

*Practical Anatomy for
General Thoracic Surgery:
The Stuff They Don't Teach
You in the Picture Books*



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TSDA Boot Camp 9/14/19



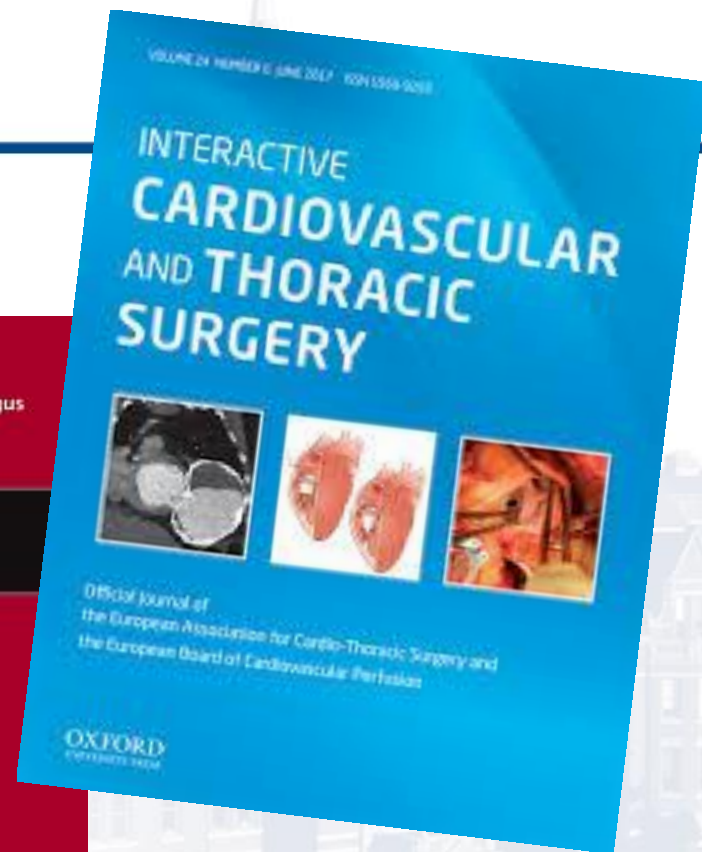
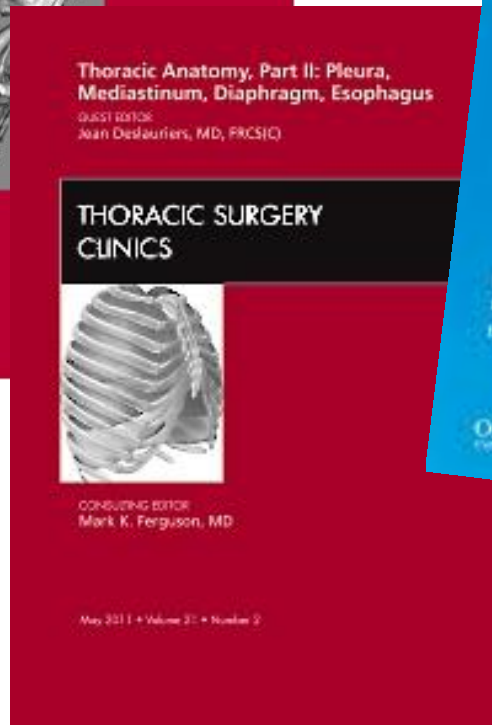
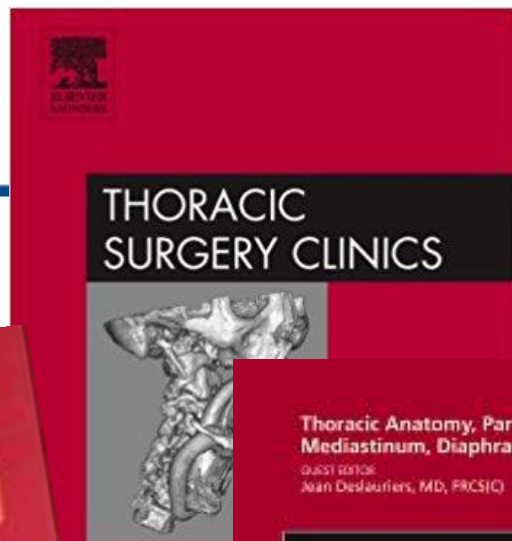
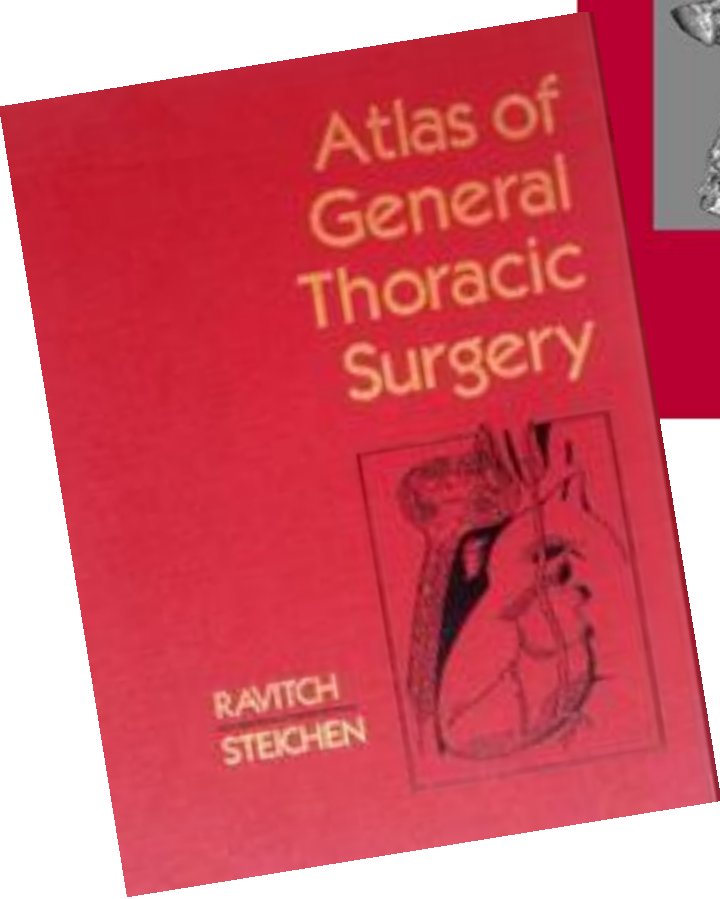
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Disclosures

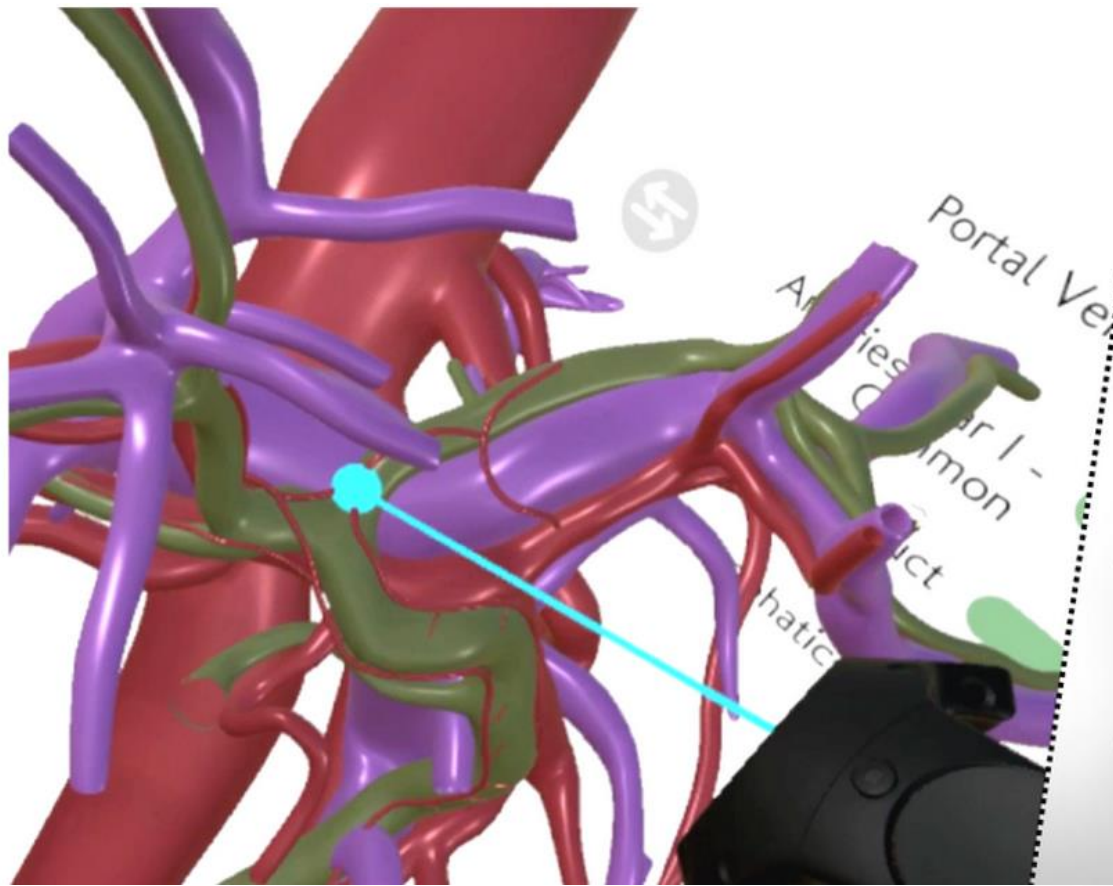


- **No financial disclosures**
- **Modest experience, don't claim to know everything**
- **Conflict: I'm a Dukie**









Objectives



- Review important anatomic landmarks in general thoracic surgery
- Recognize the common anatomic anomalies encountered during these procedures
- Describe the operative implications of these anomalies

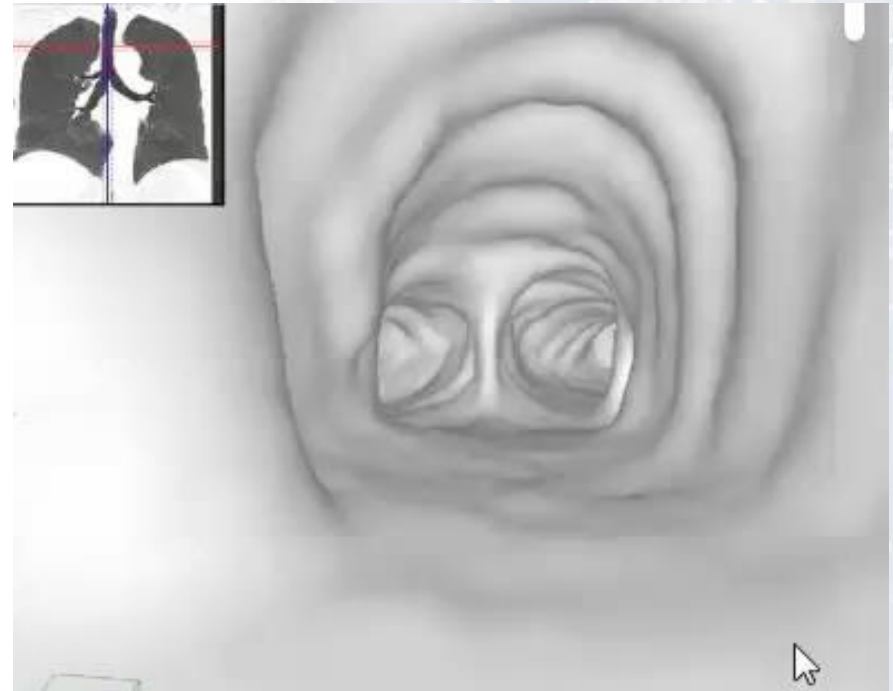
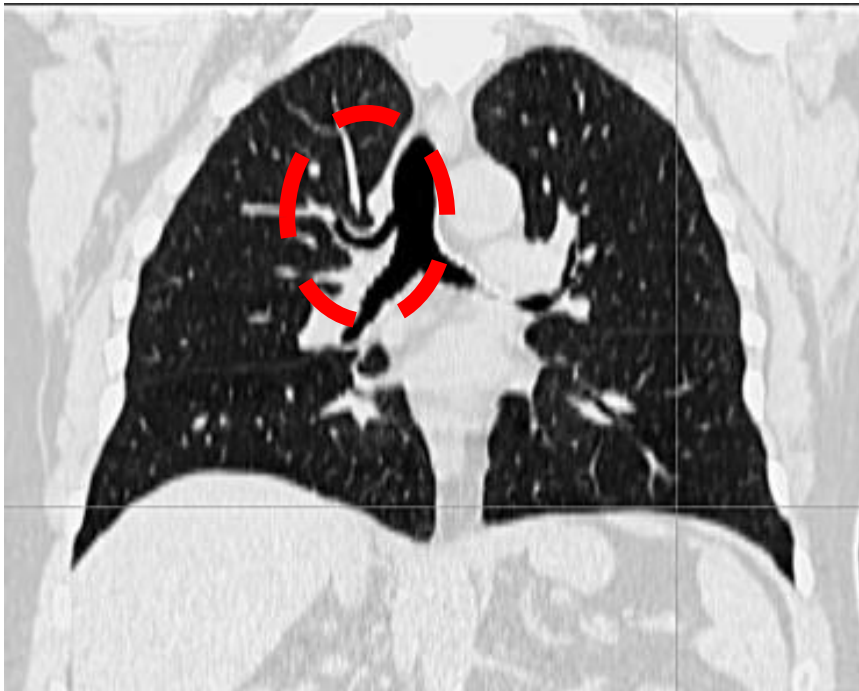
Bronchoscopy

- Know your scope!



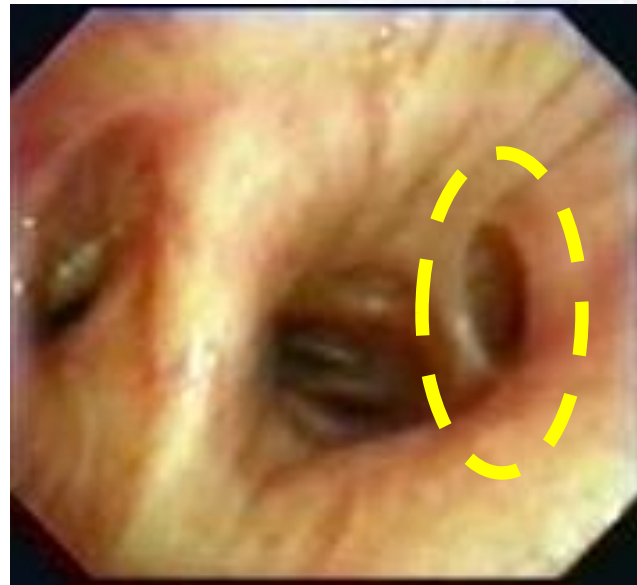
Bronchoscopy

- Know your scope!
- Tracheal RUL bronchus



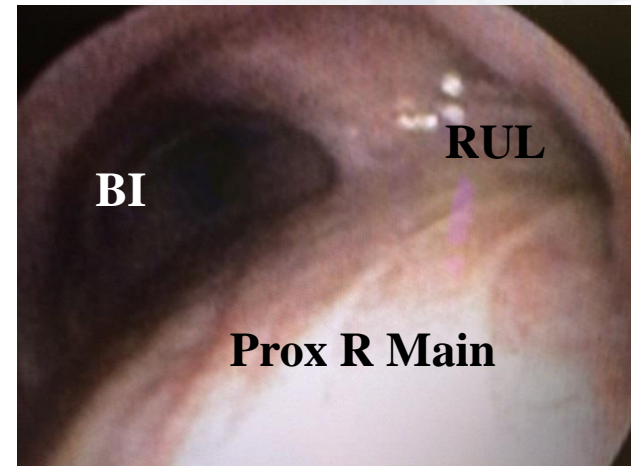
Bronchoscopy

- Know your scope!
- Tracheal RUL bronchus
- Sup seg take off varies



Bronchoscopy

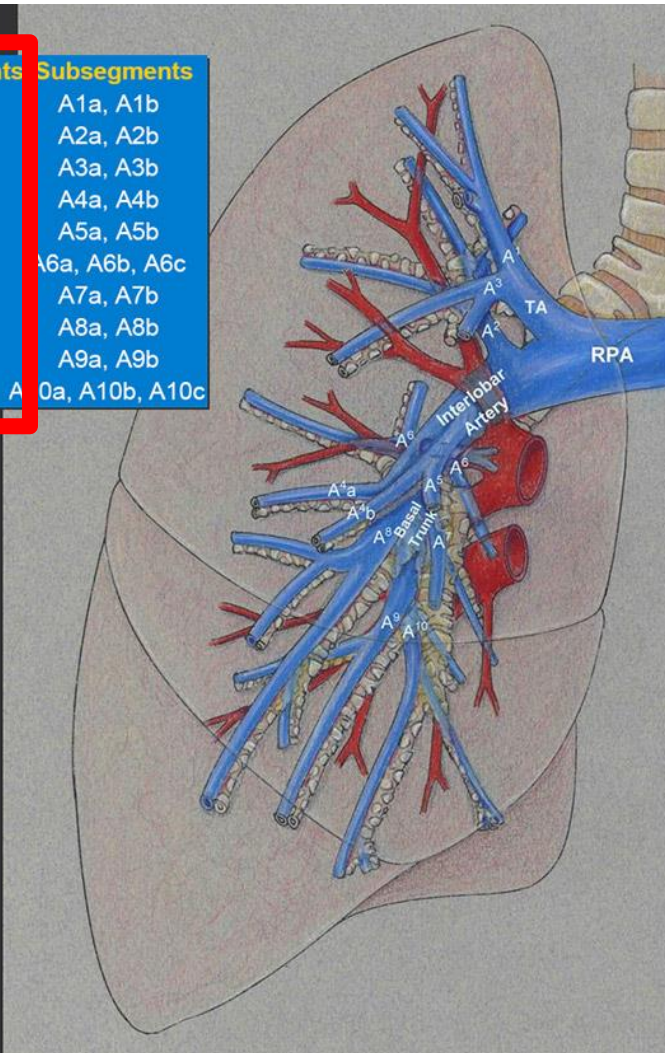
- Know your scope!
- Tracheal RUL bronchus
- Sup seg take off varies
- Troubleshooting malpositioned double lumen tubes



Bronchoscopy – Segmental Nomenclature (*anatomic vs Boyden's*)

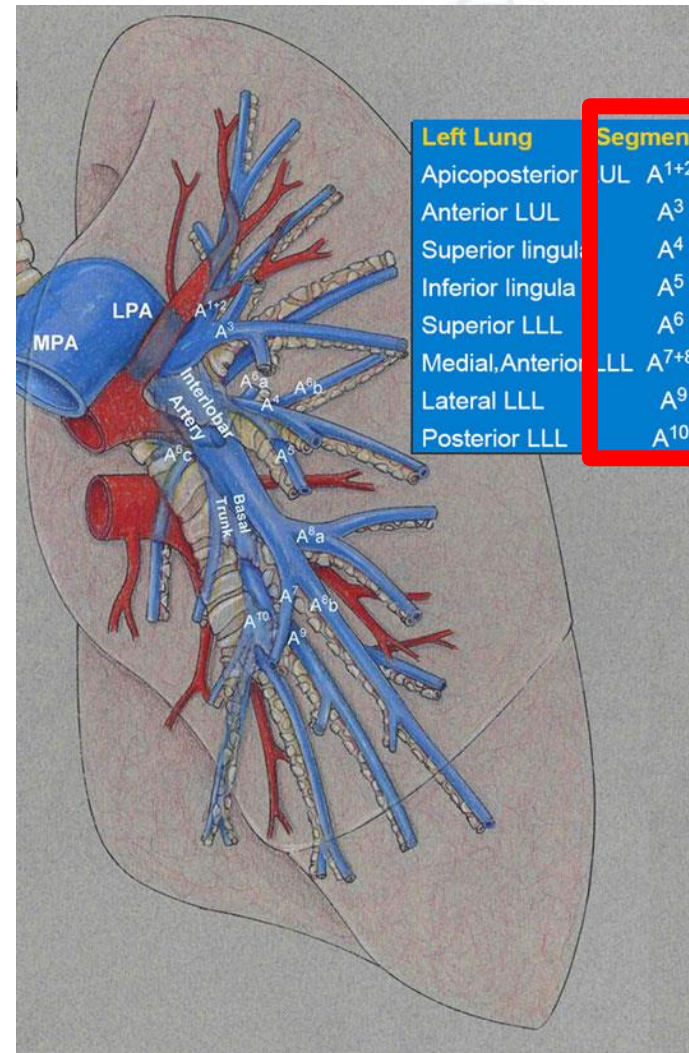
AP view

Right Lung	Segments	Subsegments
Apical RUL	A1	A1a, A1b
Posterior RUL	A2	A2a, A2b
Anterior RUL	A3	A3a, A3b
Lateral RML	A4	A4a, A4b
Medial RML	A5	A5a, A5b
Superior RLL	A6	A6a, A6b, A6c
Medial RLL	A7	A7a, A7b
Anterior RLL	A8	A8a, A8b
Lateral RLL	A9	A9a, A9b
Posterior RLL	A10	A10a, A10b, A10c

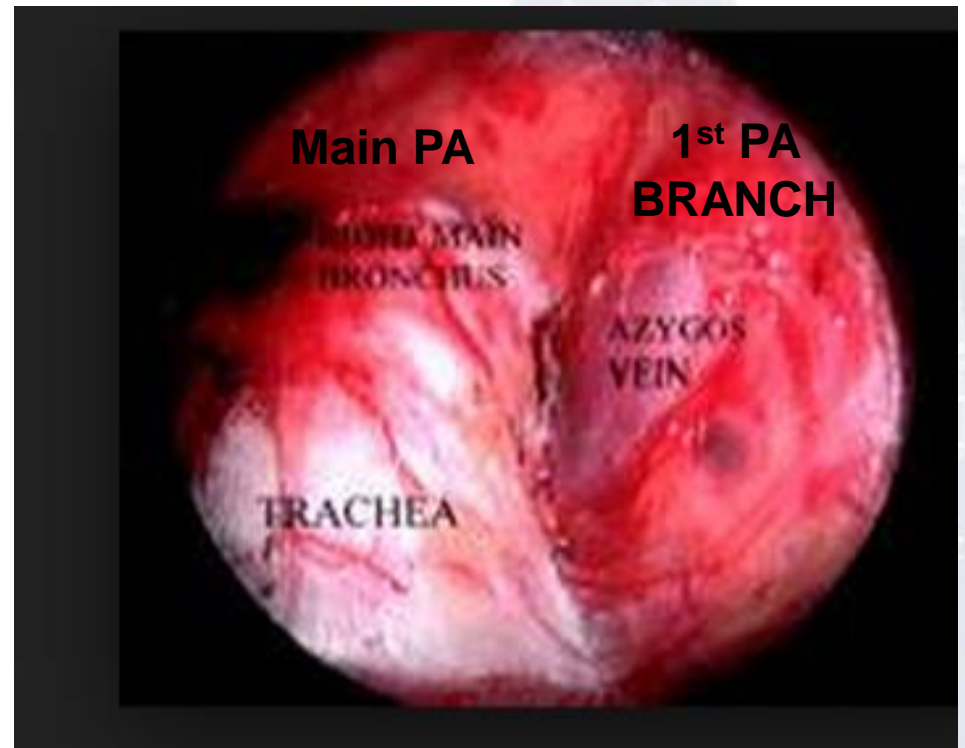
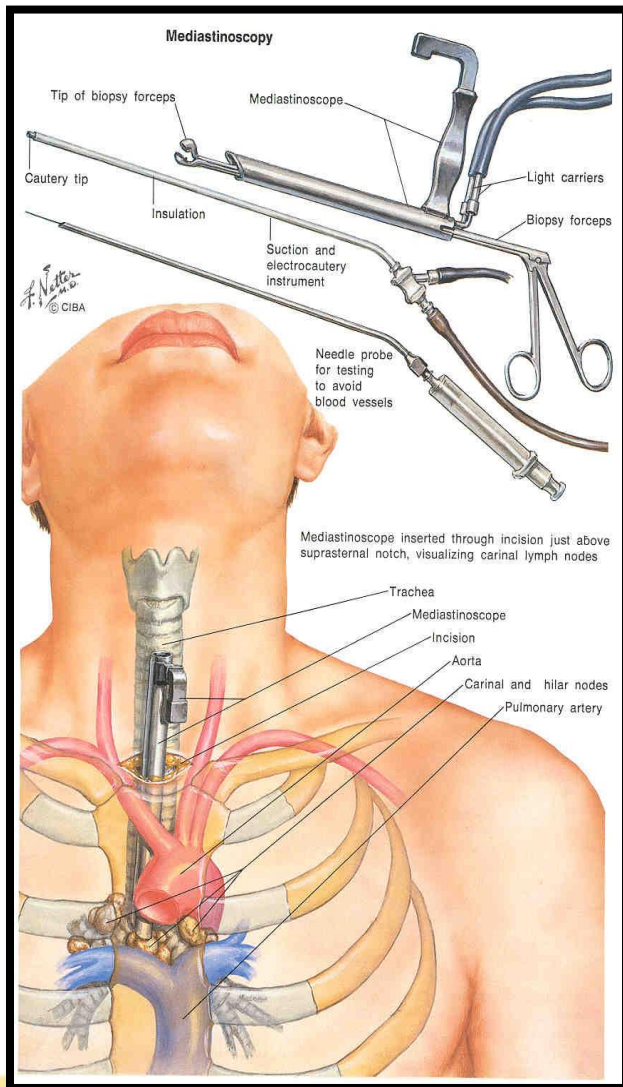


AP view

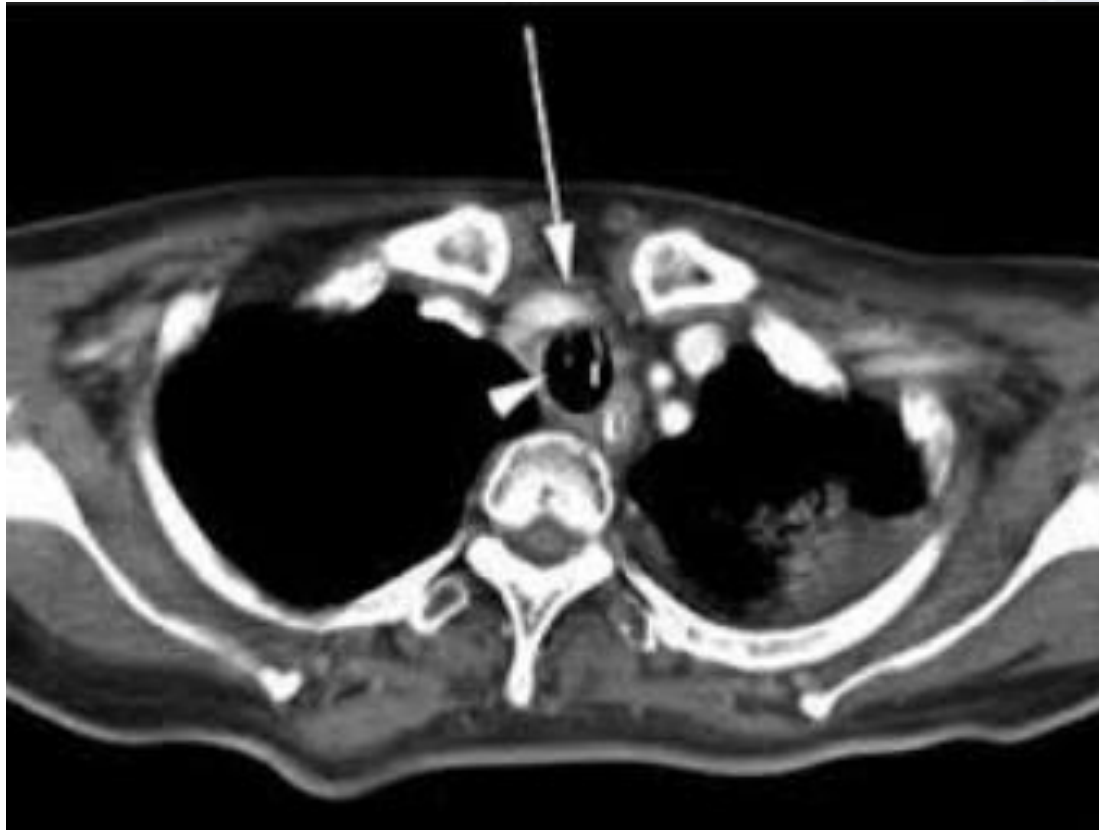
Left Lung	Segments	Subsegments
Apicoposterior LUL	A ¹⁺²	A ¹⁺² a, A ¹⁺² b, A ¹⁺² c
Anterior LUL	A ³	A ³ a, A ³ b, A ³ c
Superior lingula	A ⁴	A ⁴ a, A ⁴ b
Inferior lingula	A ⁵	A ⁵ a, A ⁵ b
Superior LLL	A ⁶	A ⁶ a, A ⁶ b, A ⁶ c
Medial, Anterior LLL	A ⁷⁺⁸	A ⁷ a, A ⁷ b, A ⁸ a, A ⁸ b
Lateral LLL	A ⁹	A ⁹ a, A ⁹ b
Posterior LLL	A ¹⁰	A ¹⁰ a, A ¹⁰ b, A ¹⁰ c



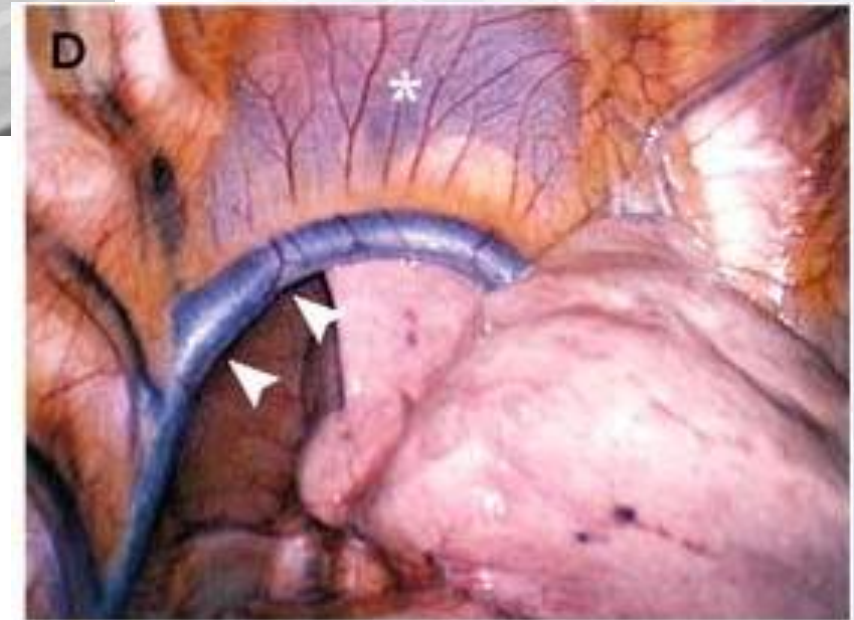
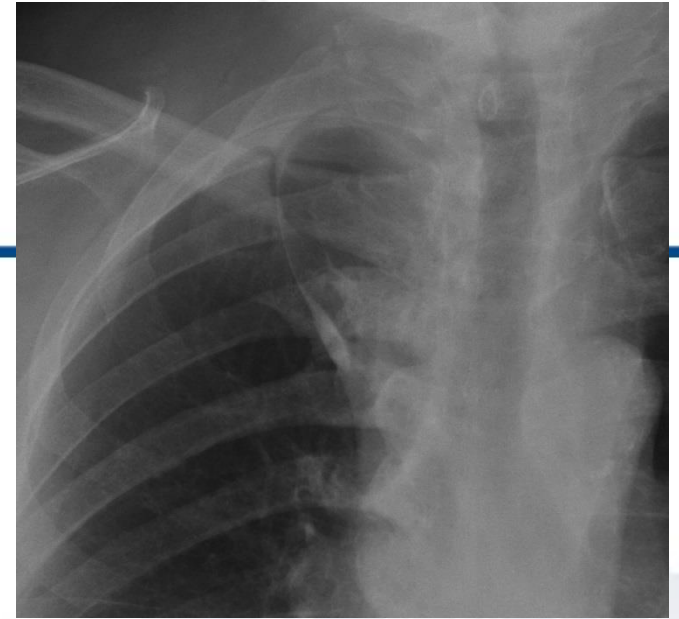
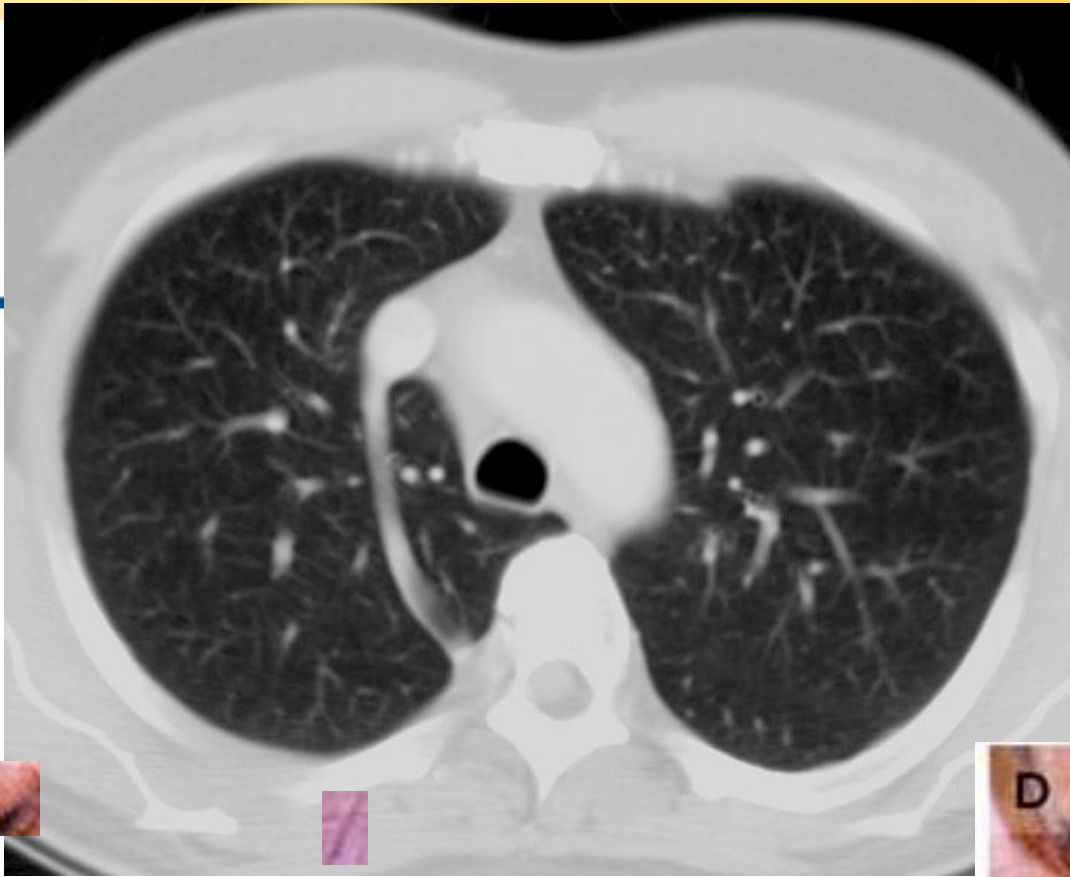
Mediastinoscopy



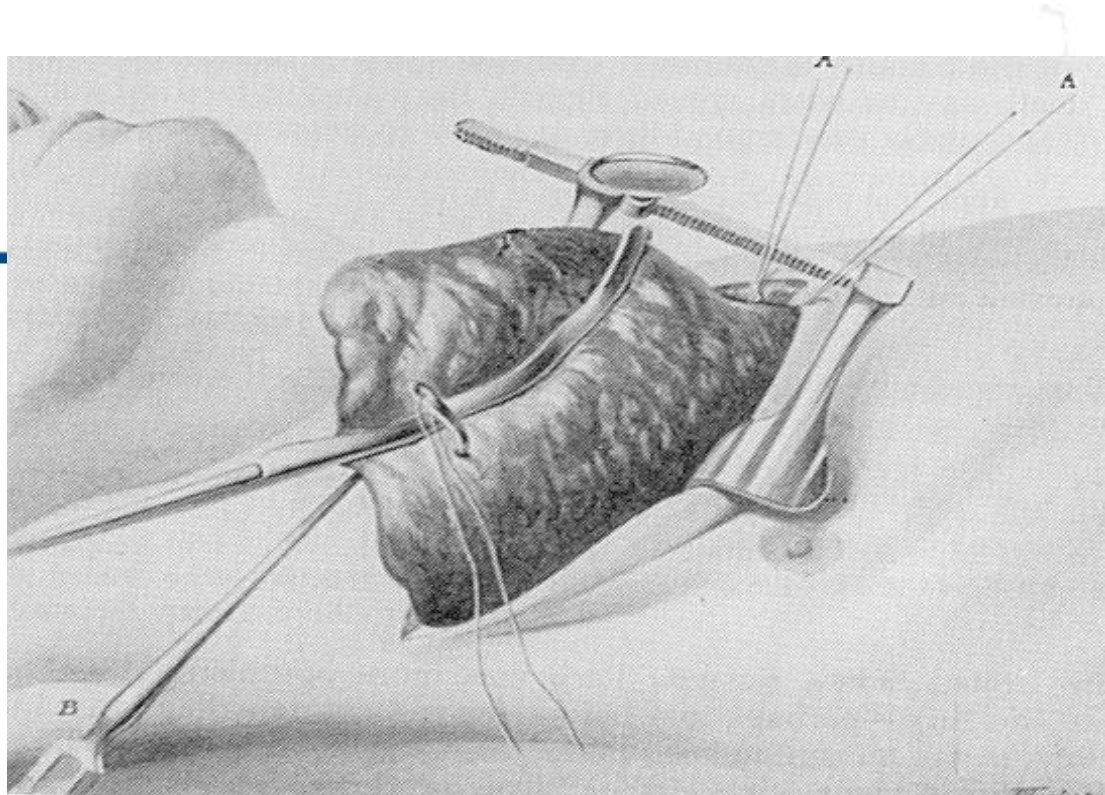
Sternotomy, tracheostomy



High riding innominate artery



Azygous lobe



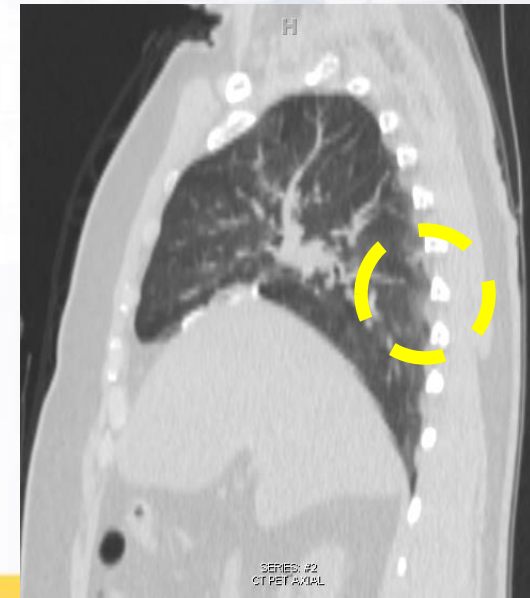
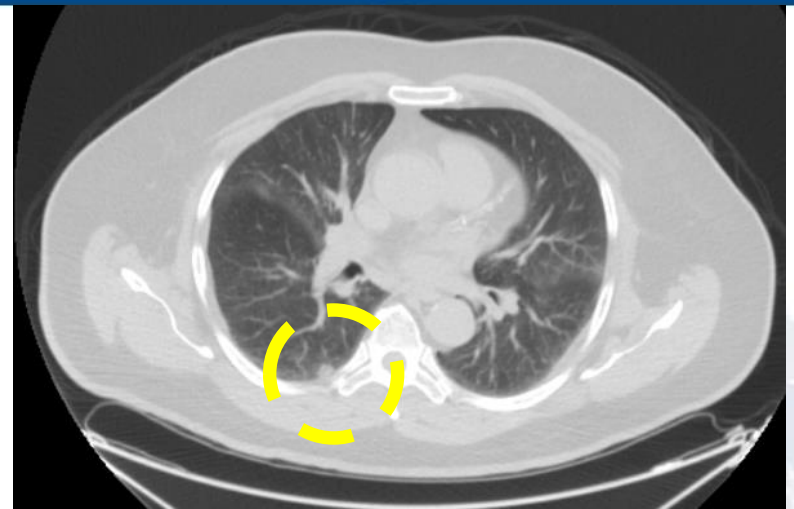
- 1891 – Tuffier, first successful lung resection for TB**
- 1908: Babcock, RLL lobectomy**
- 1931: Churchill, dissection lobectomy**
- 1933: Graham, left pneumonectomy for lung cancer**

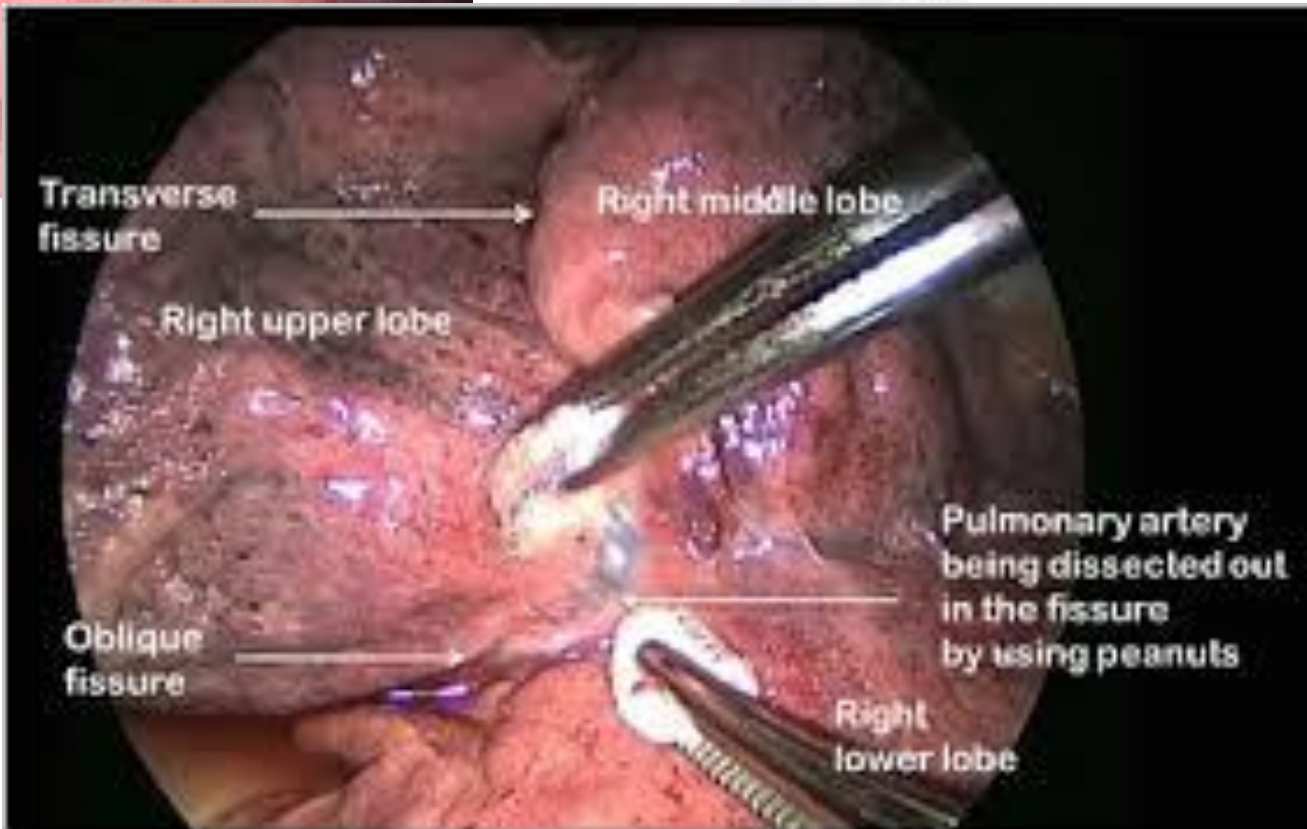
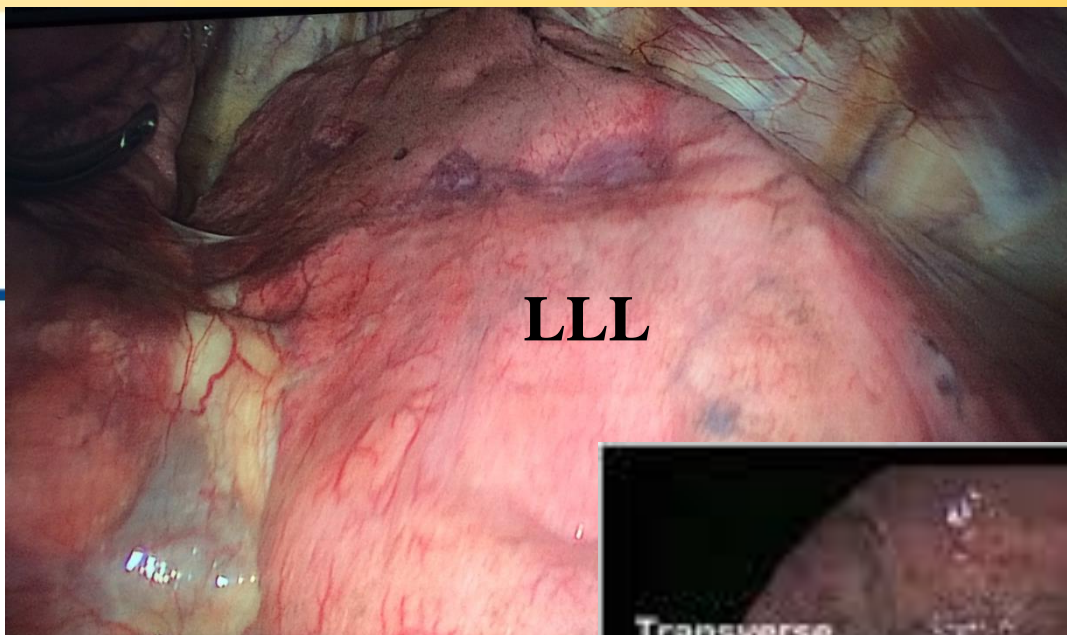
Lung Resections

- **3D vascular anatomy difficult via VATS (thus appreciate open experience)**
- **Anatomic anomalies are frequent**
- **Increasing number of (VATS) segmentectomies given screening programs picking up small lesions**

Nodule Localization

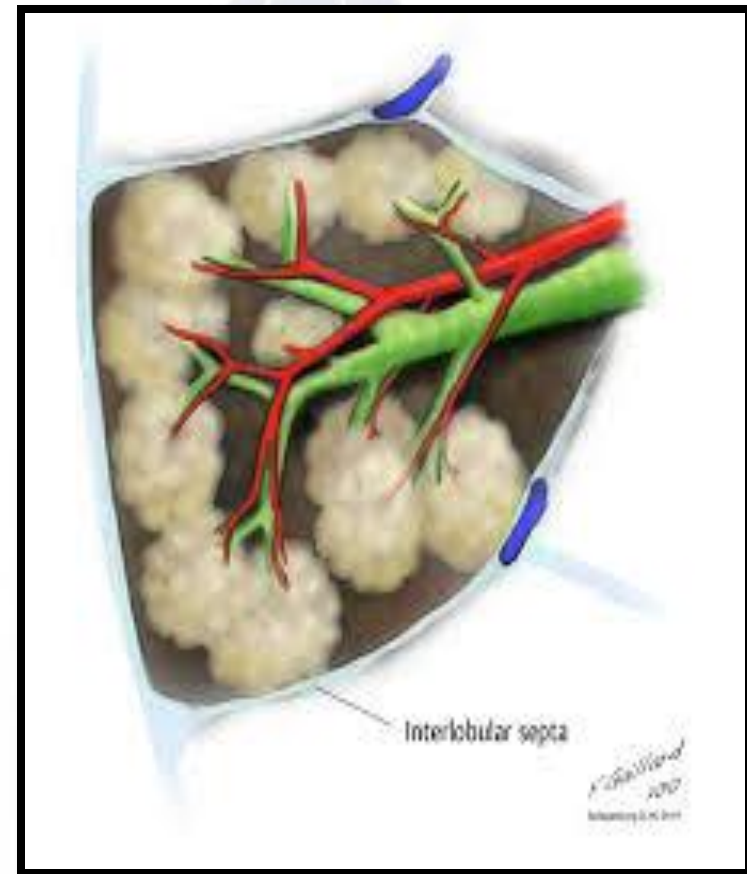
- Increased incidence w CT screening
- Use 3-D recon
- Landmarks:
 - Xiphoid
 - Table position
 - Sup seg tip
 - IPV
 - Nipples





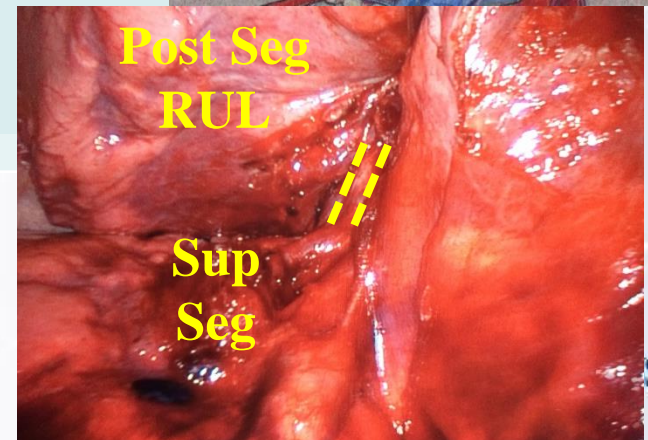
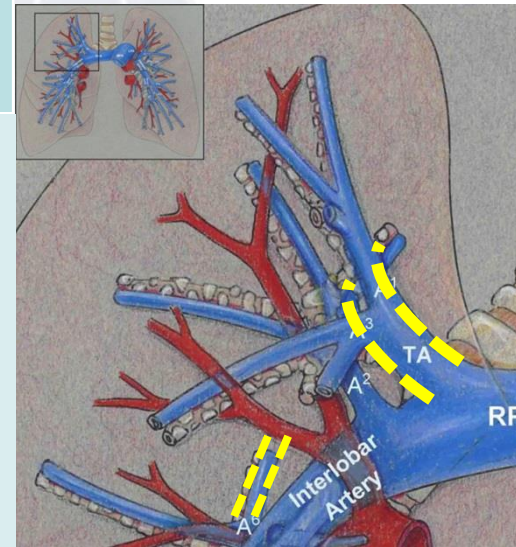
Pulmonary Collaterals: *Pores of Kohn*

- Interalveolar connections,
Canals of Lambert
- Account for:
 - ◆ Ventilation across
segments and fissures
 - ◆ Failure of endobronchial
valves
 - ◆ Local recurrence after
wedge resection



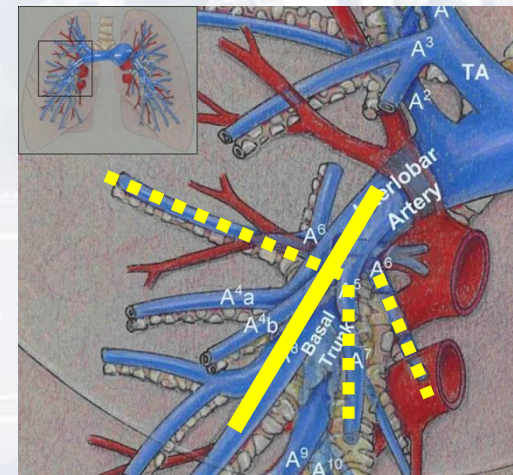
Common PA Variants - *Right*

Lobe	Common	Variant
RUL	Truncus anterior Post asc branch	



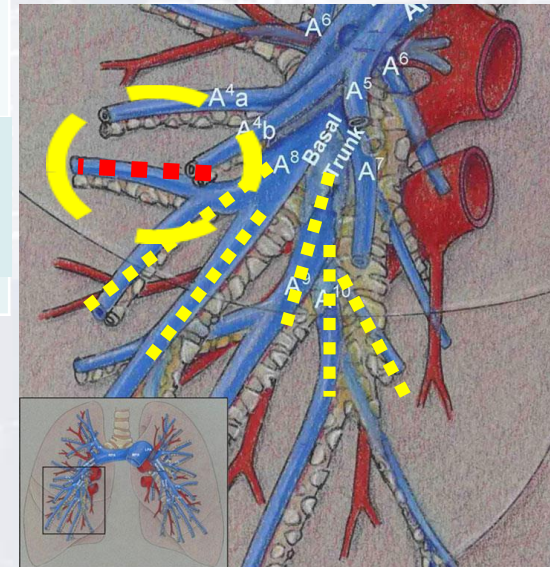
Common PA Variants - *Right*

Lobe	Common	Variant
RUL	Truncus anterior Post asc branch	15% no post asc 5% post asc from sup seg
RML	55% one common trunk 45% two branches	

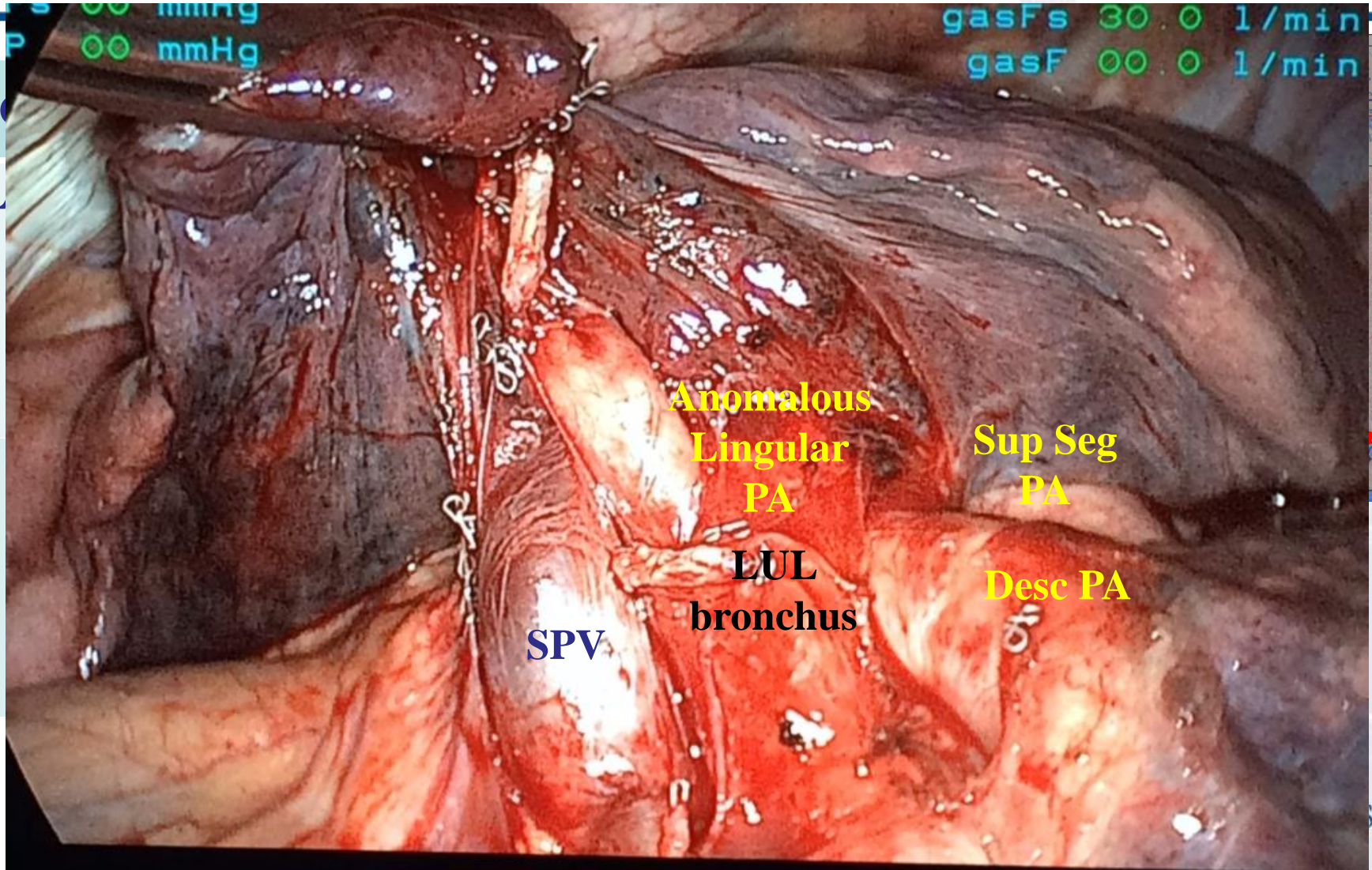


Common PA Variants - *Right*

Lobe	Common	Variant
RUL	Truncus anterior Post asc branch	15% no post asc 5% post asc from sup seg
RML	55% one common trunk 45% two branches	5% > 2 branches
RLL	5 distinct branches or common trunk to basilar	

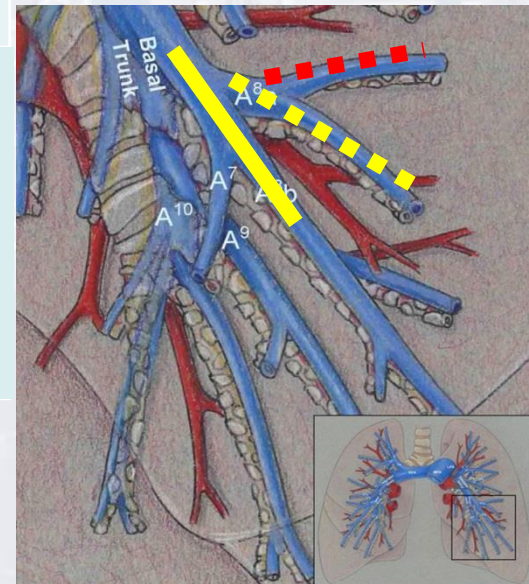


Common PA Variants - *Left*



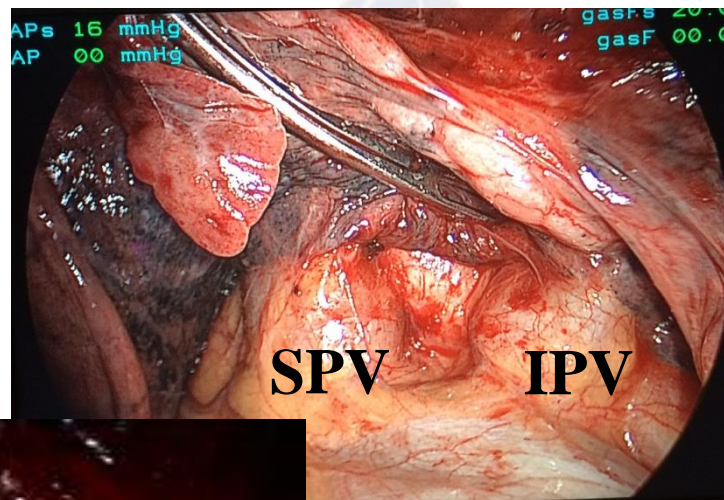
Common PA Variants - *Left*

Lobe	Common	Variant
LUL	Random order of seg branches 2-7 may arise	10% lingular branches: none or arise proximally
LLL	70% sup seg branches off before lingula 60% single common basilar trunk	



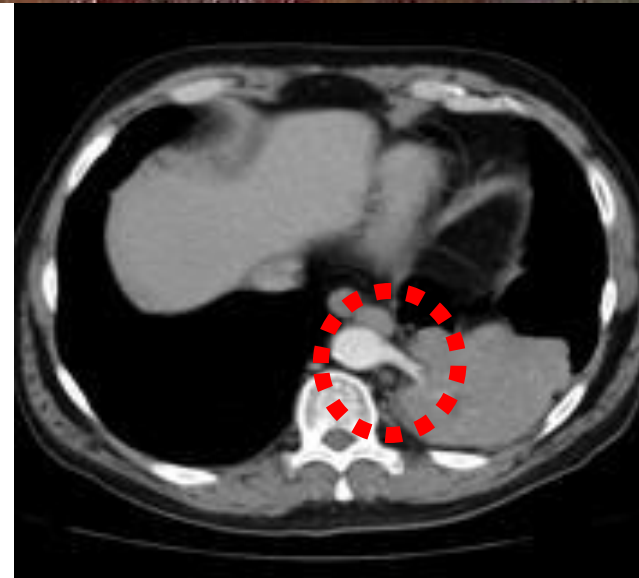
Common PV Trunk

- L>R
- Reported 14% cases
- Identify both SPV and IPV
- If accidentally divided, convert to open, reanastomose to LA (not completion pneumonectomy)



Inferior Pulmonary Ligament

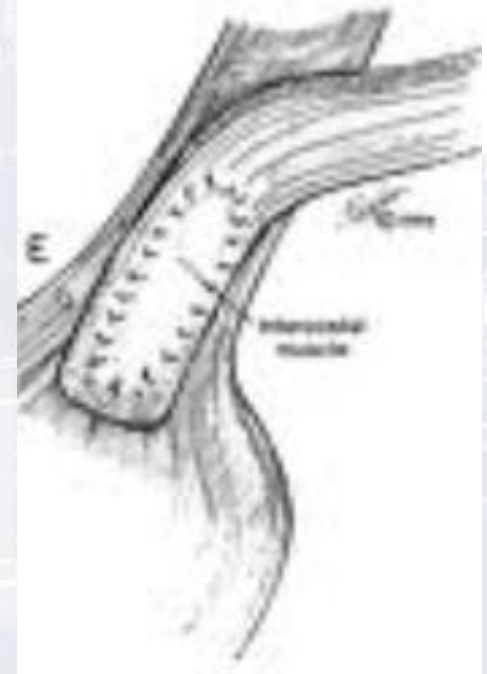
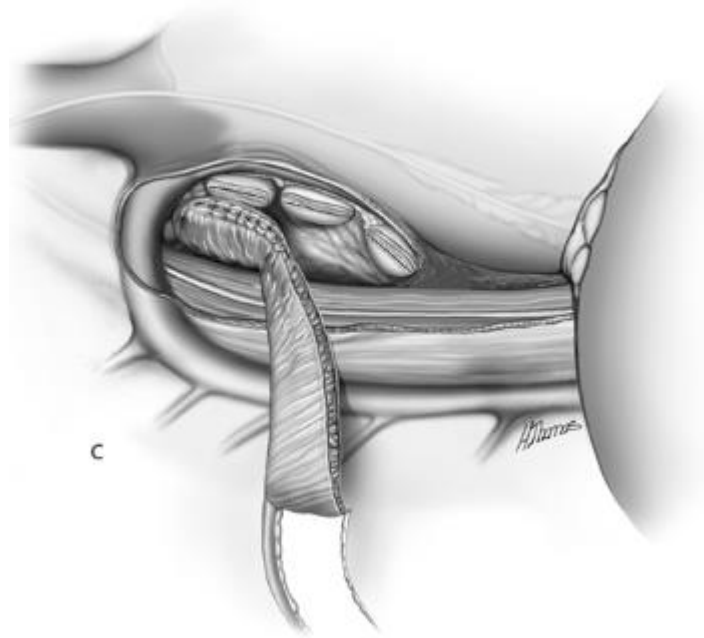
- Station 9 LN
- Vascularity increases with inflammation (esp cystic fibrosis)
- Pulmonary sequestration systemic arterial supply
- Chyle leak



Operative Pitfalls During VATS Lung Resections

- **RUL:** ligate RML PV, injury to PA during dissection behind RUL PV, azygous v. injury, dividing R mainstem bronchus
- **RML:** avulsion med seg branch
- **RLL:** dividing RML bronchus when completing lower oblique fissure, damage phrenic nerve
- **LUL/LLL:** multiple PA branches, dividing L mainstem bronchus, single PV

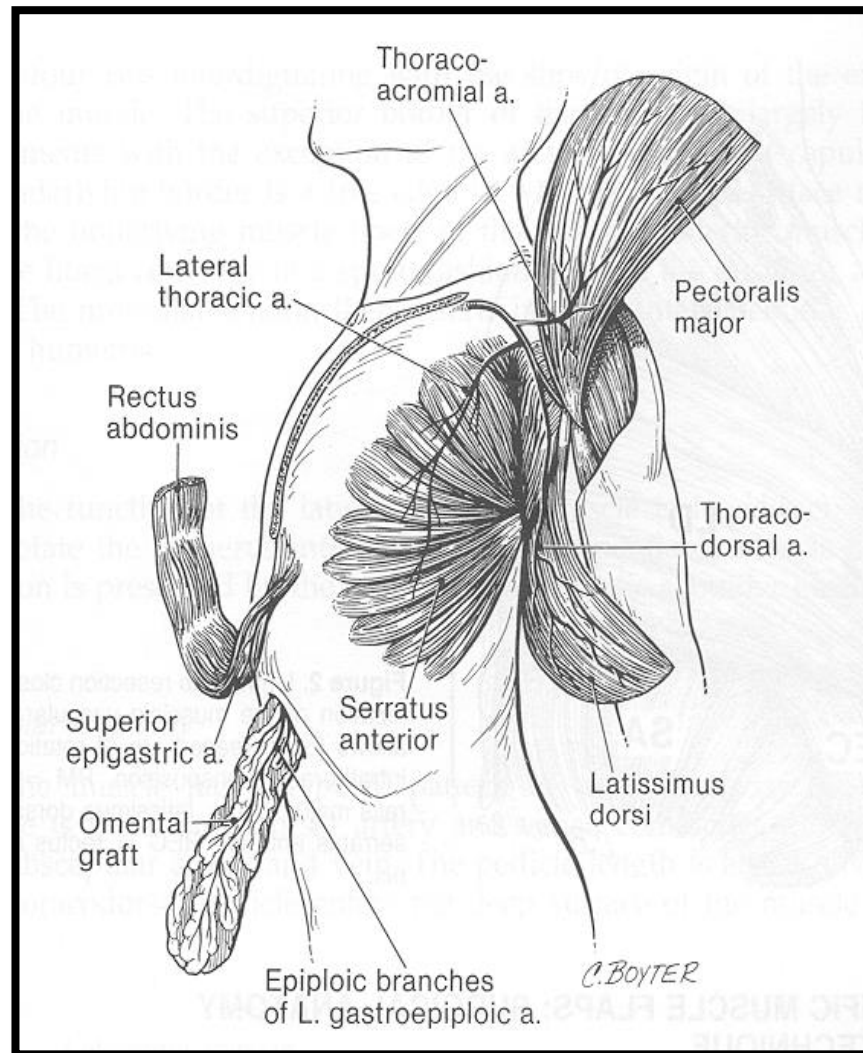
Intercostal Muscle Flap



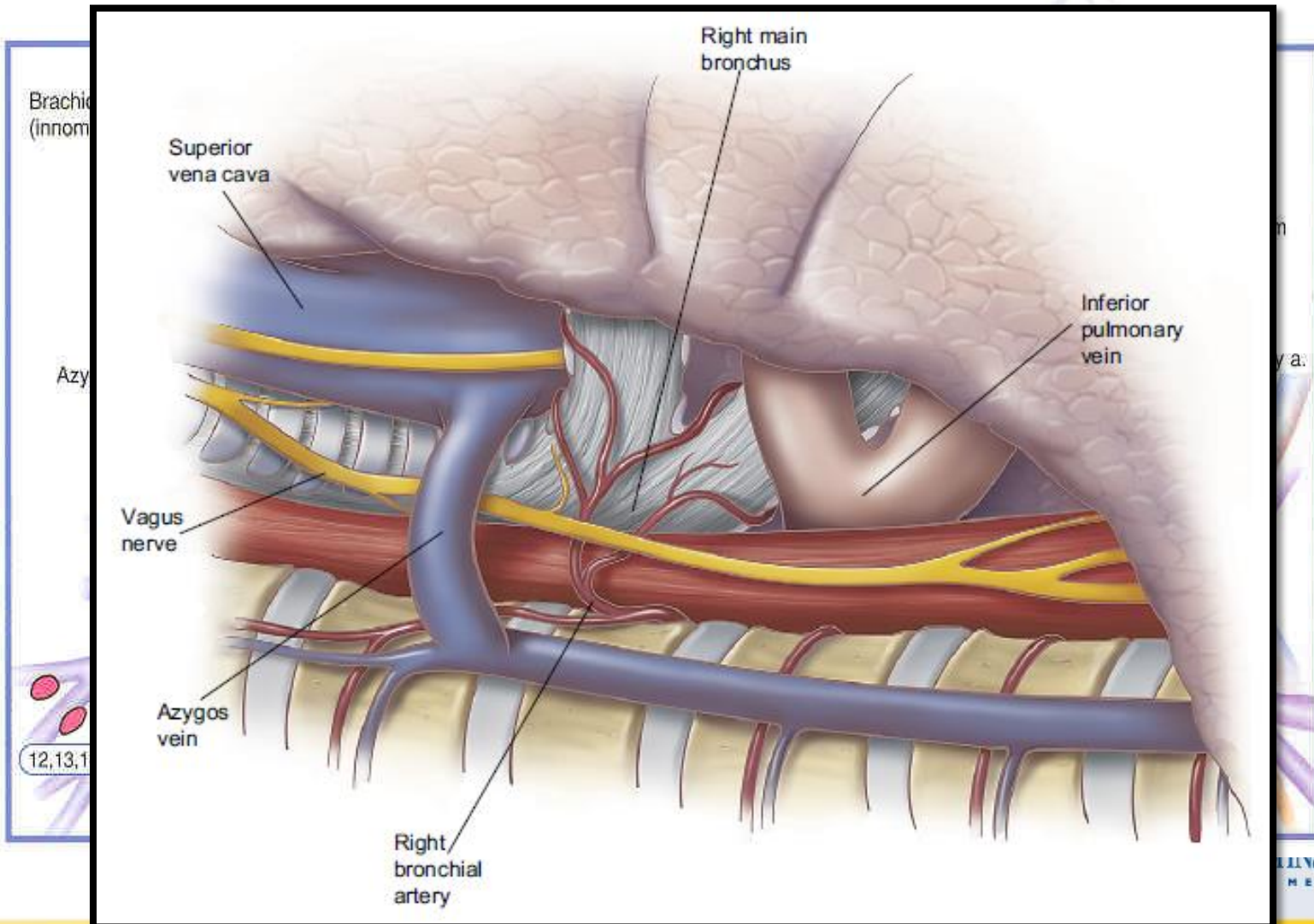
Take down 1st after opening ICS

Do not wrap circumferentially!

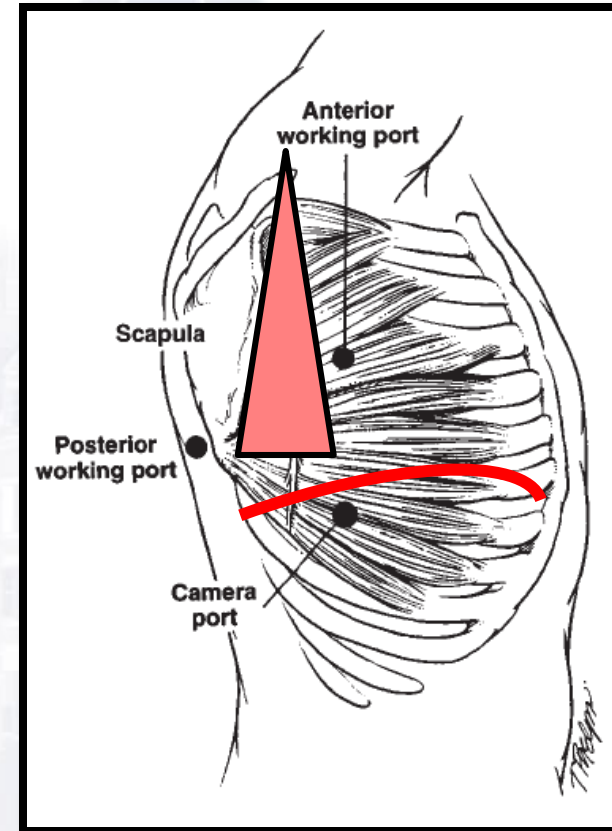
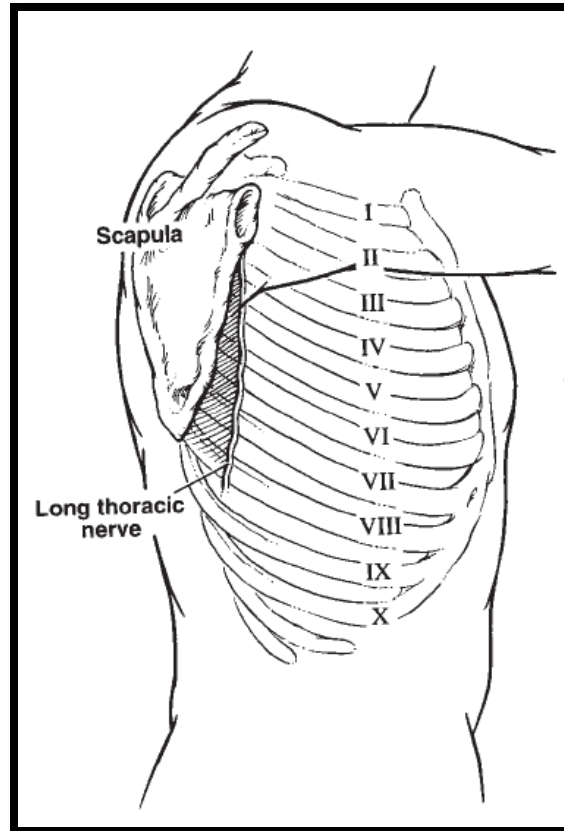
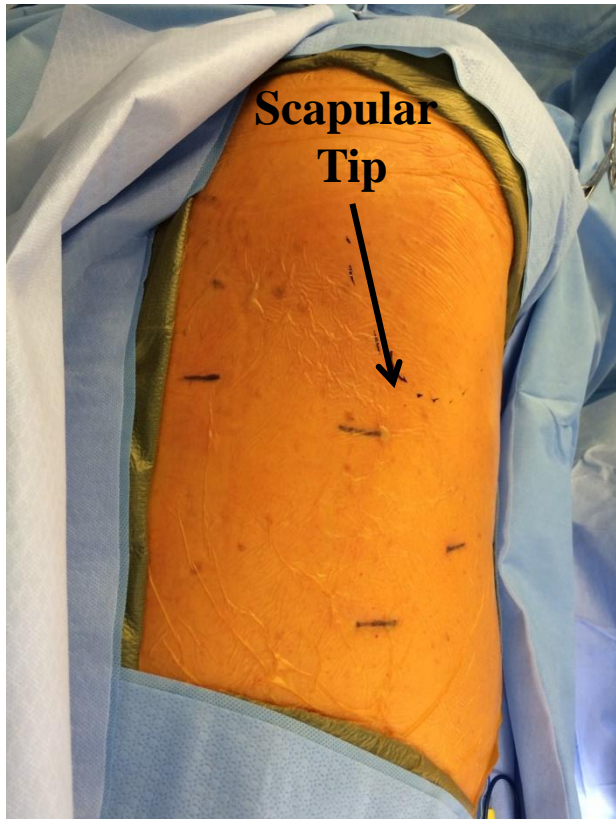
Tissue Flaps of the Chest



Lymph Node Dissection/Sampling

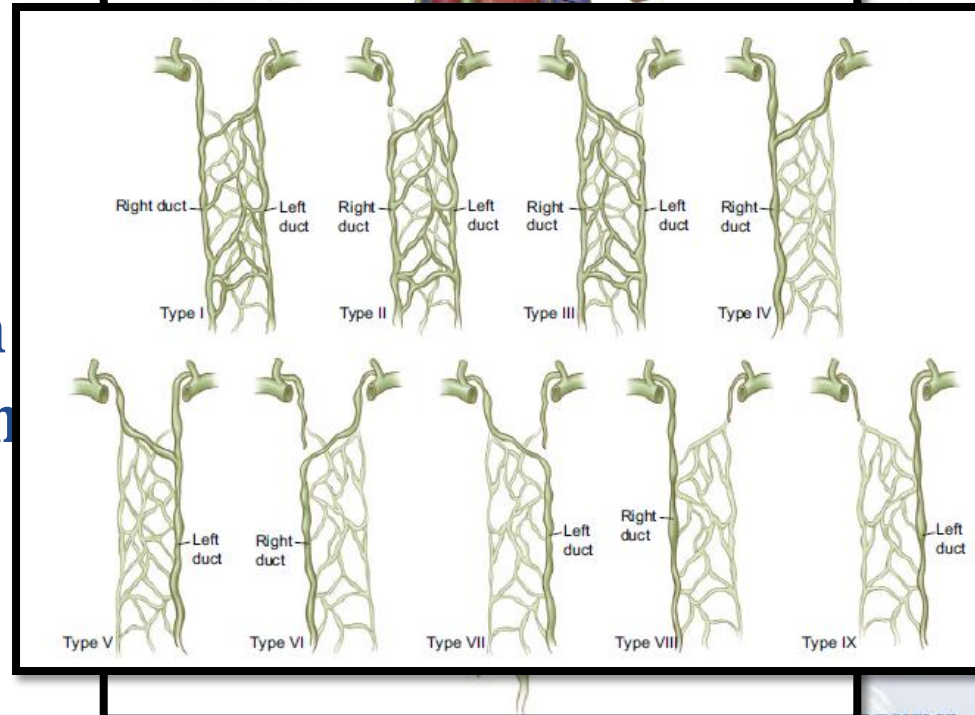
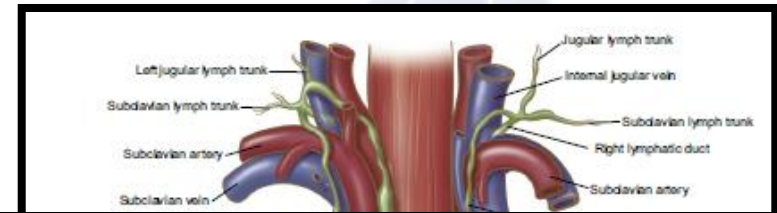


VATS Ports



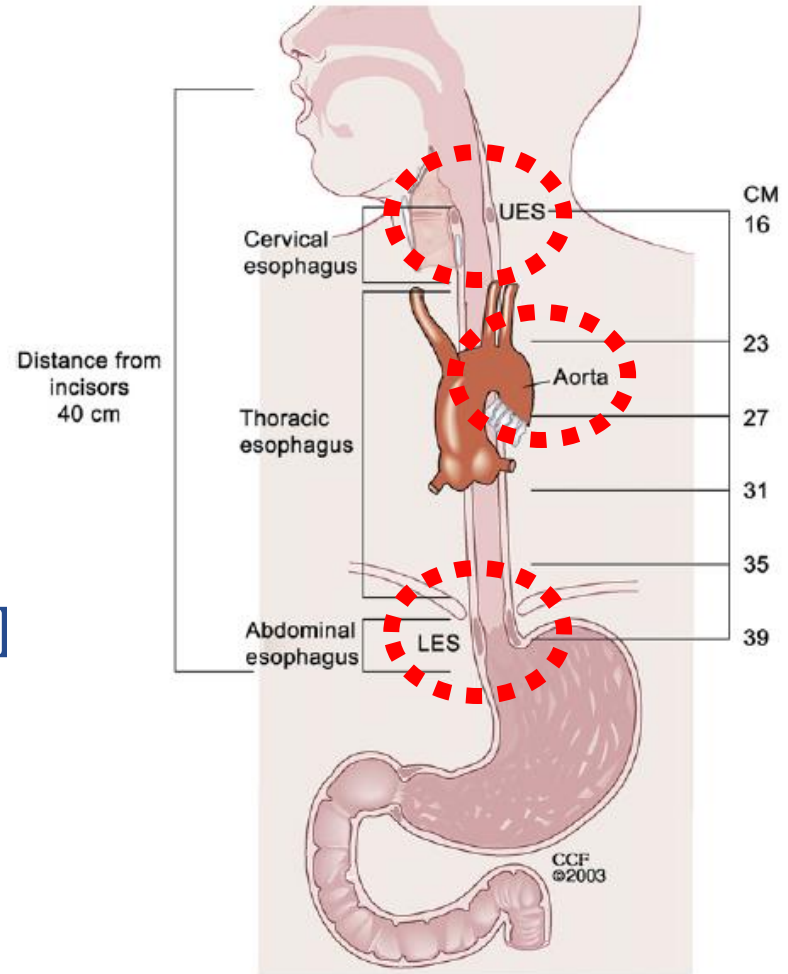
Thoracic Duct

- Injuries: nodal dissection, esophageal mobilization
- 20% with anomalous anatomy
- Some advocate ligation during thoracic portion

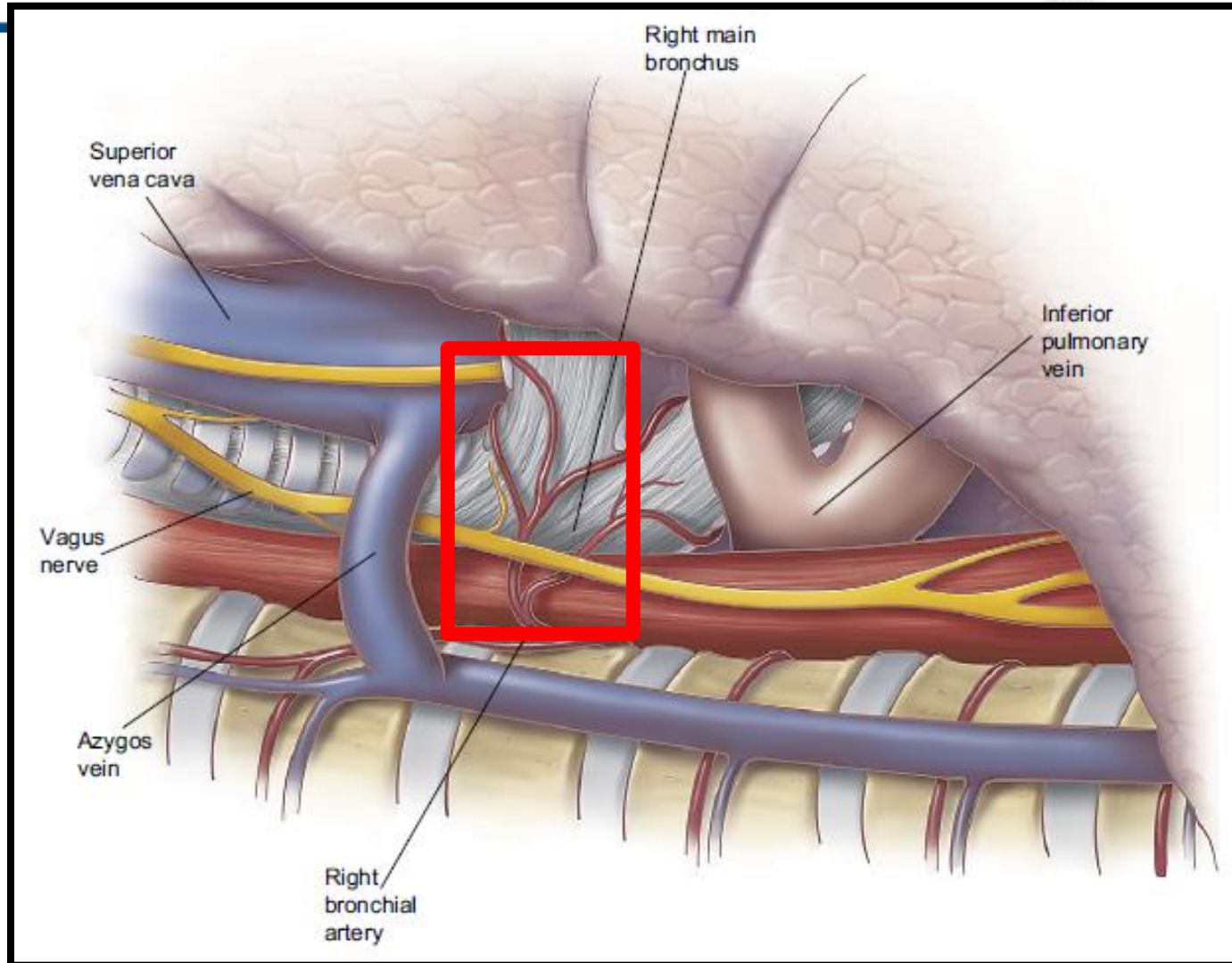


Esophagus

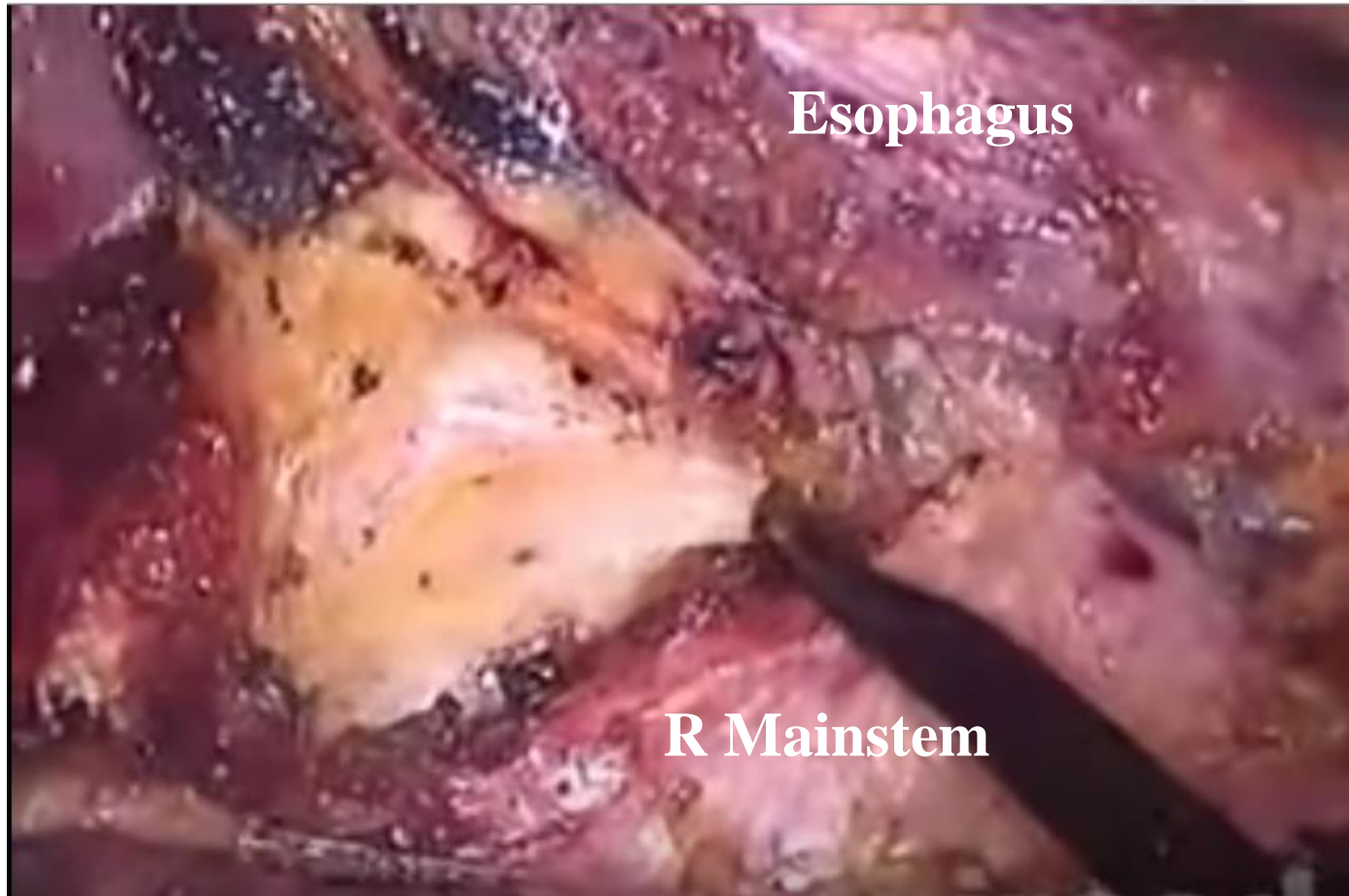
- 4 points of narrowing
- Watch for aberrant or replaced L hepatic a. (25%)
- Upper path: R chest
- Lower path: L chest
- Replaced subclavian – special approaches



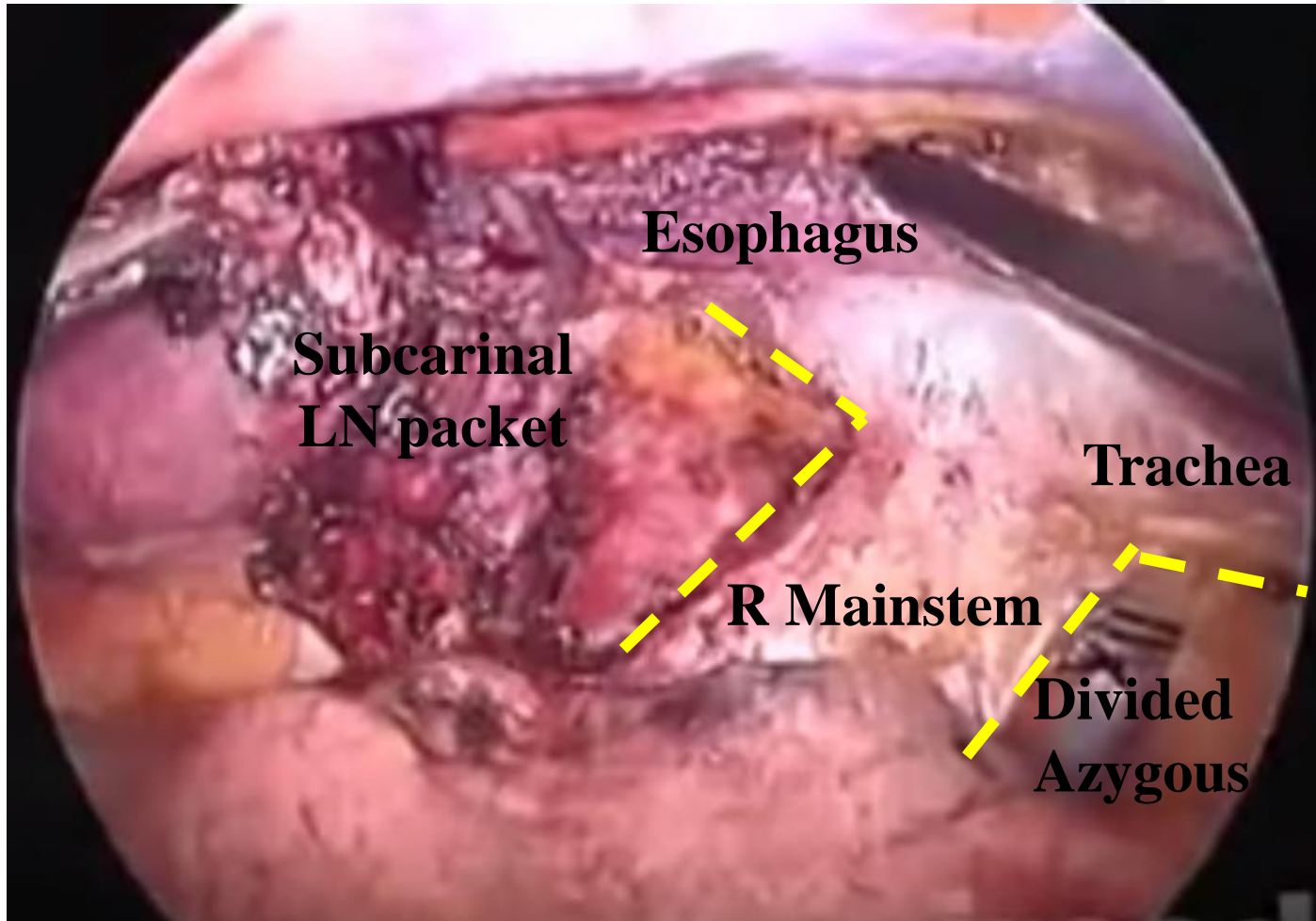
Esophageal Dissection



Esophageal Dissection



Esophageal Dissection



Conclusion

I might have forgotten all my Gross Anatomy but I'm still a boss in the OR....



someecards
user card

- A number of common anomalies exist particularly for pulmonary resections
- Value open operations to aid in VATS/robotics approach
- Vary operative procedure to gain confidence in anatomy
- Study CT 3D reconstructions carefully



Thank you
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