Advances and Updates in Pleural Disease Management: Pneumothorax and Pleural Effusion

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Speaker Introduction

- Irene Austria-Ramos is a certified pediatric nurse practitioner in the division of pediatric surgery at a large pediatric academic medical center dedicated in providing family-centered and comprehensive care for the pre-operative, post-operative and clinic patients. She works diligently to enhance the care for the general surgical population and is involved in many departmental and hospital-wide quality improvement projects. Ms. Austria-Ramos is the co-chair for the Advanced Practice Journal Club, the advanced practitioner representative in Clinical Council, an APN mentor and a member of the special interest group in a national nursing organization. Her passion is teaching patients, families and nurses. She traveled to Vietnam with in 2017 and provided education in the care of the surgical patients at a new 1,000 bed pediatric hospital in Can Tho. She has presented nationally and locally. She has joined the Colorectal Center at her organization to help provide care coordination and quality of life outcomes for patients including those with anorectal malformation, diastea, Hirschsprung disease, fecal incontinence and constipation.

Disclosures

I have no disclosures

Learning Objectives

- Review the pathophysiology and clinical presentation of the patient with pneumothorax
- Discuss the treatment of pneumothorax
- Discuss management of pleural effusion
- Identify the gold standard for operative management of empyema
- Describe treatment of the patient with pleural effusion
- Describe nursing consideration for a patient with chest tube

Video by Florida State University College of Medicine (Media)

https://youtu.be/x-625AkBwDc?t=8

Pneumothorax

- Pneumothorax air between the visceral and parietal pleura
- Air can enter the pleural space through a leak in either surface
- May flow freely within the chest or be loculated
Pneumothorax

Estimated annual incidence to be 5-10:100,000

Primary spontaneous pneumothorax (PTX): no specific, identifiable underlying etiology

Trans-pulmonary pressure = alveolar distention = rupture

Most often seen in adolescent males and young adults with tall and lean body habitus

Secondary Pneumothorax (PTX)

- related to defect of visceral pleura
- underlying disease: asthma, respiratory infection, connective tissue disorder
- traumatic injury
- iatrogenic

History & Exam

Sudden onset of dyspnea and pleuritic chest pain “sharp/stabbing”

Pain radiates to shoulder

+/− A dry or non-productive cough

Apprehensive

Decreased breath sound

Palpable crepitus

Diagnosis

Treatment

Use of supplemental oxygen

VS including pulse oximeter

IV hydration

Asymptomatic patient with pneumothorax <15-20% may be provided with supportive care
Treatment
Chest tube insertion in the setting of trauma
Tension pneumothorax
Immediate needle decompression
Tube thoracostomy followed
Chest tube insertion

Treatment
Treatment aims to prevent recurrence
Video assisted thoracoscopic surgery (VATS) approach

Treatment: Video Assisted Thoracoscopic Surgery

Treatment: Blebectomy

Recap
Pneumothorax
Imaging
VATS
Blebectomy
Pleurodesis
Transudative effusions
- a change in fluid balance

Exudative effusions
- loss of pleura integrity/lymphatics

Empyema is most common type

### Etiology

<table>
<thead>
<tr>
<th>Transudative</th>
<th>Exudative</th>
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<tbody>
<tr>
<td>Congestive Heart Failure</td>
<td>Malignant: Bronchogenic carcinoma, lymphoma, mesothelioma, metastatic cancer, pleural adenocarcinoma</td>
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<tr>
<td>Cirrhosis</td>
<td>Infectious: bacterial/parapneumonic, empyema/TB, fungal, viral, parasitic</td>
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<td>Nephrotic Syndrome</td>
<td>Collagen-Vascular Disease related: rheumatoid arthritis, Wegener’s granulomatosis, SLE, Churg-Strauss Syndrome</td>
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<td>Hypoalbuminemic conditions</td>
<td>Abdominal/GI Disease: subphrenic abscess, esophageal perforation, pancreatitis</td>
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<td>Fluid retention/overload</td>
<td>Others: chylothorax, sepsis, Dressler's Syndrome, sarcoidosis</td>
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### Pathogenesis

3 stages of Empyema/Parapneumonic Effusion (PPE)
1. Acute of exudative or “Simple PPE”
2. Fibrinopurulent or “Complicated PPE”
3. Organizational Stage

### History & Physical

**Clinical presentation**
- May be early in the course of pneumonia treatment but fail to respond
- Others may have symptoms directly related to PPE
- Any report febrile x 48 hrs after antibiotic therapy should be evaluated

**Persistent fever**
- Malaise
- Decreased appetite
- Cough
- Chest pain (pleuritic)
- Increase work of breathing
- Decreased breath sounds
- Dehydration
Diagnosis

CXR
Chest US to identify debris and loculations
CT chest for complex cases (reserve for operative planning)
Labs: CBC, electrolytes, CRP, blood gas, blood culture
Pleural fluid analysis

Treatment

Early ambulation
Analgesia
Encourage parents to remain involved in care
Monitor VS including pulse oximeter
Antimicrobial treatment
Drainage

Treatment

Early disease = no drainage
Large effusion + symptomatic despite medical management will require intervention
3 criteria for drainage of PPE
1. Large effusion size
2. Presence of symptoms
3. Evidence of loculations on imaging

Treatment

IR chest tube
Small bore tubes should be used whenever possible
Less pain
Effective with use of fibrinolitics
Tissue Plasminogen Activator (tPA)
**Treatment**

TPA dwell x1 hr
Reposition frequently
Unclamp to drainage

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**Chest Tube**

Indications of Tube placement (tube thoracostomy)
- Air
- Blood
- Lymphatic fluid
- Empyema
- Effusion

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**Chest Tube**

“Air Leak”
Bubbles in the water seal (WS) chamber indicates an air leak
Check for an air leak

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**Chest Tube**

Suction to Water Seal
Water seal when effusion or pneumothorax resolved
Re-accumulation suggest cause of excess air or fluid has not resolved
Return to suction

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**Nursing Consideration**

Assess the site, connections, drainage system and output
Assess patient’s respiratory status
Dressing changes
IR chest tube (treat similarly to surgical CT)
Nursing Consideration

Changing collection system

Keep supplies at the bedside
- dressing
- clamp

Troubleshooting chest tube

Nursing Consideration

Adequate pain medication

Incentive spirometer/“Bubbles”

Ambulate/Out of bed

References


Questions

Thank You