Pneumothorax
lecture no. 3

Is accumulation of air in a pleural space or accumulation of extra pulmonary air within the chest, is uncommon during childhood, may result from external trauma, iatrogenic, or may be spontaneous.

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Causes:

1. Trauma
2. Iatrogenic
3. Pulmonary disease

In asthma (occurs in 5-25% of asthmatic patients)

Pneumonia: in connection with empyema (pyo-pneumothorax) as in staph pneumonia.

Cystic fibrosis: occurs in 10-25% which commonly above 10 years of age.

Kerosene pneumonitis


Pneumothorax may be associated with pleural effusion (hydro-pneumothorax) or purulent effusion (pyo-pneumothorax).

It is common unilateral, while bilateral is rare beyond neonatal period.
CIF: severity of symptom depend on:
   a- extent of disease (extent of lung collapse)
   b- amount of pre-existing lung disease.

In infancy: the S&S is difficult to recognize (as irritable, dyspnea, cyanosis).

In spontaneous pneumothorax: may occur while patients at rest
   moderate pneumothorax caused little displaced of intra-thorax
   organ caused few or no symptoms.
   Extensive pneumothorax leading to severe chest pain & dyspnea
   & may be cyanosis especially in children.

Severity of chest pain usually does not directly reflect the extent of collapse.

OIE:
   1- sign of respiratory distress
   2- decreased breath sound
   3- tympanic by percussion unless associated with empyema
      or pleural effusion leading to dullness
   4- shifting of mediastinum to opposite side
Diagnosis :-- CIF + CXR

in infant translumination of chest wall helps in rapid diagnosis. It is important to determine whether this pneumothorax undertension (tension pneumothorax) why :--

Because of causing limitation of contra lung expansion leading to • compromise venous return. •

Feature of tension pneumo-thorax :--- •

1- presence of circulatory collapse •

2- evidence of an audible of Hiss of rapid exist of air with • insertion of chest tube.

3- mediastinum shifting to opposite site (sometime no shifting, if there is bilateral pneumo thorax or stiff lung of both side) •

DD:-- •

1- localized or generalized emphysema •

2- cystic fibrosis 3- diaphragmatic hernia •

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Treatment: depend on extent of pneumothorax, nature & severity of underlying disease:

1- if collapse of less 5% (mild to moderate) often resolve spontaneously within one week & increase or hasten resolution by given high concentration of O2 100% that increased nitrogen pressure gradient between pleural air & blood.

2- if collapse is extensive of more than 5% (extensive) or recurrent or under tension needs chest tube with air drainage.

Pleurodesis is indicated if pneumo-thorax is recurrent, or if the cause is cystic fibrosis or malignancy.

Pleurodesis is introduction of chemical substance by chest tube into pleural cavity like tetracycline or silver nitrate.

3- treatment of underlying lung dis.
Pneumo-mediastinum:--

is presence of air or gas in the mediastinum, resulting from dissection of air from a leak in a pulmonary parenchyma into mediast.

Causes:---

1- asthma (commonest cause)  
2- trauma (penetrate chest trauma, or esophageal perforation)  
3- may associated with dental extraction, D.K.A, acute puncture, acute G.E.  
4- idiopathic (occasionally)

It is rarely a major problem in children because of air leak going into neck or abdomen without affection of mediastinum.

CIF:--

chest pain (transient stabbing that may radiate to the neck is principle feature of pneumo-mediastinum)

OIE:--may be absent or just crunching noise over sternum by auscultation.
Subcutaneous emphysema if present is diagnostic. Diagnosis is confirmed by chest x-ray which showing mediastinum air with more distinct cardiac border than normal.

Treatment: treatment of underlying disease.

Pleurisy & pleural effusion: is fluid collection in a pleural cavity which either serous or purulent, can be differentiate between them through fluid aspiration & send for protein, sugar, cell specific gravity, lactate dehydrogenase.

<table>
<thead>
<tr>
<th></th>
<th>Serous</th>
<th>Exudate</th>
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</thead>
<tbody>
<tr>
<td>1-specific gravity</td>
<td>less than 1015</td>
<td>more than 1015</td>
</tr>
<tr>
<td>2-protein</td>
<td>less than 2.5gml/dl</td>
<td>more than 3gml/dl</td>
</tr>
<tr>
<td>3-sugar</td>
<td>normal</td>
<td>less than 60mg/dl</td>
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<tr>
<td>4-cell</td>
<td>low cell count</td>
<td>high cell count</td>
</tr>
<tr>
<td>5-LD</td>
<td>less than 200 IU/l</td>
<td>more than 200 IU/l</td>
</tr>
<tr>
<td>6-PH</td>
<td></td>
<td>less than 7.2</td>
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The commonest cause of effusion is bacterial pneumonia & next CHF, hypoproteinemia, rheumatological causes, metastatic intra-thoracic malignancy & others like T.B, SLE, aspiration pneumonitis.

Pleurisy:
- is inflammation of pleural membrane, classify into 3 types:
  1. dry or plastic type
  2. sero-fibrinous
  3. purulent type

Dry pleurisy:
- its process limited to visceral pleura with small amount of serous fluid.

Causes:
1. acute bacterial pneumonia & T.b
2. may associated with connective tissue dis. Like Rheumatic fever

CIF:
- cardinal feature is chest pain.
- x-ray diffuse hizziness at a pleural space or dense, sharply demarcated shadow
DD: 1- pleurodynia  2- trauma to rib cage  3- tumour of spinal cord  4- herpes zoster.
Note: any patient with pleurisy + pneumonia should always screened

For T.B.

Treatment: treatment of underlying dis. + analgesia NSAID

Sero-fibrinous pleurisy:

is defined by a fibrinous exudate on the pleural surface & an exudate effusion of serous fluid into the pleural cavity.

Causes:

1- most commonly associated with infection of lung or inflammatory condition of abdomen or mediastinum.

2- less commonly associated with SLE, Rheumatic fever, lung malignancy.

CIF:

1- often proceed by dry pleurisy.

2- when fluid collection, the pain is disappeared & the patients are asymptomatic.

Asymptomatic
Note: if effusion remain small: have only sign and symptoms of underlying dis., but, if effusion become large leading to resp. Distress.

OIE: depend on amount of fluid:
- large effusion: dullness by percussion
- in infant: there is bronchial breathing

Diagnosis:
1- ClF
2- X-ray finding
3- WBC
4- thoraco-centesis

Course: effusion is usually disappeared rapidly (unless fluid collection with exudate) by appropriate antibiotic.
- if persist (longer) suspected possibility:
  - T.B, neoplasm, connective tissue dis.

Treatment:
1- treatment of underlying dis.
2- if large effusion, needs drainage make the patient more comfortable.
- if become purulent: needs chest tube drainage
Purulent Effusion:—

is a accumulation of pus in a pleural space, most often associated with bacterial (staph infection) & less frequently with pneumococcal & H. influenza.

Empyema is most often encountered in infant & pre-school children. If pus not drained: may dissect through pleura into lung parenchyma producing broncho-pleural fistula & pyo-pneumothorax.

OIE:—

most frequently in infant & pre-school children, occurs in 5-10% of patients with bacterial pneumonia.

1- interval of few days between onset of bact. Pneumonia & empyema if not treated well.

2- fever 3- respiratory distress 4- if fluid is not shifted with change position, indicated loculated empyema.

Thoraco-centesis should drained as much as possible & send for gram stain, culture.
CX:

1- broncho-pleural fistula & pyo-pneumo-thorax (commonest cx)
2- others like purulent pericarditis, pul abscess, peritonitis & osteomyelitis of ribs
3- septic cx like meningitis, arthritis, osteomyelitis
4- septicemia (occurs infrequently with staph, is often occurs by H-influenza & pneumo-coccal).

Treatments:

1- pus drainage (continue for about one weeks even small amount of pus, when no longer drained, removed chest tube)
2- antibiotic
duration of antibiotic: staph for 3-4 wks
3- if pneumatocele; no treatment unless sufficient size which embarrass respiration or secondary infected (treated by surgery)
4- instillation of fibrinolytic agent into pleural cavity (promate)

Drainage, decreased fever, less for surgical interference, shorten hospitalization.

Thank you --12--