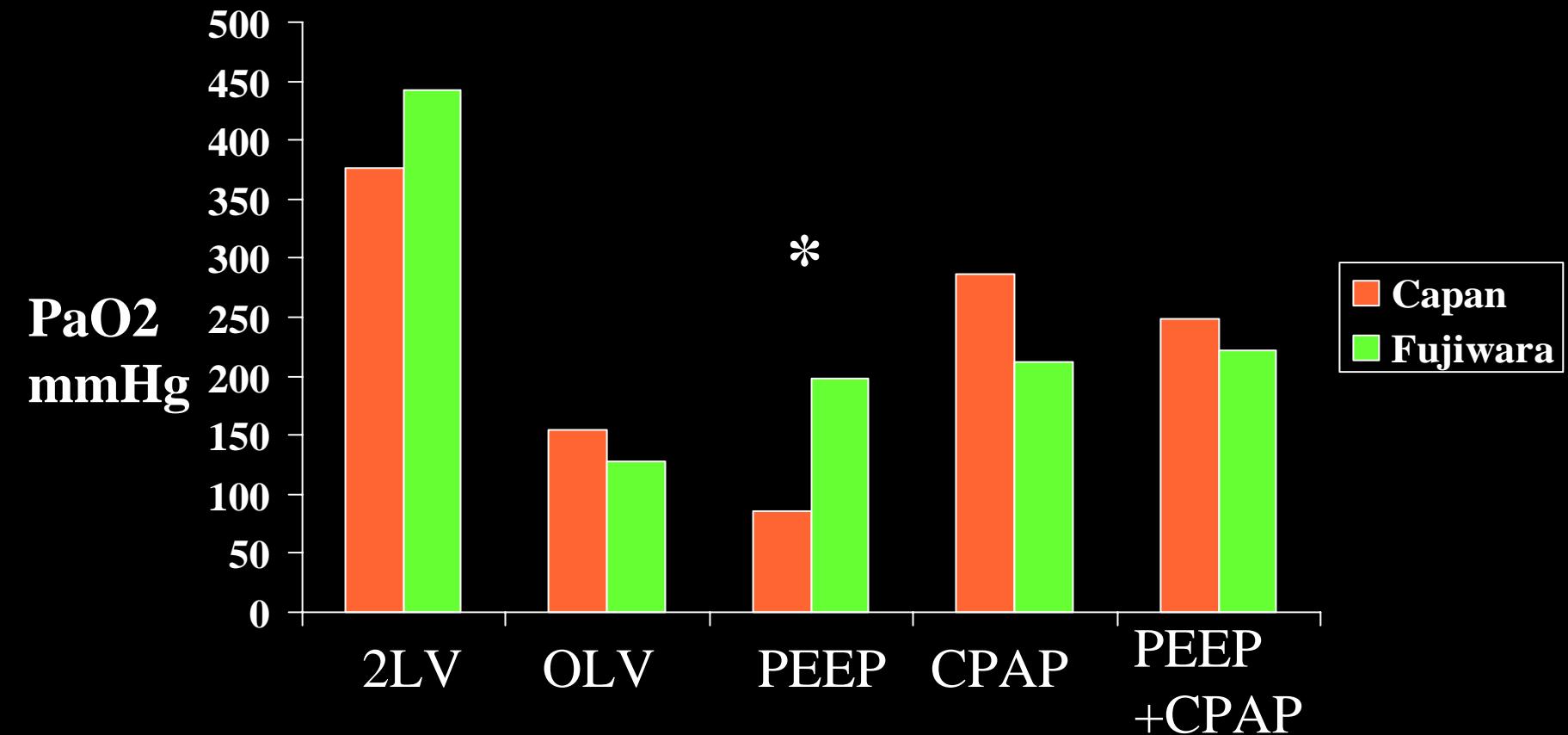


OXYGEN FLOW RATE
MUST BE
5L/MIN

“Are you still ventilating the lung?”

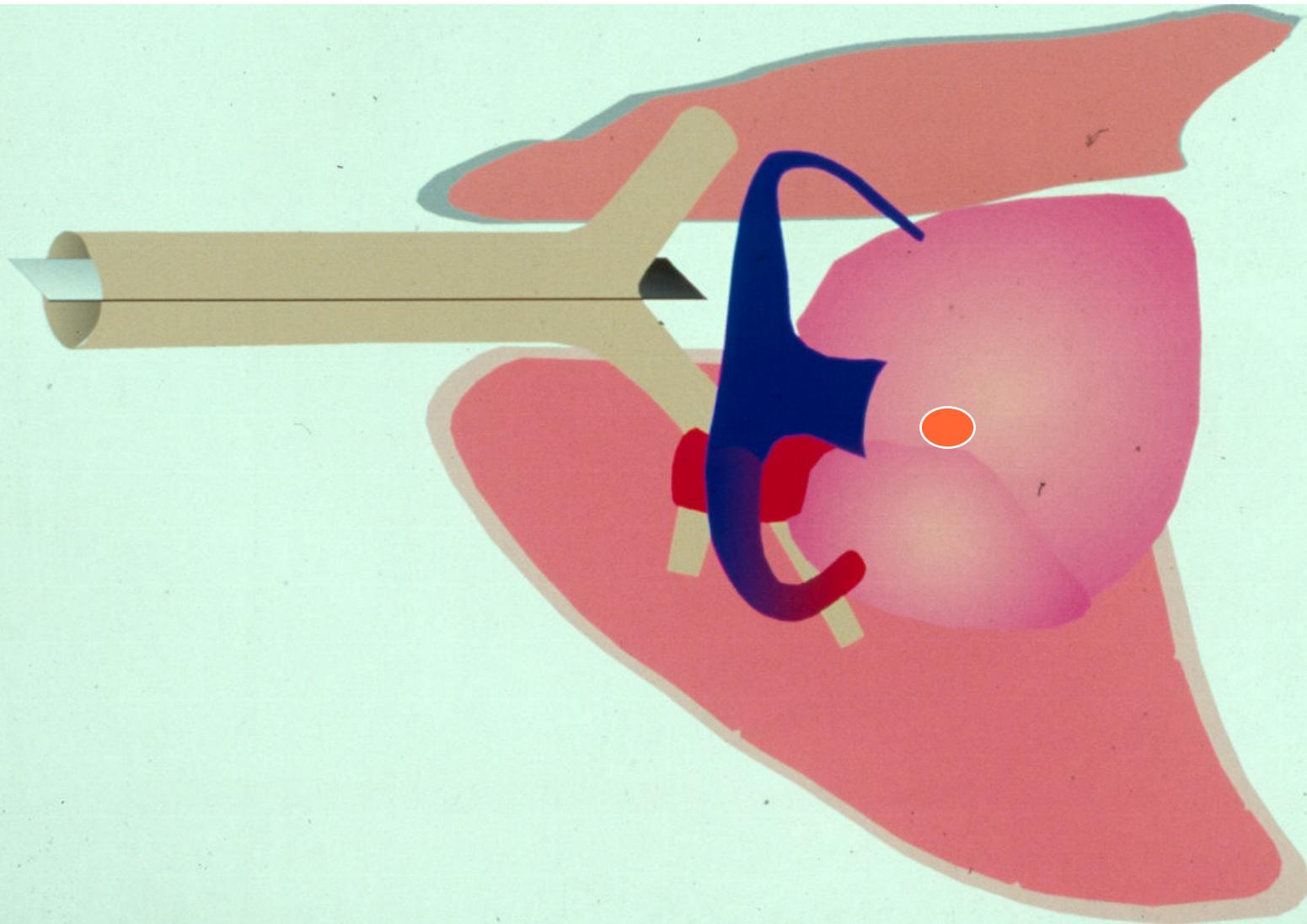


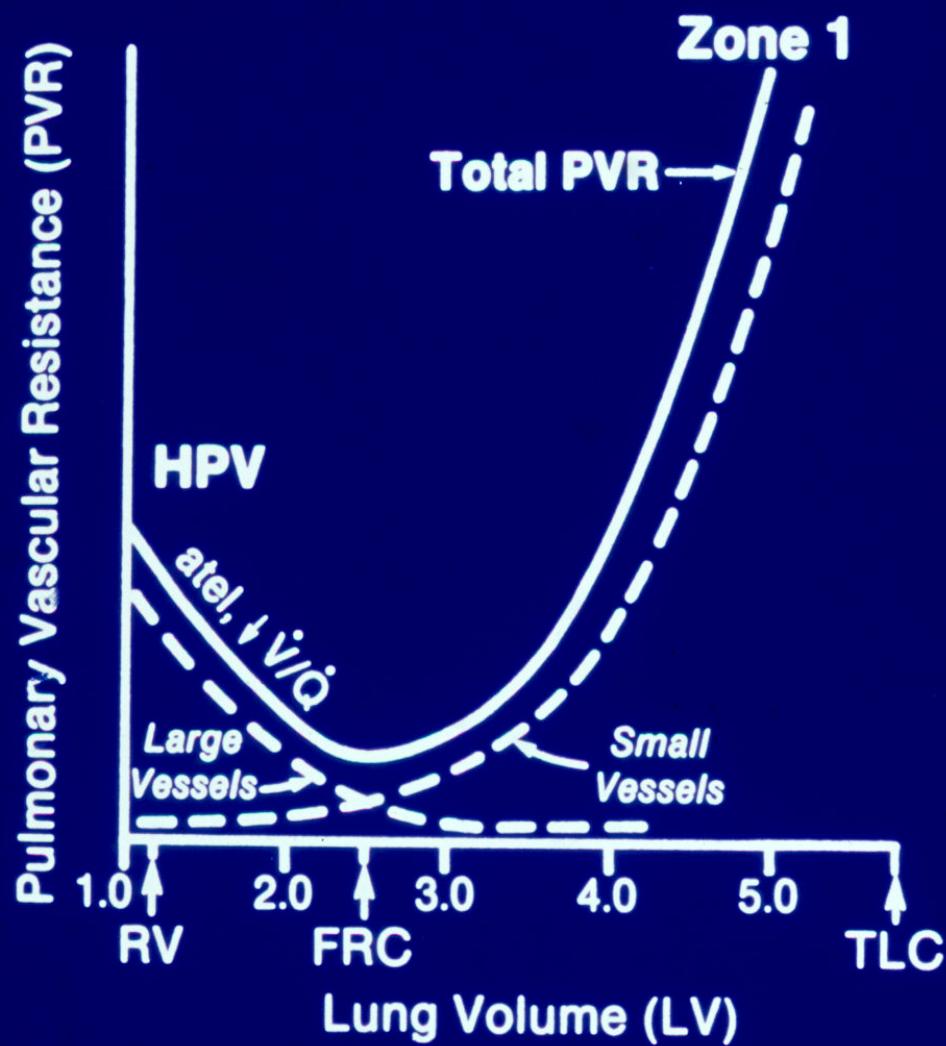
Treatment of Hypoxemia during One-lung Ventilation



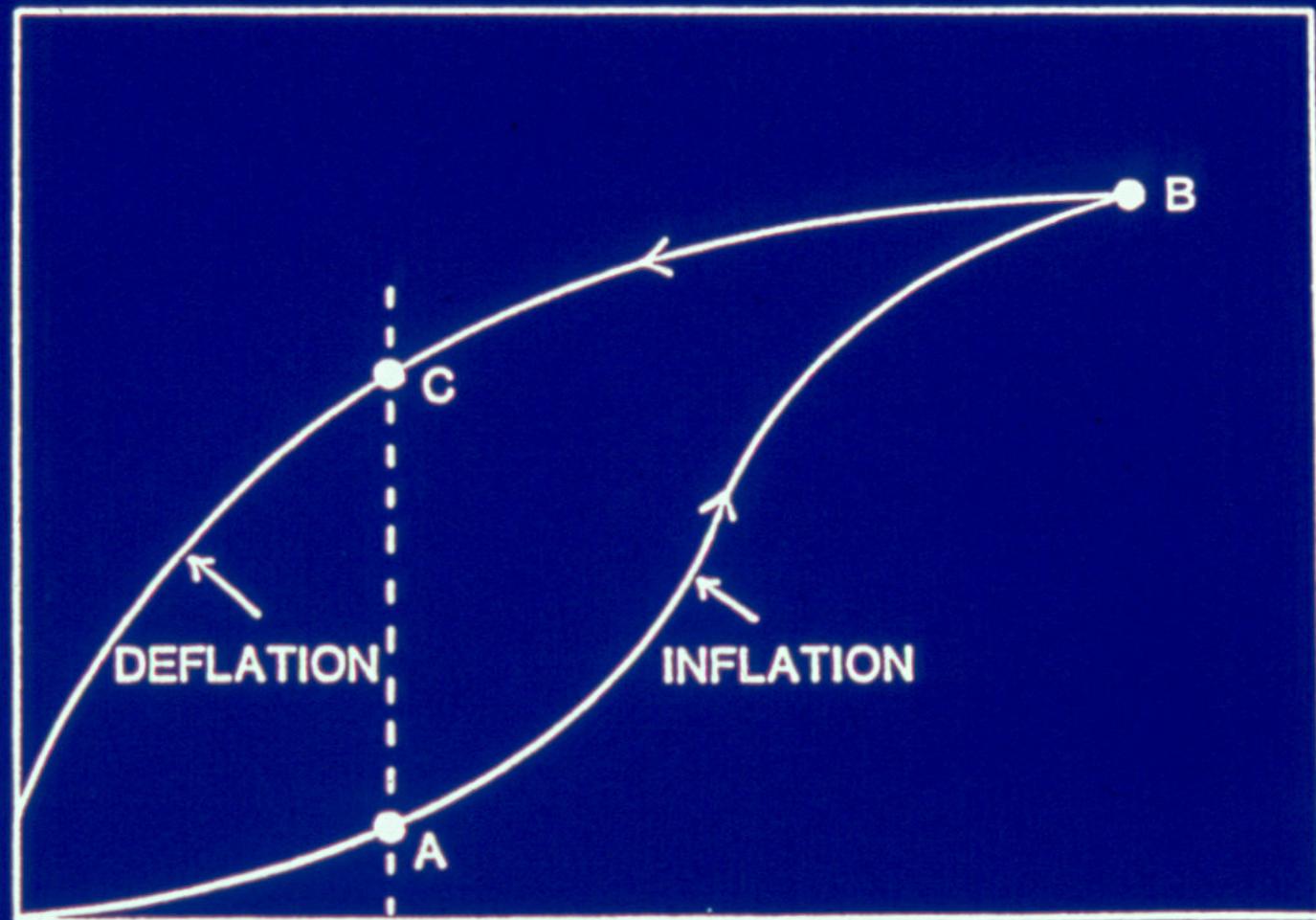
Capan L, et al. Anesth Analg 59: 847, 1980, Lung Ca., FEV1= 70%
Fujiwara M, et al. J Clin Anesth 13: 473: 2001, Esoph. Ca.

Imagine That You're a Red Cell in the RV...





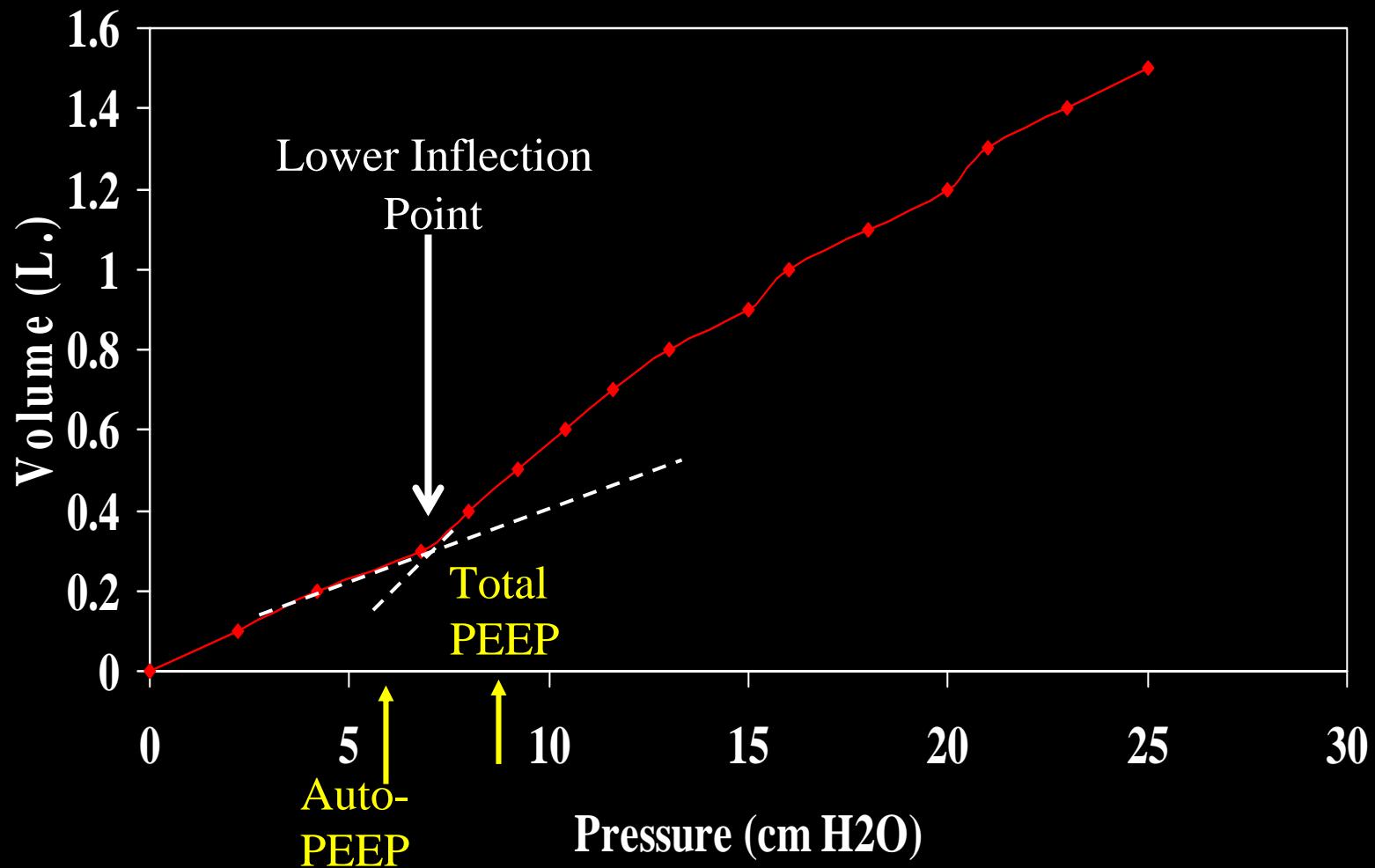
LUNG VOLUME



TRANSPULMONARY PRESSURE

Fig. 1. Classical static pressure-volume curve of the lung. Volume for a given pressure is much greater on the deflation limb than on the inflation portion. Symbols are referenced in the text.

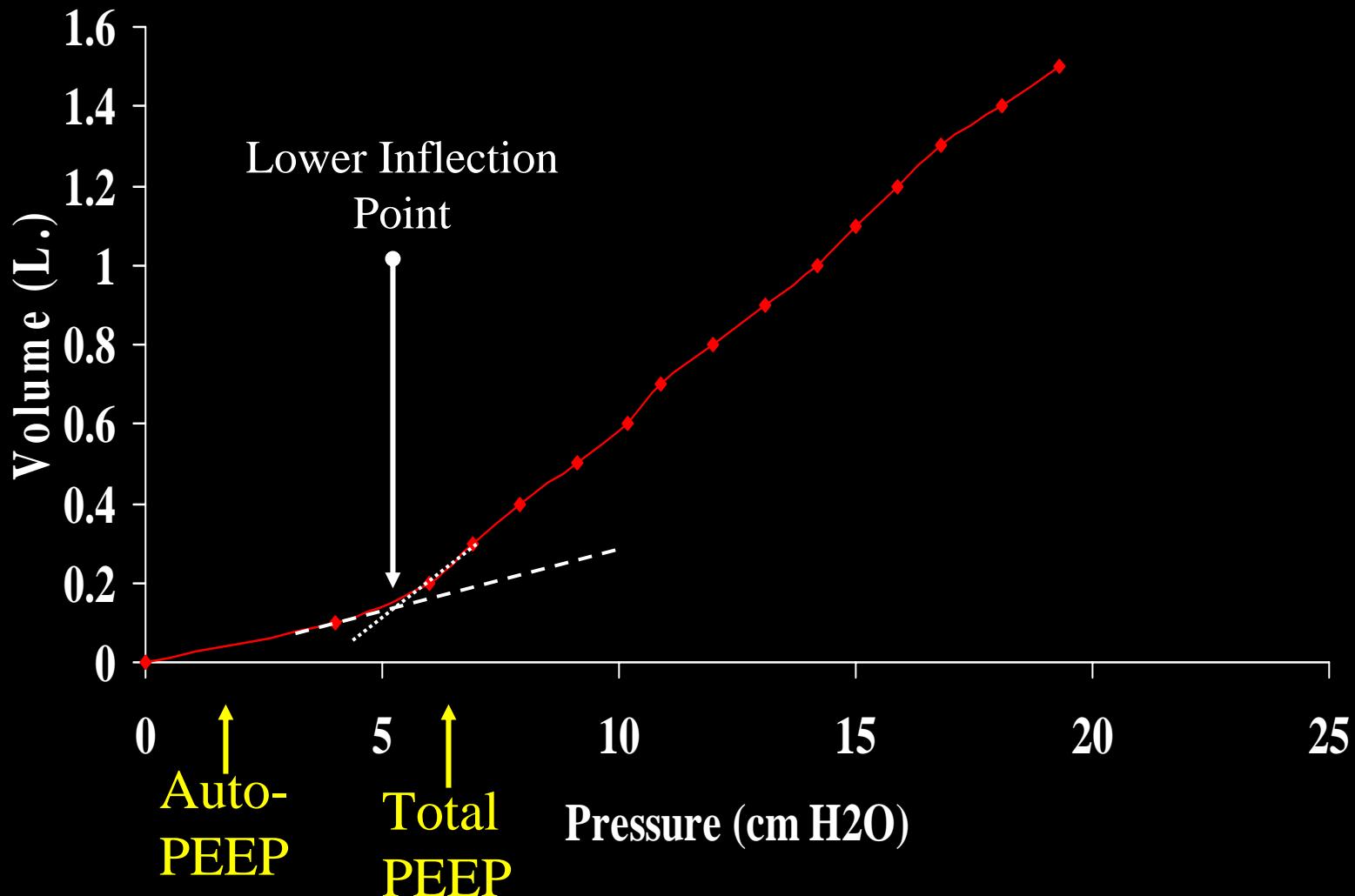
Static Compliance curve of the Ventilated (dependent) lung, 57 y.o. female, FEV1= 72%



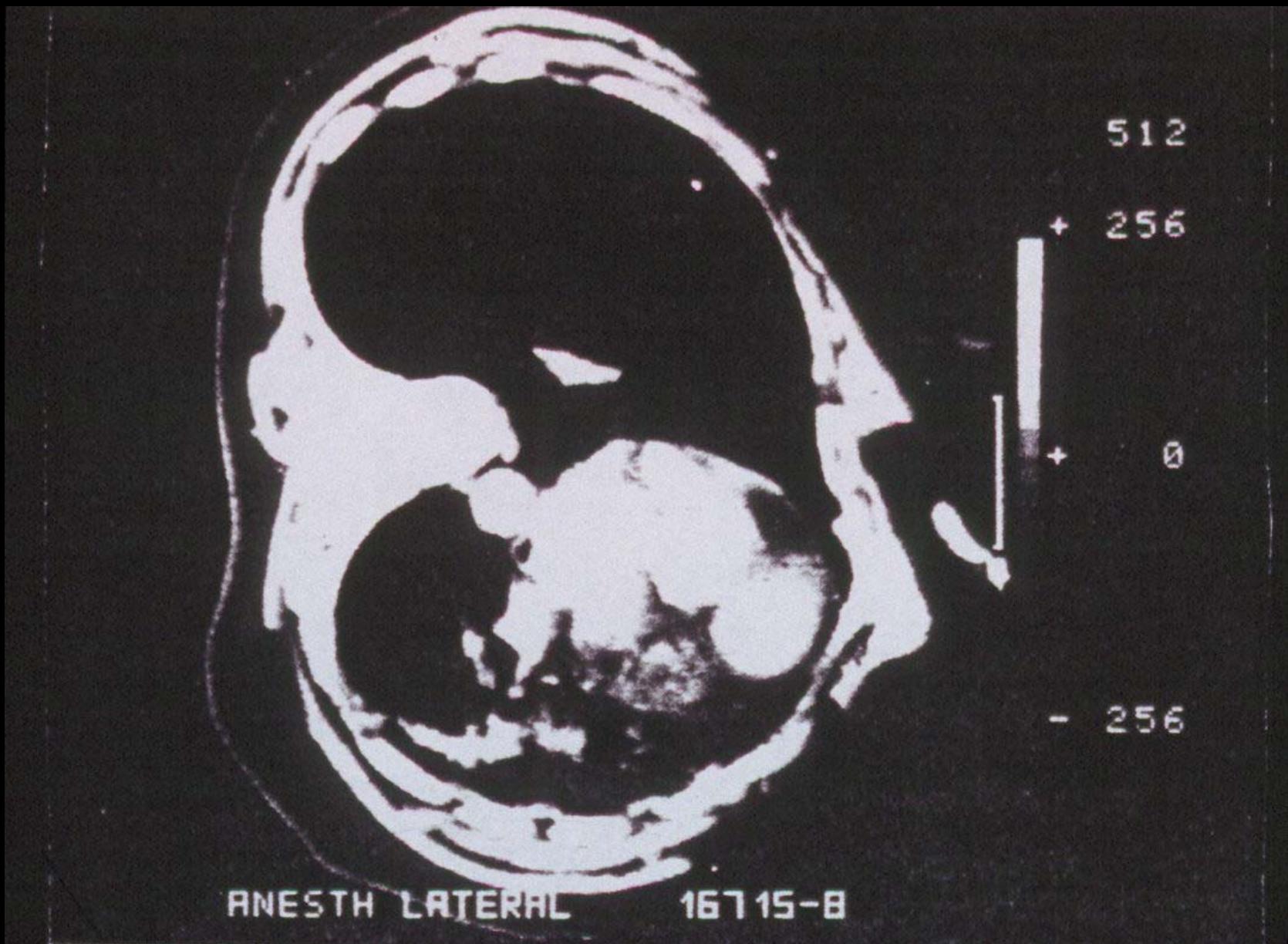
Slinger P, et al. Anesthesiology 95:1096, 2001

One-lung, Static Compliance Curve

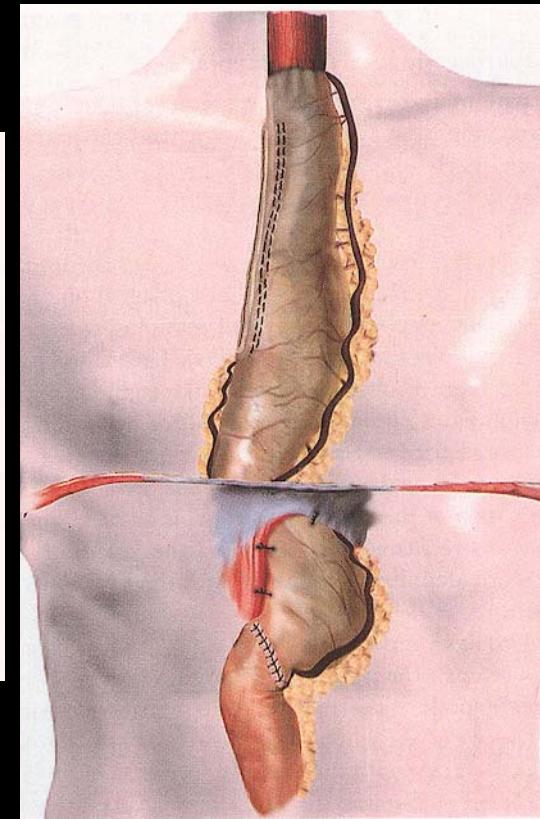
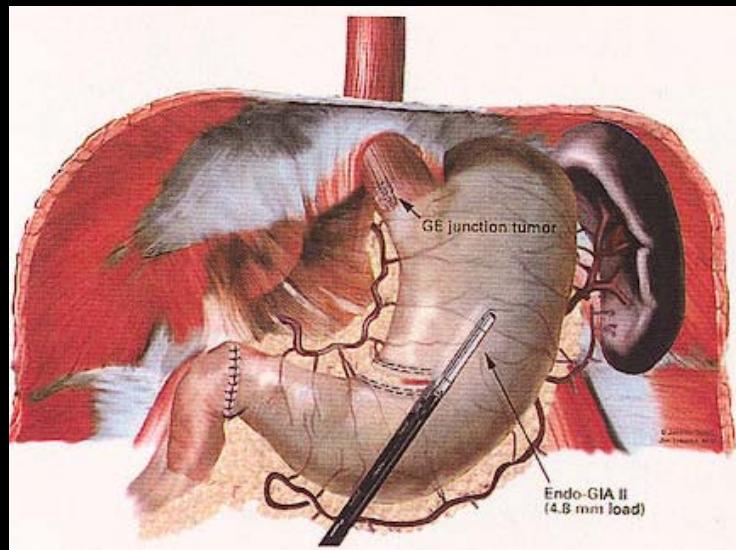
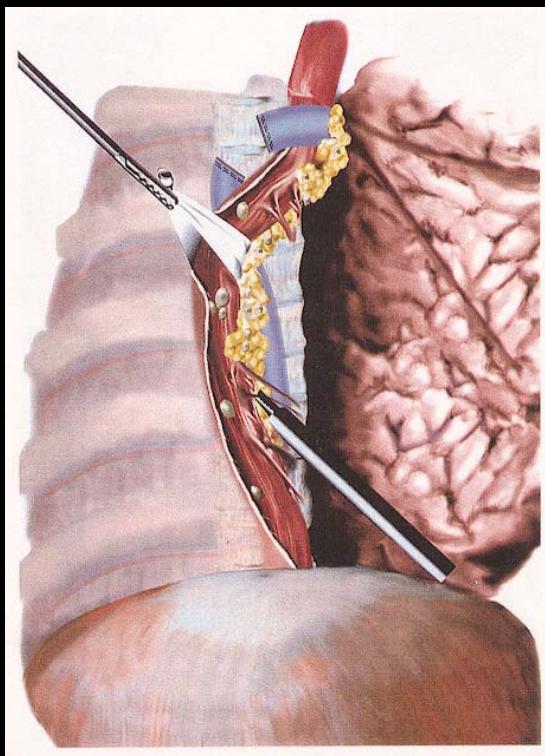
Slinger P, et al. Anesthesiology 2001, 95: 1096



32 y.o. male, FEV1= 102%



Total Endoscopic Esophagectomy: R. VATS + Laparoscopy + L. Neck incision



Prolonged One-Lung Ventilation

Individualizing One-lung Ventilation:

Exceptions:

<u>Tidal Vol.</u>	5-6 ml/kg	Pk. a/w P<35 Plat. a/w P<25
<u>PEEP</u>	Total 5 cm.	Not added if COPD
<u>Resp. Rate</u>	12	Maint. N PaCO ₂
<u>Mode</u>	Vol.-Cont. Vent.	P-C V:L Tx, Pneumnx

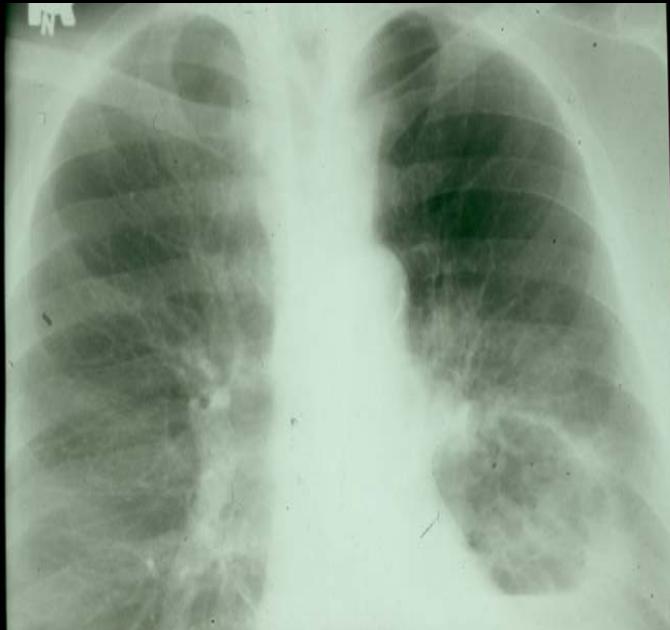
Anesthesia for Minimally Invasive Intrathoracic Surgery

- ◆ Management of OLV: changed strategies
- ◆ Lung Isolation:
 - New Priorities
 - New Methods



Indications for Lung Isolation

Absolute



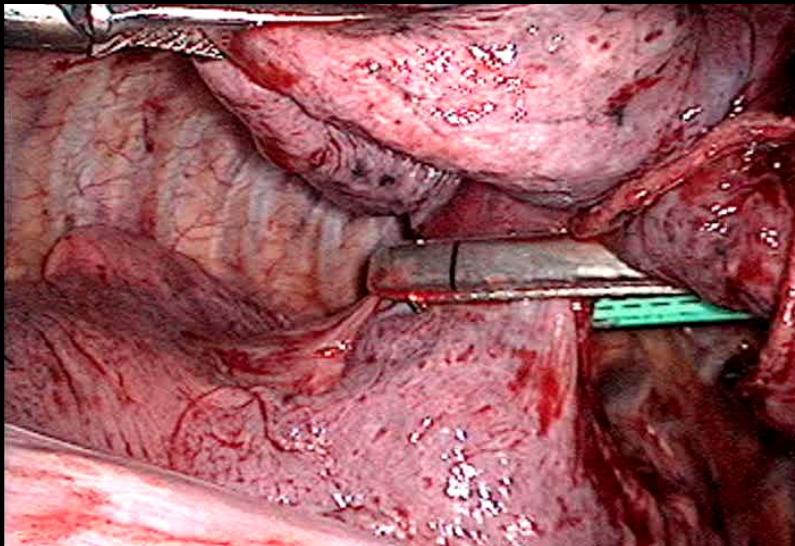
Relative?



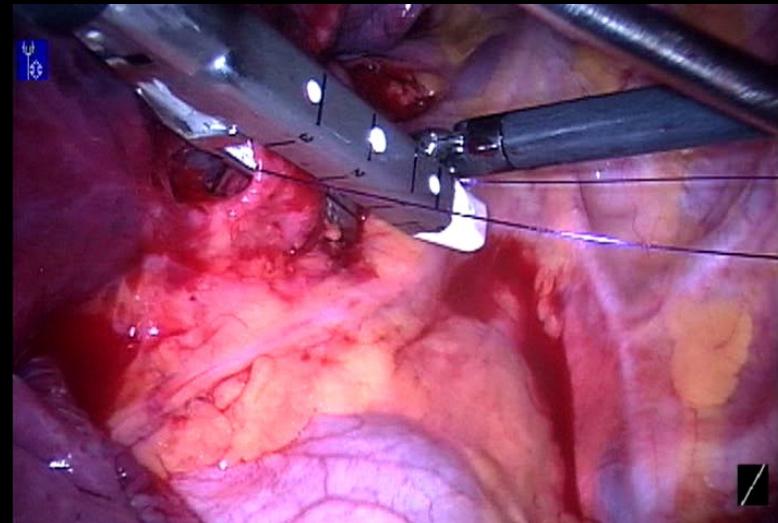
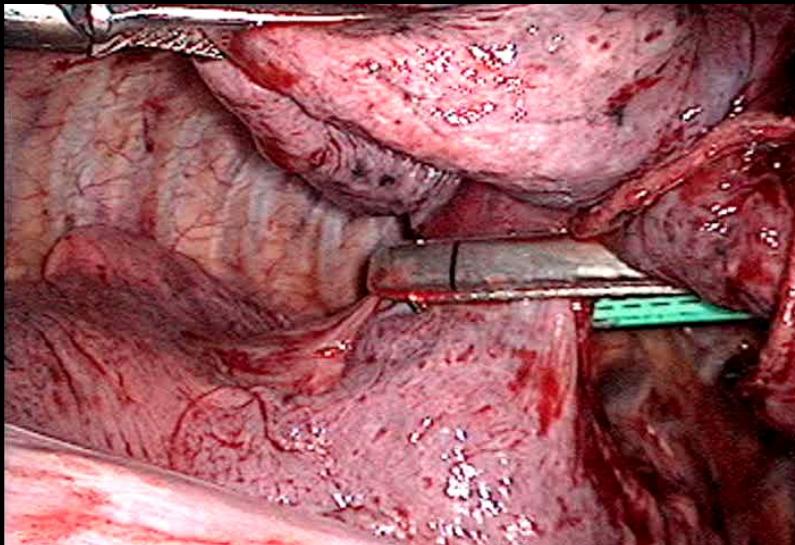
The ABC's of Lung Isolation:

- ◆ Anatomy
- ◆ Bronchoscope
- ◆ Chest X-ray, CT Scan

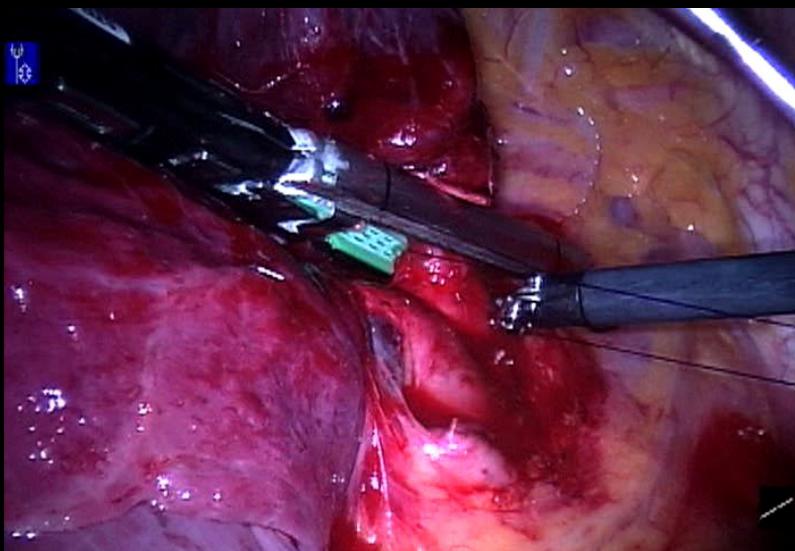
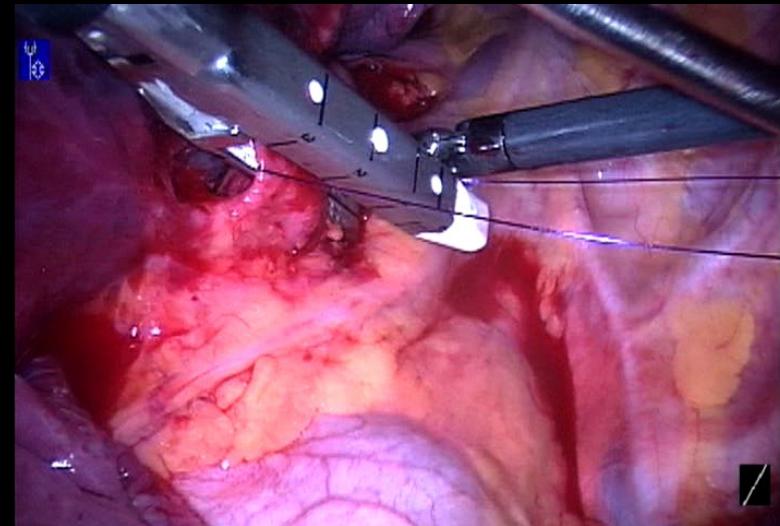
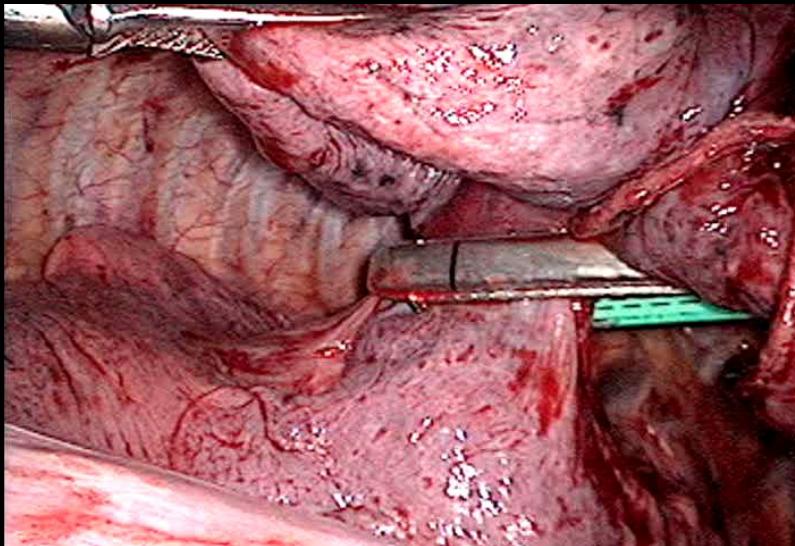
Video-Assisted Thoracoscopic (VATS) Lobectomy:



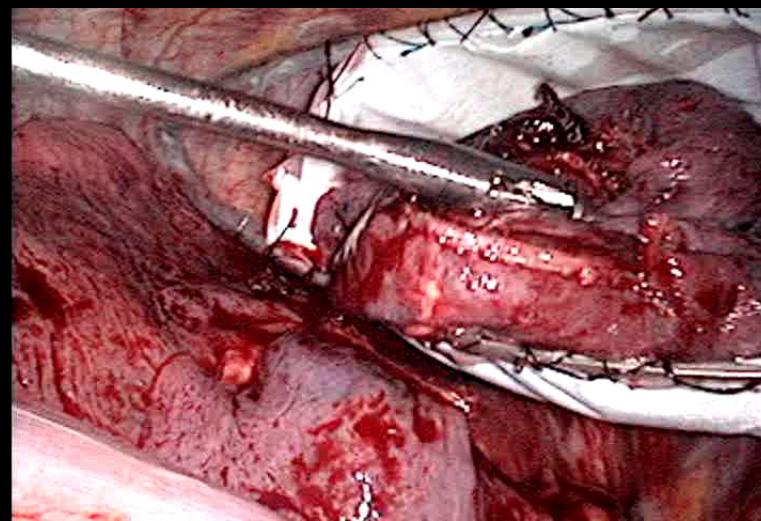
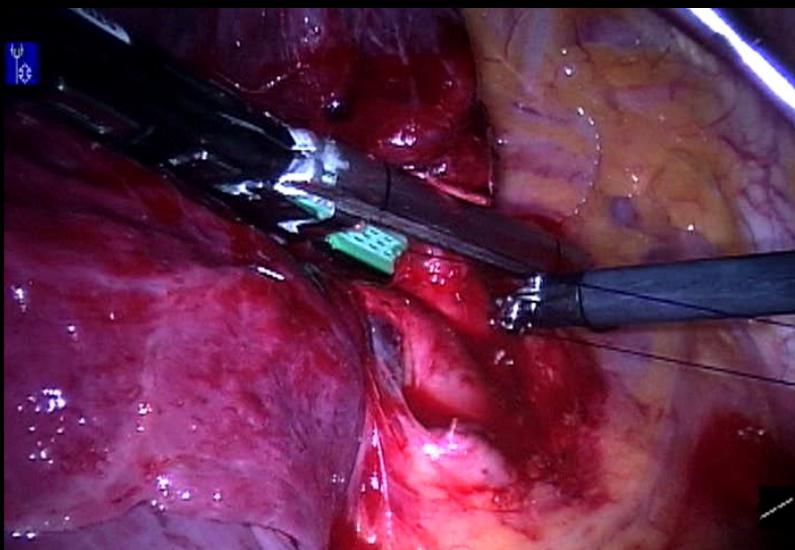
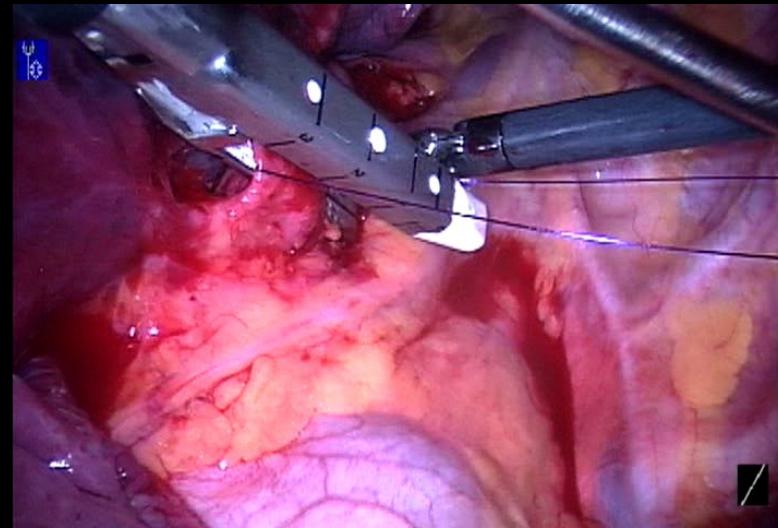
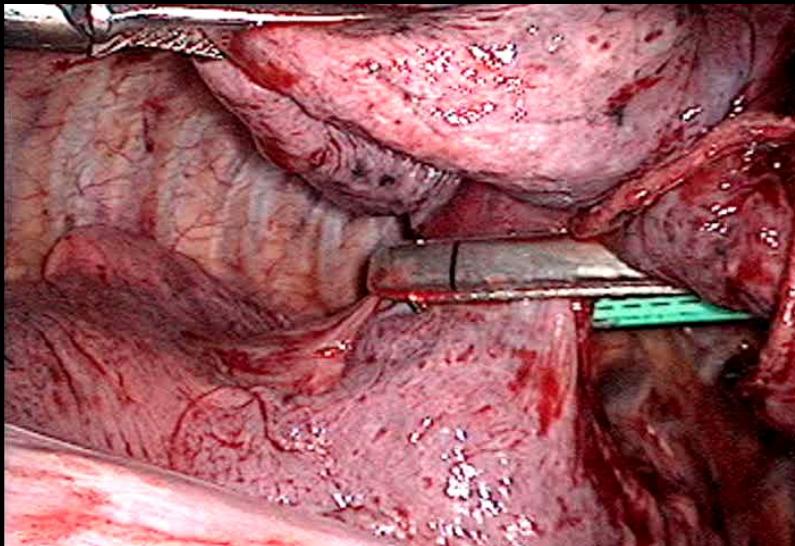
VATS Lobectomy:



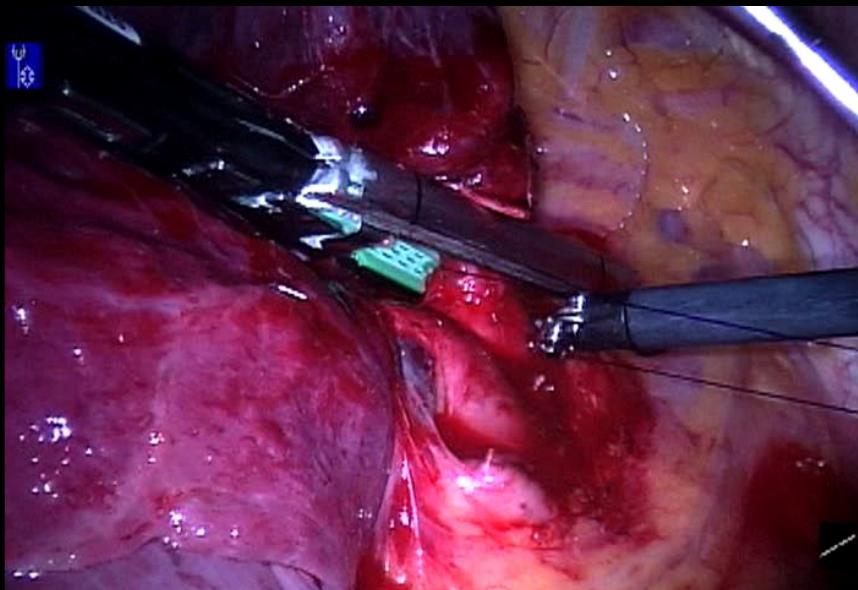
VATS Lobectomy:



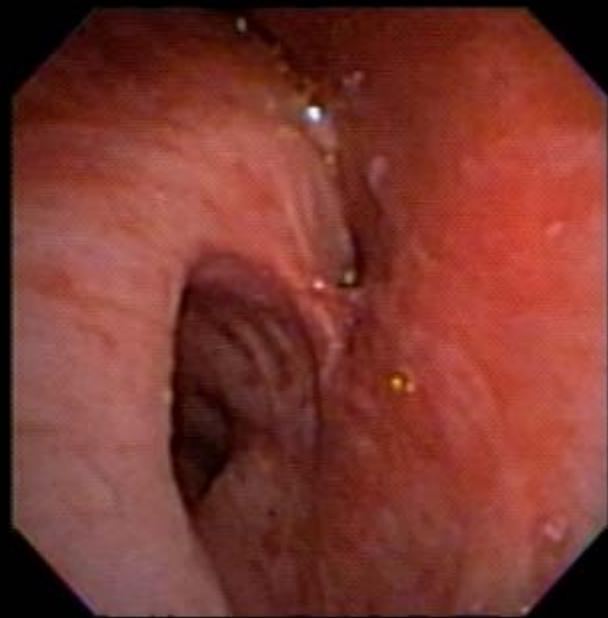
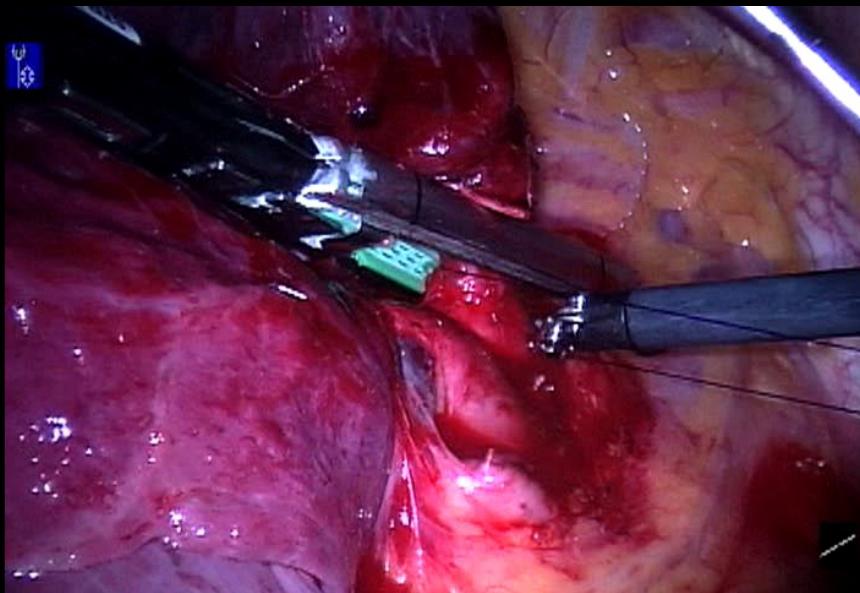
VATS Lobectomy:



VATS Lobectomy:



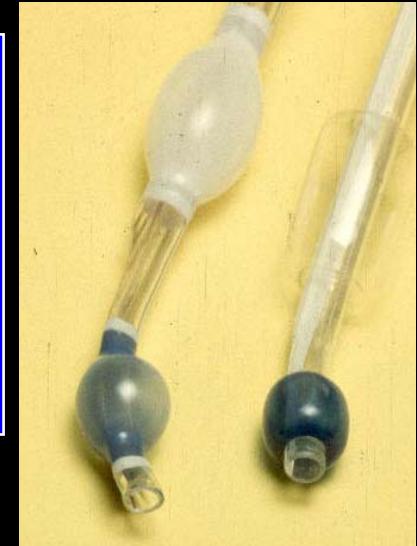
VATS Lobectomy:



DLT vs. Blocker for VATS ?

Double-lumen Tube

- Excellent Isolation
- Independent Lung Access
- Fixed Anatomical Design

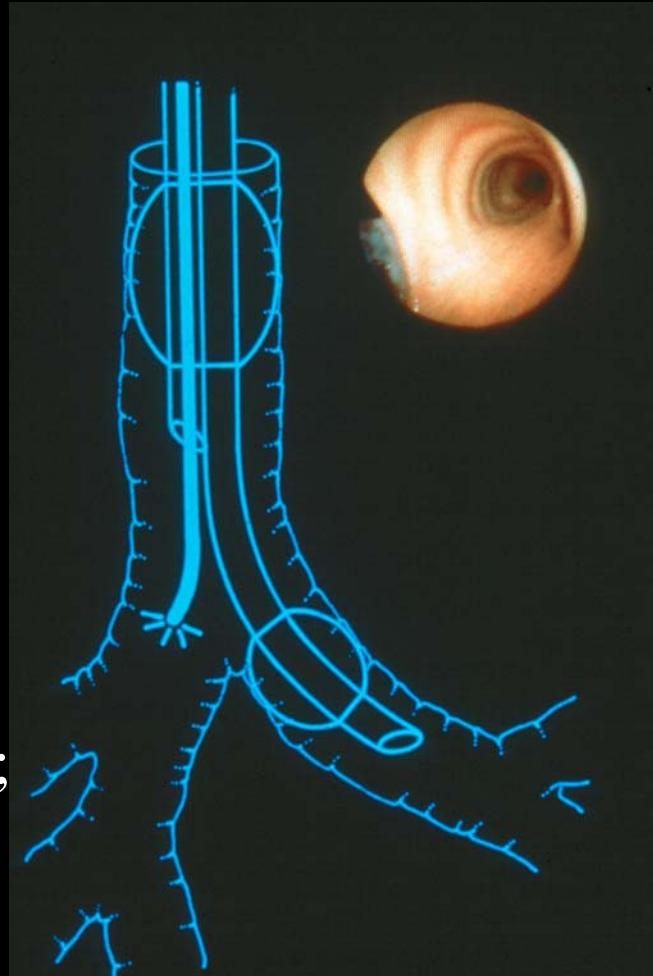


Bronchial Blocker

- Adaptability
- No need to change tube
- Left-sided Surgery
- Non-pulmonary surgery

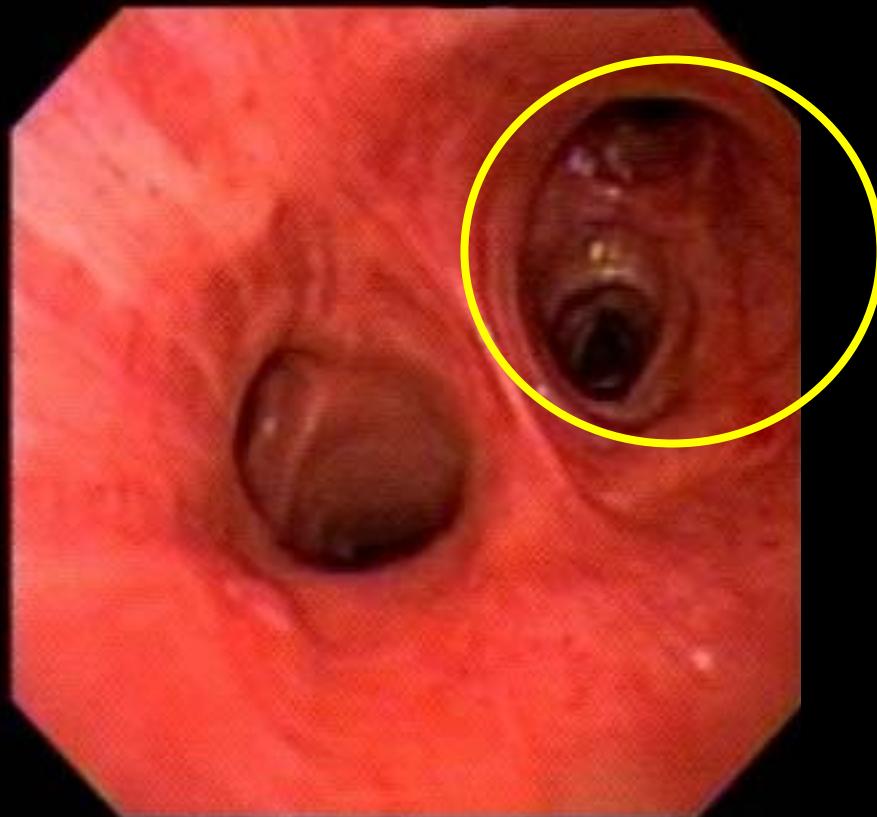
Devices for Lung Isolation used by Anesthesiologists with Limited Thoracic Experience.

Campos JH, et al.
Anesthesiology 2006;
104: 261-6



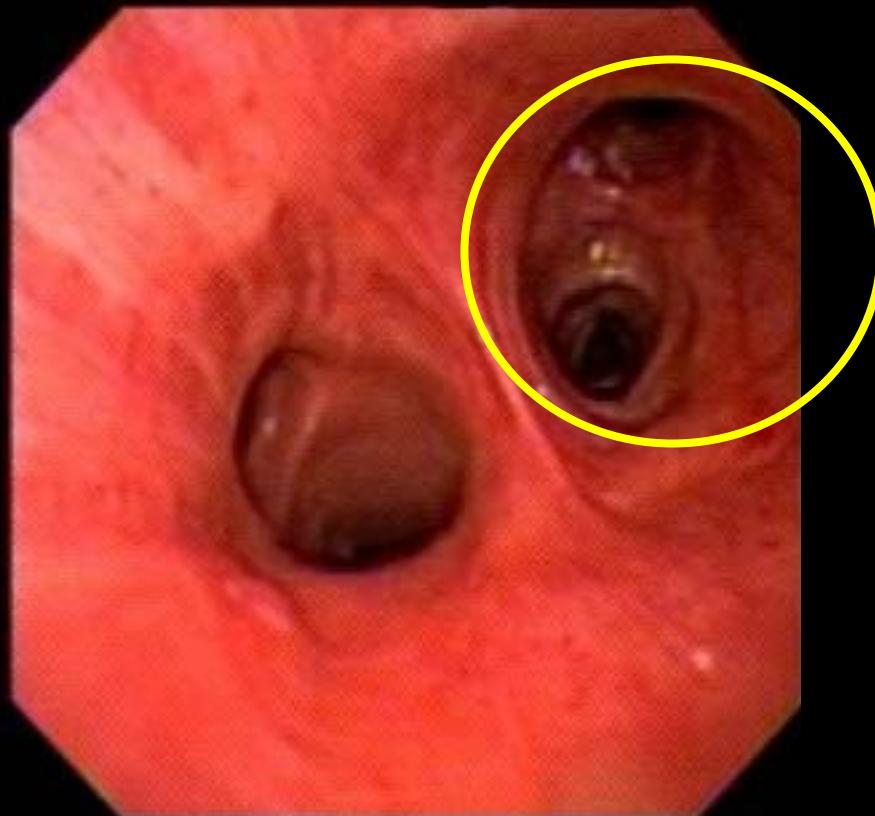
“...the most critical factor in successful placement was the anesthesiologists knowledge of endoscopic bronchial anatomy.”

The structure seen in the Yellow circle is?



- A. Right Bronchus intermedius
- B. Left upper lobe bronchus
- C. Left mainstem bronchus
- D. Right middle lobe bronchus
- E. Right upper lobe bronchus

The structure seen in the Yellow circle is?



- A. Right Bronchus intermedius
- B. Left upper lobe bronchus
- C. Left mainstem bronchus
- D. Right middle lobe bronchus
- E. Right upper lobe bronchus

Teaching Bronchial Anatomy



- ◆ In the OR
- ◆ Review articles/CD/DVD
- ◆ Workshops
- ◆ Virtual bronchoscopy simulator
- ◆ Online bronchoscopy simulator

about us articles bronchial anatomy quiz bronchoscopy simulator contact us restricted articles search

ThoracicAnesthesia.com
General Issues, Information & References.

University Faculty Network



Categories

general **Miscellaneous**

Monthly

March 2007

Pages

[About Us](#) [Articles](#) [Bronchial Anatomy Quiz](#) [Bronchoscopy Simulator](#) [Contact Us](#) [Restricted Articles](#)

Links

Anesthesia and Analgesia
SCA

About Us

welcome to thoracicAnesthesia.com

ThoracicAnesthesia.com is an Internet based education, information, and reference service for issues related to Anesthesia for Thoracic Surgery.

This service is a free not-for-profit continuing medical education activity which is offered to all practitioners of Anesthesia and related areas of Medicine and Surgery. By clicking on the "Bronchial Anatomy Quiz" tab, readers can complete a needs assessment of their knowledge of tracheo-bronchial anatomy, which is fundamental to the skill of lung isolation for thoracic anaesthesia. After completion of the Quiz, using the user name and password generated for the Quiz, readers have access at any time to the bronchoscopy simulator which is an interactive teaching simulation of fiberoptic bronchoscopy. Also, after completing the quiz, readers will have access to several review articles on Lung Isolation in the "restricted Articles" section on the homepage.

There will be a regular update of articles recently published in the medical literature and a selection of REVIEW ARTICLES pertaining to Thoracic Anesthesia.

Readers are encouraged to submit clinical questions or cases in the "Contact Us" section which will then be discussed and answered by members of the International Editorial Board. As questions are answered they will be indexed and posted on the Web site along with the discussion and will form a library for future reference.

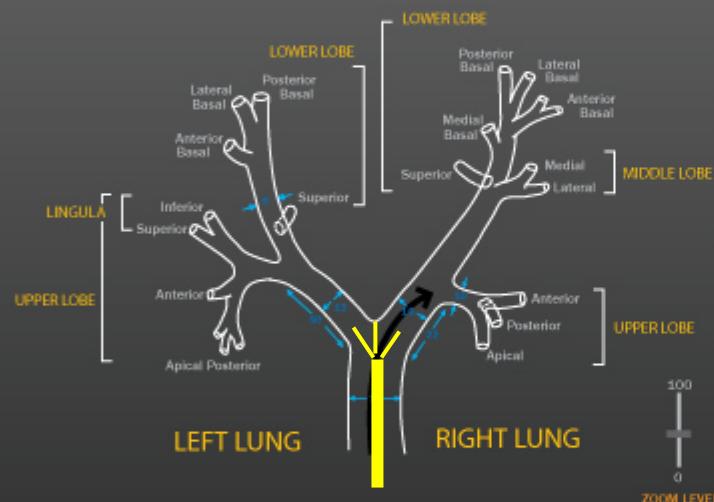
Authors and readers are encouraged to submit summaries or abstracts of relevant published information from other sources.

Simulator Link →

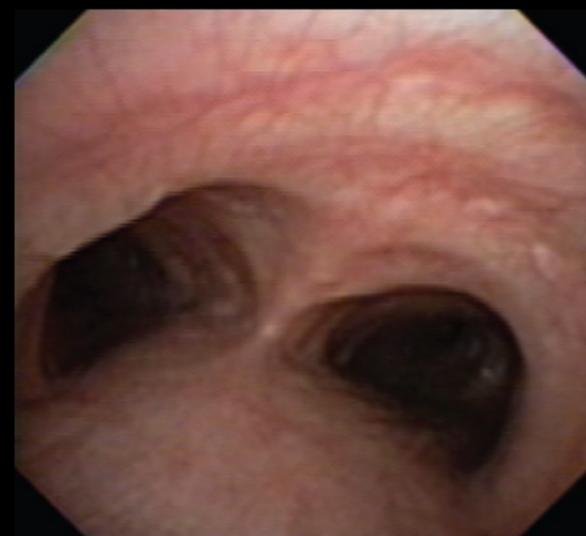
Google: Thoracic Anesthesia

Thoracicanesthesia.com Bronchoscopy Simulation

BRONCHIAL TREE NAVIGATION MAP VIEW



BRONCHOSCOPE VIEW



Navigation Map	Enabled / Disabled
Navigation Labels	Enabled / Disabled
Bronchoscope Labels	Enabled / Disabled



Bronchoscope Navigation