

Post-Operative Complications from Thoracic Surgery and the Respiratory Therapist's Role

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September 28, 2012



EAST CAROLINA
HEART INSTITUTE

No disclosures

“Pulmonary resection is the operation that defines the thoracic surgeon.”

-Larry Kaiser

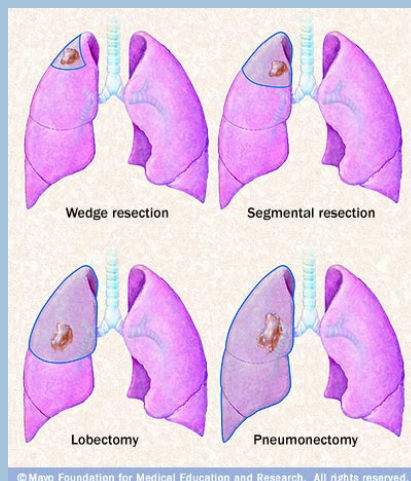
What we mess with

- Lungs
 - Resection
- Esophagus
 - Resection
 - Anti-reflux
- Trachea
 - Stents
 - Tracheostomies
 - Fistulas
- Thymus
 - Resection
- Diaphragm
 - Plication
 - Pacemaker
 - Reconstruction
- Pleural Effusions
 - Pleurx catheter
 - Pleurodesis

Indications for Pulmonary Resections

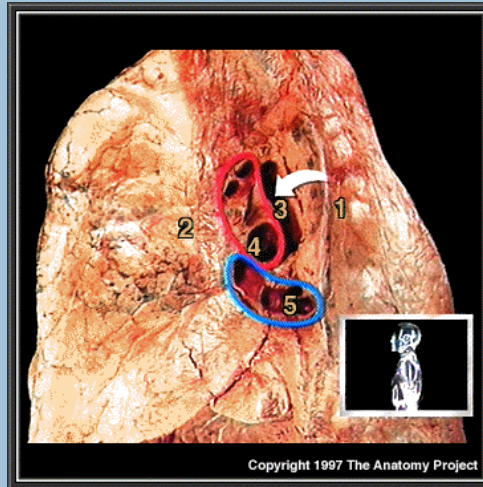
- Cancer
- Lung Biopsy
- Bleb Resection
- Lung Volume Reduction Surgery
- Complications from Infection: hemoptysis
 - Tuberculosis
 - Aspergillosis

Types of Resections



www.mayoclinic.com

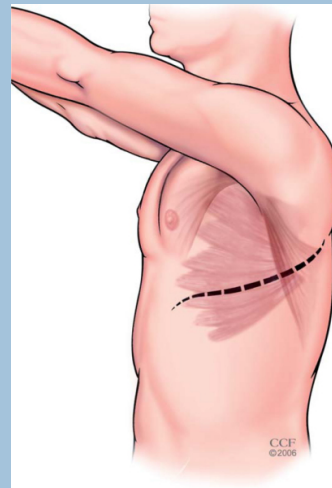
Anatomic Resection



anatomy.med.umich.edu

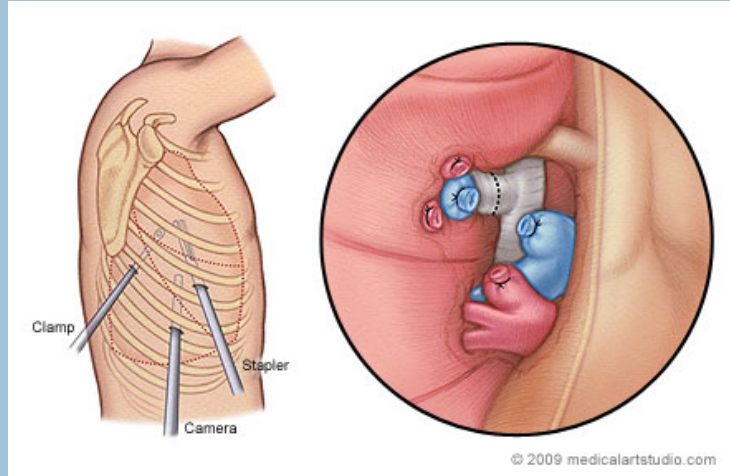
Surgical Approach: Posterolateral Thoracotomy

- Most painful surgical incision
- Muscles divided
 - Latissimus
 - Intercostal
 - Possibly Serratus, Rhomboid, Trapezius



Murthy, S. Thoracic Incisions. In Pearson's Thoracic and Esophageal Surgery.

Surgical Treatment of Lung Cancer: Thoracoscopy



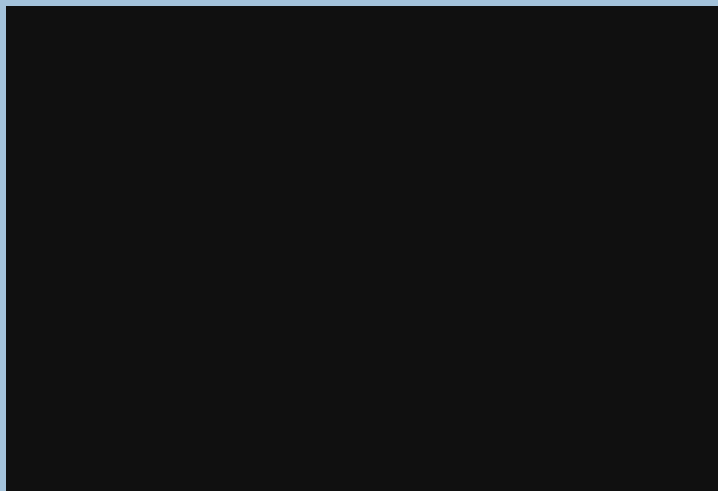
thoracicsurgery.stanford.edu

Surgical Approach: Robotic



Veronesi, et al. JTCVS. 2010; 140: 19-25.

Robotic Lobectomy



Complications after Pulmonic Resections

- Pneumonia
- Persistent Air Leak/
Pneumothorax
- Bronchopleural fistula
- Chylothorax
- Bleeding
- Pulmonary Embolus
- Empyema
- Aspiration
- Atrial Fibrillation

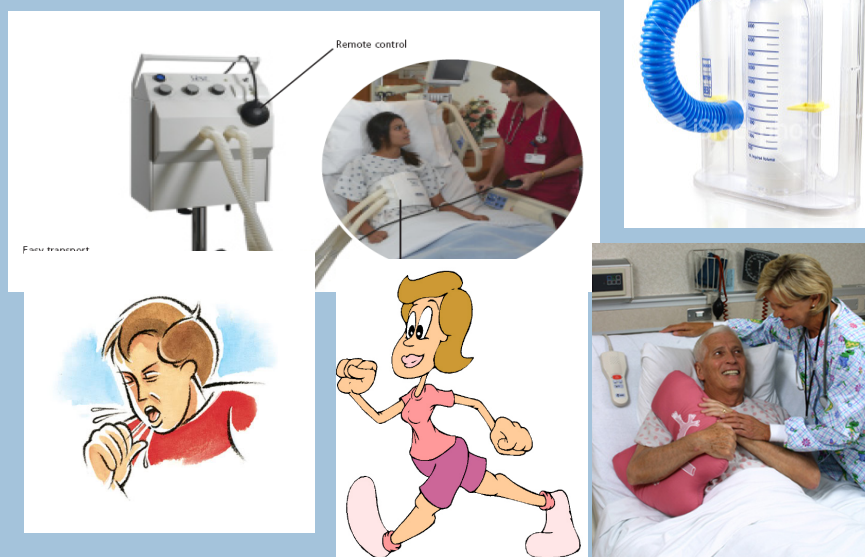
Post-Operative Care

- #1 cause of morbidity & mortality in ALL thoracic patients is pulmonary complications.
- This is preventable.
- Downward spiral
 - Retained secretions → pneumonia → intubation
 - MSOF → Death

Post-Operative Care

- Pain Control
- Early mobilization
- Pulmonary toilet

Prevention is key!!



Cost-effectiveness analysis of prophylactic respiratory physiotherapy in pulmonary lobectomy[☆]

Gonzalo Varela^{*}, Esther Ballesteros, Marcelo F. Jiménez, Nuria Novoa, José L. Aranda

Table 1
Comparison of continuous variables in both series

	Physiotherapy, mean (SD)	Control, mean (SD)	<i>p</i>
Age (years)	63.98 (11.81)	63.36 (10.92)	0.17
ppoFEV1%	68.08 (15.72)	69.14 (16.97)	0.47
BMI	25.82 (3.88)	25.75 (4.16)	0.99

Cost-effectiveness analysis of prophylactic respiratory physiotherapy in pulmonary lobectomy[☆]

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Table 2
Comparison of categorical outcomes

	Mortality, <i>n</i> (%)	Pneumonia, <i>n</i> (%)	Atelectasis, <i>n</i> (%)
Cases, <i>n</i> = 119	1 (0.8)	6 (5)	2 (1.7)
Controls, <i>n</i> = 520	18 (3.5)	48 (9.2)	40 (7.7)
Odds ratio (95% CI)	0.23 (0.03–1.79)	0.52 (0.22–1.25)	0.20 (0.05–0.86)

Varela, et al. ECTS. 2006; 29: 216-220.

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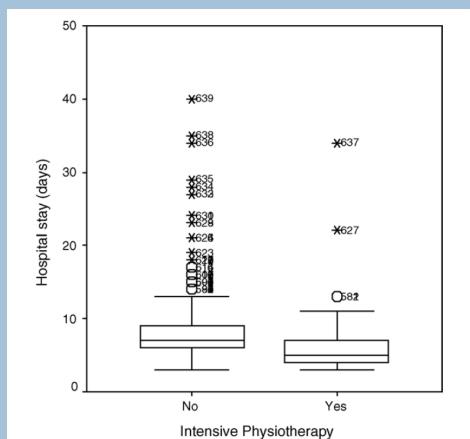


Fig. 1. Differences in length of hospital stay between both series of cases ($p < 0.001$ on Mann-Whitney test).

Varela, et al. ECTS. 2006; 29: 216-220.

Cost-effectiveness analysis of prophylactic respiratory
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Table 4
Monetary evaluation of implementing the intensive physiotherapy program

	Estimation in €
Costs	
New staff wages	-30,447.81
New equipment	-18,000.00
Total	-48,447.81
Savings	
151.75 avoided hospital days	+89,532.50
Balance	+41,084.69

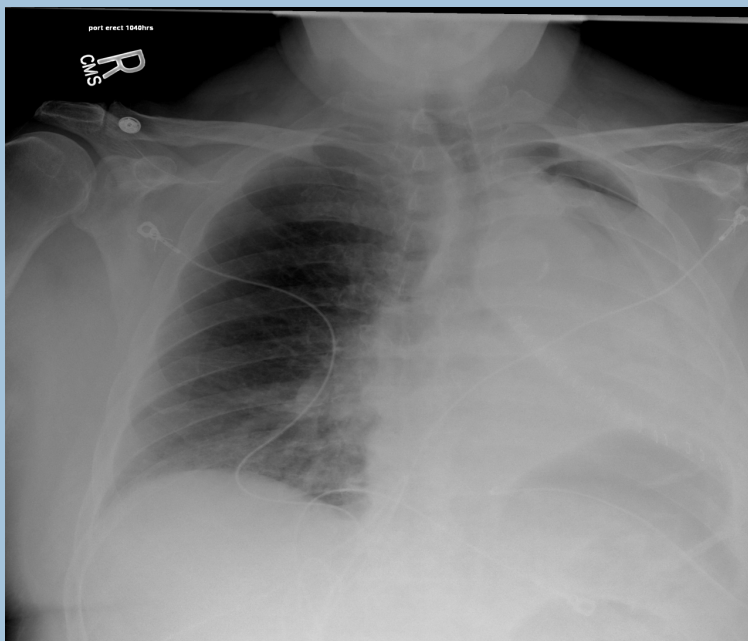
Varela, et al. EJCTS. 2006; 29: 216-220.

Pneumonia

- 2.2-6% incidence
- Atelectasis is major risk factor

Case Presentation

- 52 yo male who underwent an elective left lower lobectomy for NSCLC.
- POD #3: chest tube was clamped because of debate of shake vs. airleak



Case Presentation

- Patient underwent an awake bronchoscopy which showed mucous plugging of the left upper lobe.
- He underwent aggressive chest PT and daily bronchoscopies until clear.

Persistent Air Leak/Pneumothorax

- Also known as Alveolar-Parenchymal fistula
- Incidence:
 - 25% on POD #1
 - 20% on POD #2
 - 5% on POD #4
- Prolonged air leak is defined as >4 days

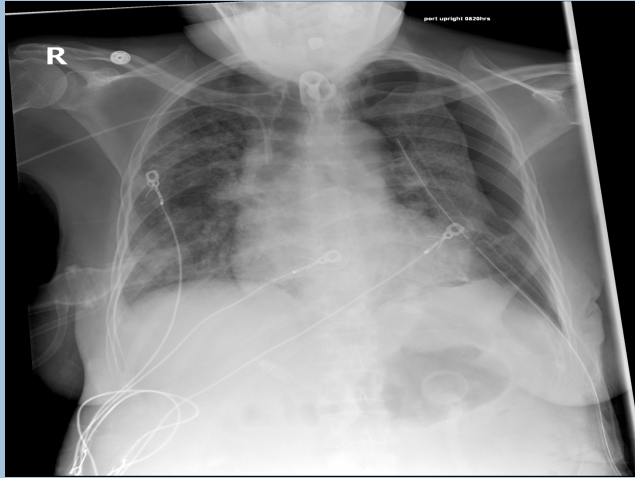
Persistent Air Leak/Pneumothorax: Risk Factors

- Emphysema
- Steroids
- Improper chest tube placement
- Bilobectomy

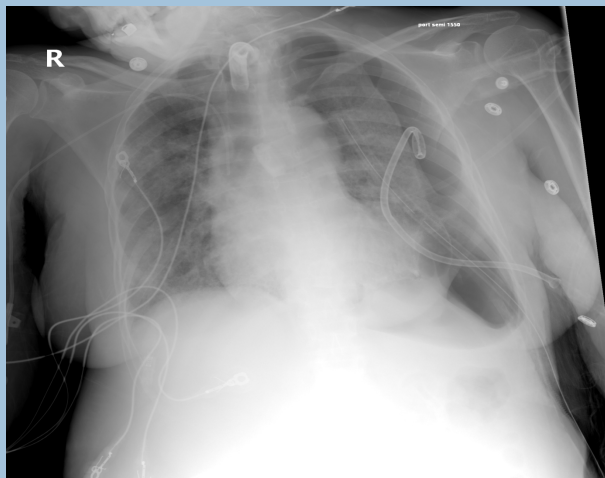
Persistent Air Leak/Pneumothorax

- 61 yo female with ILD with a recurrent left pneumothorax that was enlarging despite chest tube
- Underwent left thoracotomy, pneumatocele resection, and mechanical pleurodesis
- Post-op care complicated by VDRF and persistent air leak

Persistent Air Leak/Pneumothorax



Persistent Air Leak/Pneumothorax



Bronchopleural Fistula

- Communication between the bronchus and the pleura
- Incidence
 - 0.5% after lobectomy
 - 4.5-20% after pneumonectomy
- Mortality of 18-67%
- Present POD #8-12

Risk Factors for Bronchopleural Fistula

What we can't control

- Preoperative chemotherapy &/or radiation therapy
- Endobronchial TB/infection
- Steroids
- Right pneumonectomy
- Immunocompromised
- Postoperative intubation

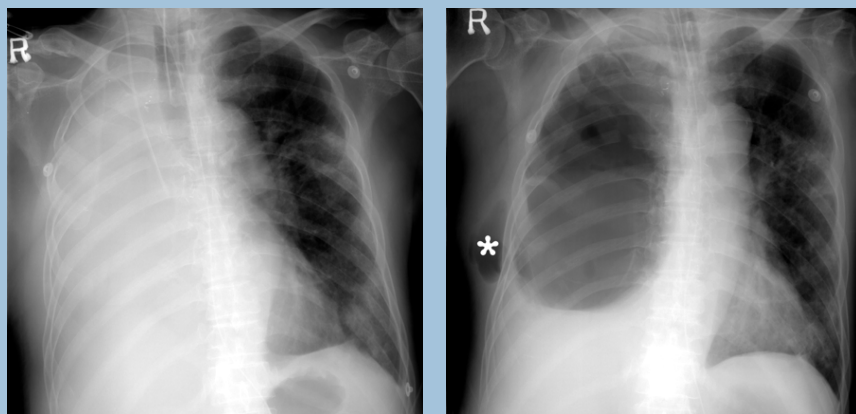
What we can control

- Contamination of the pleural space during resection
- Long bronchial stump
- Devascularized bronchus
 - Use of flaps to cover stump
- Poor surgical technique
 - Residual tumor
- Postoperative intubation

Presentation

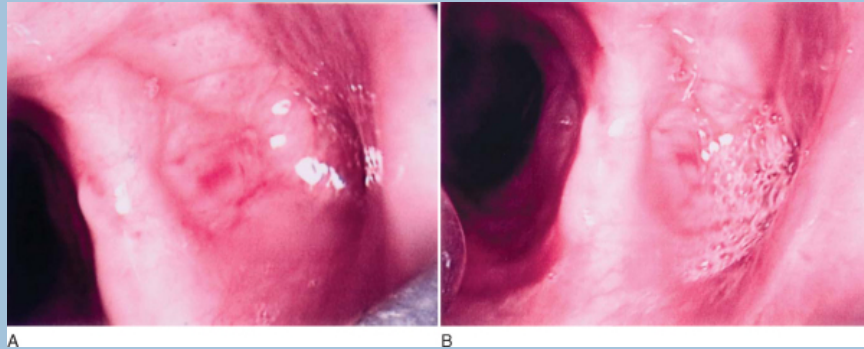
- Fever
- Malaise
- Coughing up foul smelling, rust colored fluid
- Respiratory distress
- Cardiopulmonary collapse
 - Aspiration
 - Tension pneumothorax

Diagnosis: CXR



Chae, et al. Radiographics. 2006. 26:
1449-68.

Diagnosis: Bronchoscopy



Temes, et al. Late Postoperative
Complications. in Pearson's Thoracic &
Esophageal Surgery.

Immediate Treatment

- Place patient operative side down
- Place chest tube
- Secure airway
 - Mainstem intubation
 - Double lumen endotracheal tube

Ventilator Management

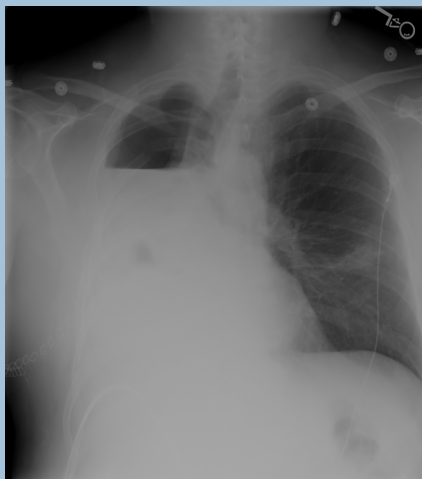
- Minimize inspiratory time
- Keep respiratory rate low
 - Allow PCO₂ in the 50's
- Minimize PEEP
- Minimize tidal volume

Surgical Management

- Widely drain the area
 - Eloesser flap
 - Chest tube
- Bronchial stent
- Re-resect the bronchus (only if non-infected space)
- Muscle/omental flaps
- Fibrin glue via bronchoscope

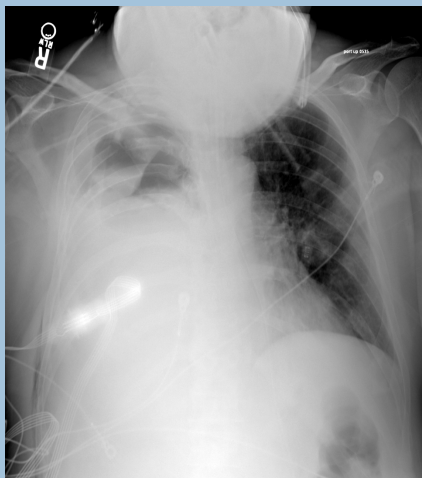
Bronchopleural Fistula

- 57 yo male with large right lung ca who underwent chemoradiation therapy followed by a right pneumonectomy



Bronchopleural Fistula

- Presented 3 weeks later with malaise & cough
- Intubated & creamy, brown secretions from ETT
- Chest tube placed
- Bronchoscopy showed necrotic bronchial stump



Bronchopleural Fistula

- Went to OR for Eloesser flap
- During induction of anesthesia, severe loss of TV; anesthesia unable to ventilate patient

Bronchopleural Fistula

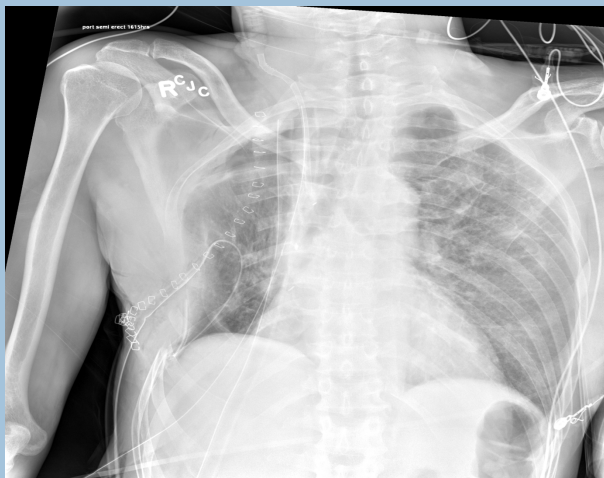
- Chest tube was to suction
- Once chest tube placed to water seal, able to ventilate patient

Combined Case

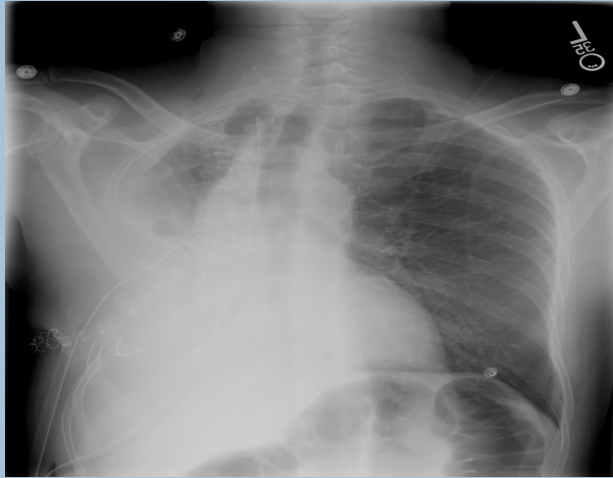


- 46 yo male with a chest wall tumor treated with chemoradiation therapy who underwent extensive chest wall resection, RUL, RML, & superior segmentectomy of RLL

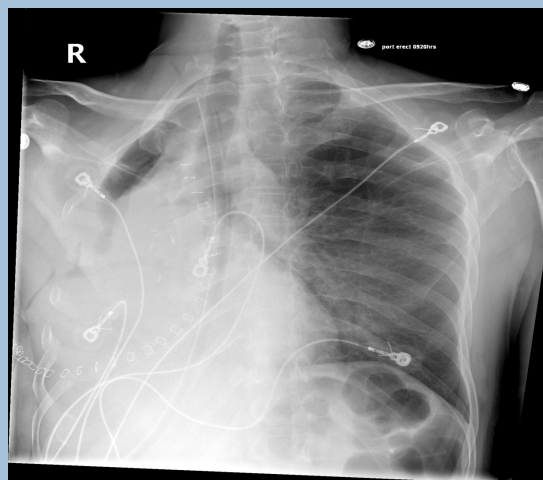
Combined Case



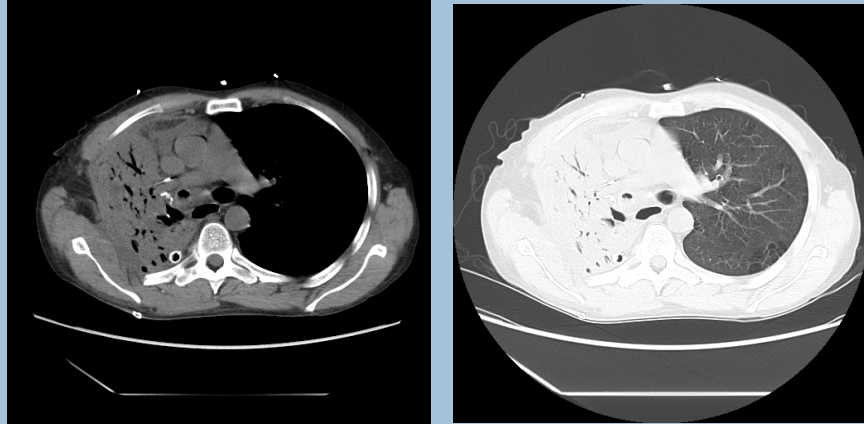
Combined Case: POD #2



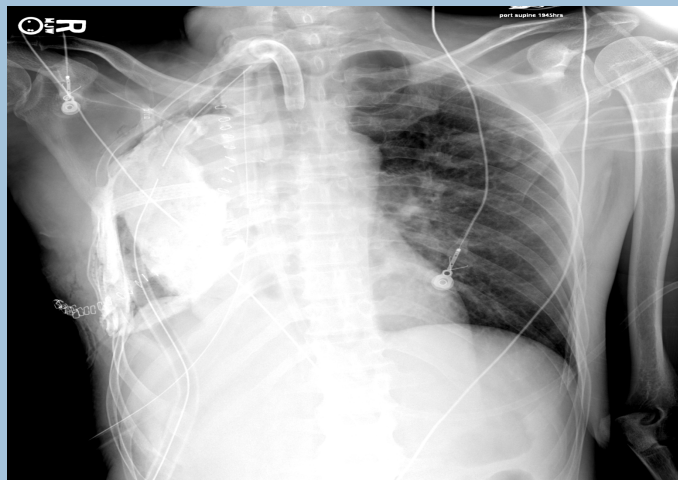
Combined Case: POD #3



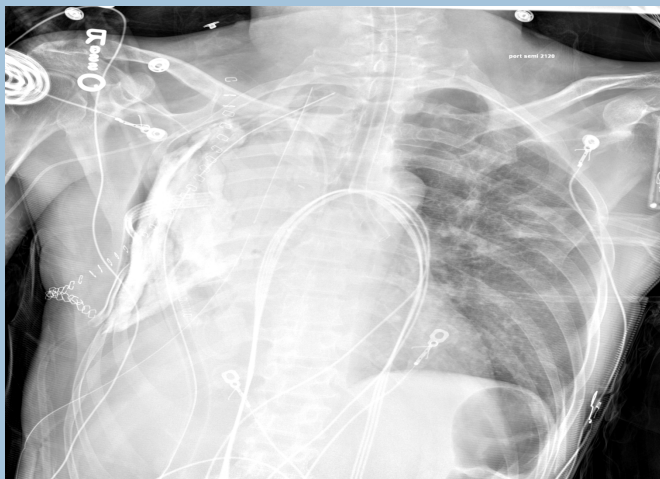
Combined Case: CT of the chest



Combined Case: POD # 11/1: chest wall reconstruction & tracheostomy



Combined Case: POD #14/4

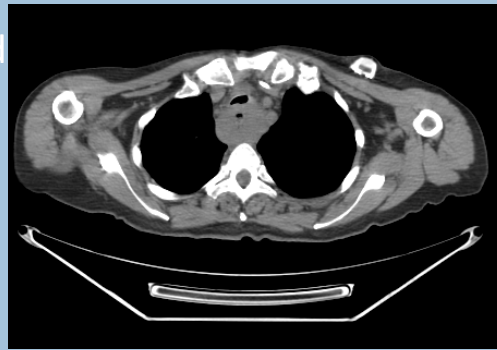


Combined Case

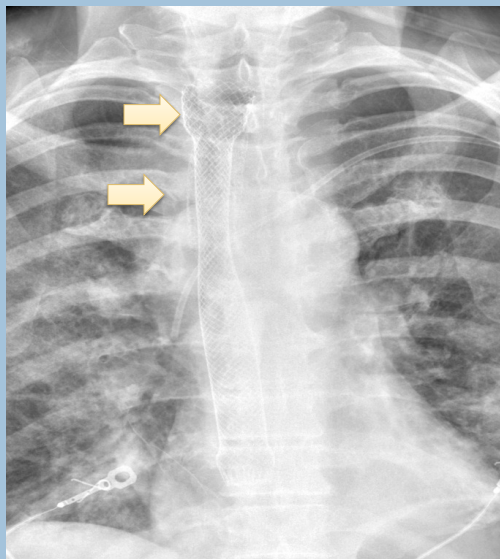
- Patient returned to the OR for a completion pneumonectomy, placement of serratus muscle flap, placement of tracheal stent, Eloesser flap.
- Pathology of the lung showed extensive necrosis and mucous plugging.

Case: Tracheal Stent

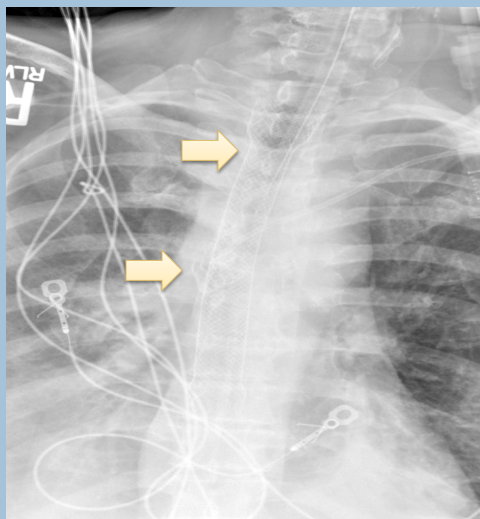
- 52 yo female with dysphagia, increased oral secretions, with squamous cell carcinoma of the esophagus



Post-Op: Tracheal & Esophageal Stents



Reintubation: Tracheal & Esophageal Stents



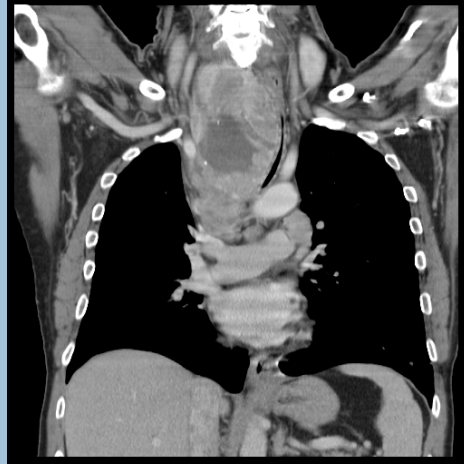
Airway Emergency

- 64 yo M who presented to OSH with stridor for 3 mos & worsening SOB for 48 hours.



Airway Emergency

- Transferred to ICU and started on Heliox and racemic epinephrine nebs.
- At 4 am, worsening respiratory status



Airway Emergency: What do you do?

- A: Bipap
- B: Intubate patient at the bedside
- C: Awake intubation in the OR
- D: Emergent tracheostomy
- E: Nebulizer treatment

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Airway Emergency

- Patient was taken back to ICU paralyzed.
- ETT was hubbed and the patient was unstable.
- Taken to OR for emergent sternotomy and thyroidectomy.
- Pathology showed a 19 cm poorly differentiated thyroid cancer.

Conclusions

- Although technology has evolved in thoracic surgery, the complications are similar for a thoracotomy, thoracoscopy, and robotic resections.
- Chest physiotherapy has been shown to decrease the incidence of atelectasis, length of stay, and cost.
- Knowledge of the patient's history is key in prevention and treatment.
- Post operative care of the thoracic patient requires a multidisciplinary care plan including the surgeons, nurses, and respiratory therapists.

Thank you
Questions?

