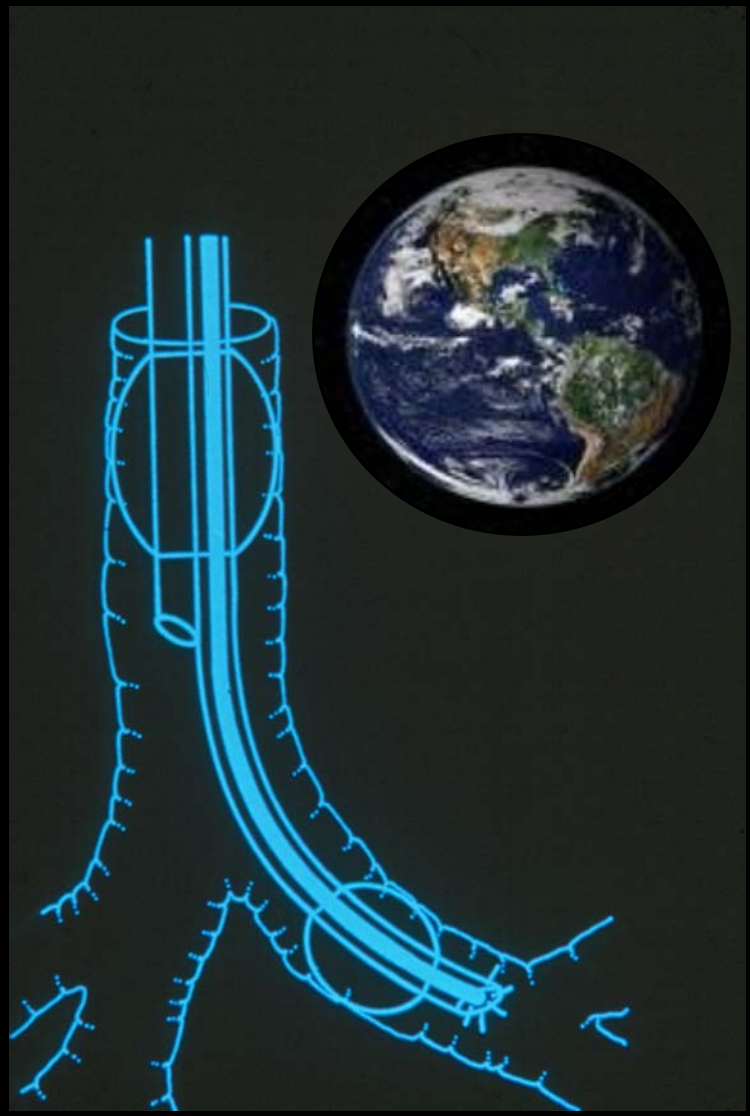
Why is Lung Isolation Difficult?

Peter Slinger
MD, FRCPC

University of
Toronto



1. Look
2. Know What You are Looking At

Disclosures:

I

C

F

O

Disclosures:

I’m

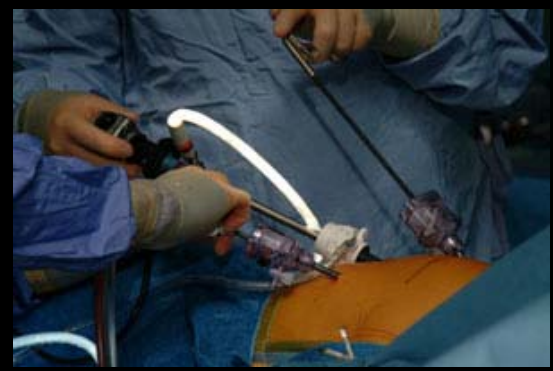
Cheering

For

Ottawa

Increasing Spectrum of One-lung Anesthesia:

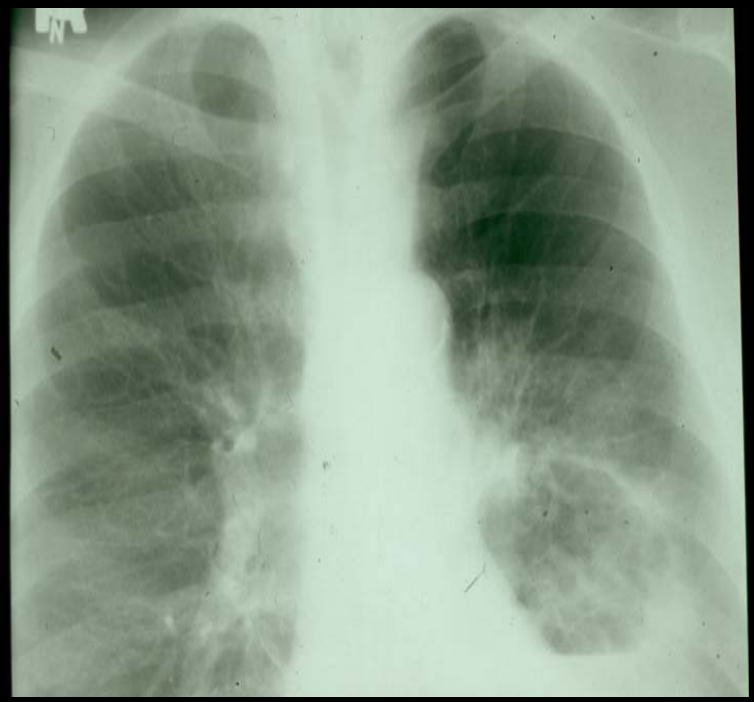
- Lung Surgery
- Esophagus
- Thoracic Spine
- Autonomic Nerves
- Robotic Cardiac

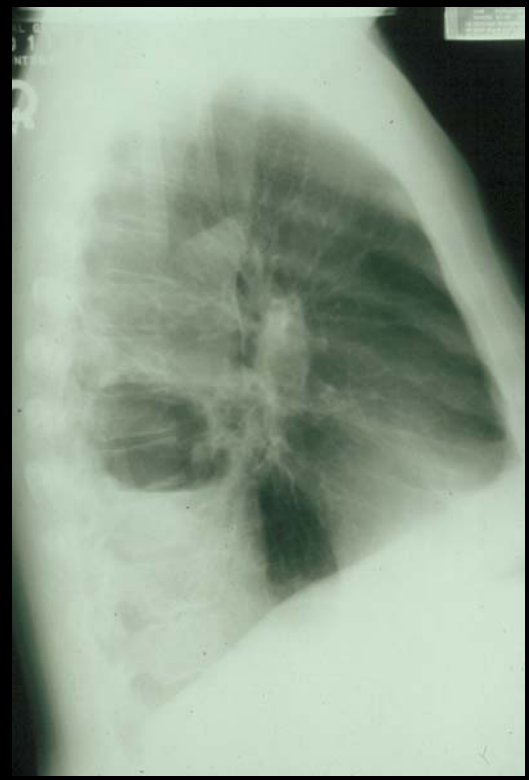


Indications for Lung Isolation

Absolute:
Blood
Pus
Air

Relative:
Surgical exposure





Indications for Lung Isolation

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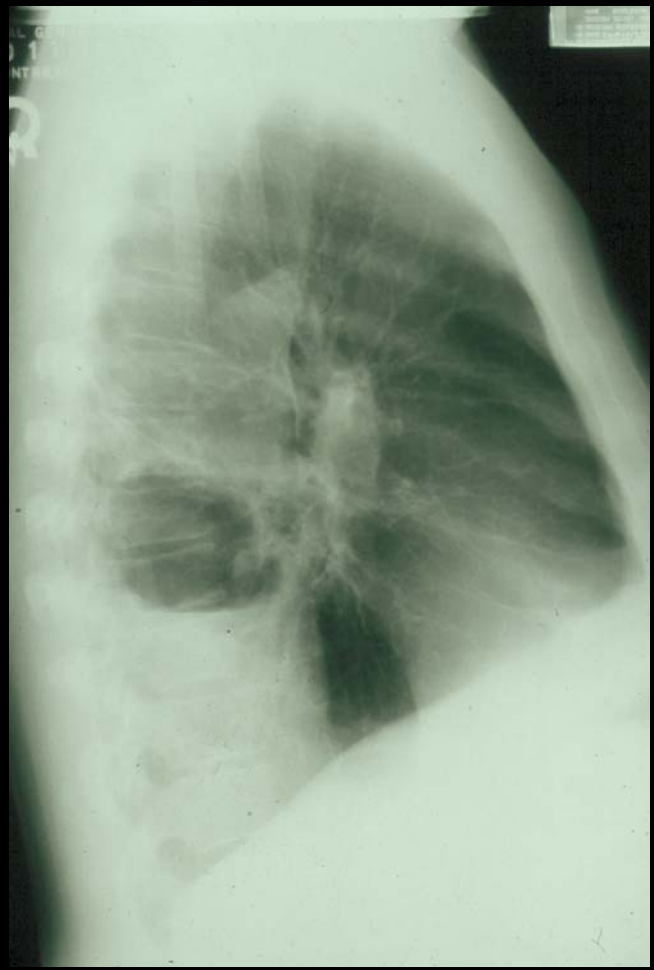


Surgical Exposure

Lung Protection
Blood
Pus
Fluid

Ventilation
BPF
ILV

Techniques of Lung Isolation:

- Single Lumen Tubes
- Double-lumen Tubes
- Bronchial Blockers

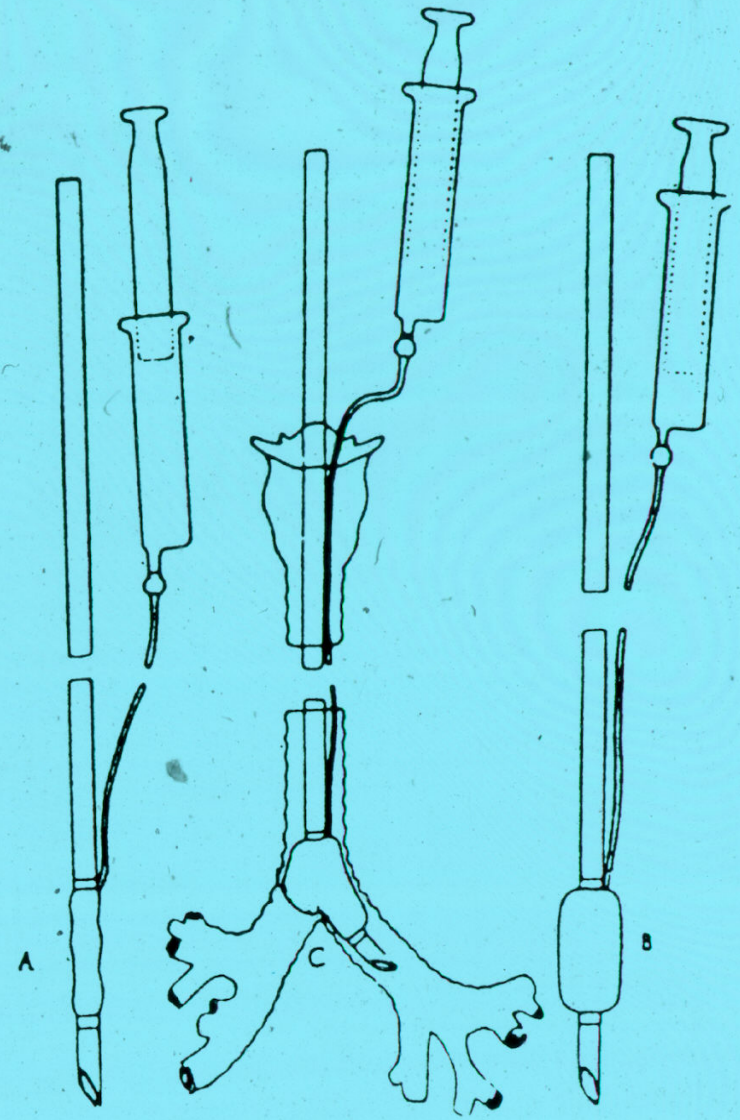
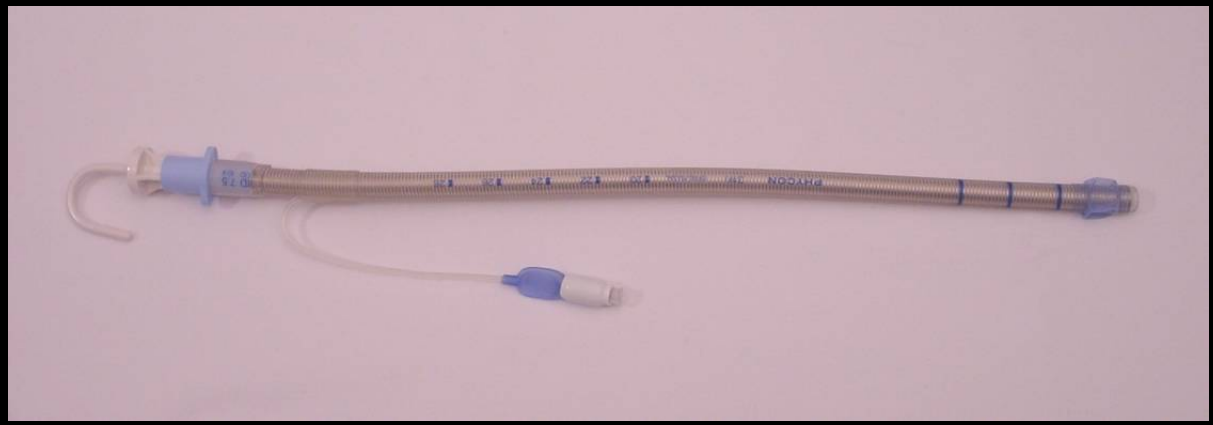


FIG. 156. GALE AND WATERS ENDOBRONCHIAL INTUBATION FOR ONE-LUNG ANAESTHESIA (1931

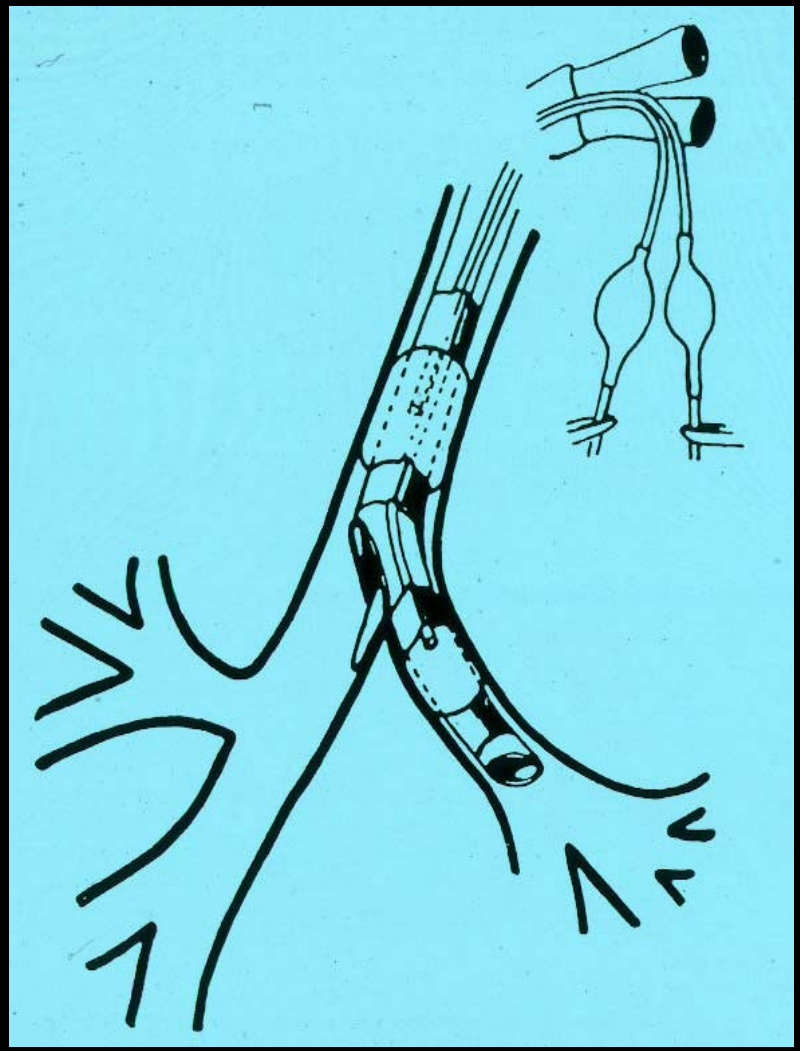
Single Lumen Endobronchial Tubes



Techniques of Lung Isolation:

- Single Lumen Tubes
- Double-lumen Tubes
- Bronchial Blockers

Carlens Double-lumen Endobronchial Tube

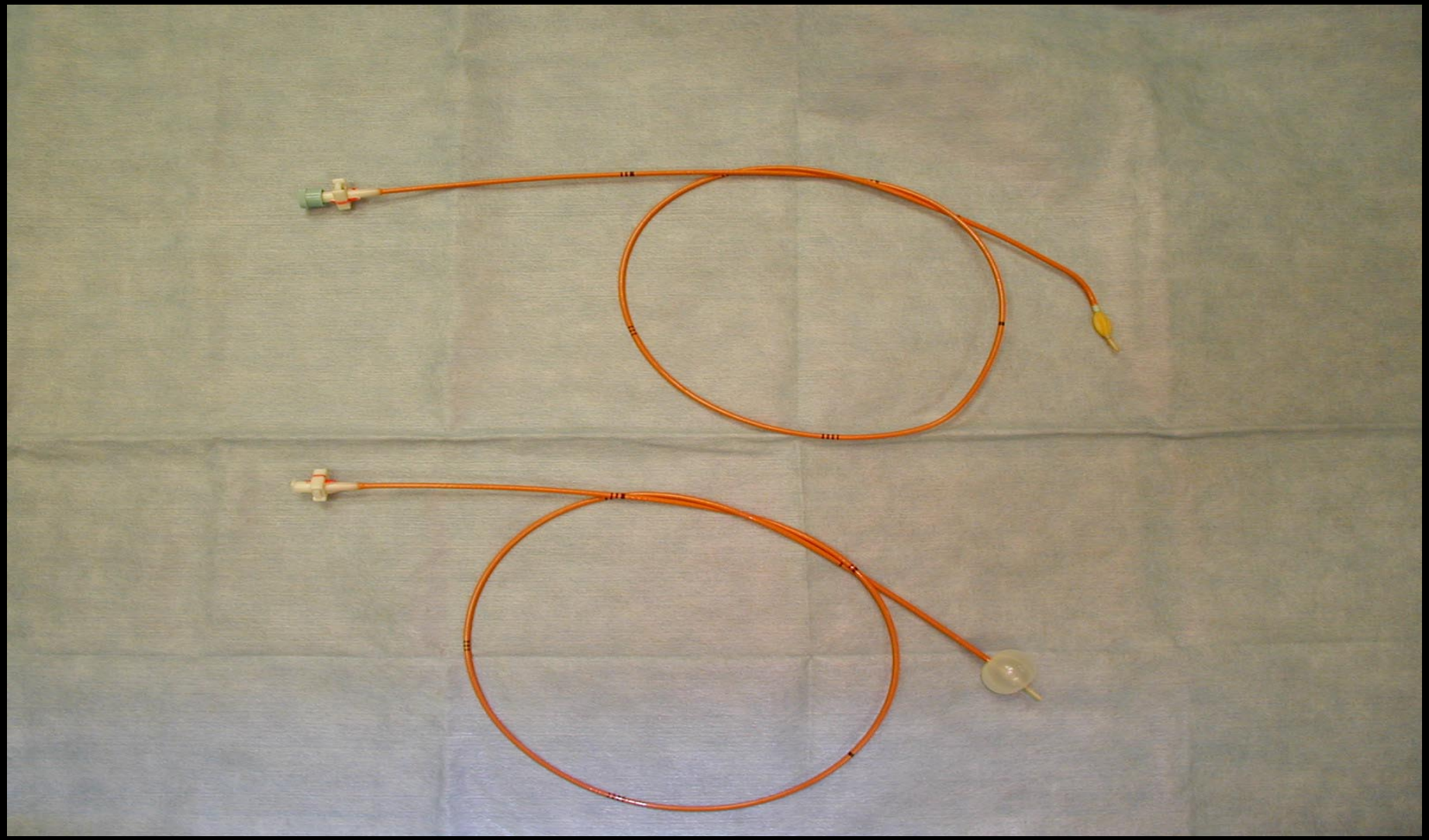


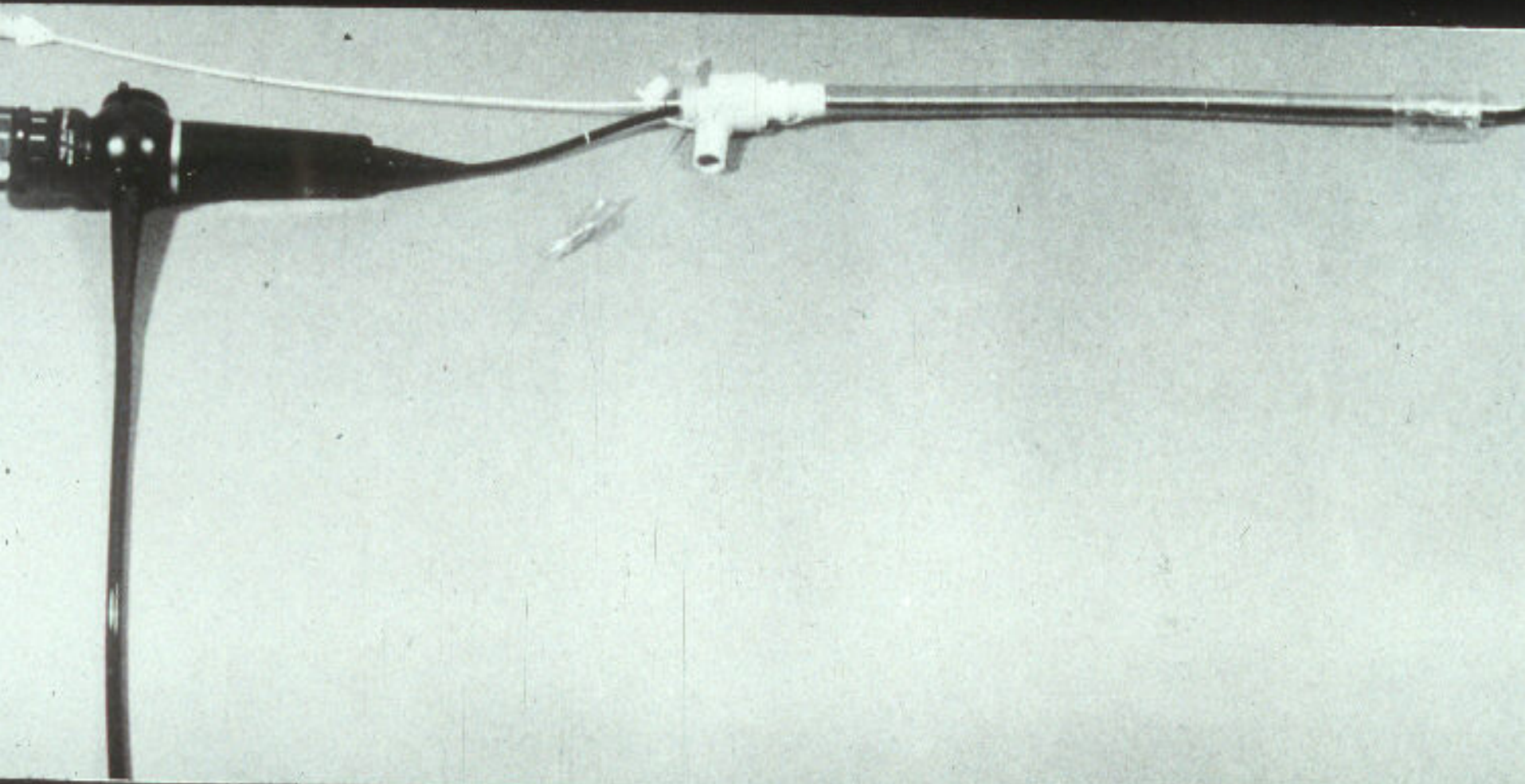

SHERIDAN

Techniques of Lung Isolation:

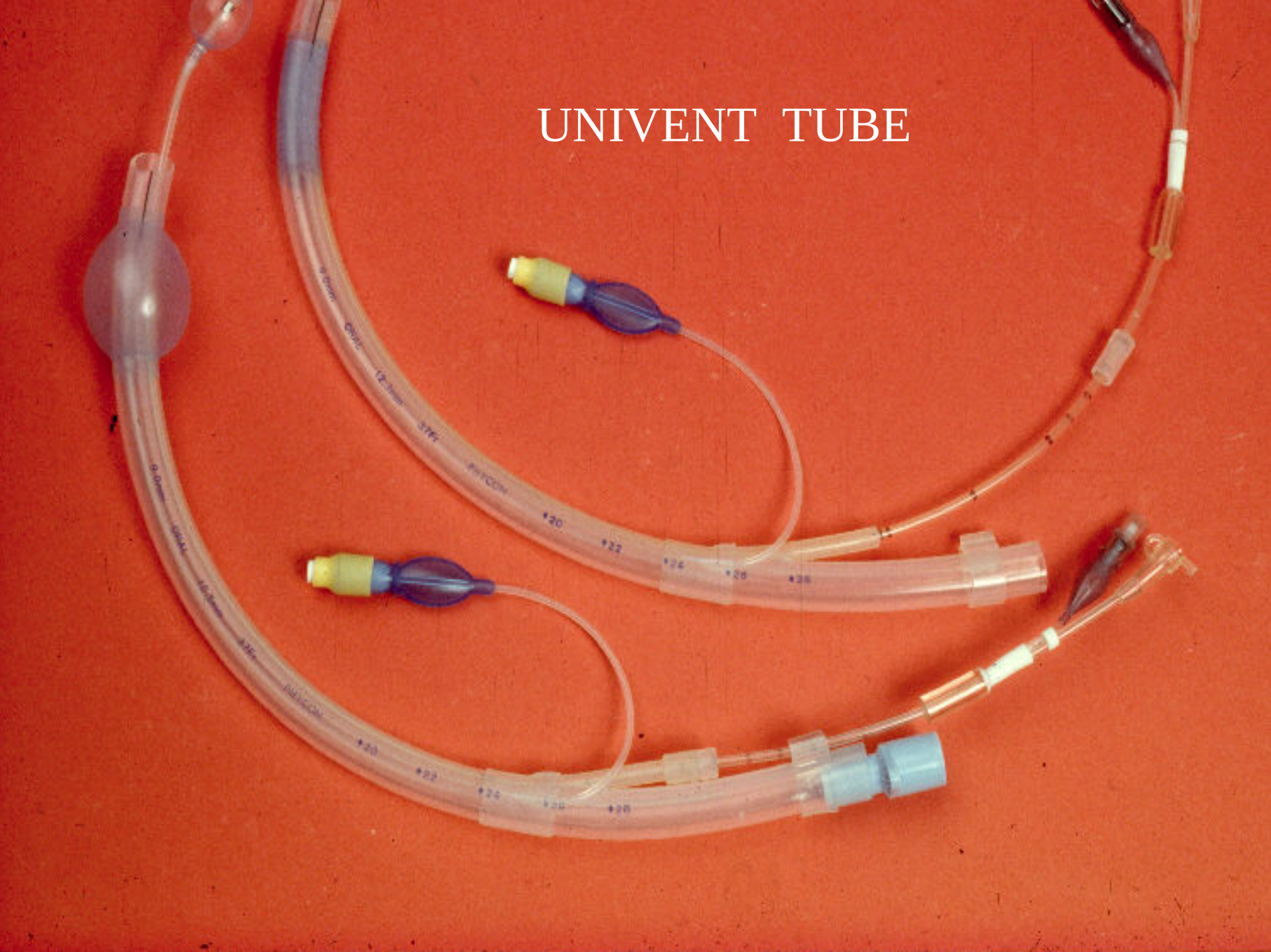
- Single Lumen Tubes
- Double-lumen Tubes
- Bronchial Blockers

8 Fr. Fogarty Venous Embolectomy Catheter, 10 cc balloon

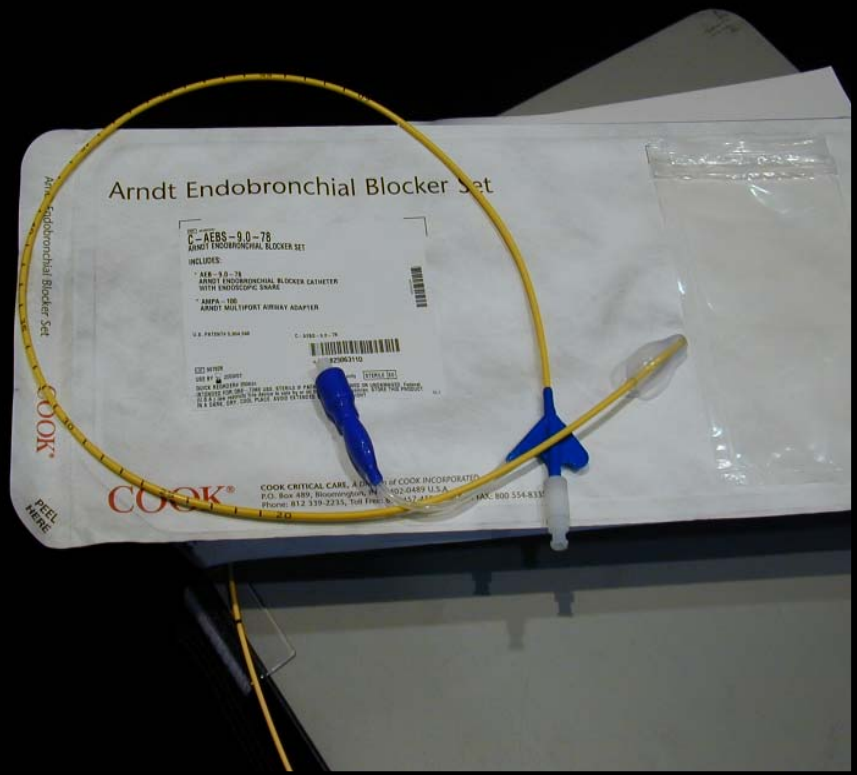


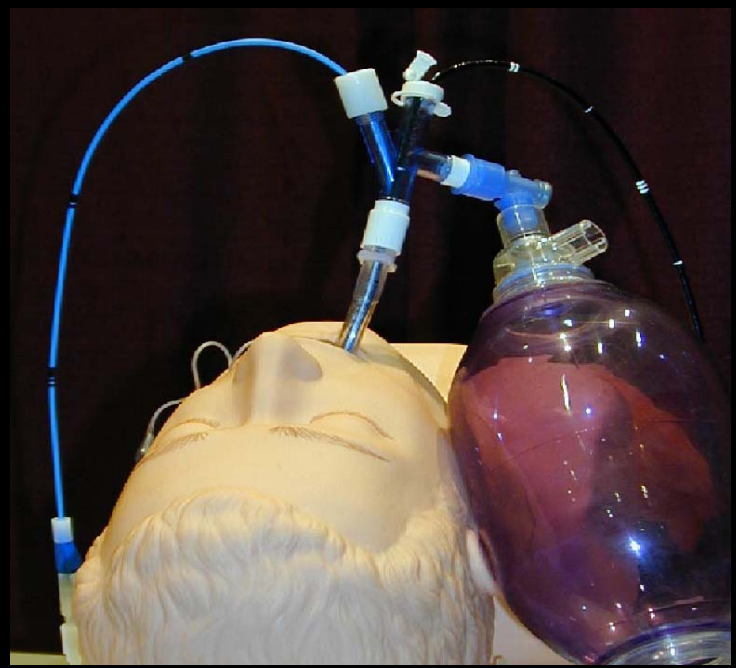


UNIVENT TUBE

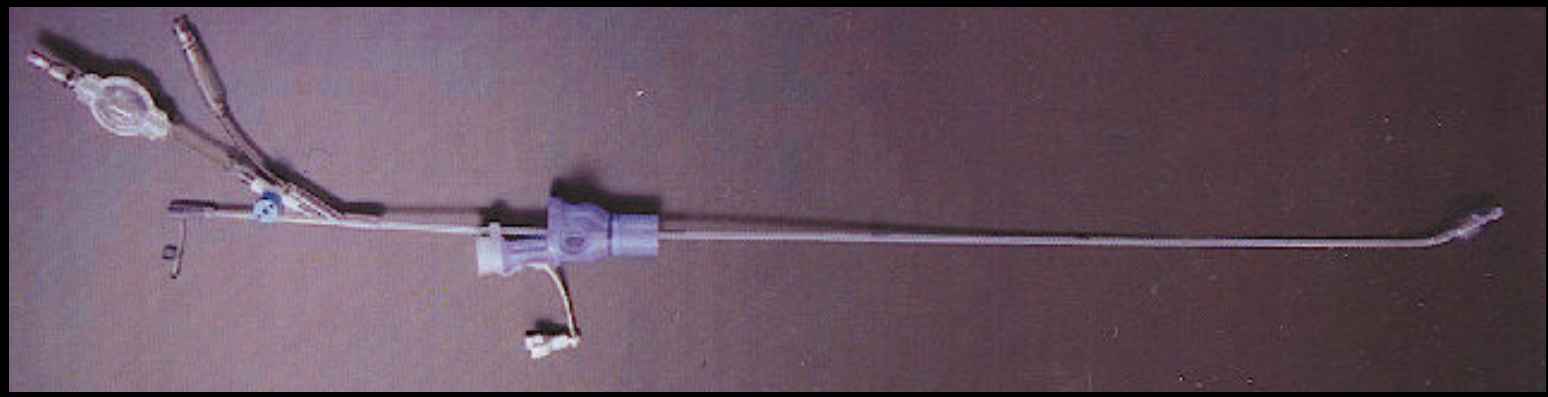


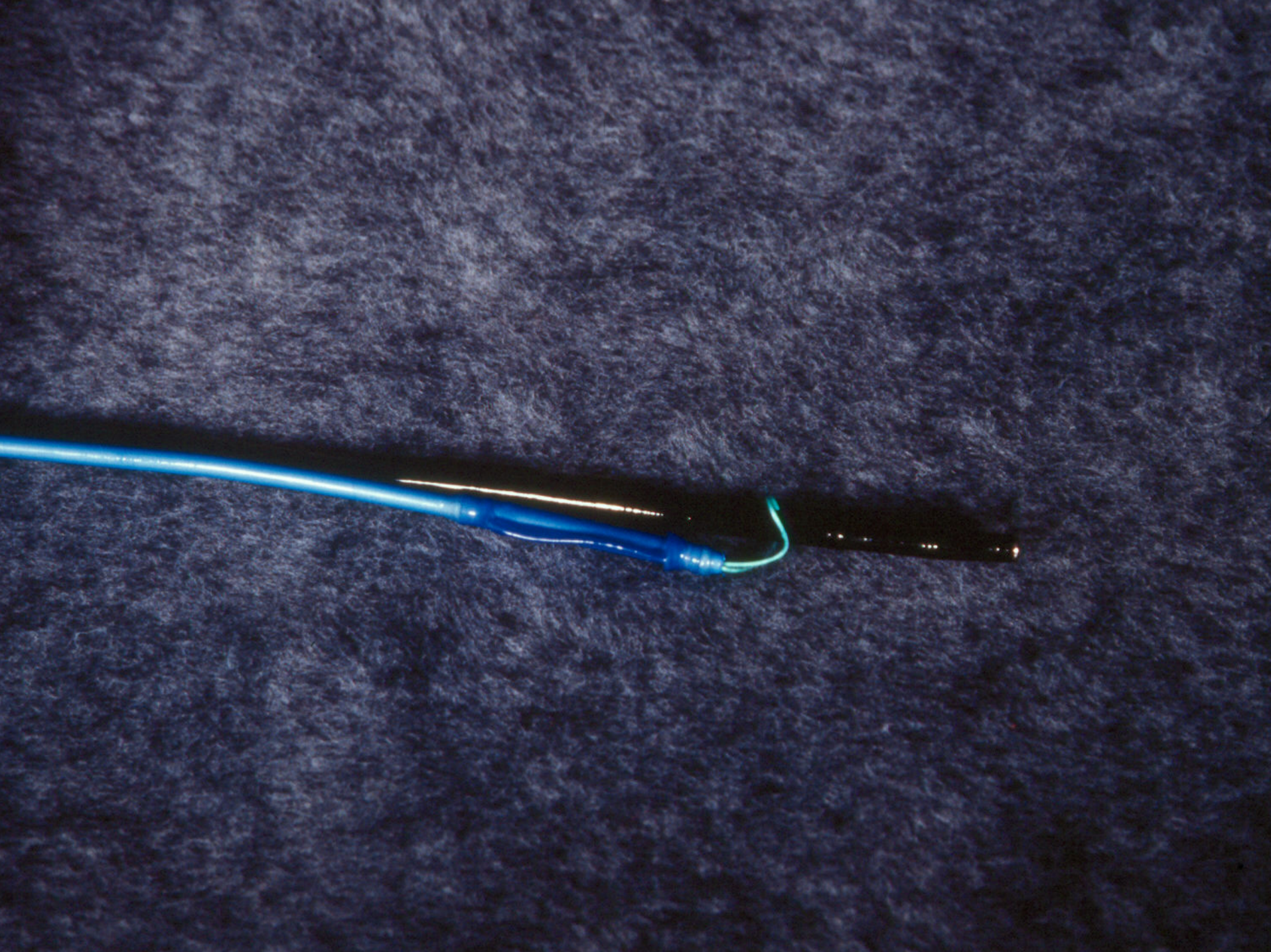
The “Arndt” Bronchial Blocker

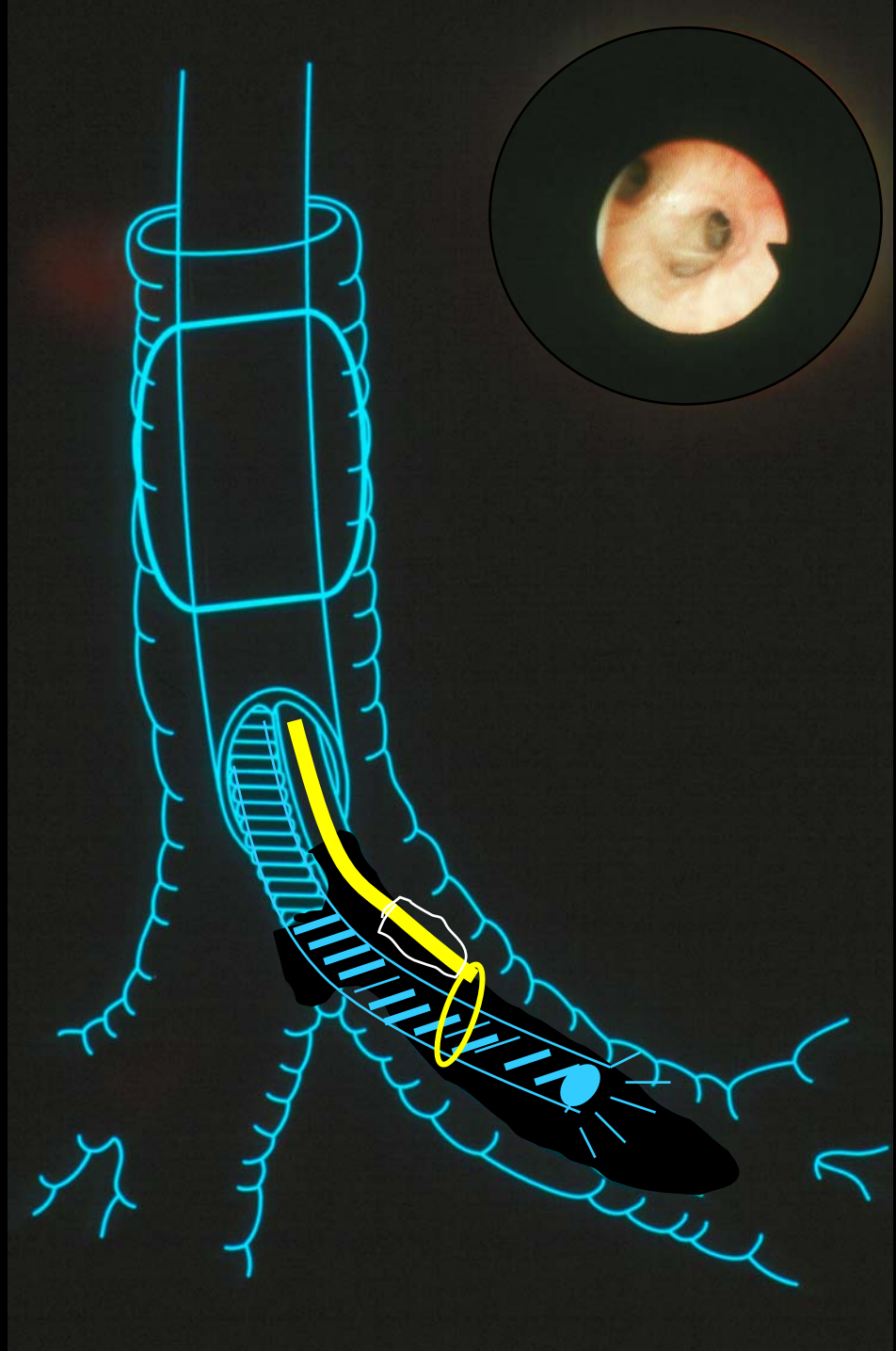


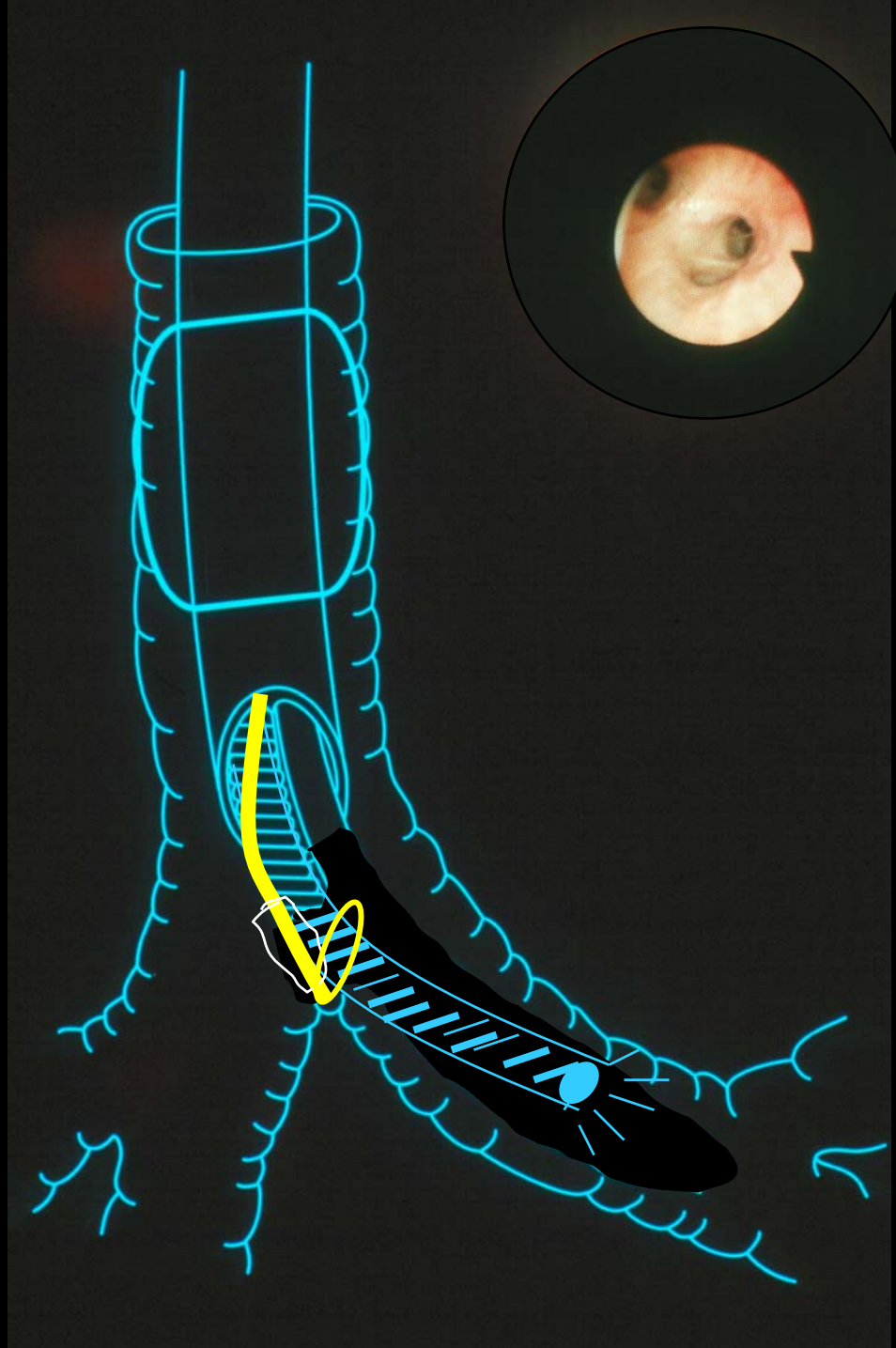


Fuji “Uni-Blocker”

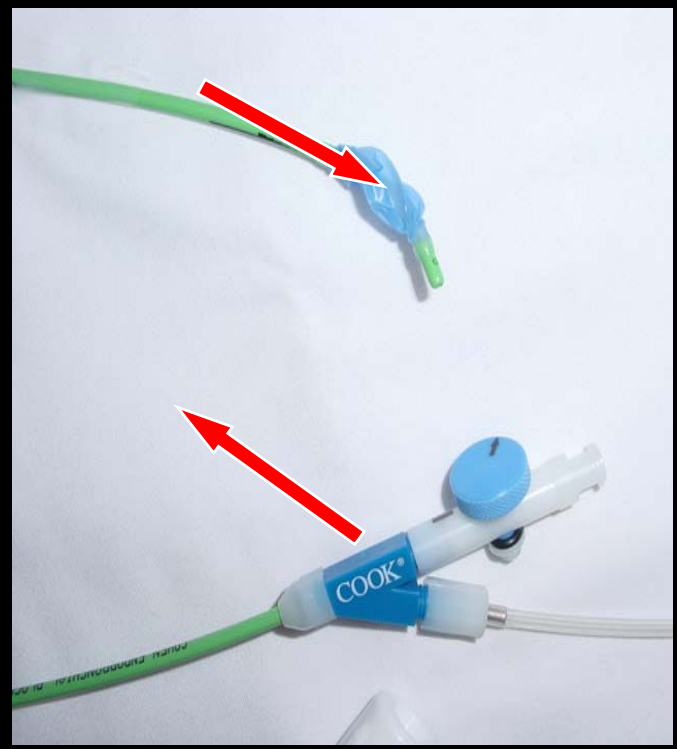








Bronchial Blockers – Cohen



New Bronchial Blockers

COHEN

FUJI

ARNDT

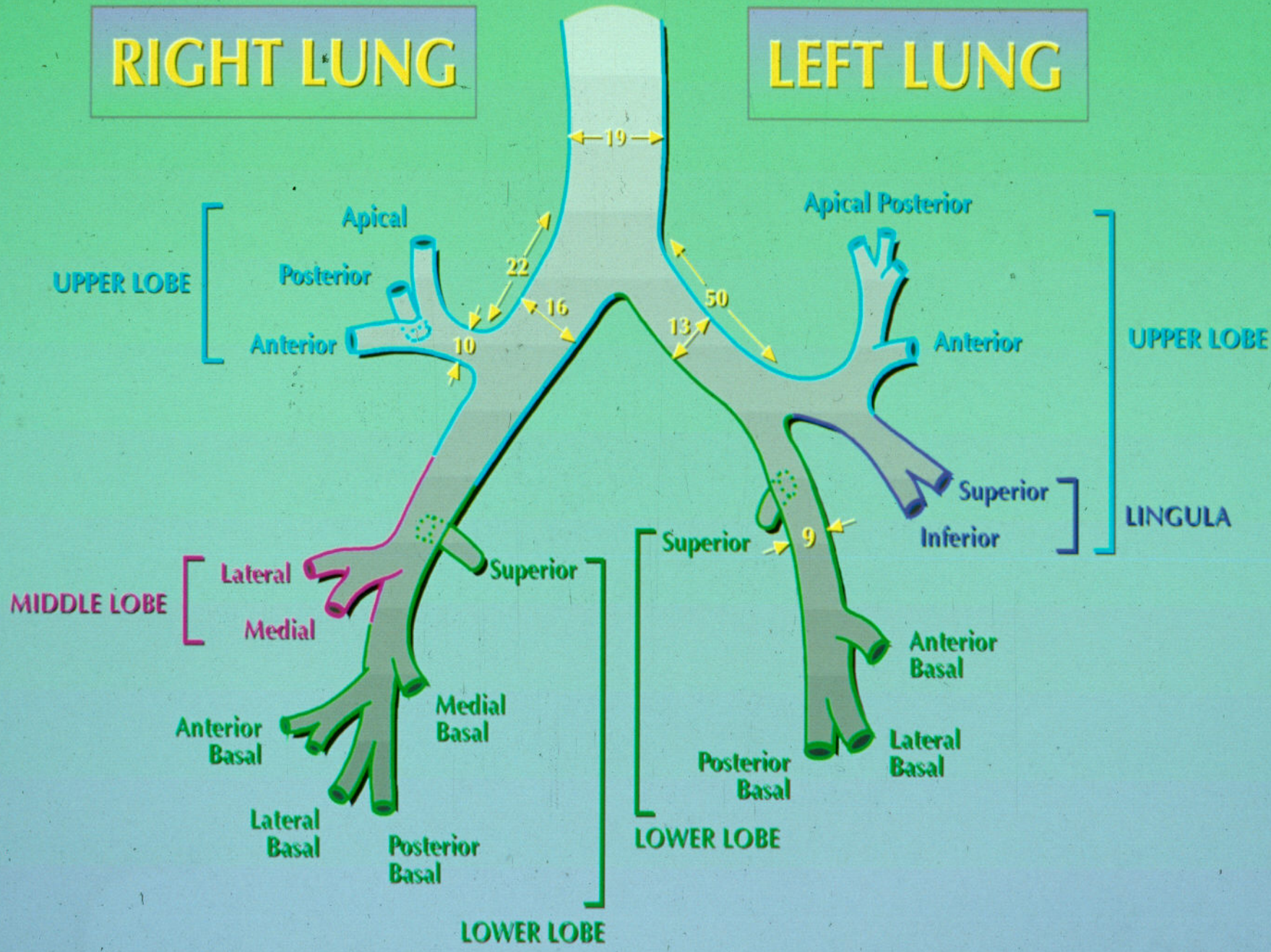
Bronchial Blocker compared to Double-lumen tube during VATS

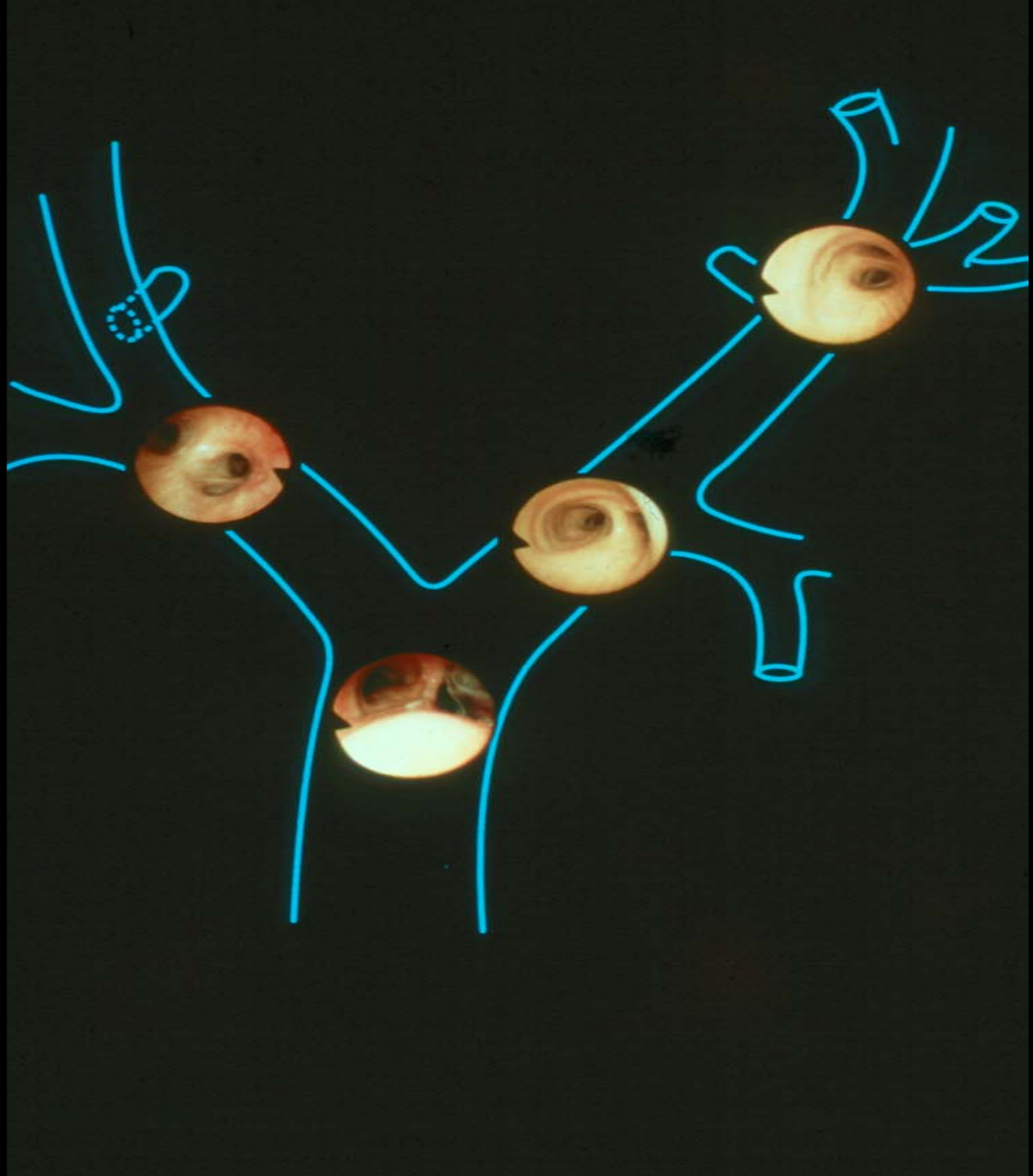
Bauer C, et al. Acta Anaesth Scand 45: 250, 2001

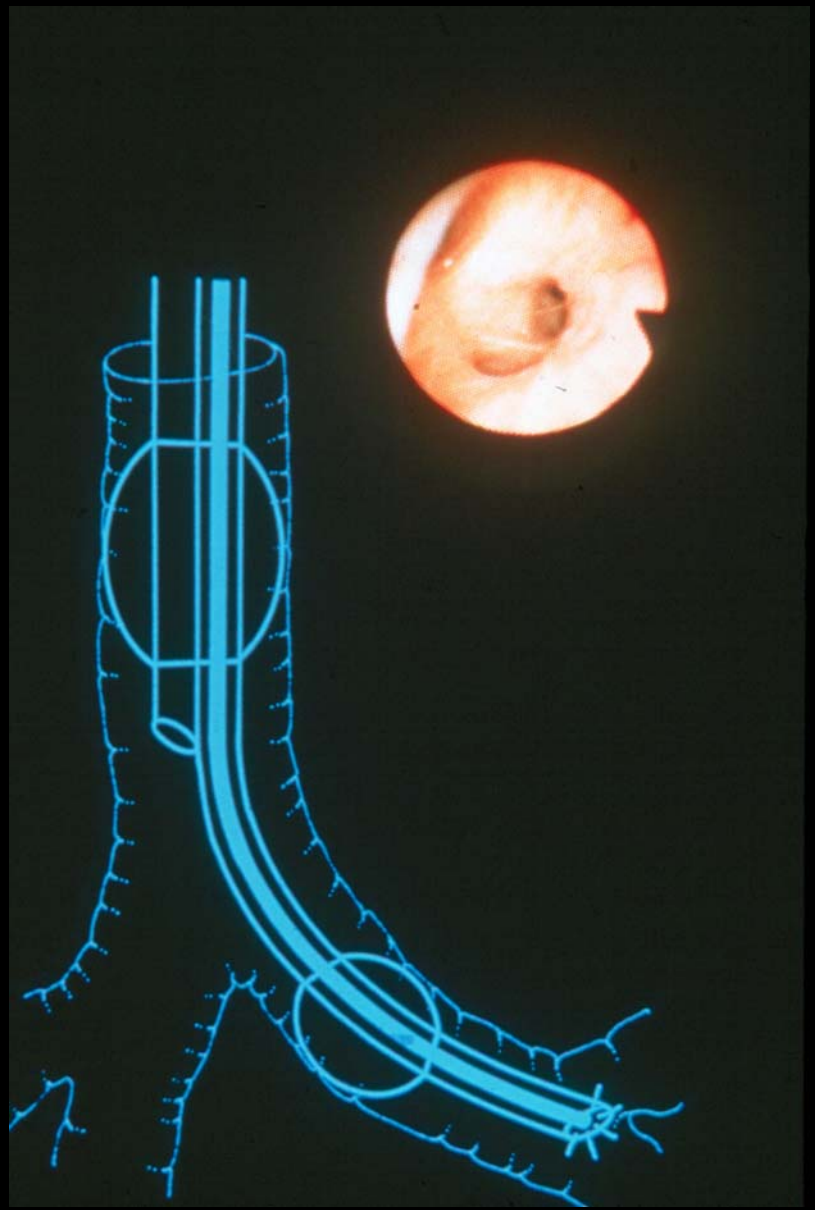
Method	Time for Placement	Placement Failure	Satisfactory Deflation
DLT	2.3 min.	1/16	16/16
Left BB	4.2	3/10	10/10
Right BB	2.4	0/9	5/9

The ABC's of Lung Isolation:

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


RIGHT LUNG
LEFT LUNG
19
22
16
10
50
13
9
UPPER LOBE
Apical
Posterior
Anterior
MIDDLE LOBE
Lateral
Medial
Superior
Anterior Basal
Medial Basal
Lateral Basal
Posterior Basal
LOWER LOBE
Apical Posterior
Anterior
UPPER LOBE
Superior
Inferior
LINGULA
Superior
Anterior Basal
Lateral Basal
Posterior Basal
LOWER LOBE





38% Incidence of major malpositions of Double-lumen Tubes and Blockers

"The most critical factor in successful placement was the anesthesiologist's knowledge of endoscopic bronchial anatomy"

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

The ABC's of Lung Isolation:

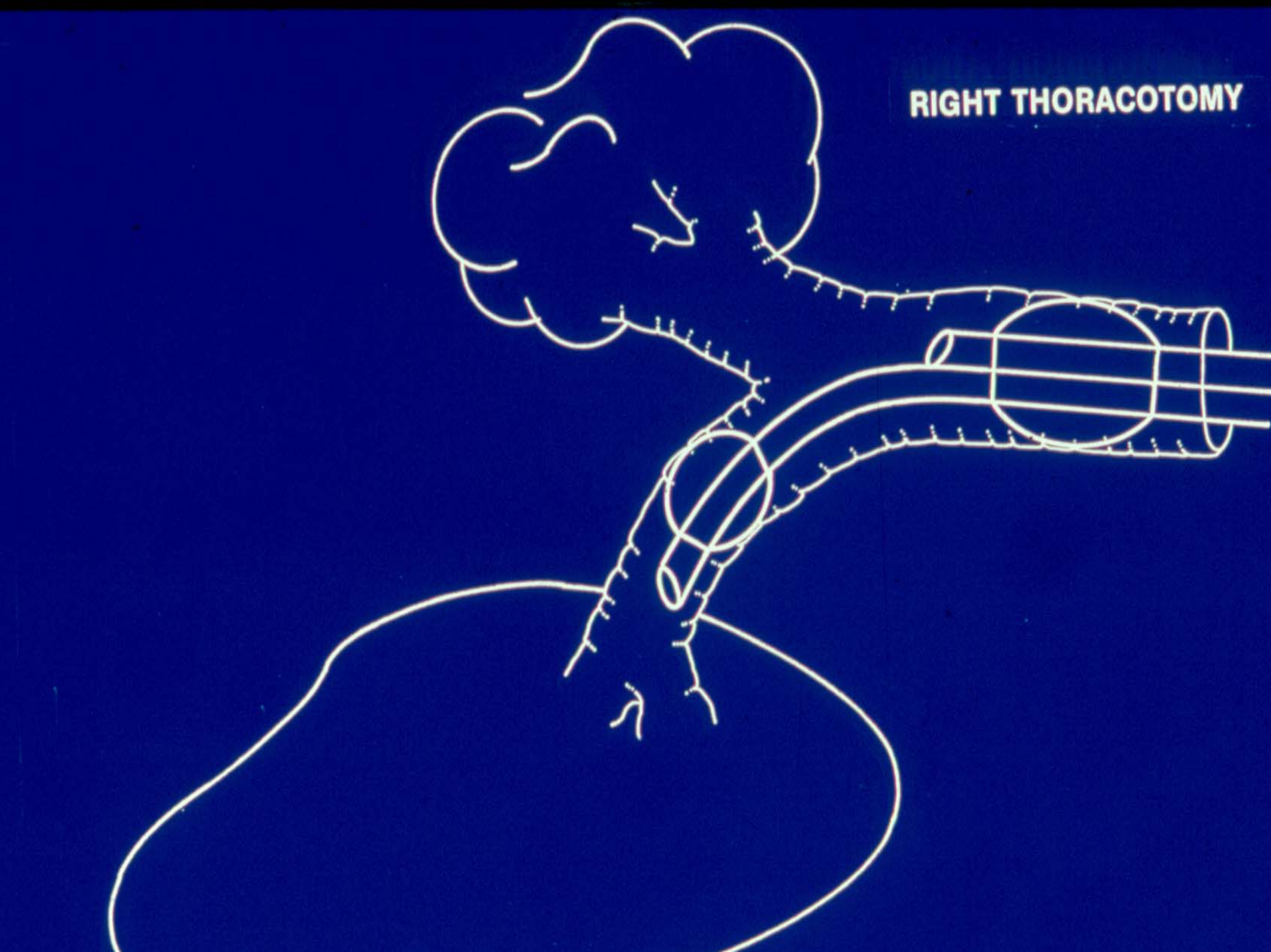
- Anatomy
- Bronchoscope
- Chest X-ray, CT Scan

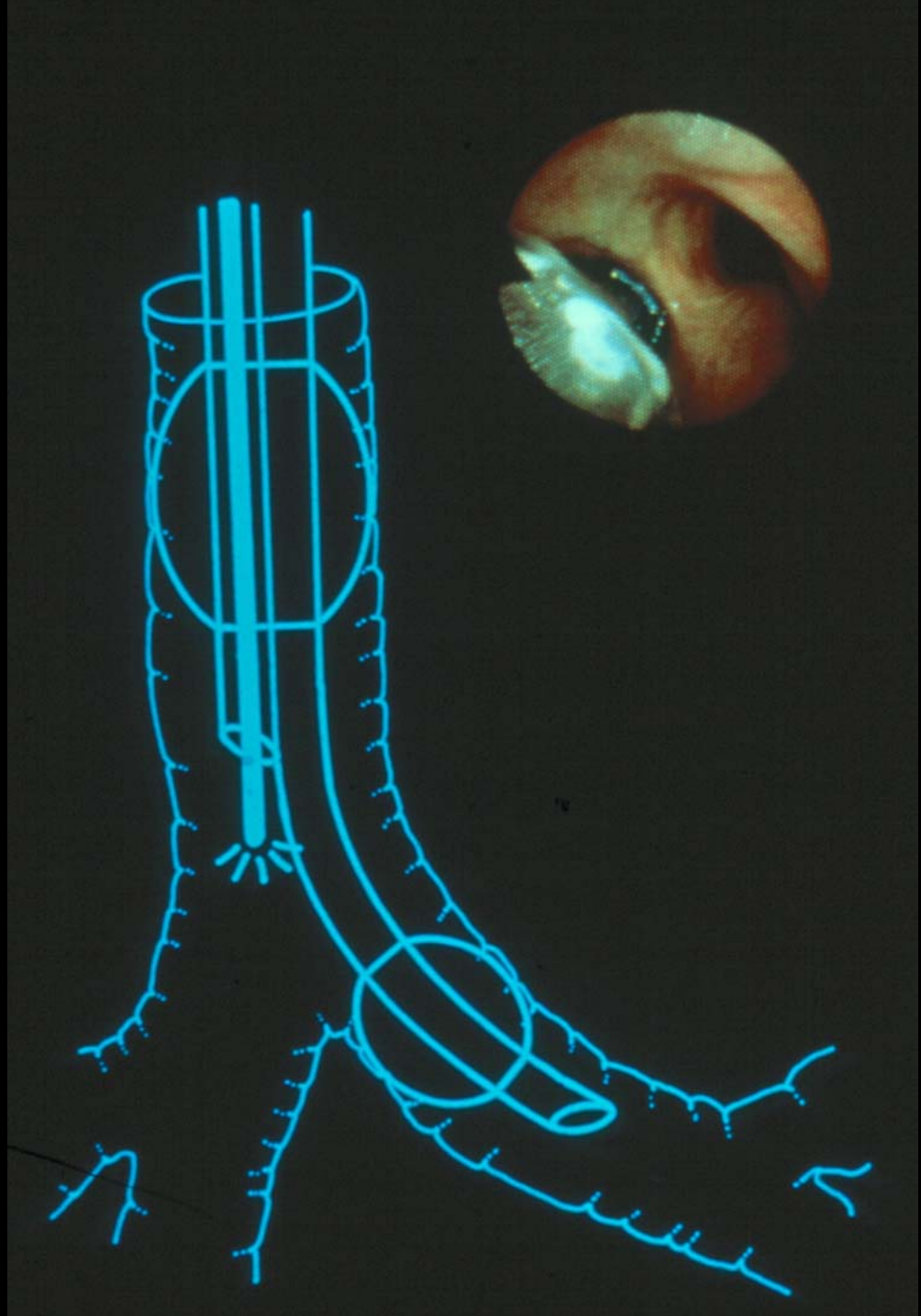
Left double-lumen tubes
Clinical experience with 1,170 patients.

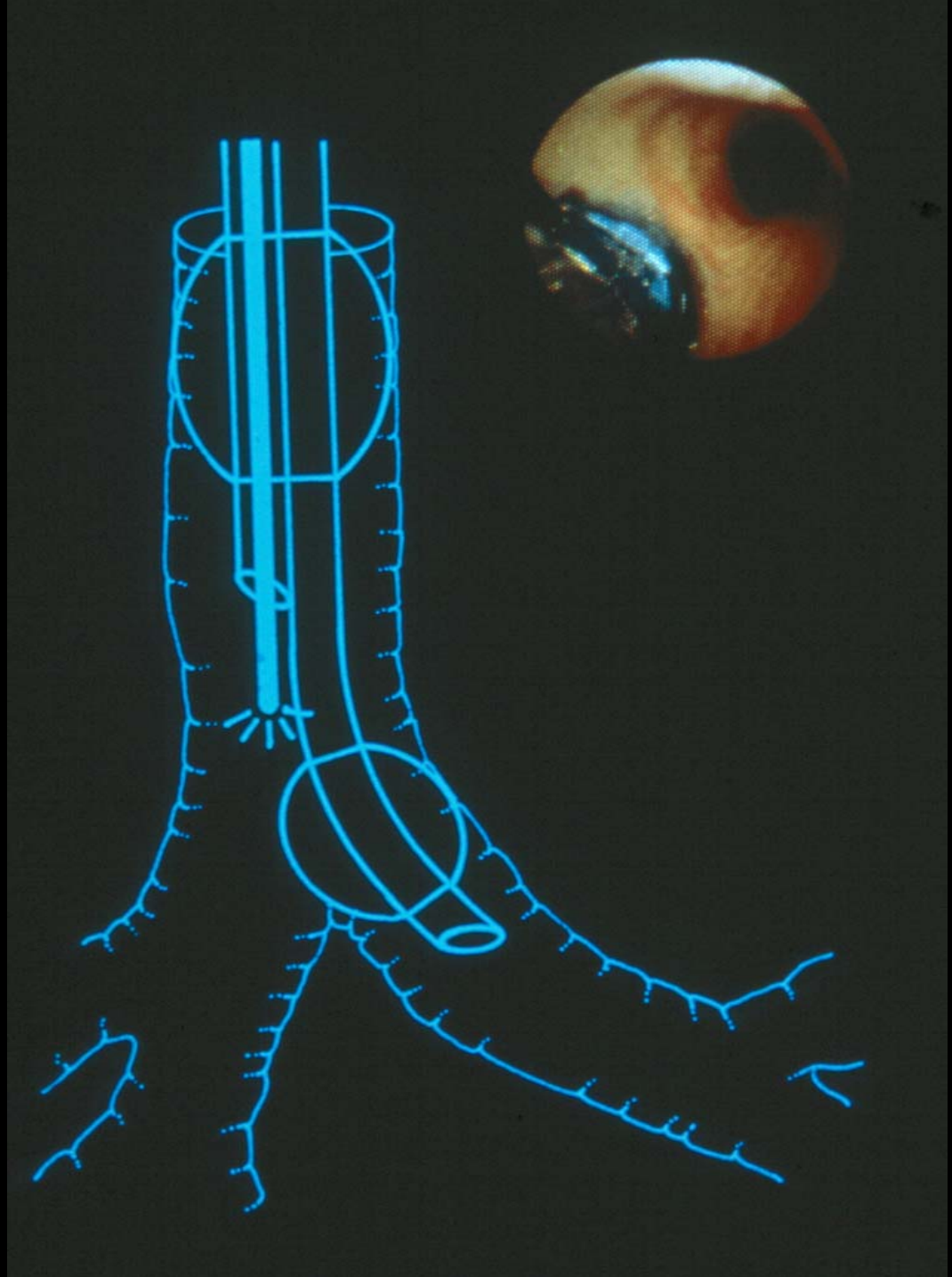
- **Positioning of DLTs with auscultation and observation of chest wall movement**

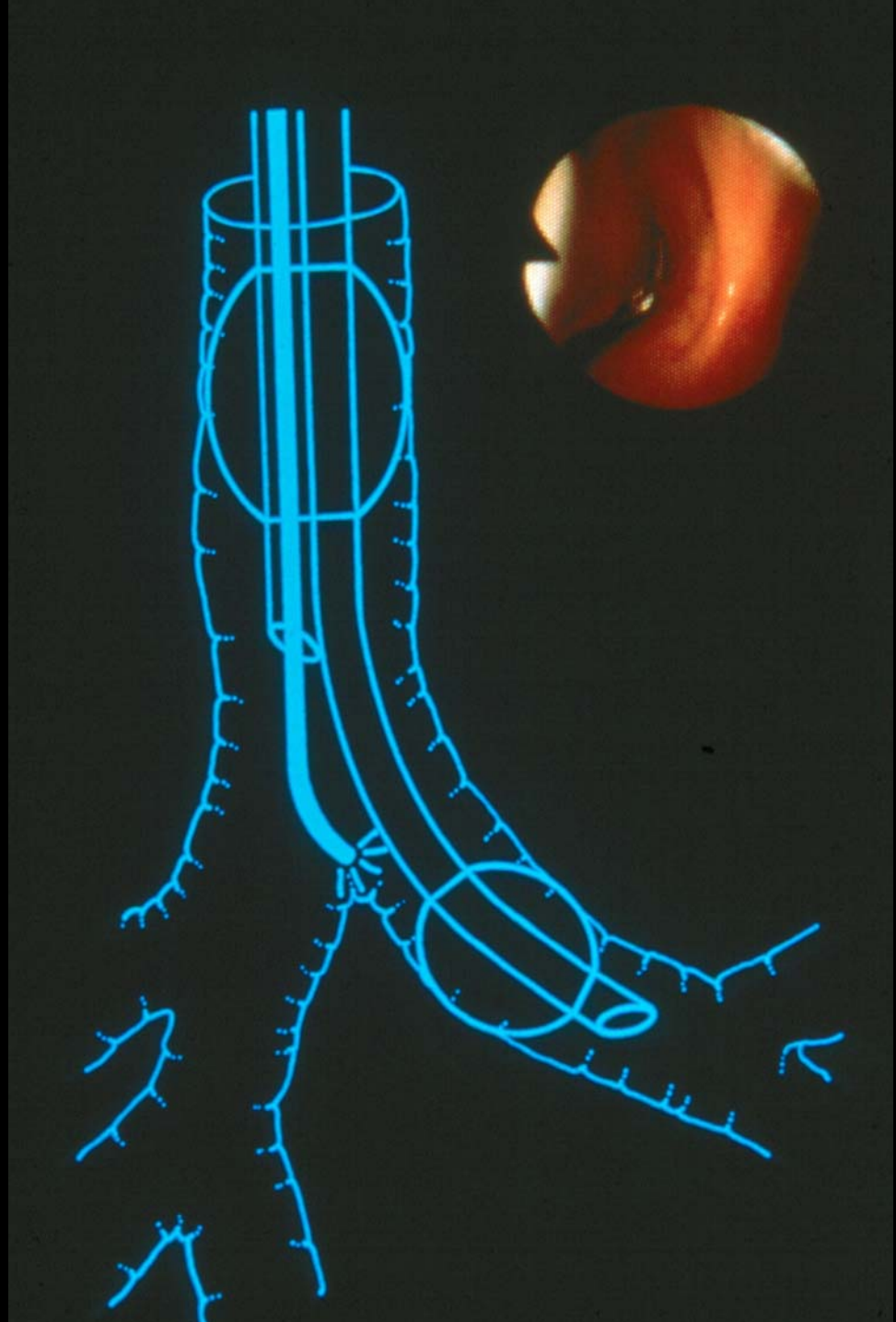
- **“The authors find bronchoscopy unnecessary in the majority of patients and do not use it routinely.”**

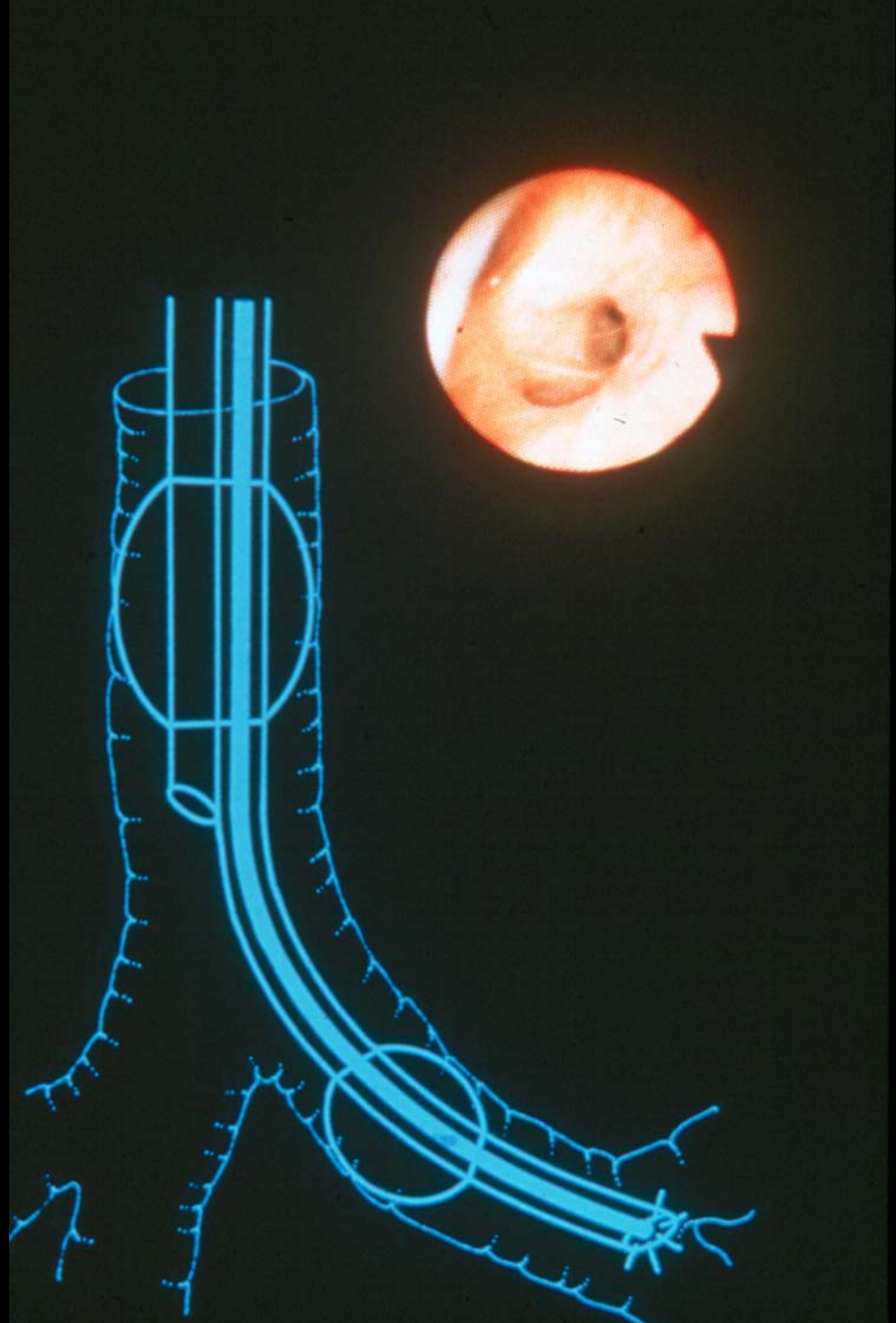
Brodsky JB, Lemmens HJM.
J Cardiothorac Vasc Anesth 2003;17:289-98

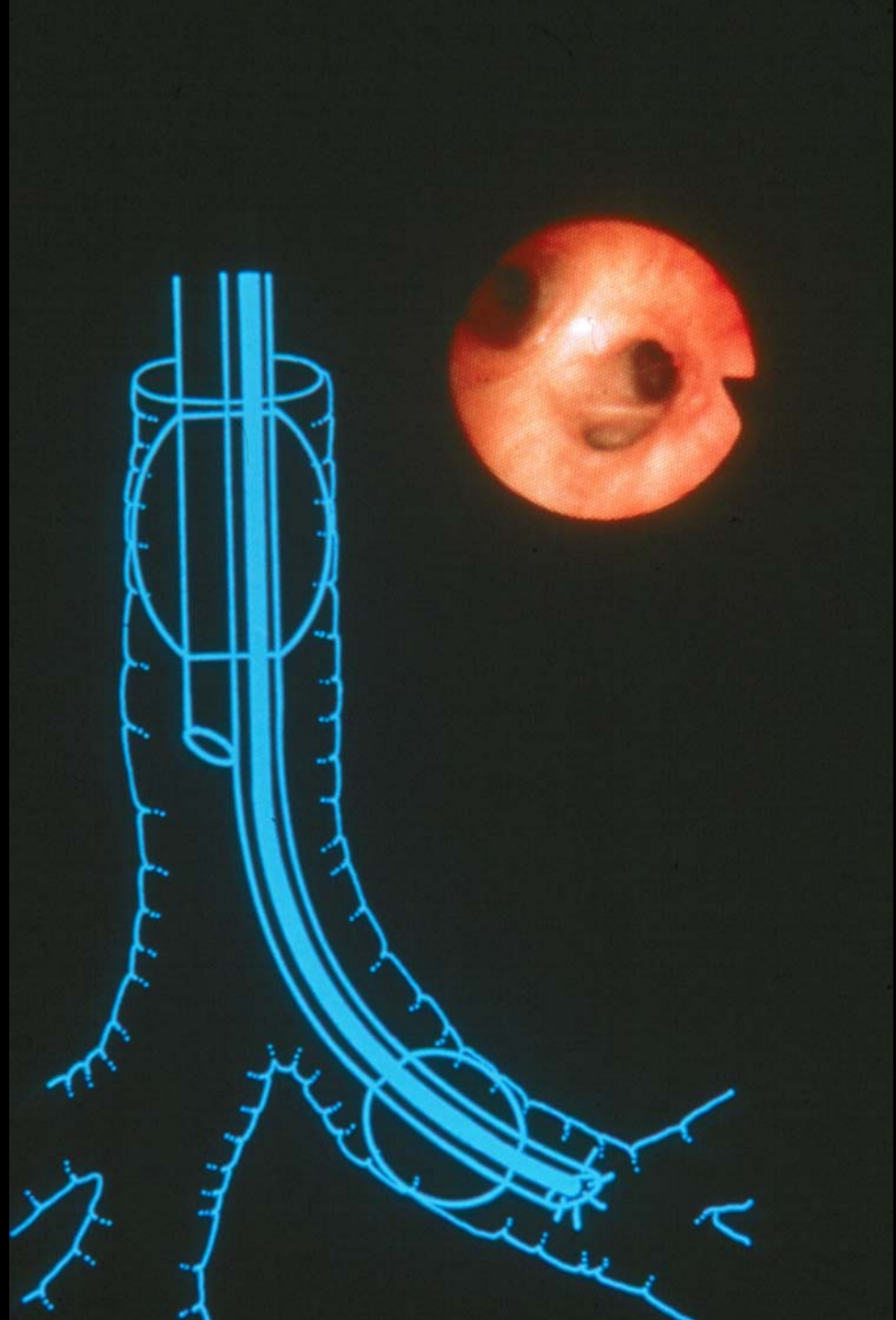

RIGHT THORACOTOMY







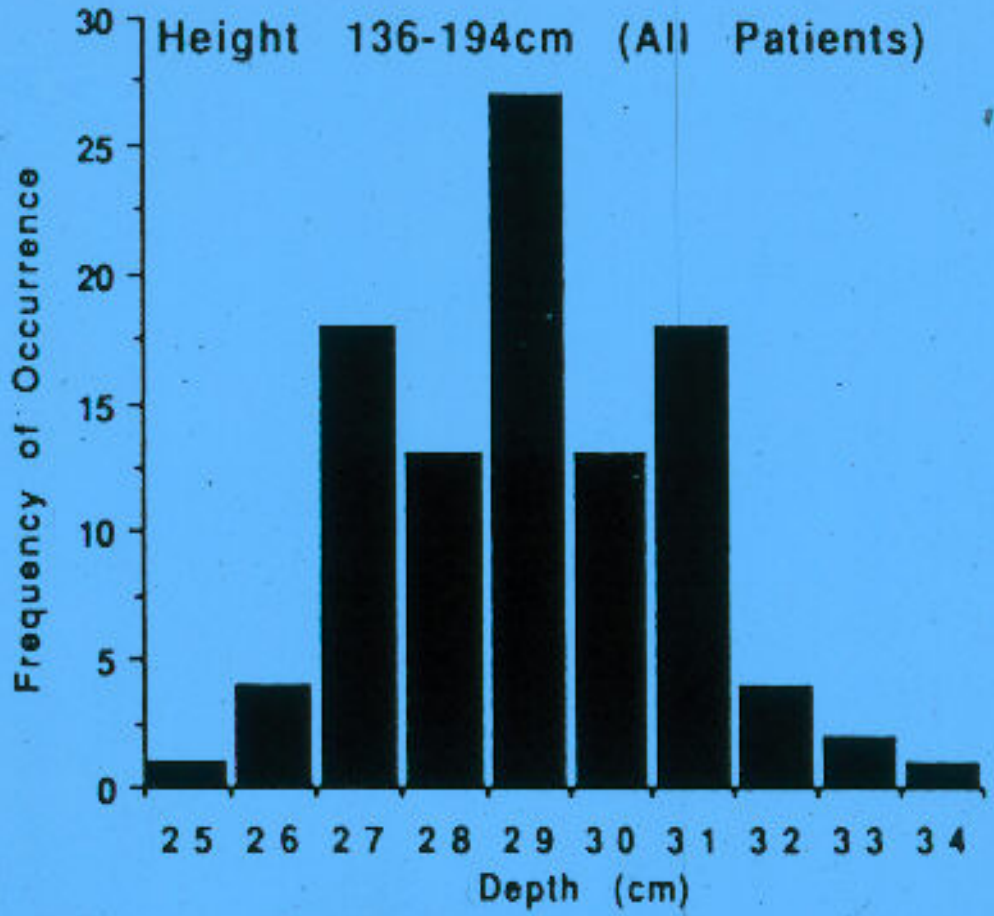




Double-lumen Tubes:

? Placement Technique

? Size



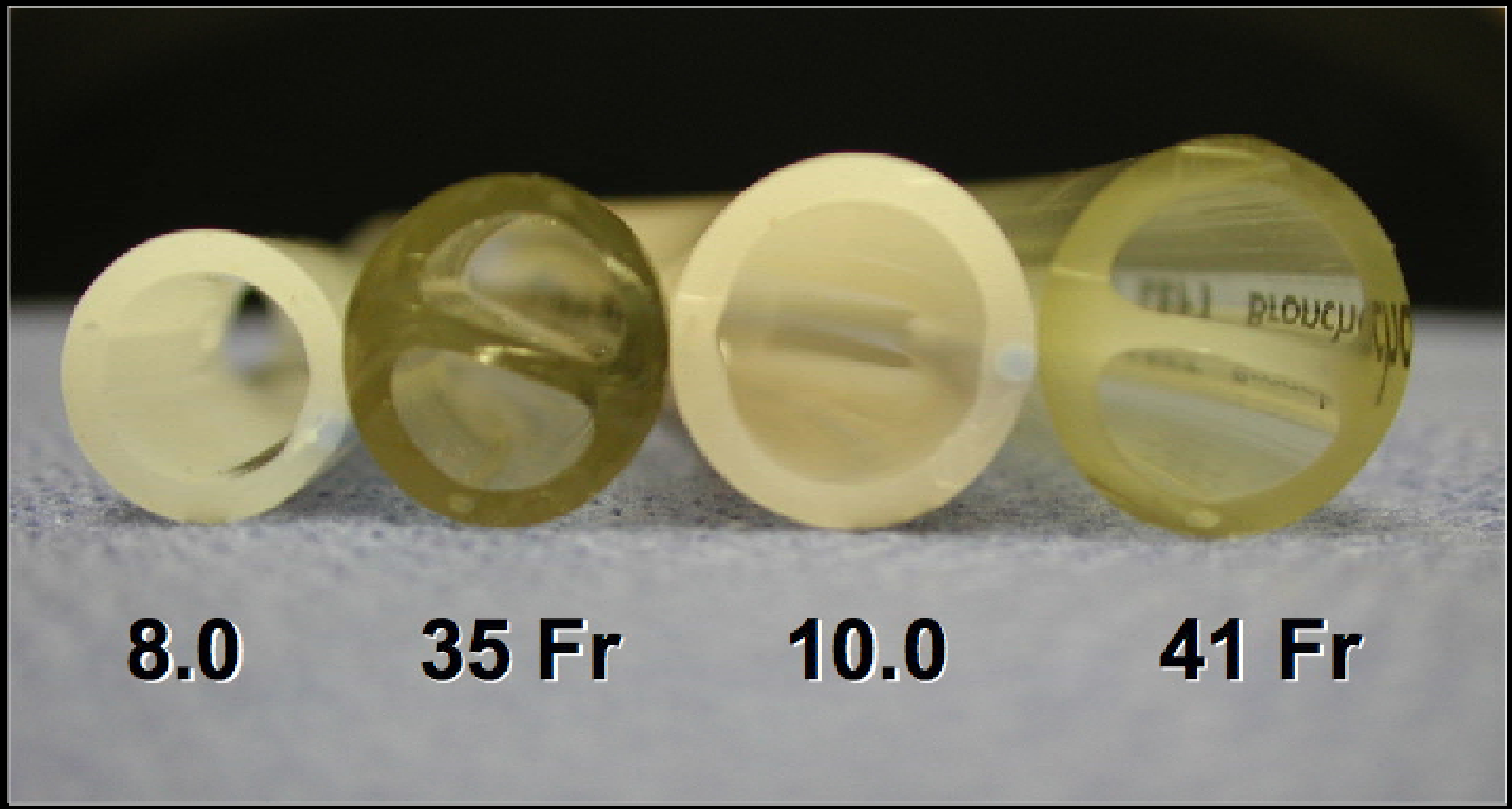
Brodsky JB, et al
Anesth Analg 73:570, 1991

Double-lumen Tubes:

? Placement Technique

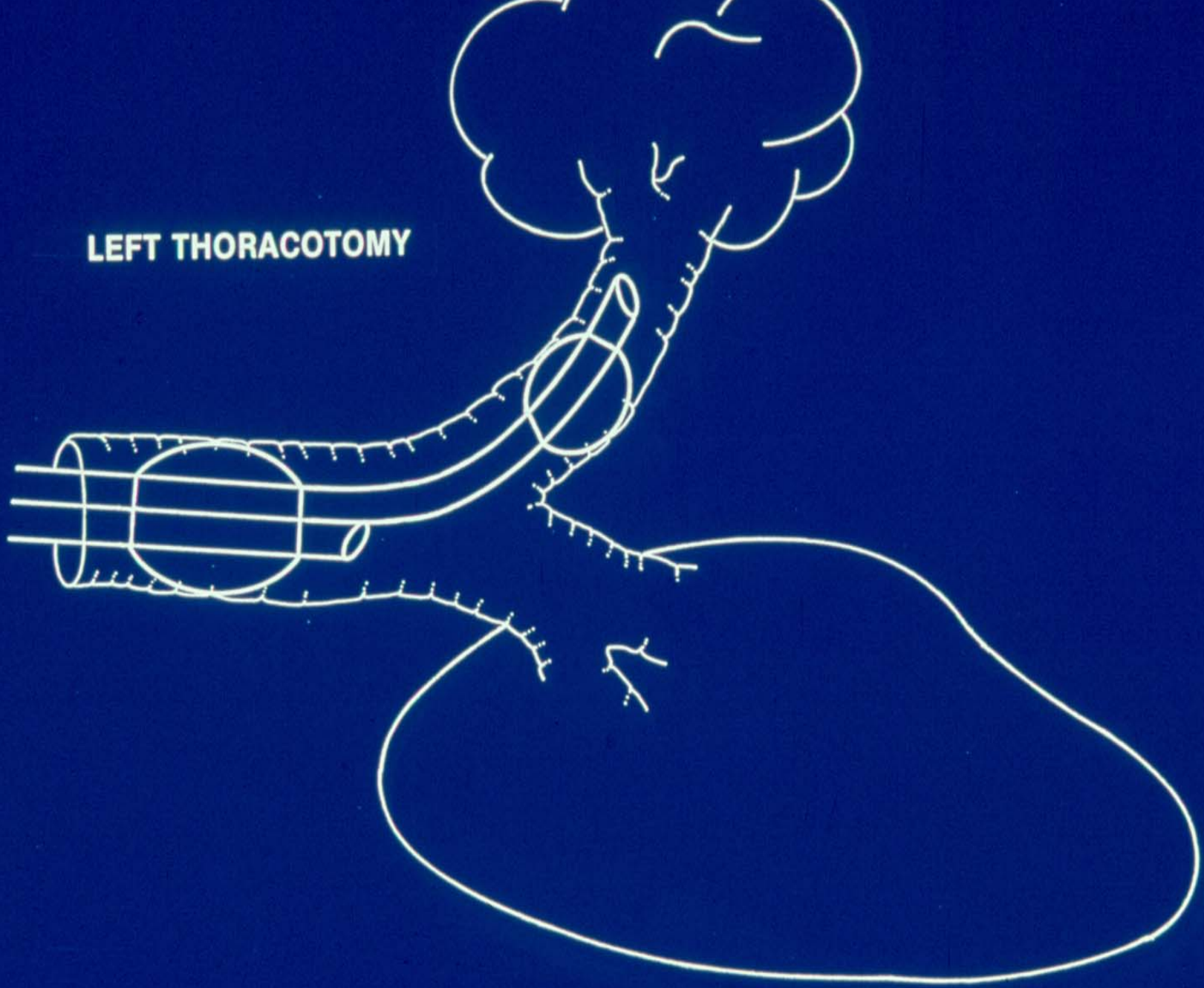
? Size

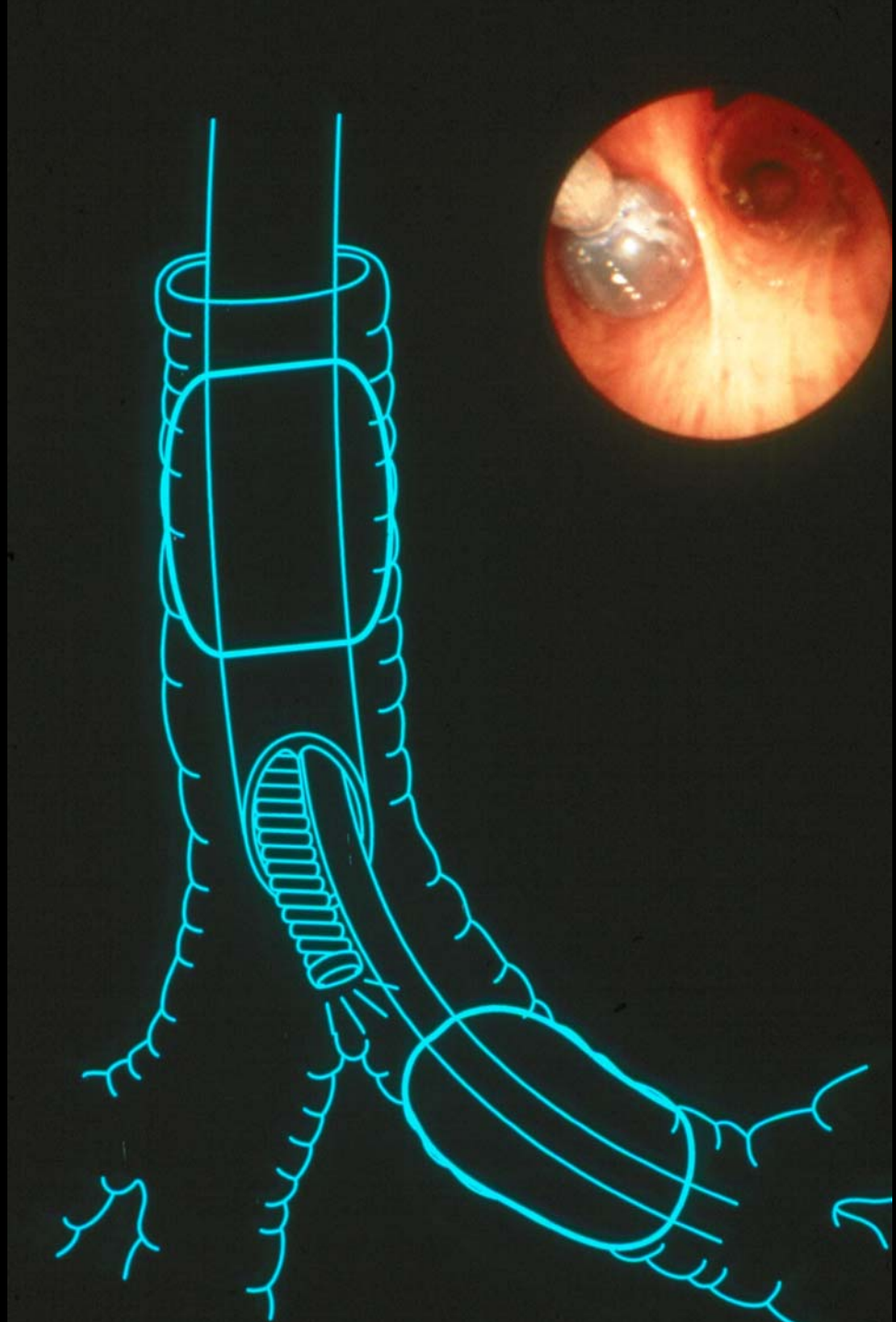
Single- vs. Double-Lumen Tubes in Cross-Section

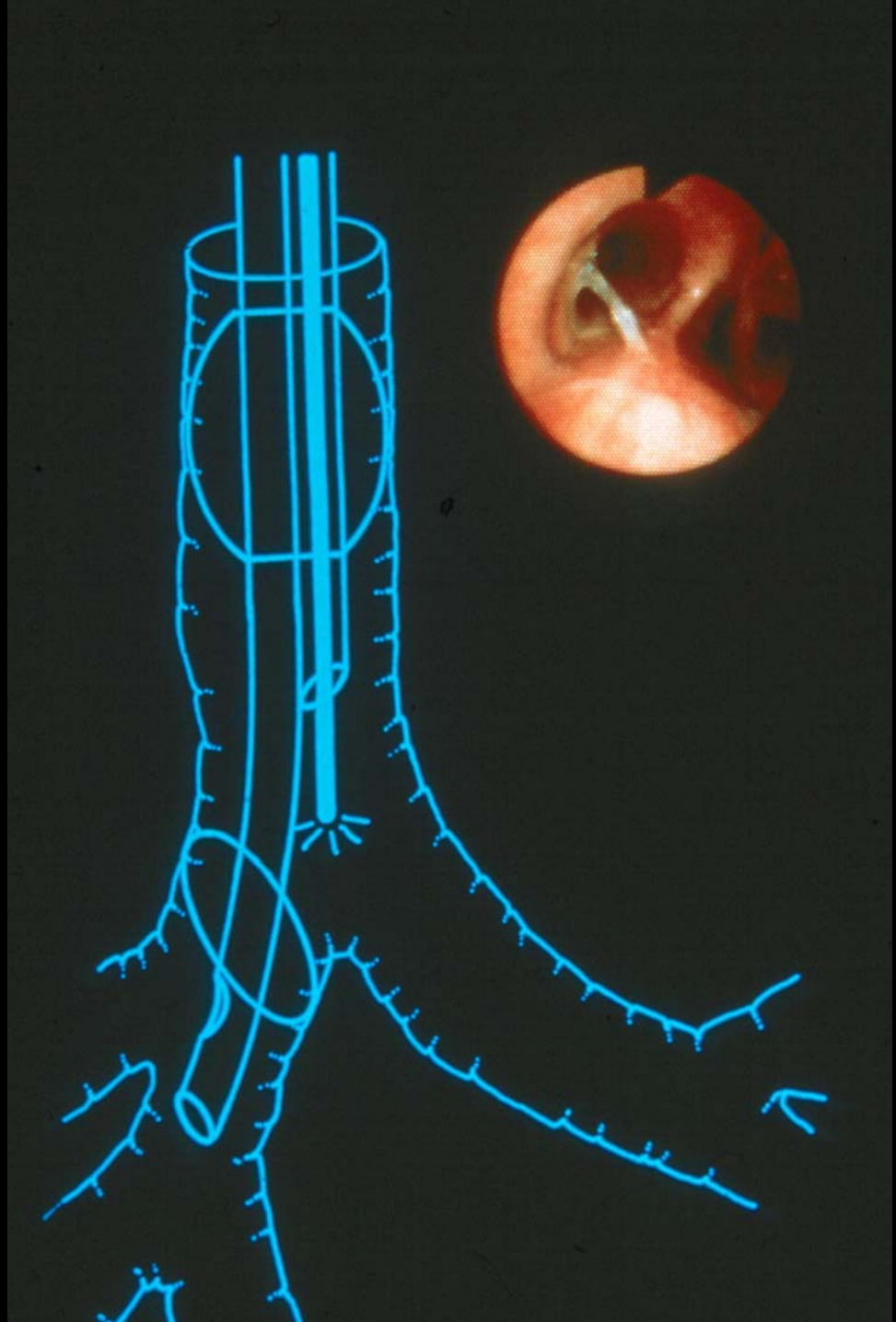


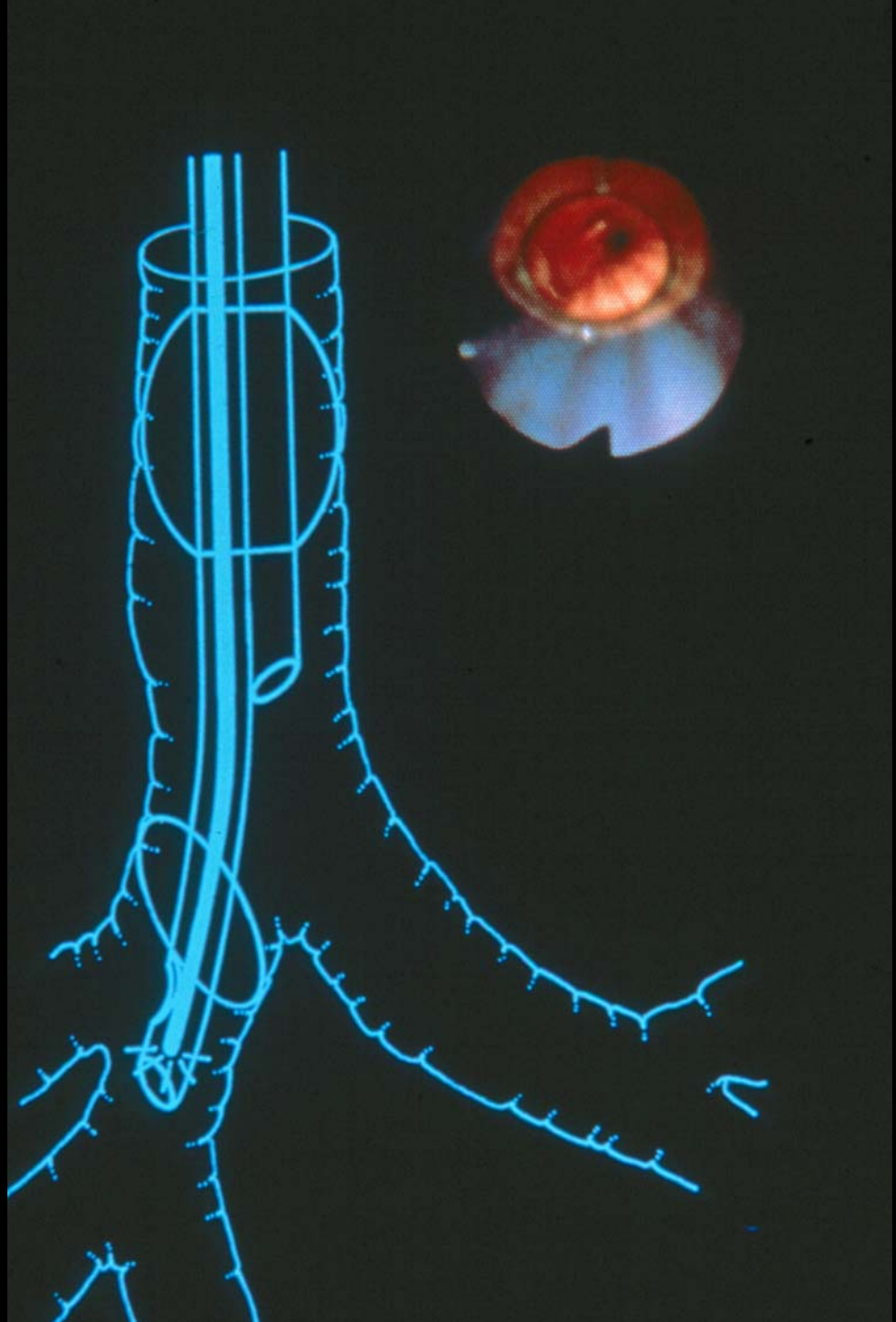
Suggested Sizes for Double-lumen Tubes:

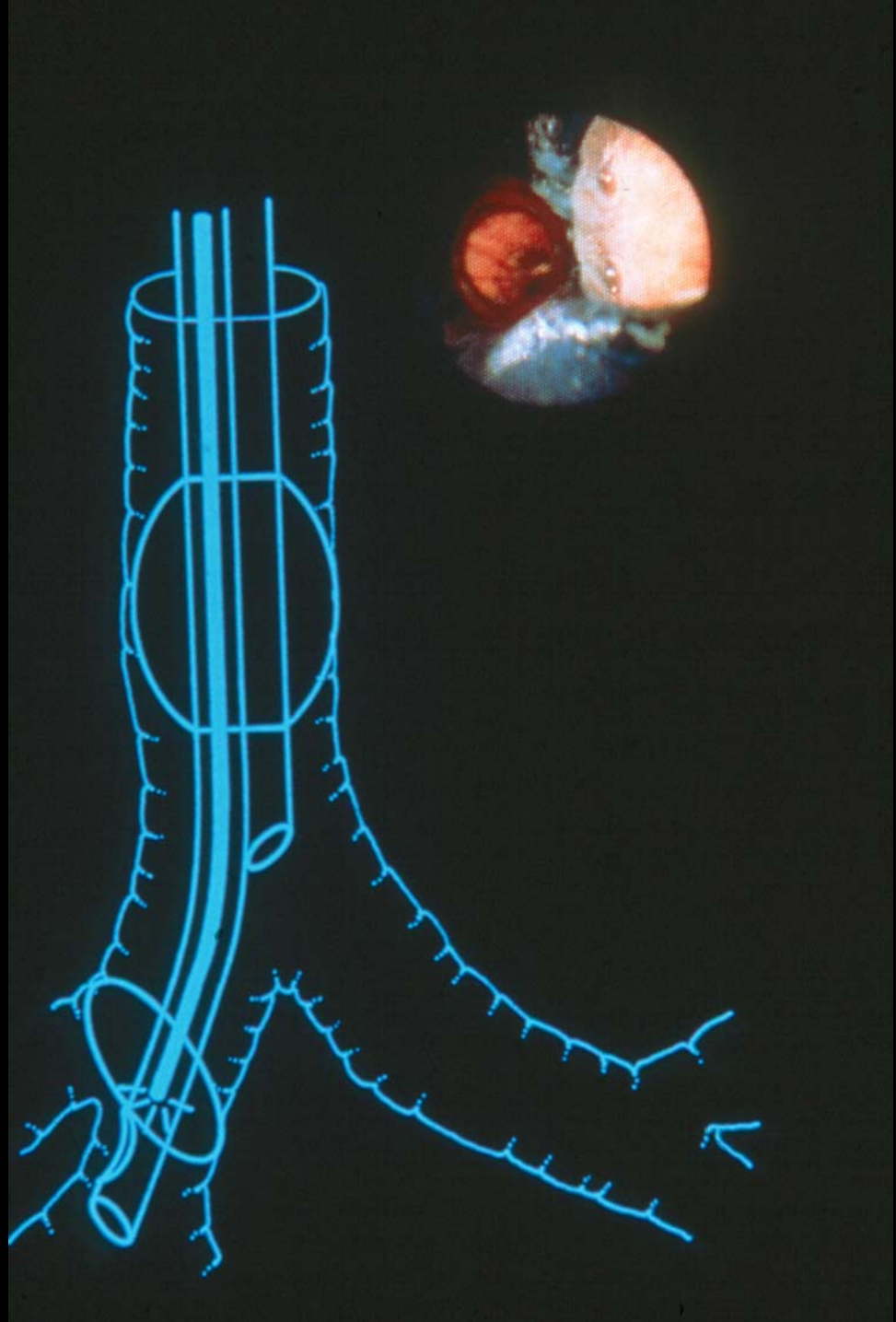
Sex	Height	Size of Tube (Fr.)
Female	< 160cm (63in)	35
Female	≥ 160cm	37
Male	< 170cm (67in)	39
Male	≥ 170cm	41

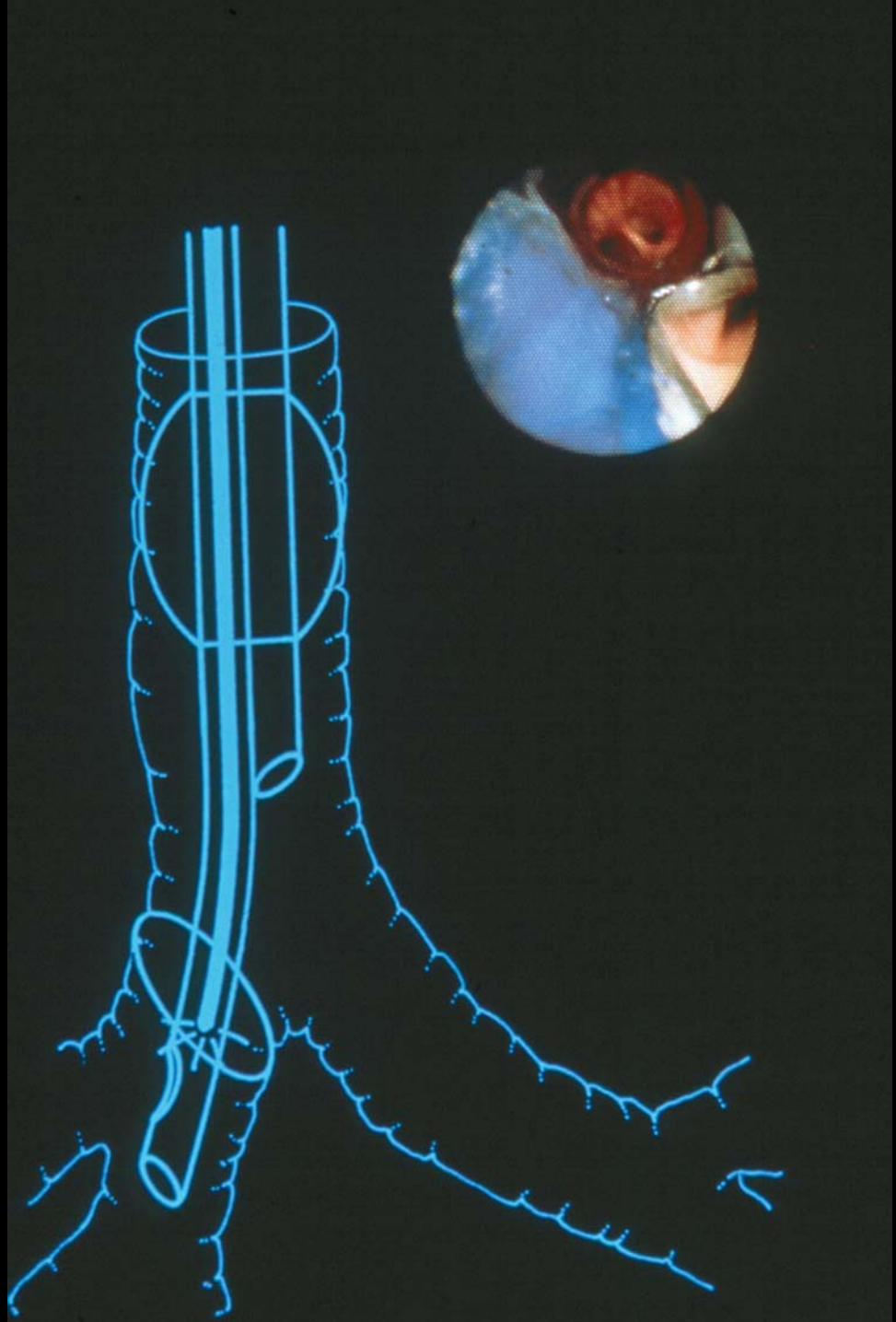

LEFT THORACOTOMY

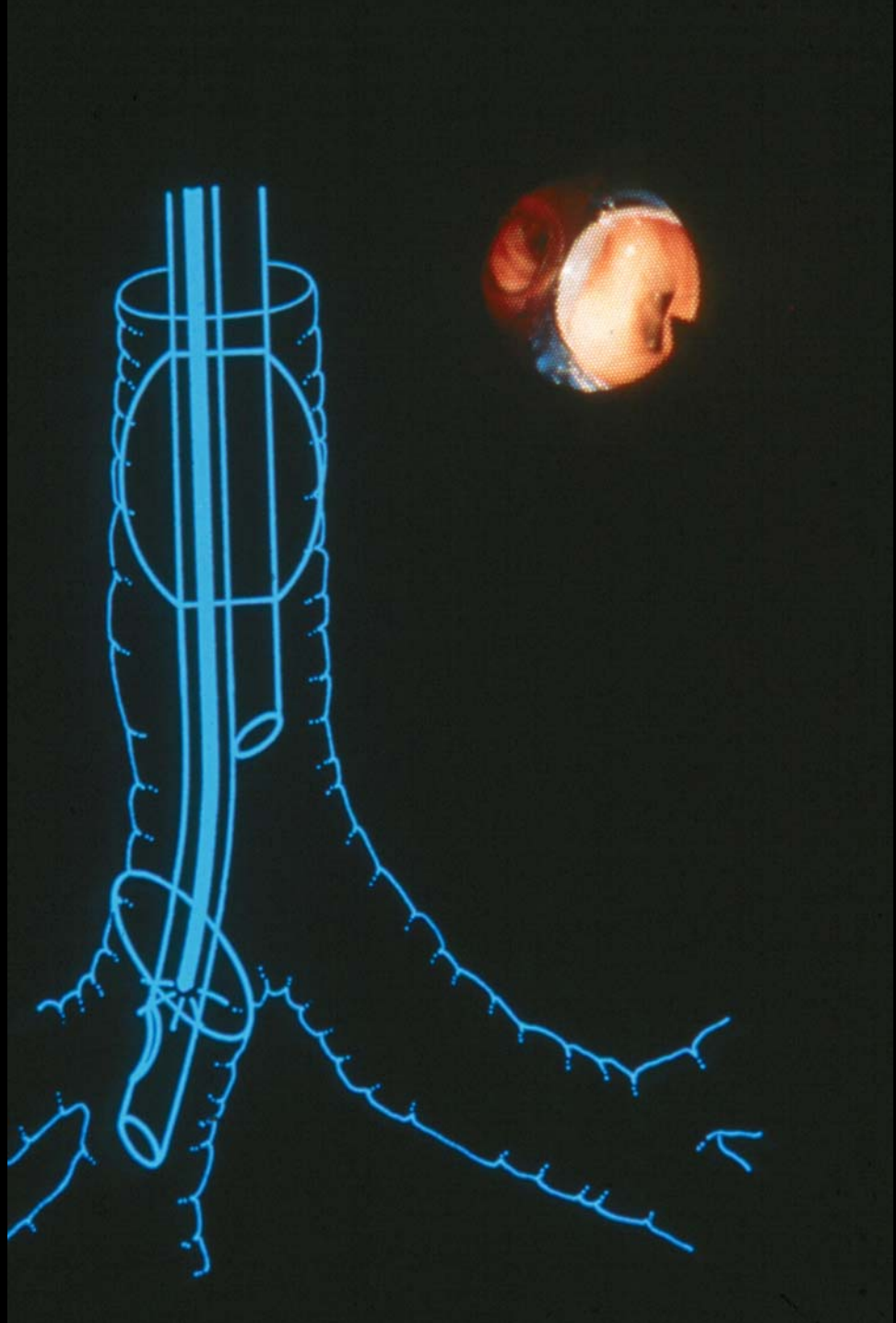




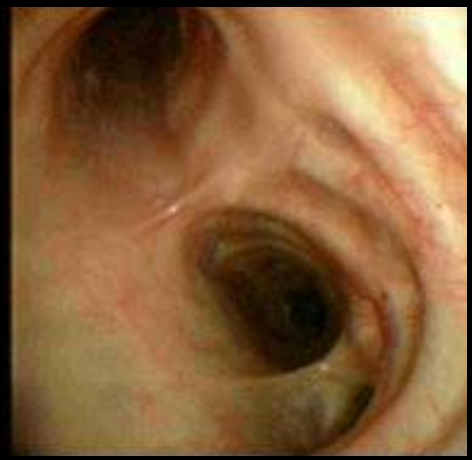
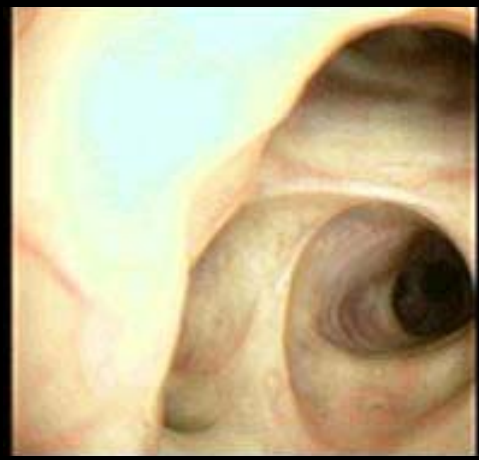








“Tracheal Bronchus”
High takeoff of Right UL Bronchus

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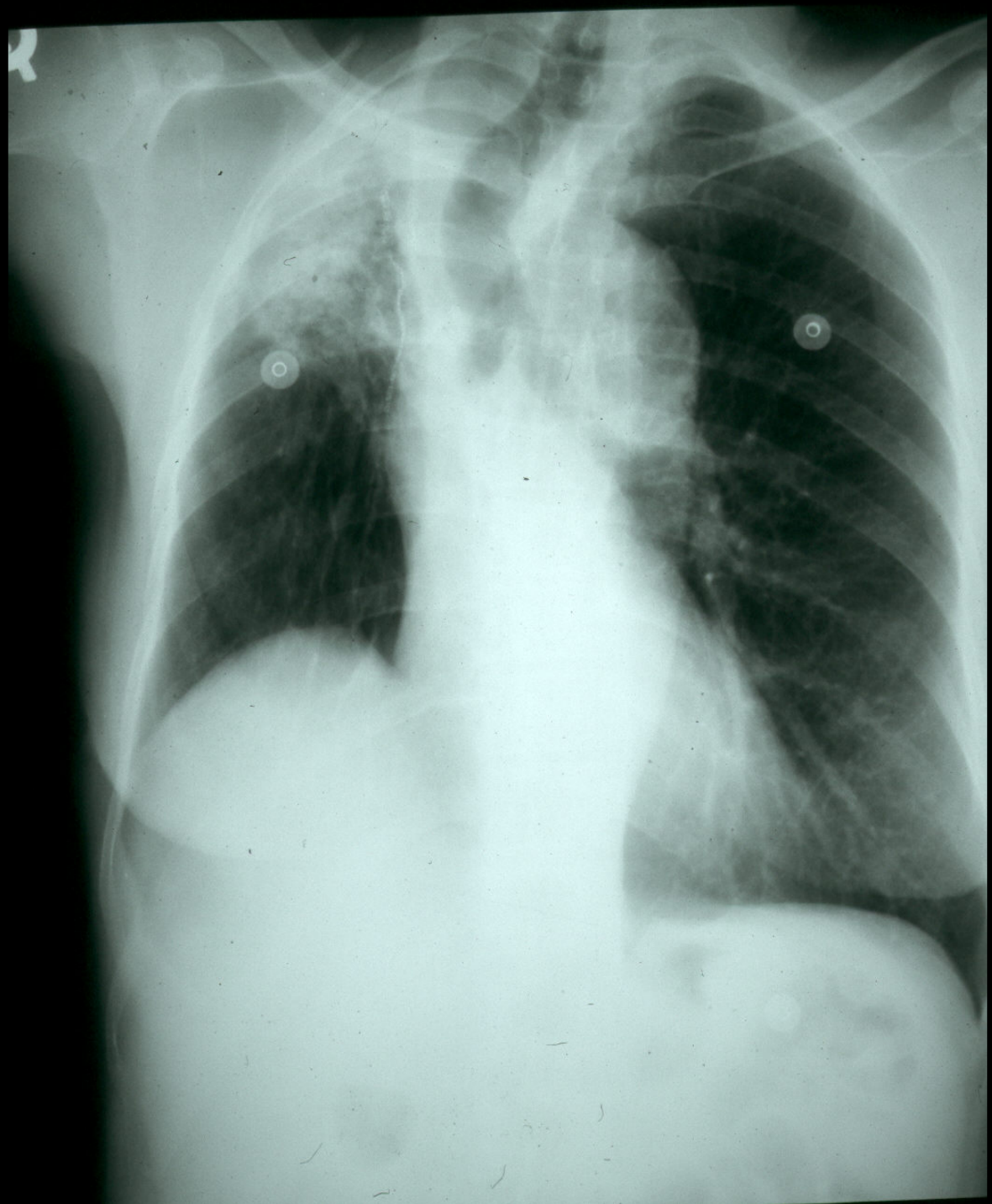
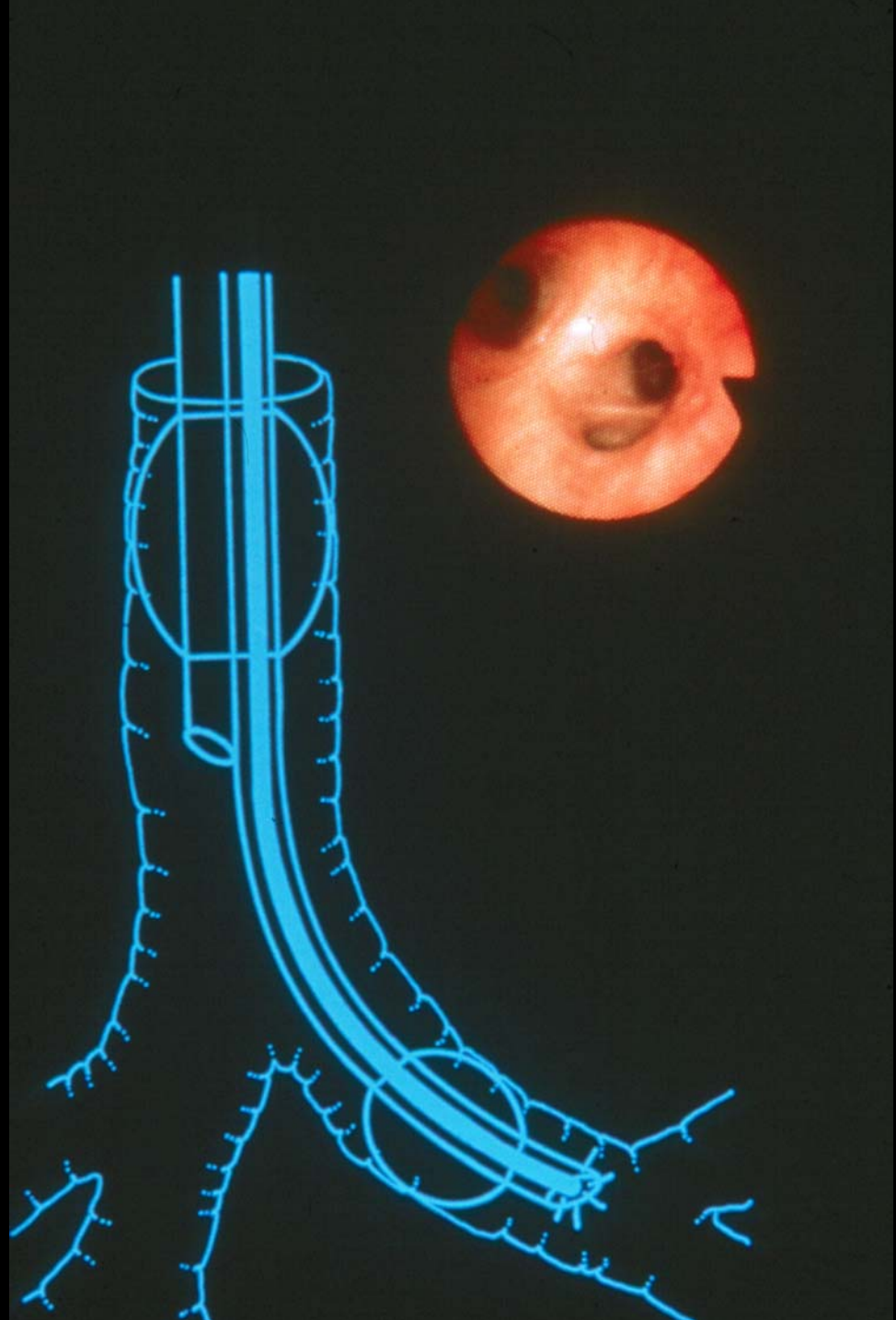
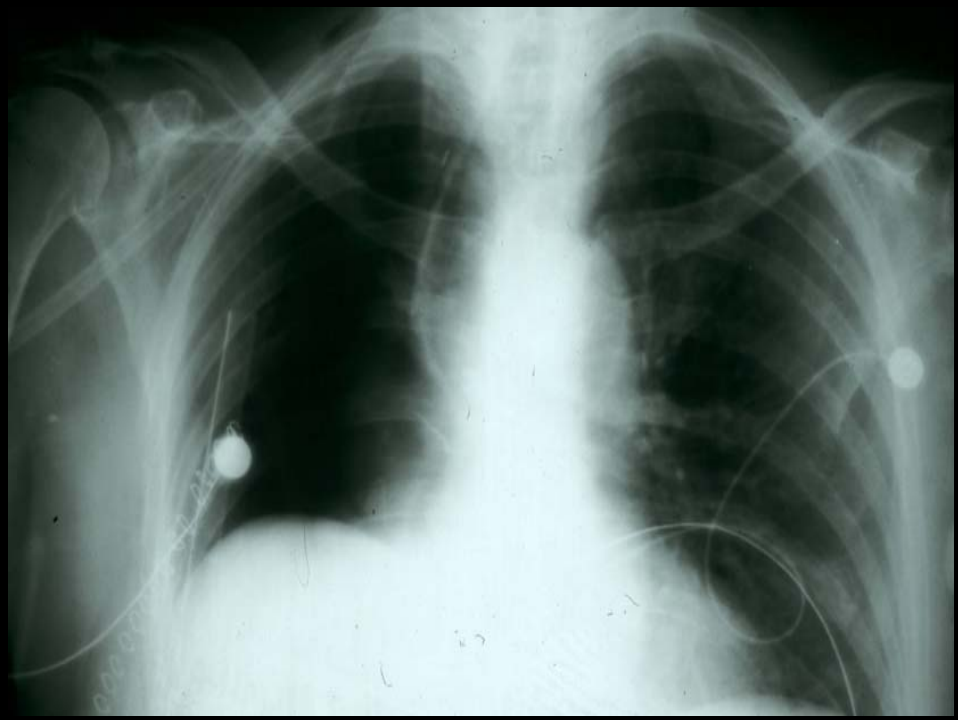
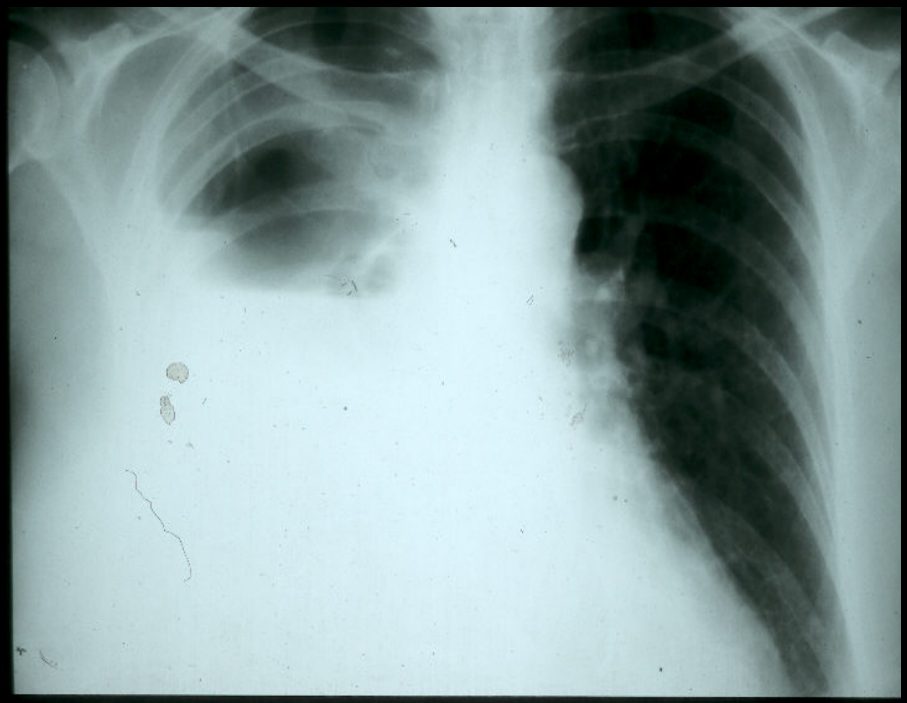




55 y.o. Female Post-op. R Pneumonectomy



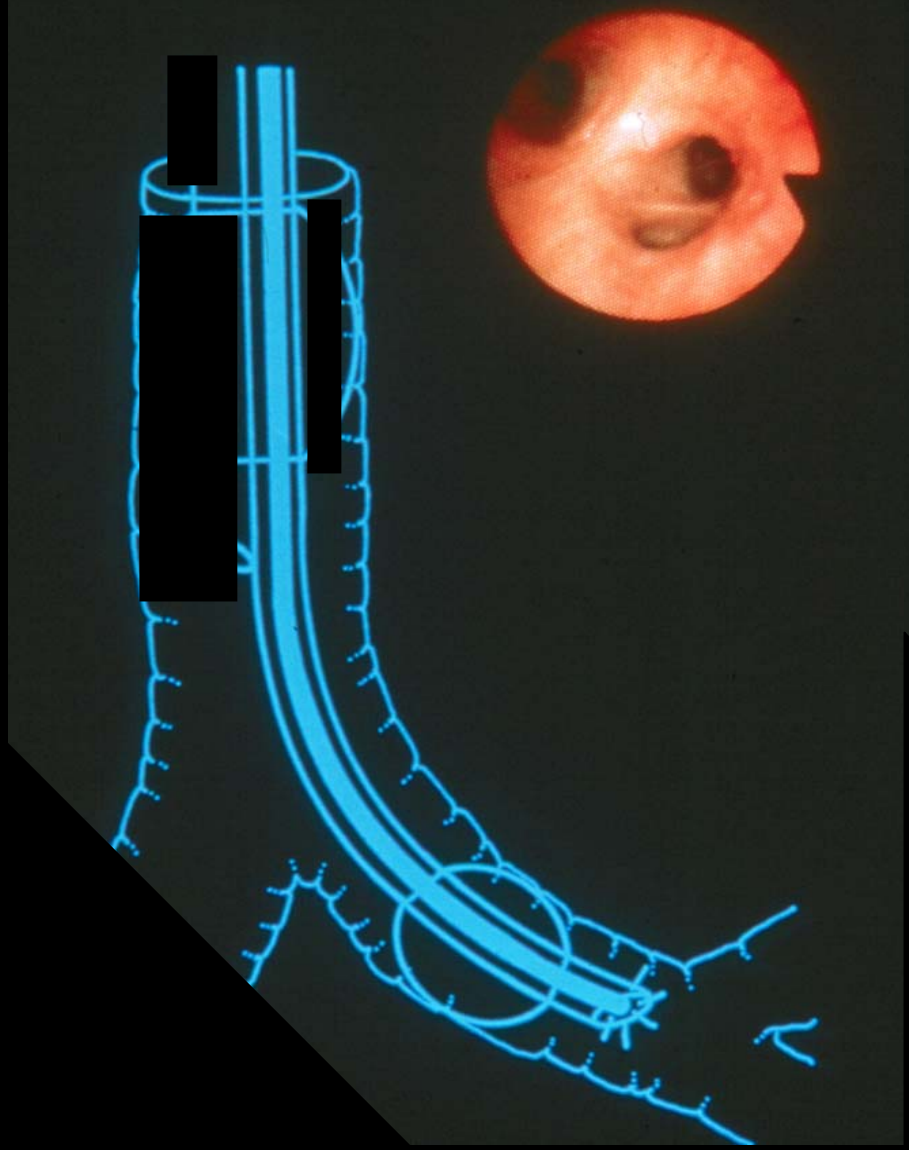
Post-op. Day 1

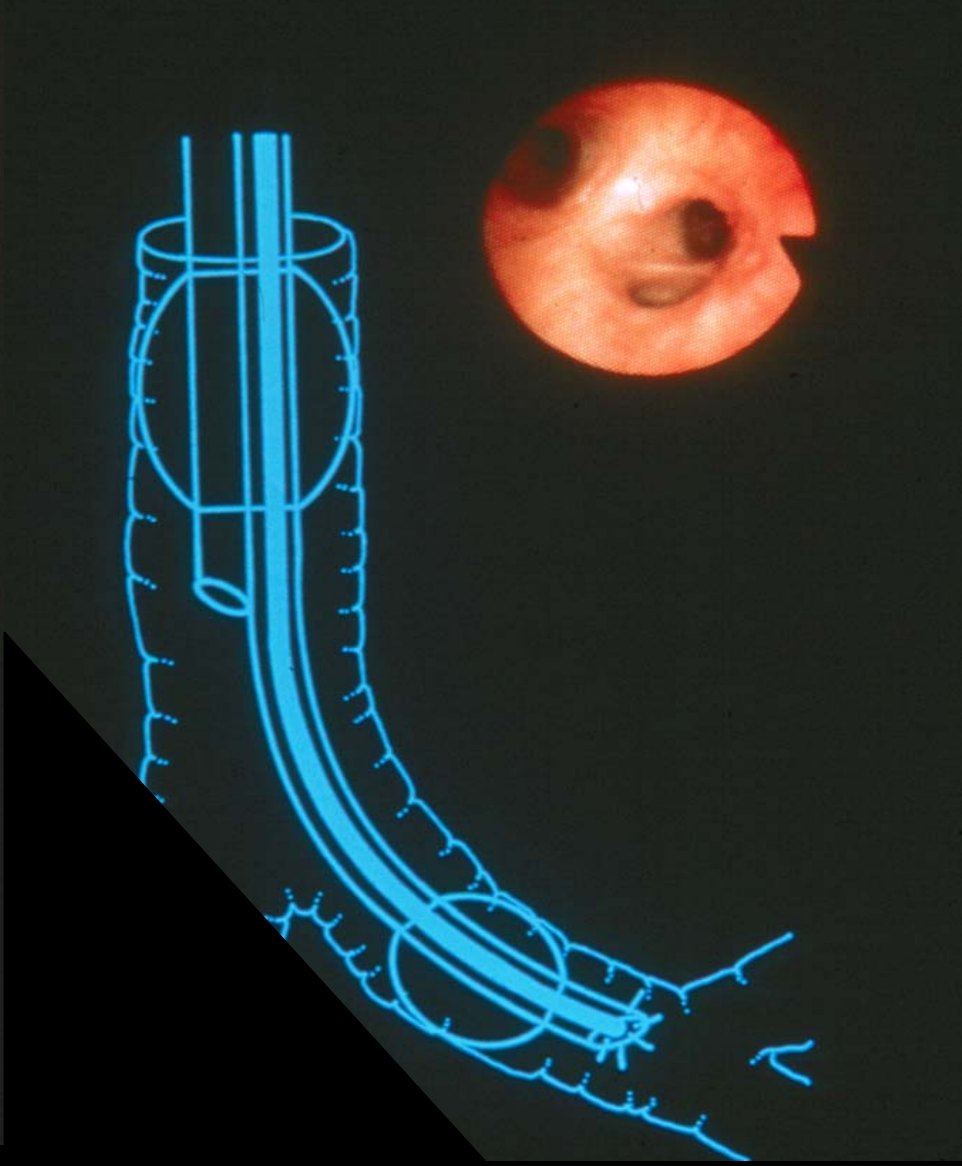


Post-op. Day 7

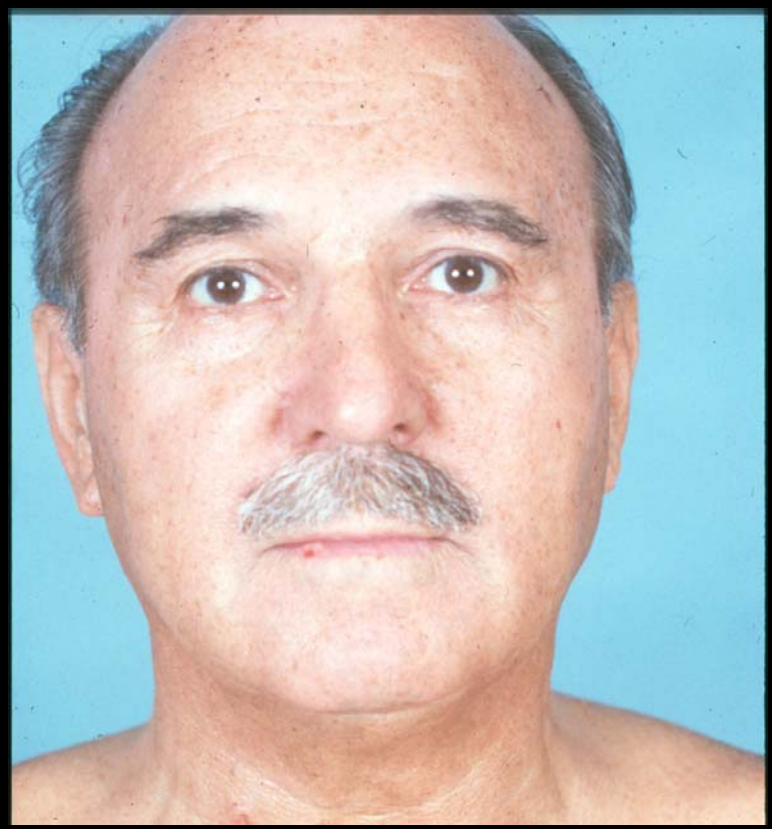
Single-lumen EBT

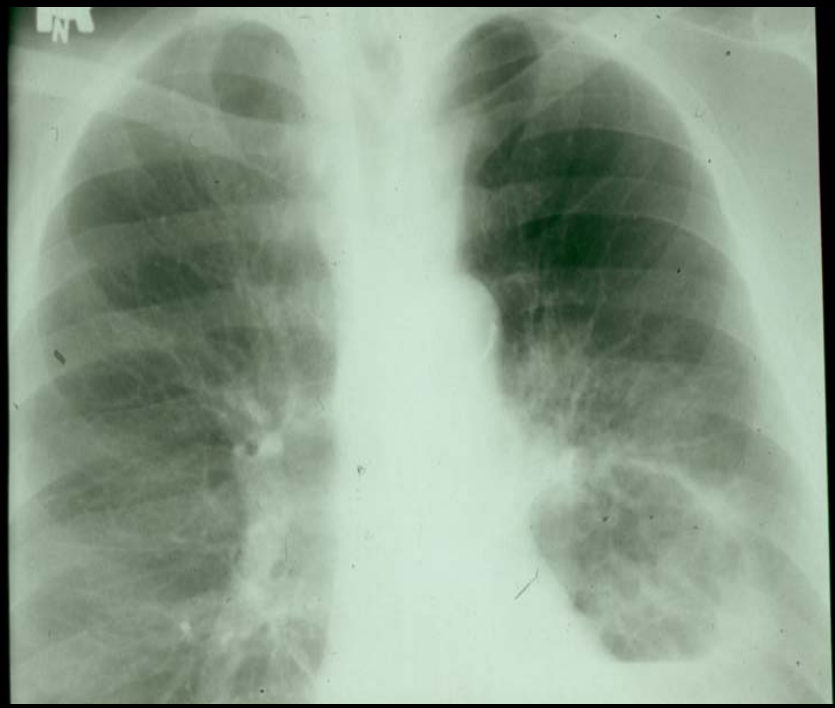
Double-lumen EBT





62 y.o. male, Left lower lobe Lung Cancer
Previous Failed Intubation



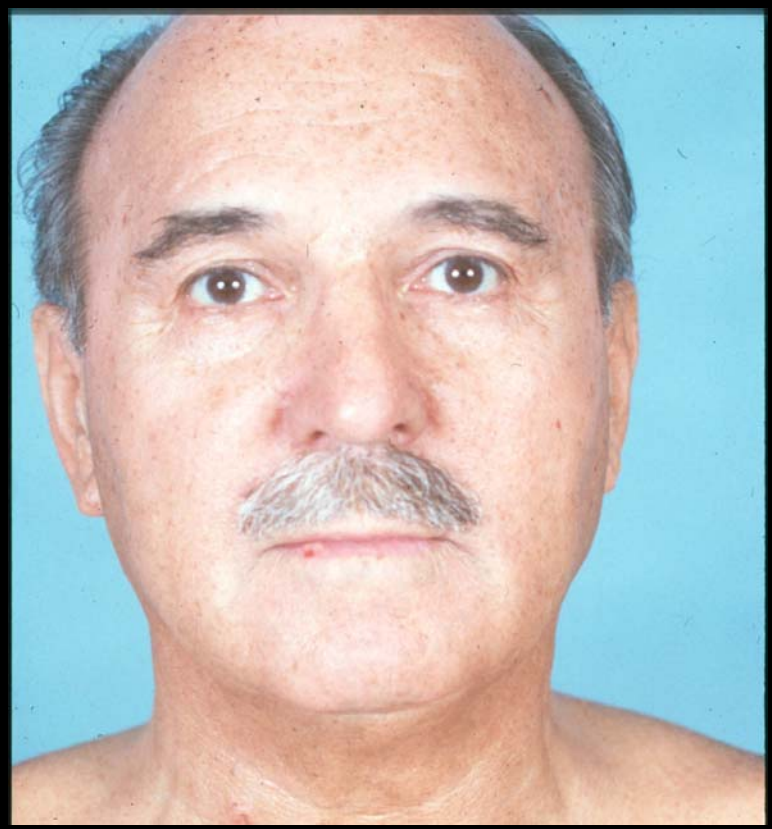


Video-Laryngoscope + Tube Exchanger

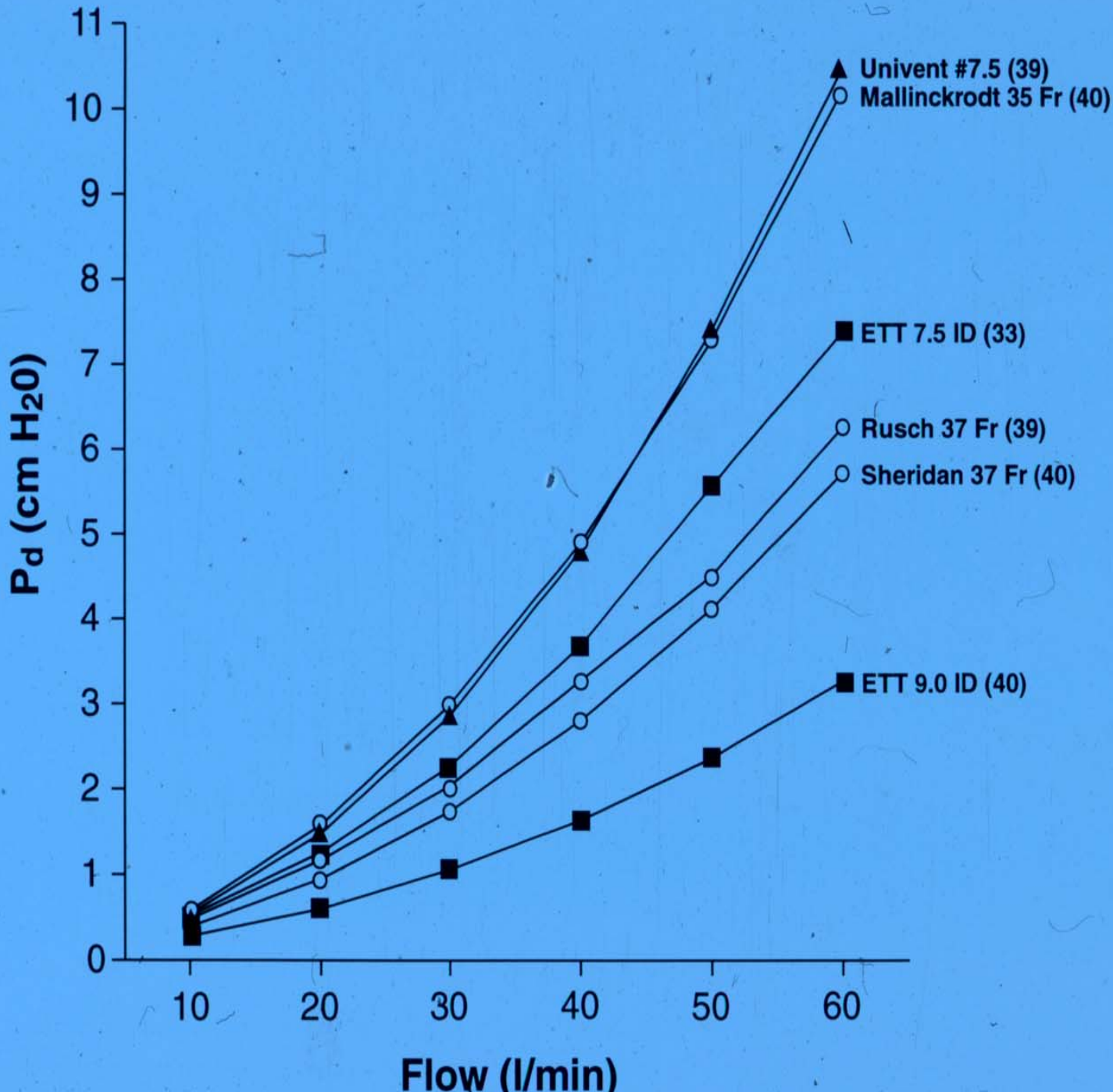
Glidescope

62 y.o. male, Left lower lobe Lung Cancer

Previous Failed Intubation



- ++ Drowsy at end of surgery
- ? Extubation
- ? Tube change


11
10
9
8
7
6
5
4
3
2
1
0
P_d (cm H_2O)
10
20
30
40
50
60
Flow (l/min)
Univent #7.5 (39)
Mallinckrodt 35 Fr (40)
ETT 7.5 ID (33)
Rusch 37 Fr (39)
Sheridan 37 Fr (40)
ETT 9.0 ID (40)

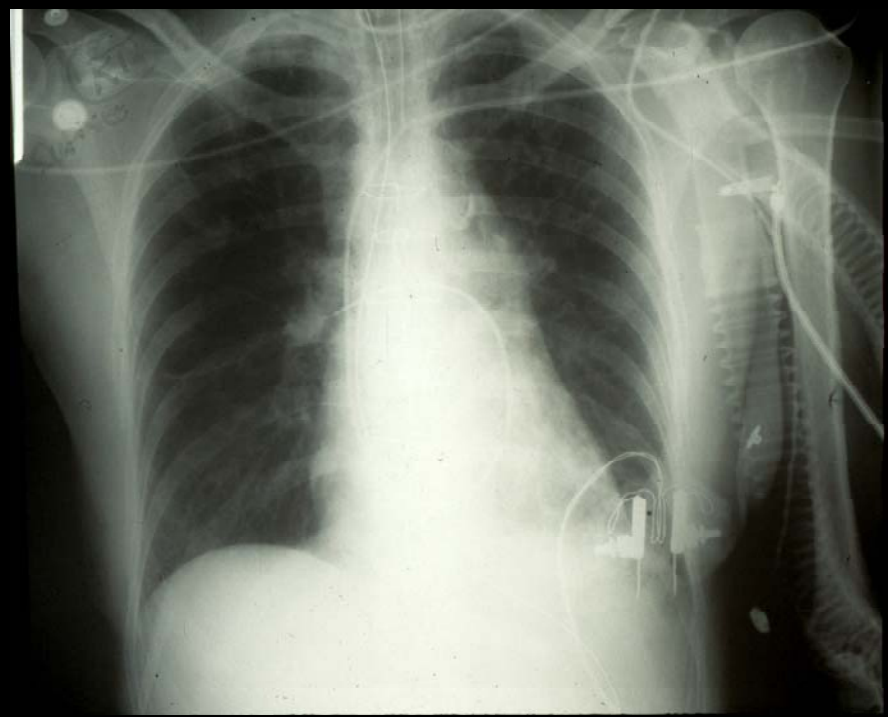

TRACHEAL
BRONCHIAL

60 y.o. F, 2 hr. post-op. MVR

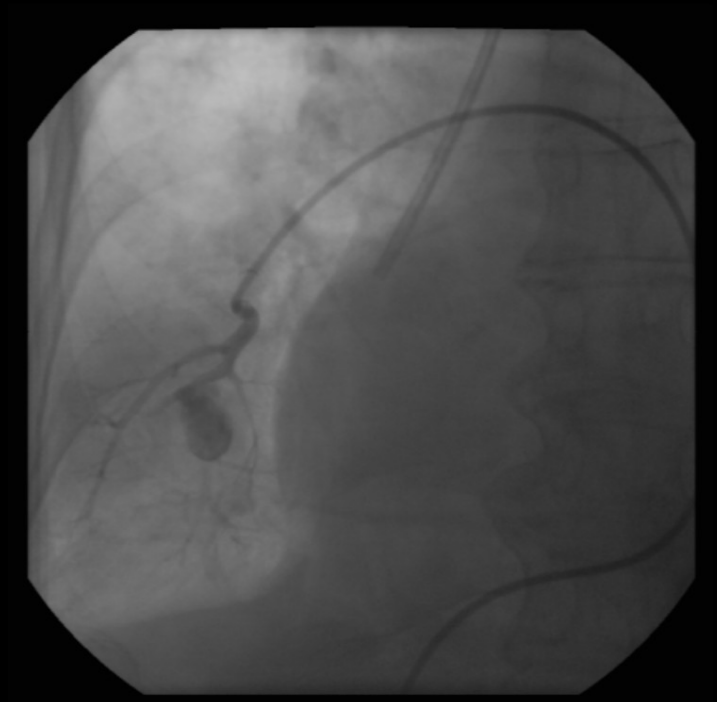
- Sudden onset massive hemoptysis

? dDx

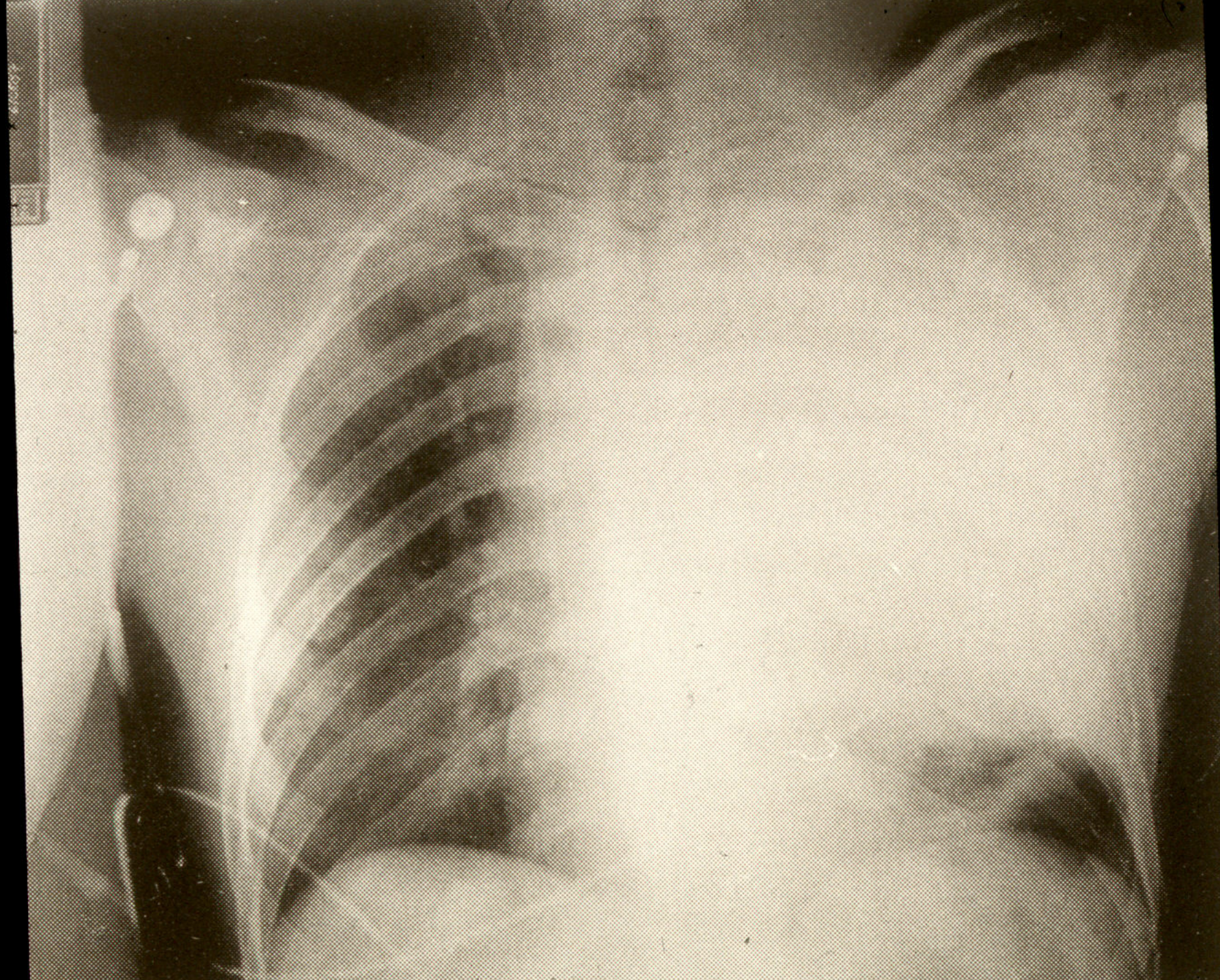
? Rx



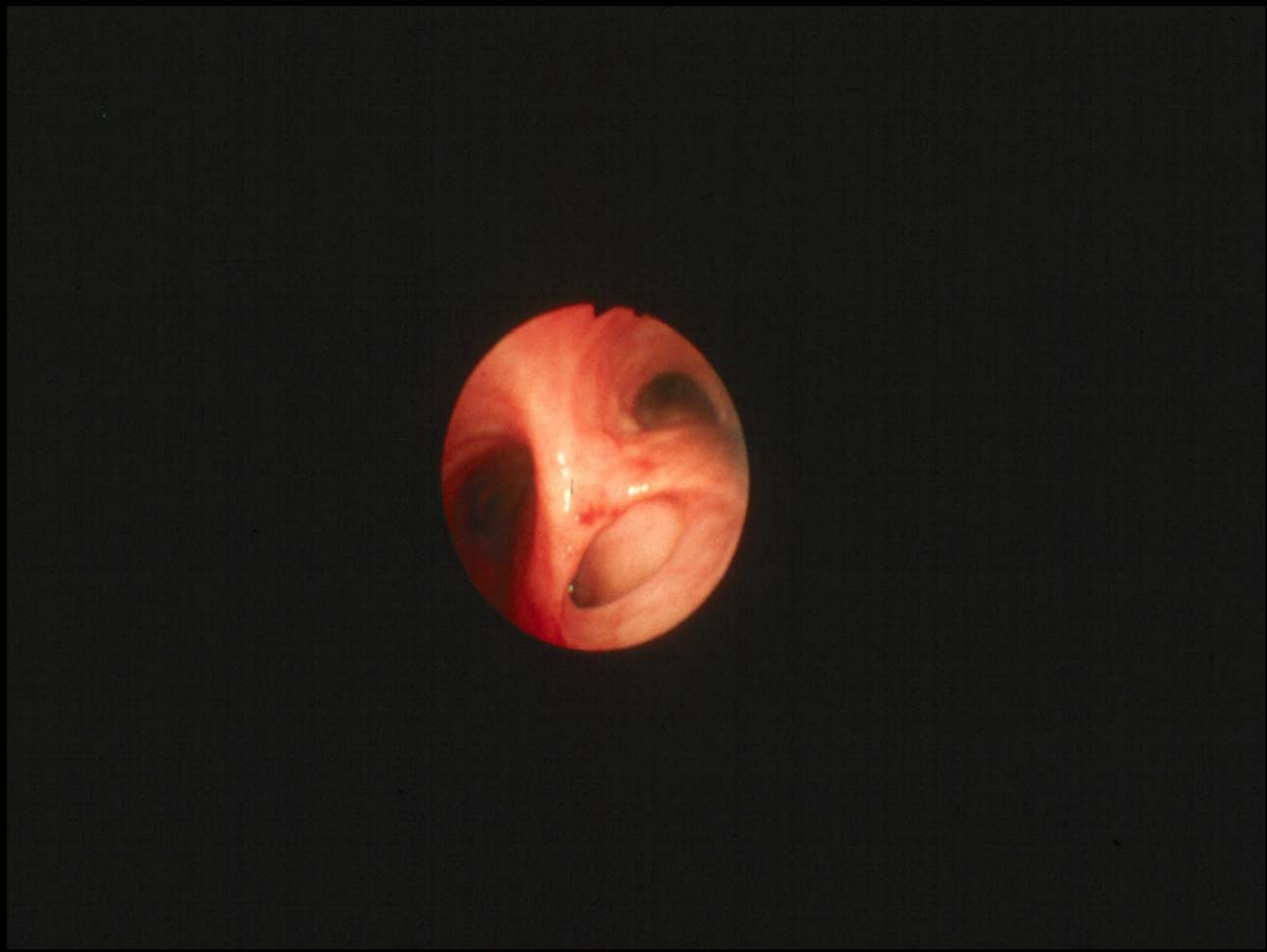
False Aneurysm
RLLobe PA



Embolization Coil
RLLobe PA



68 y.o. Female, Mid-esophageal Ca.
TE Fistula



Tube Selection for Lung Isolation:

Double-Lumen Tube

- **Excellent Isolation**
- **Independent Lung Access**
- **Fixed Anatomical Design**
- **Adults**

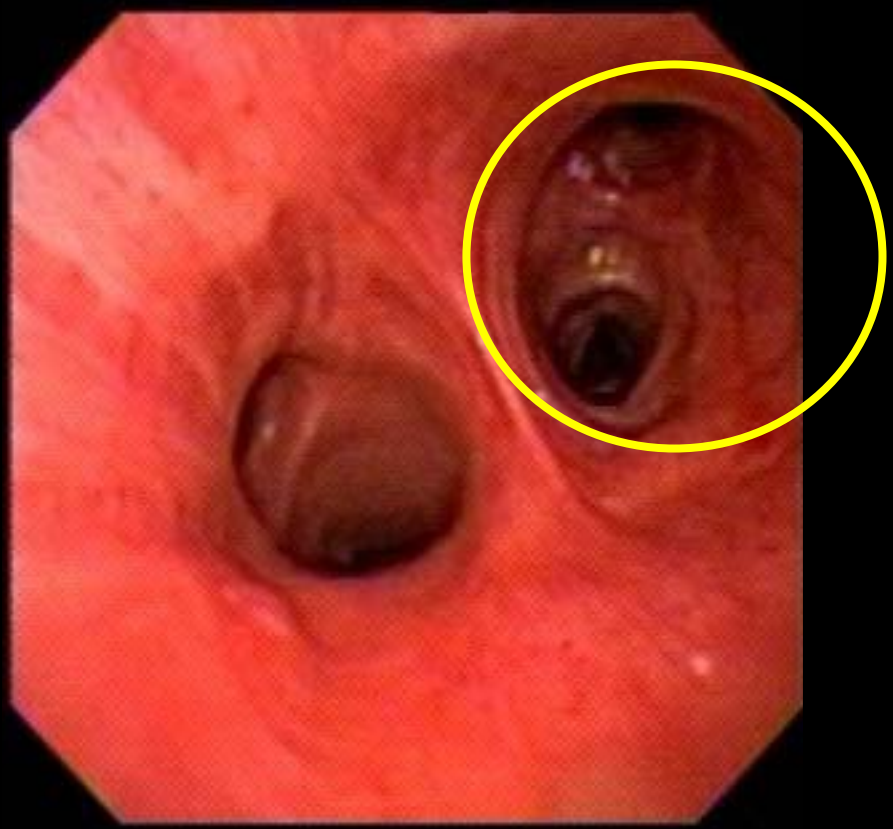
Bronchial Blocker or (Single-Lumen EBTube)

- **Adaptability**
- **Difficult airways**
- **No need to change tube**
- **Suctioning**

The ABC's of Lung Isolation:

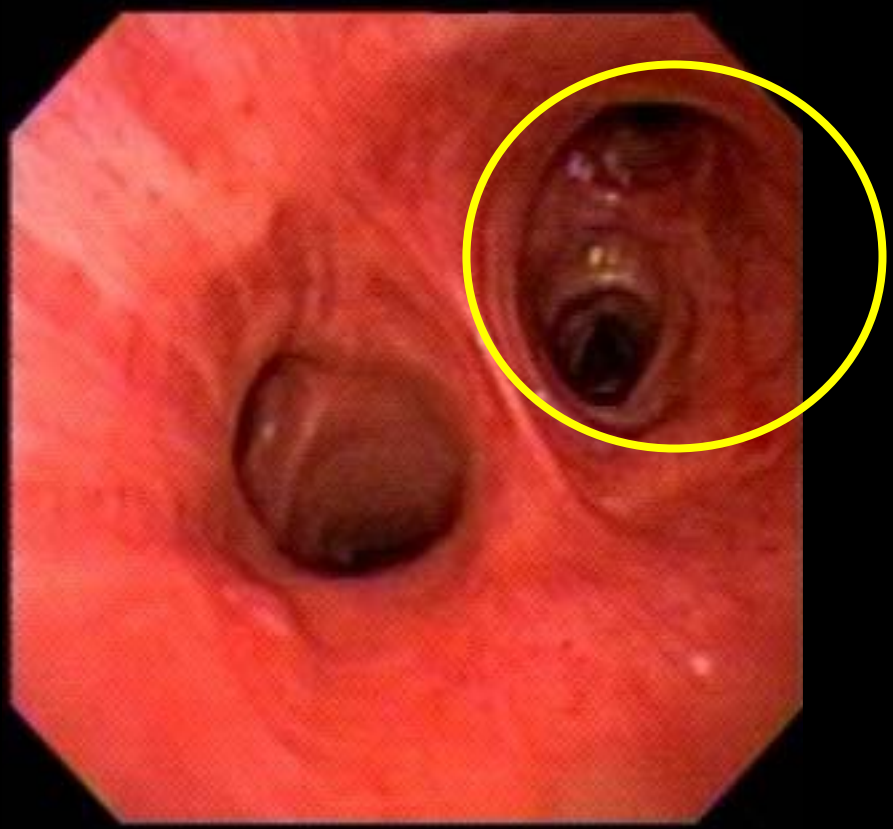
- Anatomy
- Bronchoscope
- Chest X-ray, CT Scan
- Anatomy

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
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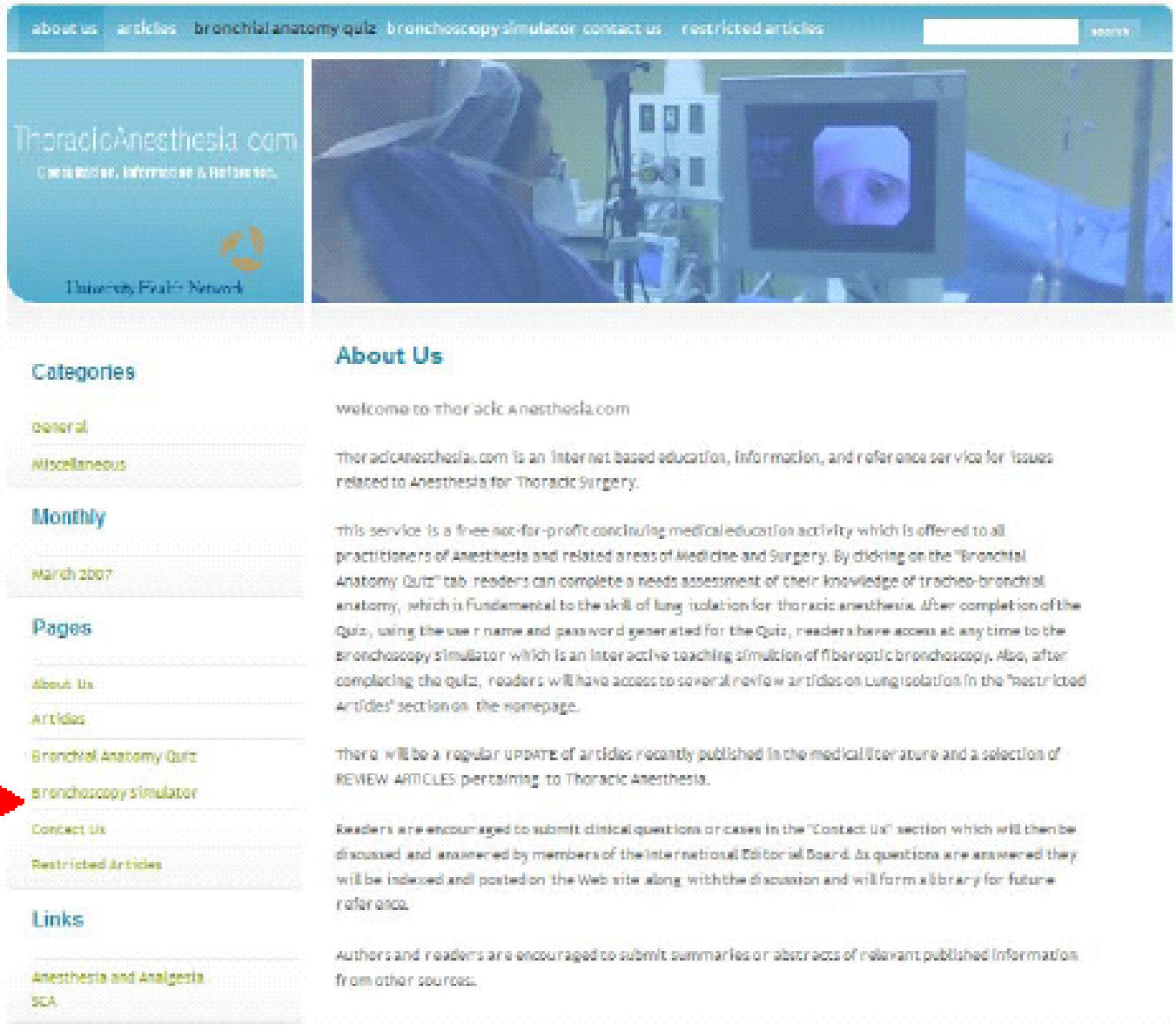
Teaching Bronchial Anatomy

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

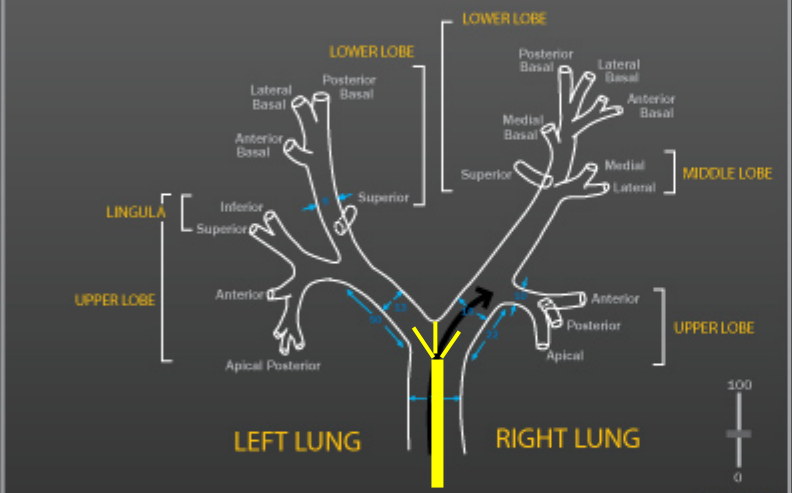
www.thoracicanesthesia.com

Simulator Link

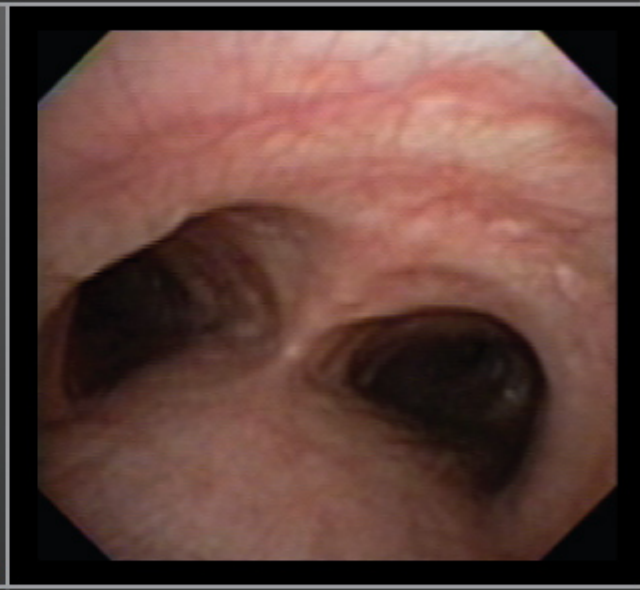


Thoracicanesthesia.com Bronchoscopy Simulation

BRONCHIAL TREE NAVIGATION MAP VIEW



BRONCHOSCOPE VIEW



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

Bronchoscope Navigation