

# Bullous Lung Disease

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# Clinical Case

- ❖ 49 year old man with HTN, SLE, interstitial lung disease, and pulmonary HTN on home O2 presented to ER with 2 days progressive dyspnea
- ❖ PMH: followed at KCHC for interstitial lung disease. (FEV1 1.3L, FVC 1.4L, < 1 block exercise tolerance)
- ❖ Social: 20 pack-year smoking history
- ❖ Medications: include predinsone 80mg daily

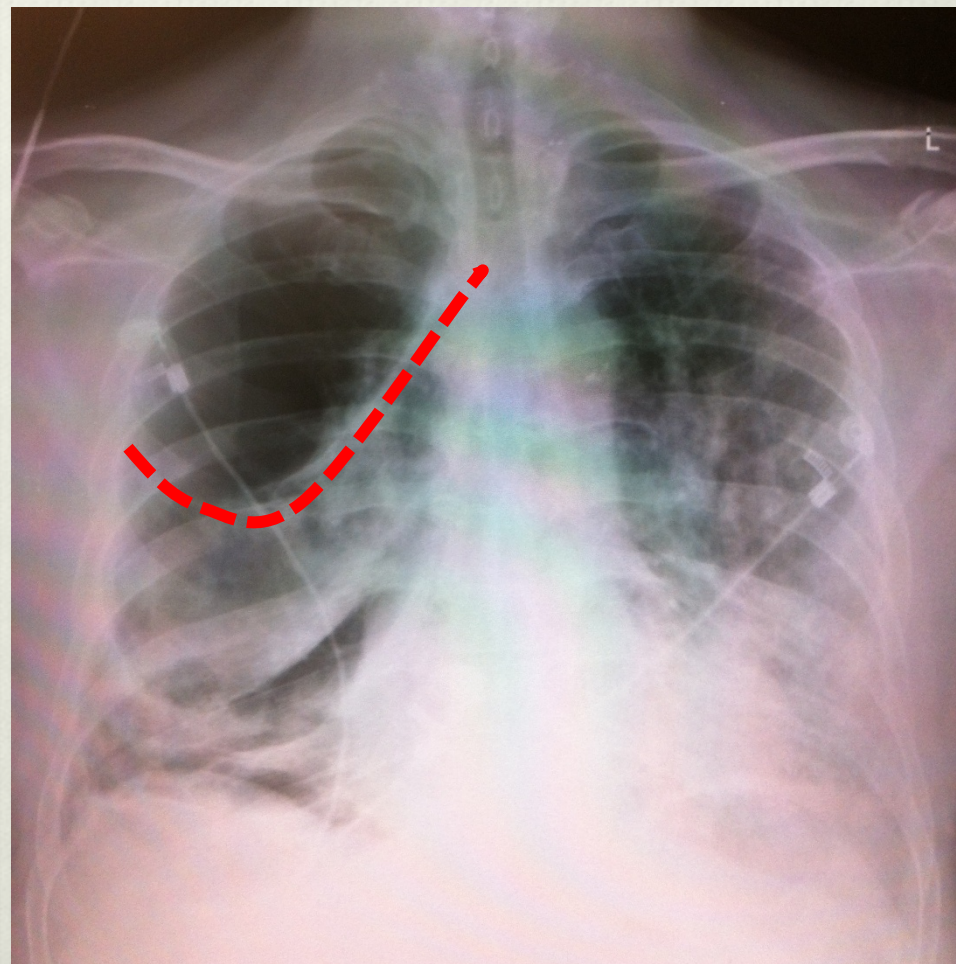
# Initial Presentation

- ❖ T 97 BP 146/101 HR 126 RR 34
- ❖ O2 sat undetectable
- ❖ Thin appearing, hyper-resonance on chest auscultation bilaterally
- ❖ ABG: 7.24/26/62 on 100% Nonrebreather FM
- ❖ ER course:
  - ❖ Placed on BIPAP (ipap 10/epap 5)
  - ❖ Zosyn for presumed PNA
  - ❖ CXR, CT chest & CT surgery consultation obtained
  - ❖ Admitted to MICU

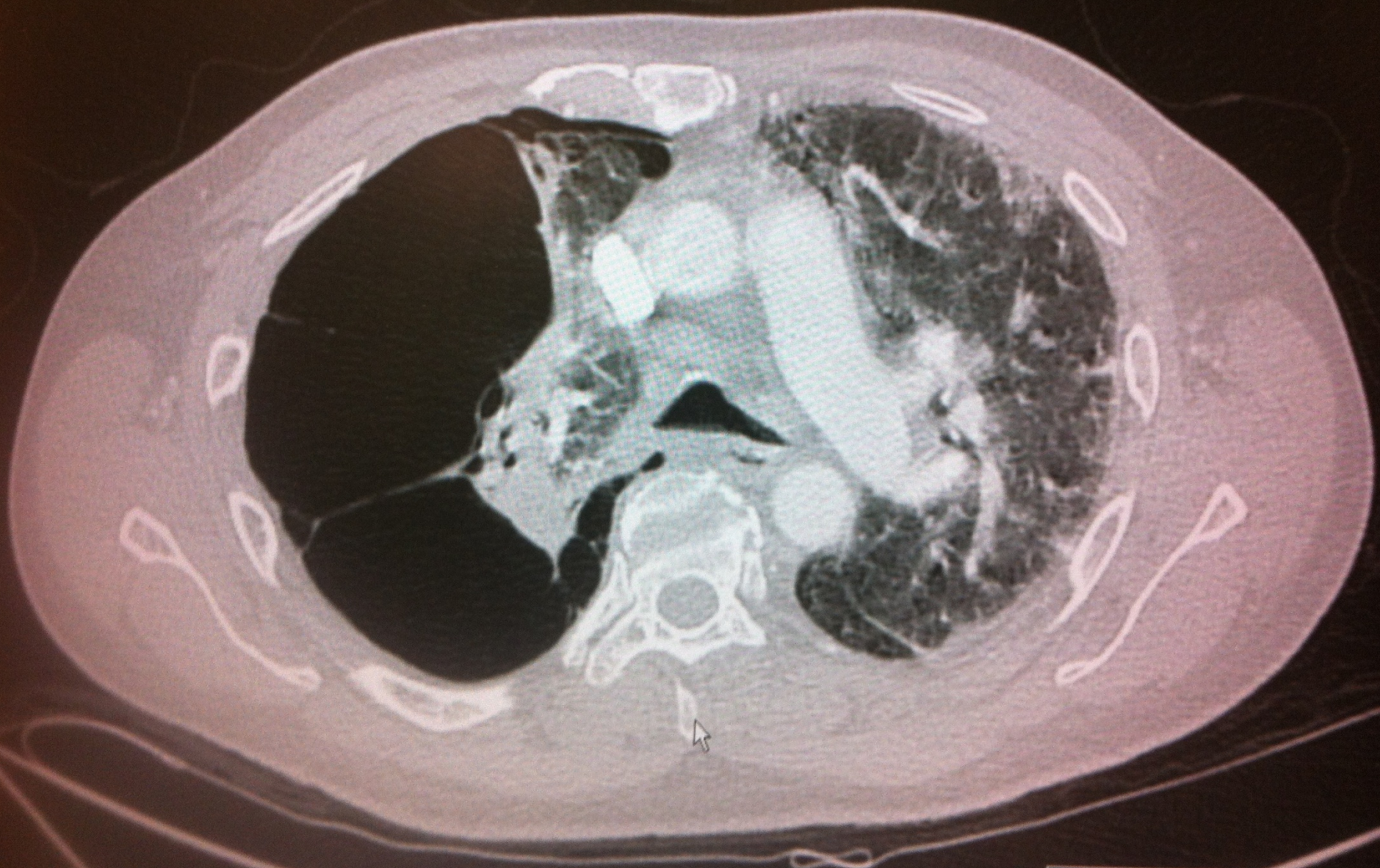
**1 MONTH PRIOR CXR**



**IN ED AFTER BIPAP**







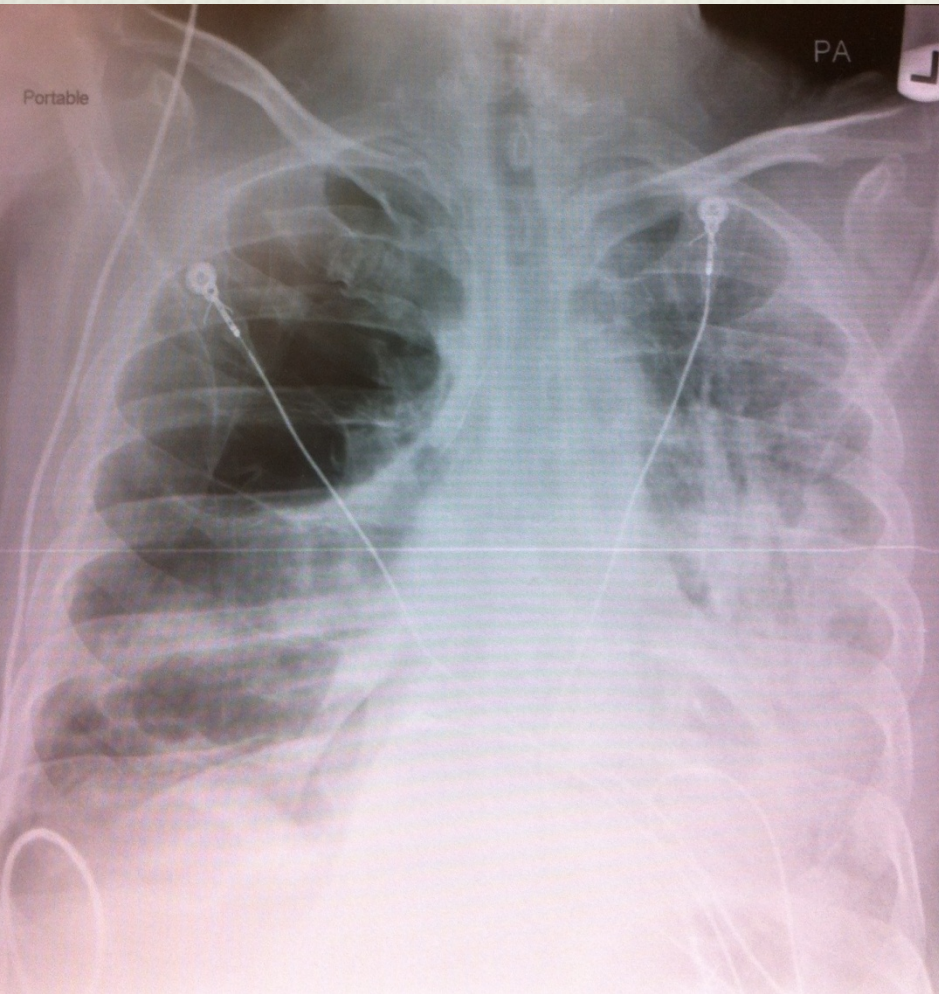


# Hospital Course

- ❖ Scheduled for bullectomy to be performed HD #3
- ❖ Emergent intubation in early morning on day of surgery for tachypnea (RR 40-50)
- ❖ CMV 450/12/5/100%
- ❖ Post-intubation: 98.6 149/92 105
- ❖ ABG 7.4/41/109/26
- ❖ Neither anesthesia or surgical team informed of events



# PRIOR TO INTUBATION



# POST-INTUBATION



# Intraoperative Events

- ❖ Hypotension on initiation of anesthesia in OR
- ❖ CVC, arterial line, double-lumen ET tube placed
- ❖ Right upper lobe blebectomy and decortication via right posteriolateral thoracotomy
  - ❖ Poor tolerance of single-lung ventilation
  - ❖ Endo-GIA 3.5mm stapler with Peri-strips
- ❖ Pathology:
  - ❖ usual interstitial pneumonitis with subpleural bullae
  - ❖ No infection, inflammation, or tumor

# Postoperative Course

- ❖ Initially improved oxygenation & hemodynamics
- ❖ rapid decompensation 14hrs postop (low BP & UOP) → expired POD 4:
  - ❖ Fever 102 F
  - ❖ pulmonary hypertension (PAP 65/40)
  - ❖ echo-confirmed right heart failure (CI 1.5)
  - ❖ liver failure (AST/ALT 1900/1400, bili 16, INR 3.3)
  - ❖ renal failure (BUN/Cr 43/5.3)

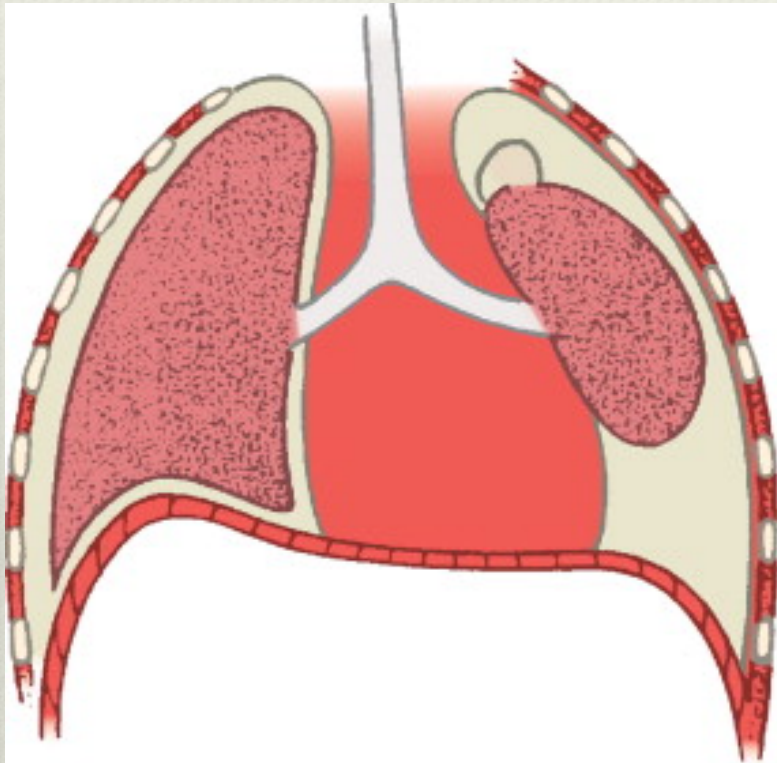
# Bullous Lung Disease

After a brief discussion of spontaneous pneumothorax...

# Questions

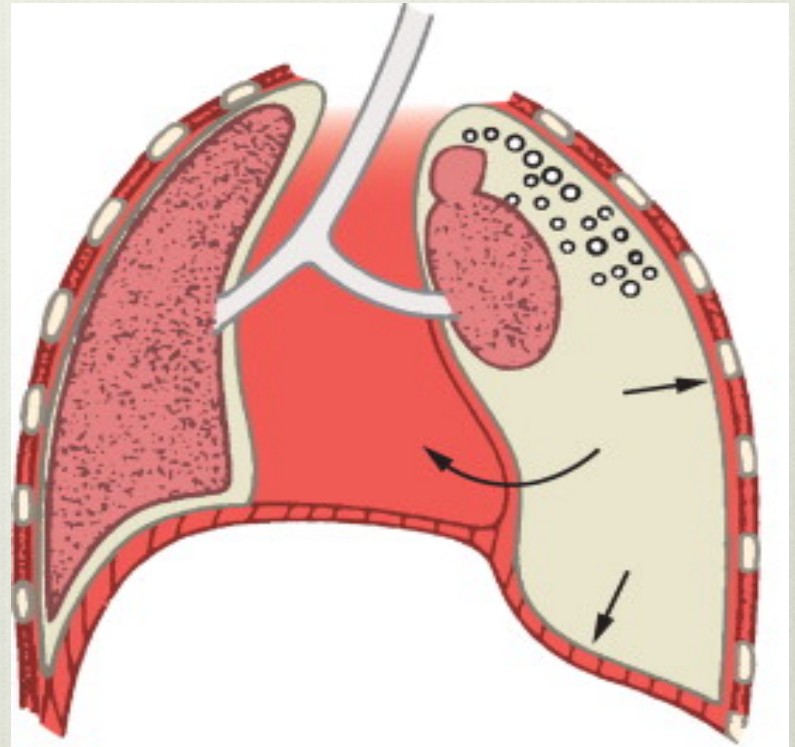
- ❖ Which of the following is the most common cause of spontaneous pneumothorax?
- ❖ Which of the following is an indication for surgical intervention in a patient with spontaneous pneumothorax?
- ❖ Which of the following is associated with secondary pneumothorax?

# Pneumothorax



- ↑ Air flow until no pressure difference
- ↓ Apex to base pressure gradient
- ↓ Lung compliance
- ↓ Functional residual capacity
- ↓ Ventilation
- ↓ Oxygenation
- Slight shunt

# Tension Pneumothorax



- ↑ Continuous air flow (one-way valve)
- ↑ Intrapleural pressure
- ↑ Mediastinal shift (alteration of lung mechanics)
- ↓ Ventilation
- ↑ Shunt
- ↓ Oxygenation
- ↑ Cardiac stroke volume
- ↑ Heart rate

# Spontaneous Pneumothorax

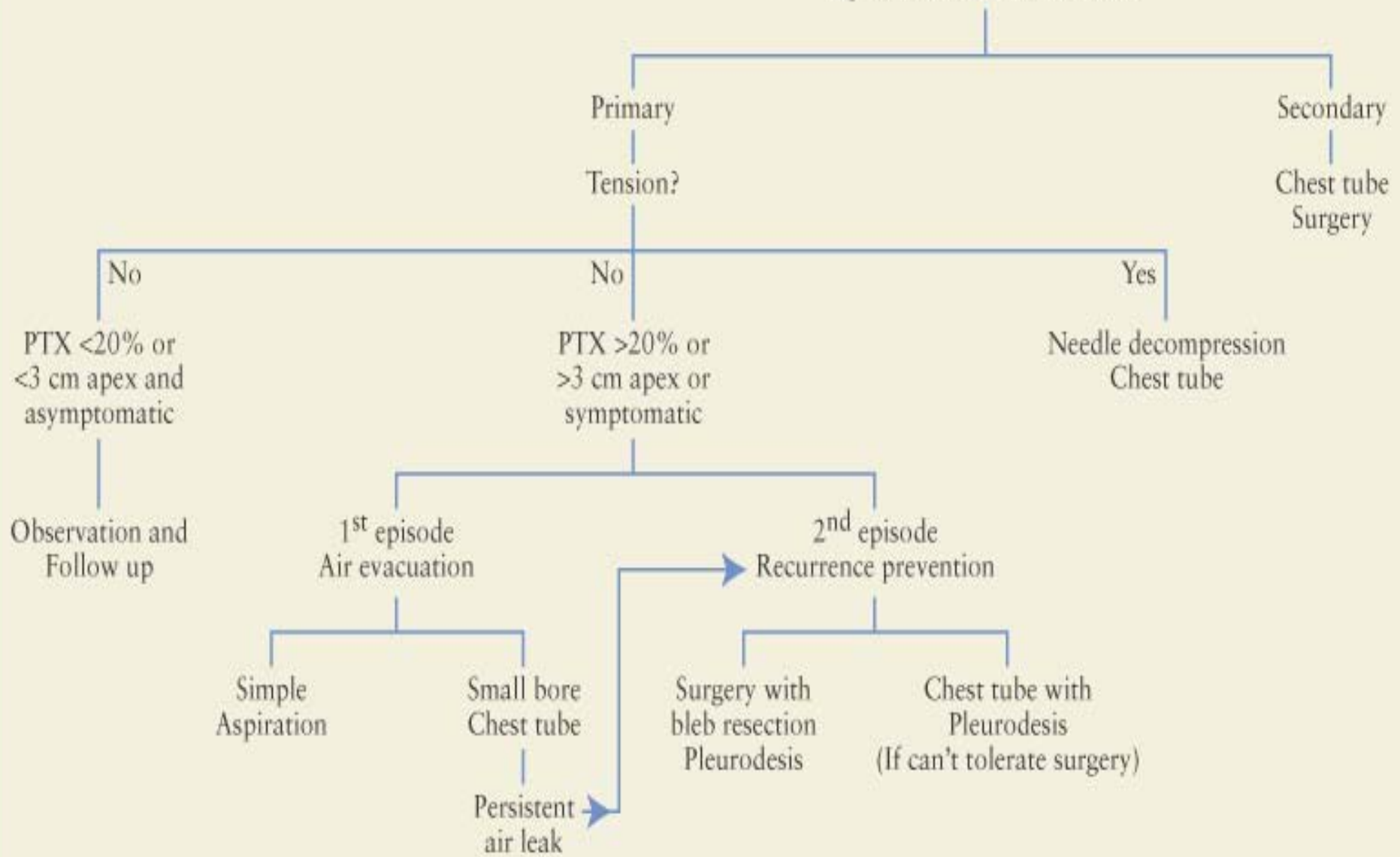
## Primary

- ❖ 10-30 yrs old
- ❖ thin men with localized apical blebs but otherwise normal lungs
- ❖ 7-18/100,000 annually
- ❖ Ruptured subpleural bleb

## Secondary

- ❖ 60-65 yrs old
- ❖ structural lung disease
  - ❖ **COPD**, asthma
  - ❖ **Interstitial lung disease**
  - ❖ HIV/PCP PNA, TB
  - ❖ Cystic fibrosis,  $\alpha$ -1 antitrypsin deficiency
- ❖ 6/100,000 annually
- ❖ Ruptured bulla (4x increase mortality/PTX)

# Spontaneous Pneumothorax

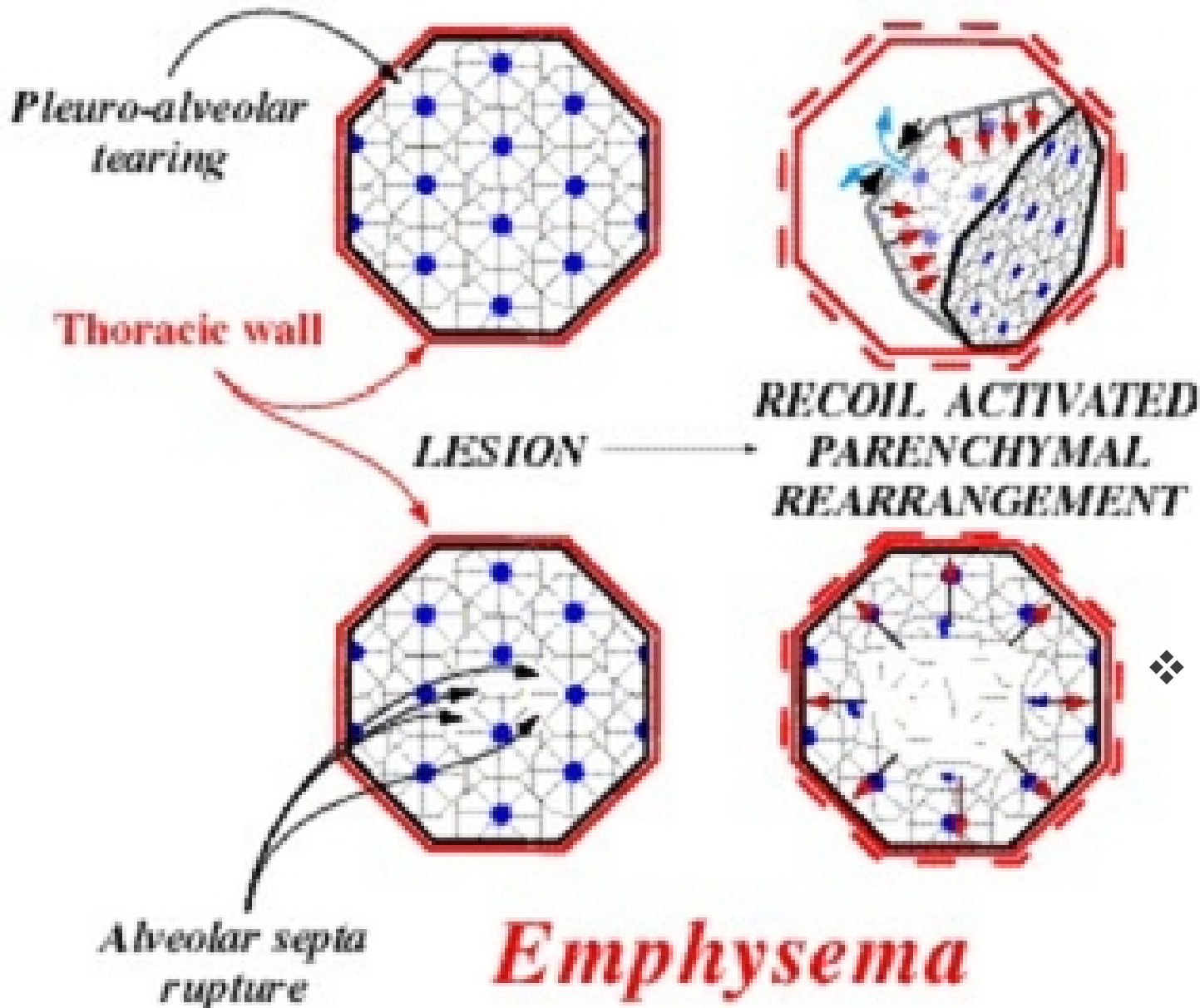


ALGORITHM 80.4



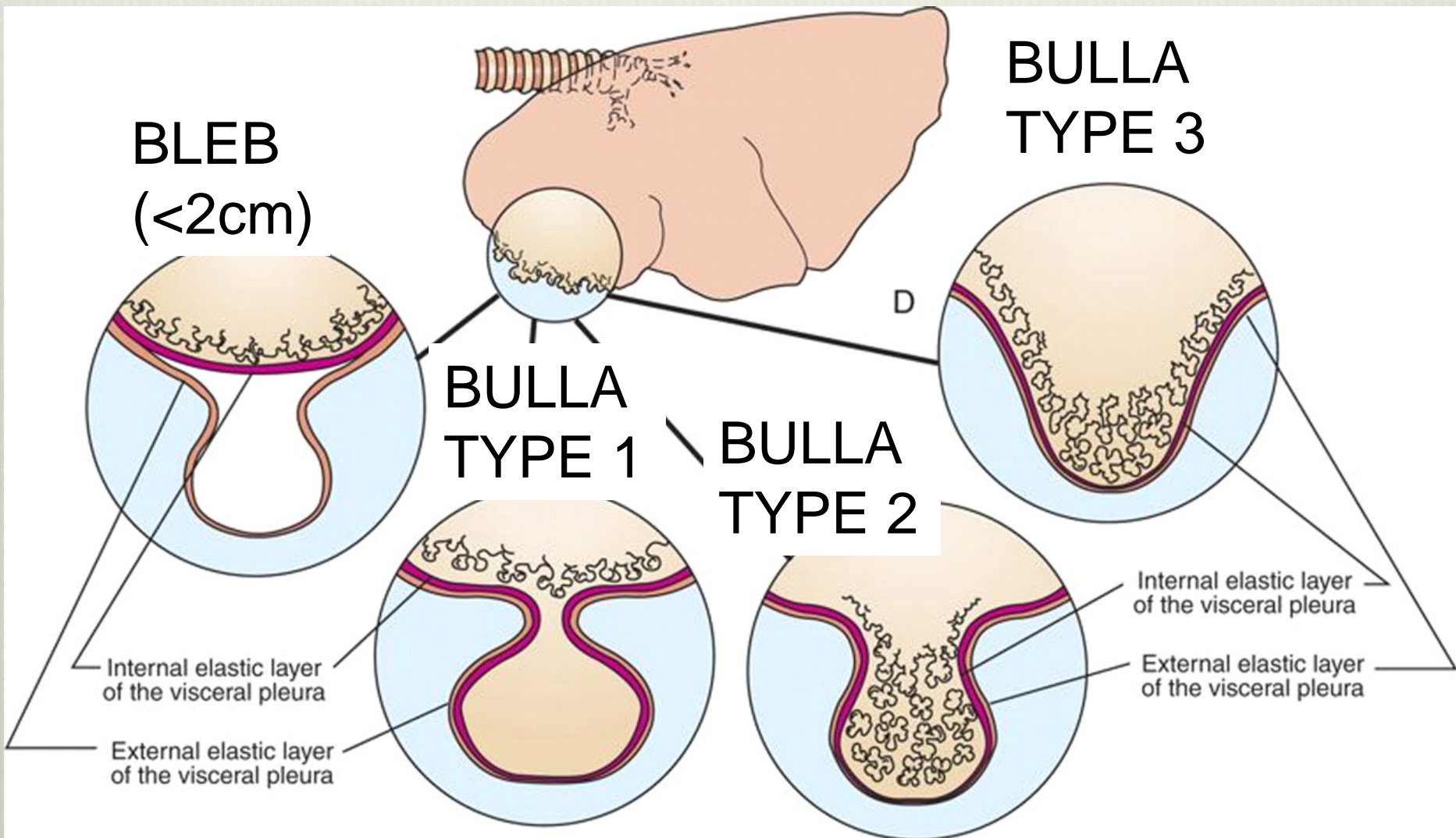
# *Pneumothorax*

- ❖ Negative intra-pleural pressure favors distension of apical alveoli. Rupture → PTX

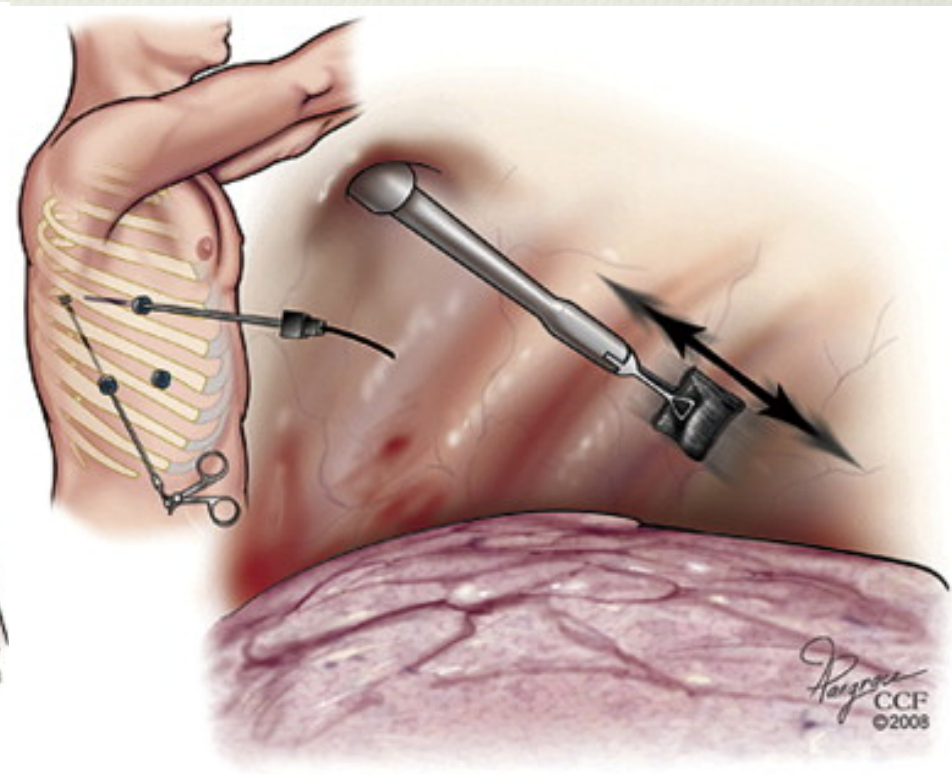
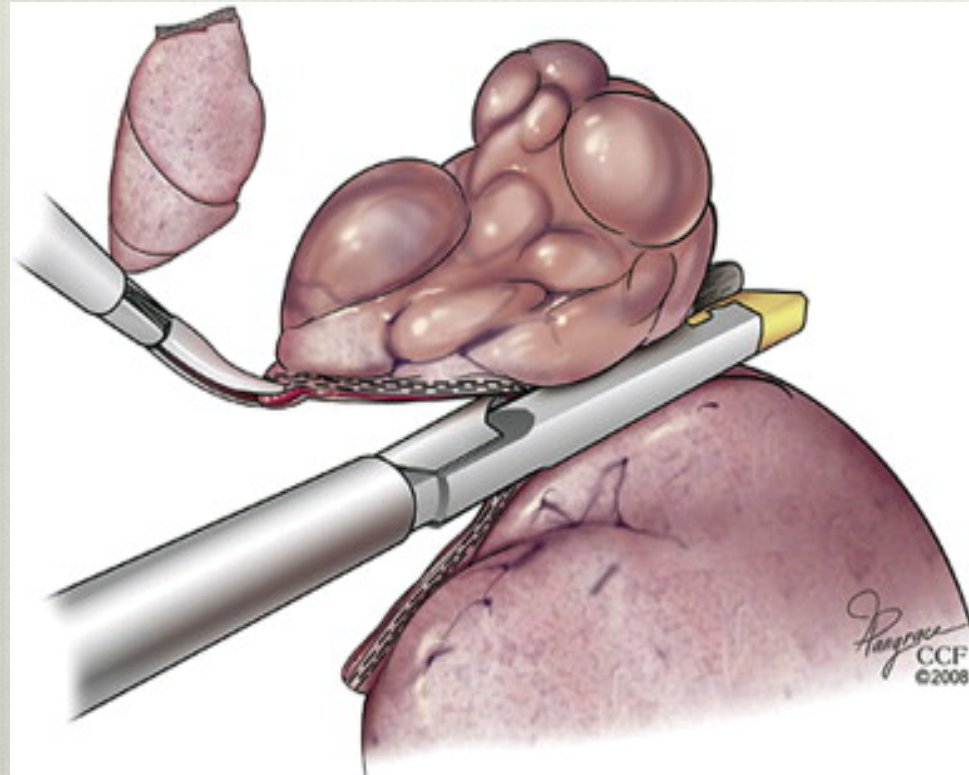


- ❖ Alveolar wall destruction by inflammatory cells. Rupture → BULLA

# Bleb vs Bulla

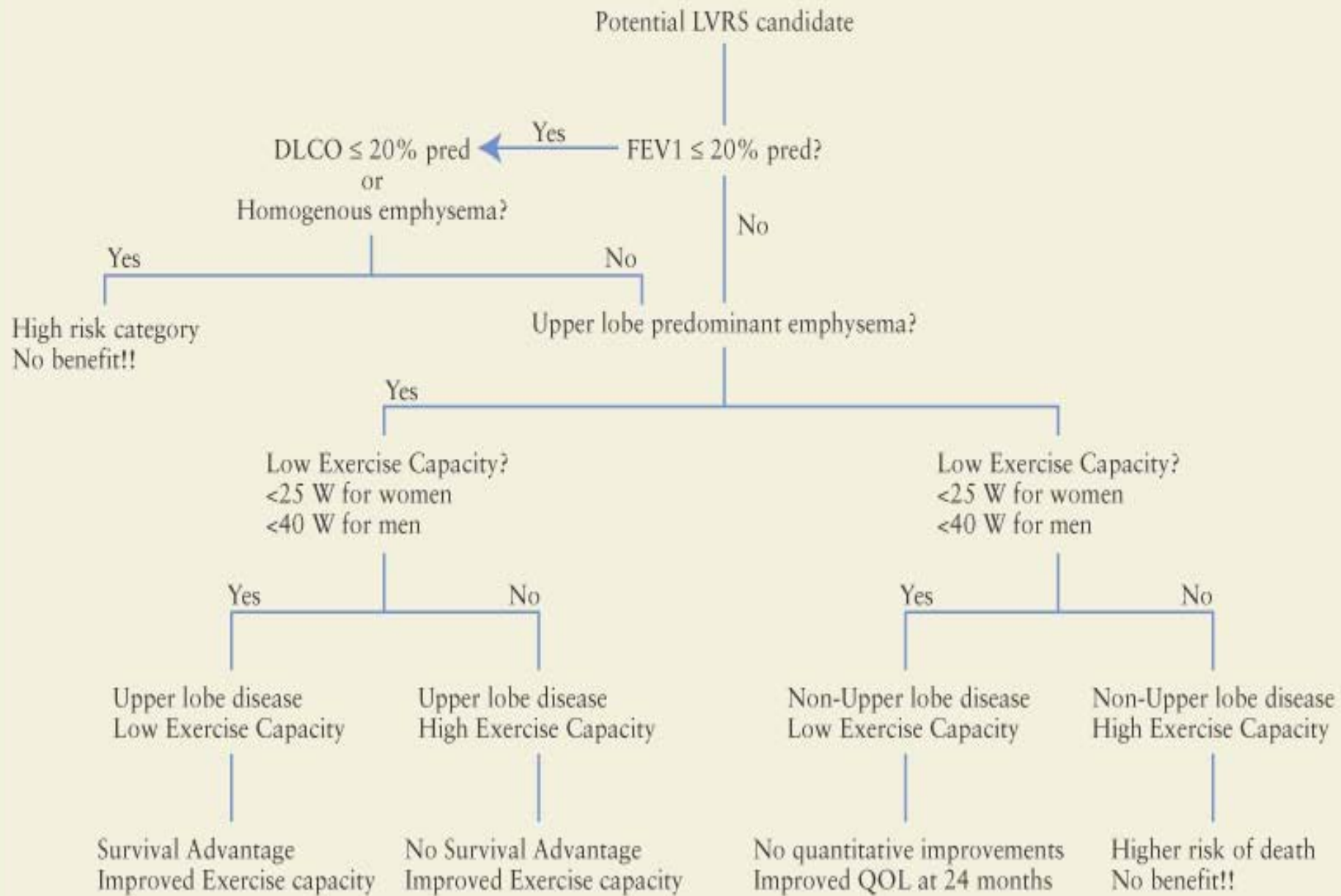


# VATS bullectomy & pleurodesis



# Bullectomy (Reduction Pneumoplasty)

- ❖ Factors predicting success (based on retrospective data)
  - ❖ Bulla size  $> 1/3$  hemithorax = giant bulla
  - ❖ Marked compression of adjacent lung tissue demonstrated by CT scan
  - ❖ FEV1  $< 50\%$  predicted
- ❖ NETT (Nat'l emphysema treatment trial) for elective LVRS
  - ❖ operative mortality up to 6%
  - ❖ pulmonary morbidity 30%
  - ❖ High risk for death with little functional benefit FEV1  $< 20\%$  predicted  $\rightarrow$  16% 30-day mortality



ALGORITHM 80.3

# Questions

- ❖ Which of the following is the most common cause of spontaneous pneumothorax?
  - ❖ A) tuberculosis
  - ❖ B) rupture of small blebs
  - ❖ C) emphysema and chronic bronchitis
  - ❖ D) endometriosis

# Questions

- ❖ Which of the following is an indication for surgical intervention in a patient with spontaneous pneumothorax?
  - ❖ A) recurrent spontaneous pneumothorax
  - ❖ B) persistent air leak at the end of a 3-day trial of closed drainage of a spontaneous pneumothorax
  - ❖ C) complete collapse of the lung in a patient with an initial spontaneous pneumothorax
  - ❖ D) pregnancy

# Questions

- ❖ Which of the following is associated with secondary pneumothorax?
  - ❖ A) usually occurs in young women
  - ❖ B) observation if small and asymptomatic
  - ❖ C) video-assisted repair usually effective
  - ❖ D) rarely associated with underlying lung disease



# References

- ❖ Beauchamp G and Ouellette D. “Spontaneous pneumothorax and pneumomediastinum” in Pearson’s Thoracic and Esophageal Surgery, 3<sup>rd</sup> ed. 2008.
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