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PLEURAL DISEASE

Professor Nick Maskell
Bristol UK
ERS Adult HERMES Summer School
Portugal 2016
AIMING TO COVER

• Undiagnosed unilateral effusions
• Pleural infection
• Pleural malignancy
• Pneumothorax
• Benign mediastinal disorders
• All geared towards MCQ’s and helping you pass the exam !!!
INVESTIGATION OF UNDIAGNOSED UNILATERAL EFFUSION
PLEURAL INFECTION
Diagnostic algorithm for the investigation of a pleural effusion

1. History, clinical examination and chest radiography
   - Does the clinical picture suggest a transudate? e.g. LVE, hypoproteinemia, dialysis (section 2)
     - YES: Treat the cause
     - NO: Pleural aspiration. Send for: cytology, protein, LDH, pH, Gram stain, culture and sensitivity, AFB stains and culture
       - NO: See box 1

2. See box 1
   - YES: Do you suspect an empyema, chylothorax or haemothorax?
     - NO: Is it a transudate? (section 5.2)
       - YES: Treat the cause
       - NO: Have the fluid analysis and chemical features given a diagnosis?
         - YES: Treat appropriately
         - NO: Refer to a chest physician
           - Request contrast enhanced CT thorax (fig 2) (section 6.3)
             - Obtain pleural tissue, either by ultrasound/CT guided biopsy, or by closed pleural biopsy or thoracoscopy. Send these for histology and TB culture together with a repeat pleural aspiration for cytology, microbiological studies +/- special tests (see box 2) (sections 7.1 and 7.2)
               - YES: Cause found?
                 - NO: Reconsider thoracoscopy
                   - YES: Cause found?
                     - NO: Reconsider PE and TB. Wait for diagnosis to evolve. (section 9)

Box 1: Additional pleural fluid tests

<table>
<thead>
<tr>
<th>Suspected disease</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chylothorax</td>
<td>cholesterol and triglyceride</td>
</tr>
<tr>
<td>Haemothorax</td>
<td>hematocrit</td>
</tr>
<tr>
<td>Empyema</td>
<td>centrifugal</td>
</tr>
</tbody>
</table>

Box 2: Pleural fluid tests which may be useful in certain circumstances

<table>
<thead>
<tr>
<th>Suspected disease</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatoid disease</td>
<td>glucose, complement</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>amylase</td>
</tr>
</tbody>
</table>
WHAT TO SEND FLUID FOR

• **Biochemistry**
  - Protein
  - Glucose
  - LDH
  - pH
    - Amylase
    - Haematocrit
    - Cholesterol
    - Albumin
    - Urea
    - Rheumatoid factor

• **Microbiology**
  - M, C, & S
  - AFB

• **Cytology**
  - White cell differential

---

**Light’s Criteria**

If...

Pleural fluid PROTEIN : Serum PROTEIN >0.5

and / or

Pleural fluid LDH : Serum LDH >0.6

and / or

Pleural fluid LDH >0.6 upper limit of lab normal

...then pleural fluid is an EXUDATE
DISEASES OF THE PLEURA

TRANSUDATE

• Left ventricular failure
• Liver cirrhosis
• Hypoalbuminaemia
• Nephrotic syndrome
• Hypothyroidism
• Mitral stenosis
• Pulmonary embolism
• Constrictive pericarditis
• Urinothorax
• Meig’s syndrome
• Ovarian hyperstimulation
• Superior vena caval obstruction
• Malignancy

EXUDATE

• Malignancy
• Parapneumonic effusion
• Pulmonary infarction
• Rheumatoid
• Mesothelioma
• Empyema
• Tuberculosis
• Systemic lupus erythematosus
• Autoimmune disease
• Benign asbestos pleural effusion
• Pancreatitis
• Dressler’s syndrome
• Oesophageal rupture
• Post CABG
• Yellow nail syndrome
• Chylothorax
• Drugs
• Sarcoidosis
• Fungal infection

European Respiratory Society every breath counts
WHAT COLOUR IS IT?

- Serous / Straw-coloured
- Serosanguineous / Blood-stained
- Chylous / Milky
- Empyematous / Green

- Does it smell?
  - Urinothorax
  - Empyema

- Is there anything in it?
  - Food
<table>
<thead>
<tr>
<th>Fluid</th>
<th>Suspected disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Putrid odour</td>
<td>Anaerobic empyema</td>
</tr>
<tr>
<td>Food particles</td>
<td>Oesophageal rupture</td>
</tr>
<tr>
<td>Bile stained</td>
<td>Cholo thorax (biliary fistula)</td>
</tr>
<tr>
<td>Milky</td>
<td>Chylothorax/pseudochoylothorax</td>
</tr>
<tr>
<td>‘Anchovy sauce’ like fluid</td>
<td>Ruptured amoebic abscess</td>
</tr>
</tbody>
</table>
Box 1 Commonly prescribed drugs known to cause pleural effusions (over 100 cases reported globally)

- Methotrexate
- Amiodarone
- Phenytoin
- Nitrofurantoin
- β-blockers

Box 5 Causes of lymphocytic pleural effusions (ie, lymphocytes account for >50% of nucleated cells)

- Malignancy (including metastatic adenocarcinoma and mesothelioma)
- Tuberculosis
- Lymphoma
- Cardiac failure
- Post-coronary artery bypass graft
- Rheumatoid effusion
- Chylothorax
- Uraemic pleuritis
- Sarcoidosis
- Yellow nail syndrome
• Sensitivity only 60% and yield increased slightly in second sample taken

• Yield for mesothelioma much lower – only 15-20% sensitive

• Therefore often need a pleural biopsy to get diagnosis
Figure 5  Right malignant pleural effusion with enhancing nodular pleural thickening (a) extending over the mediastinum (b).
# CHYLOTHORAX AND PSEUDOCHYLOTHORAX

## Table 4  Pleural fluid lipid values in pseudochylothorax and cylothorax

<table>
<thead>
<tr>
<th>Feature</th>
<th>Pseudochylothorax</th>
<th>Chylothorax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triglycerides</td>
<td>$&gt;5.18 \text{ mmol/l (200 mg/dl)}$</td>
<td>$&gt;1.24 \text{ mmol/l (110 mg/dl)}$</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Usually low</td>
<td>Absent</td>
</tr>
<tr>
<td>Cholesterol crystals</td>
<td>Often present</td>
<td>Absent</td>
</tr>
<tr>
<td>Chylomicrons</td>
<td>Absent</td>
<td>Usually present</td>
</tr>
</tbody>
</table>
## Box 6 Common causes of chylothorax and pseudochoylothorax

### Chylothorax
- Trauma: thoracic surgery (especially if involving posterior mediastinum, eg oesophagectomy), thoracic injuries
- Neoplasm: lymphoma or metastatic carcinoma
- Miscellaneous: disorders of lymphatics (including lymphangioleiomyomatosis), tuberculosis, cirrhosis, obstruction of central veins, chyloascites
- Idiopathic (about 10%)

### Pseudochoylothorax
- Tuberculosis
- Rheumatoid arthritis
PERSISTENT UNDIAGNOSED EFFUSION

In the frail with a persistent undiagnosed effusion think about:

• TB

• Lymphoma

• Heart failure

• PE

• Otherwise interval CT likely to be reasonable
Pleural infection

Dr Nick Maskell

December 2012

nick.maskell@bristol.ac.uk
PLEURAL INFECTION

- **Usually following / with a pneumonia (82%)**
  - Primary empyema (5%)
  - Post operative (10%)
  - Miscellaneous (3%)

- **Community acquired**
  - Strep milleri group (32%)
  - Strep pneumoniae (13%) / other strep (7%)
  - Staphylococci (11%)
  - Anaerobes (16%)

- **Hospital acquired**
  - MRSA (26%)
  - Staphylococci (18%)
  - Enterobacteriaceae (17%)
  - Enterococcus (13%)

40% of patients with pneumonia will develop an effusion

40% never have positive cultures

Empyema and malignancy potentially have similar presentations

european respiratory society every breath counts
PATHOPHYSIOLOGY

• **Exudative phase**
  • Increased pleural / vascular permeability
  • Normal pH

• **Fibropurulent phase**
  • Secondary bacterial invasion
  • Fibrin deposition
  • Low pH

• **Organising phase**
  • Development of dense fibroid septations
It’s Not All Empyema

- **Class 1 – Non-significant**
  - < 10mm
  - No action

- **Class 2 – Typical parapneumonic**
  - > 10mm
  - pH > 7.2

- **Class 3 – Borderline complicated**
  - pH 7.0 - 7.2 or LDH >1000
  - Gram stain negative

- **Class 4 – Simple complicated**
  - pH < 7.0 or Gram stain positive

- **Class 5 – Complex complicated**
  - pH < 7.0 or Gram stain positive
  - Loculations

- **Class 6 – Simple empyema**
  - Frank pus
  - Single locule

- **Class 7 – Complex empyema**
  - Frank pus
  - Multiple loculations
BACKGROUND

- **Pleural infection**

  • Mortality rates higher than pneumonia alone – 3.4x higher in one large series (Hasley 1996)

  • Annual cost for treating pleural infection high – in USA >$ 500 million per year (Light 2013)
PLEURAL INFECTION

Incidence increasing:

• Farjah et al, J Thorac Cardiovasc Surg 2007:
  • 4,424 patients hospitalised with empyema
  • Annual increase in incidence of 2.8%

• Finley et al, Can Respir J 2008:
  • 11,294 patients with empyema
  • Incidence rate of 1995 vs 2003: increasing
Parapneumonic empyema-related hospitalisations

- <18 years
- 18 – 39 years
- 40 – 64 years
- ≥ 65 years

Hospitalisation rate per 100,000

Year: 1996 to 2008

Girjalva Thorax 2011

European Respiratory Society every breath counts
INCREASED INCIDENCE

- Began to rise in mid 1990’s
- Doubling of hospitalizations with pleural infection between 1996 - 2008
- Increase in Streptococcal species and Staph aureus
- Introduction of heptavalent pneumococcal vaccine (PCV7) in 2000 *may* be in *part* to blame

Grijalva et al Thorax 2011
AGE DISTRIBUTION BY SEX

Frequency

Age group (years)

18-24 25-34 35-44 45-54 55-64 65-74 75-84 85-94

Male Female

NEJM 2005: 352:865
3 Corner stones of management

- removal of pleural collection
- iv antibiotics
- nutrition
THE MANAGEMENT OF PLEURAL INFECTION

BTS guidelines 2010 Thorax
MEASURING PH
PLEURAL PH AND PLEURAL INFECTION

Heffner et al Meta analysis AJRCCM

european respiratory society every breath counts
METHOD

No additives (control) > analyzed at 0, 1, 4 + 24 hr

0.2 ml lidocaine

1 ml air

0.4 ml lidocaine

0.2 ml heparin

1.0 ml lidocaine

*Note*: If pH not available a pleural fluid glucose is almost as good

Cut off 2.2 mmol/L
POTENTIAL TRAPS - DIFFERENTIAL DIAGNOSIS

• Malignancy – often presents with raised CRP, low pleural fluid pH and sweats

• Rheumatoid effusions – have low pH and low glucose. Rates of pleural infection in Rh A patients high!

• Ruptured oesophagus – usually very low pH and high amylase
MICROBIOLOGY
Prospective study of 62 cases of pleural infection

Pleural fluid cultured from sterile container and Blood culture bottles in different quantities (2,5,10ml)

Yield increased to 59% from 38% by using both.

Menzies Thorax 2011
Community acquired

- H. Influenzae (2%)
- S. intermedius-anginosis-consetelatus group (24%)
- S. pneumoniae (21%)
- Other Streptococcus (7%)
- Other (3%)
- MRSA (2%)
- Staph Aureus (8%)
- Proteus (1%)
- Pseudomonas (1%)
- Enterobacteriacea (6%)
- Enterococci (1%)
- Anaerobes (20%)
- n=336

Maskell et al AJRCCM 2006
Hospital acquired infections by type:

- **Enterococci** (12%)
- **Enterobacteriacea** (18%)
- **Anaerobes** (8%)
- **Pseudomonas**
- **Proteus**
- **S. intermedius-anginosis-consetelatus group** (7%)
- **S. Pneumonia** (5%)
- **Other** (4%)
- **Other Streptococcus** (7%)
- **Staph Aureus** (10%)
- **MRSA** (25%)

Source: Maskell et al AJRCCM 2006
WHAT ANTIBIOTICS AND FOR HOW LONG?

- Local microbiology advice and guidance most important

- Avoid aminoglycosides – do not work in acidic pleural space

- CAP – eg iv Ampicillin and Metronidazole then oral Augmentin at discharge
- HAP – eg Tazocin and Vancomycin

- Length of course – no hard evidence but often several weeks required
MRC/BTS MIST1 STUDY

Purulent pleural fluid
Acidic, pH < 7.2
Bacteria positive

I.P. Streptokinase
Placebo Control

Alive? Needed surgery? Adverse events?
Lung Function? CXR? (3 and 12 months)

n = 454  Maskell et al NEJM 2003
PRIMARY RESULT

Surgery-free survival over days for Placebo and Streptokinase treatments.

- Placebo
- Streptokinase
MIST2 – TRIAL DESIGN

- Purulent pleural fluid
  - Acidic, pH < 7.2
  - Bacteria positive

Randomisation

- DNase & placebo
- tPA & placebo
- DNase & tPA
- Double Placebo

Radiographic outcome at 7 days
Secondary outcomes at 3 months
Secondary outcomes at 12 months

Rahman et al – NEJM 2011
SURGERY

- VATS now used first line for most cases and can be converted to thoracotomy if required

- Can be done under LA if needed

- Rib resection and open drainage remains an option in the very frail.

- Occasionally when patient not fit enough for surgery and underlying lung trapped – IPC insertion and long term antibiotics an option
SUMMARY POINTS

- Increasing incidence with significant mortality
- Requires early pleural fluid sampling – both US findings and pleural fluid pH useful
- Initial nutritional assessment important
- Intra-pleural tPa /Dnase is exciting new medical treatment option but requires further evaluation
- Surgical VATS is now an option for most
Pneumothorax

Dr. Nick Maskell
Reader and Consultant respiratory physician
University of Bristol, Bristol, UK

Email: nick.maskell@bristol.ac.uk
PNEUMOTHORAX

• Epidemiology
  – 16 and 6 / 100,000 admissions per year (men, women) in UK
  – Hospital serving 1M population will see 125 cases of PSP per annum

• “Pneumothorax”
  – Coined by Itard then Laennec (1803, 1819)
  – Mainly related to TB

• “Primary Spontaneous Pneumothorax”
  – Occurring in “healthy people” - Kjægaard (1932)
PNEUMOTHORAX

• **Primary Spontaneous Pneumothorax (PSP)**
  - “Absence of underlying lung disease”
  - “young tall male smokers”?
  - Smoking – 22x RR risk of PTx (12% lifetime risk vs 0.1% (Bense, 1987)
  - Height – PSP tend to be taller & ↑ recurrence (Sadikot, 1997)
    ?Gradient effect

• **Mechanism**
  - “Subpleural blebs” found on CT scanning in 90% of PSP (Lesur, 1990)
EMPHYSEMA LIKE CHANGES (ELC`S)
PNEUMOTHORAX

• **Size of pneumothorax**

![Diagram of lungs with measurements a and b]

- \( a \): Apex to cupola distance - American Guidelines
- \( b \): Interpleural distance at level of the hilum - British Guidelines

*Figure 1* Depth of pneumothorax.
MANAGEMENT OF SPONTANEOUS PNEUMOTHORAX

Spontaneous Pneumothorax
If Bilateral/ Haemodynamically unstable proceed to Chest drain

Primary Pneumothorax

- Age >50 and significant smoking history
- Evidence of underlying lung disease on exam or CXR?

Secondary Pneumothorax

- >2cm or Breathlessness

* In some patients with a large pneumothorax but minimal symptoms conservative management may be appropriate

Aspirate 16-18G cannula
Aspirate <2.5l

Success (<2cm and SOB improved)

Consider discharge

Size 8-14Fr
Admit

Aspirate 16-18G cannula
Aspirate <2.5l
Or observe closely

Size now<1cm

Admit
High flow oxygen (unless known oxygen sensitive)
Observe for 24 hours

Spontaneous Pneumothorax
If Bilateral/ Haemodynamically unstable proceed to Chest drain

Size 1-2cm

NO

YES

NO

YES

Chest drain

Size 8-14Fr
Admit
CASE - PSP

- 30 year old man
- Previously fit and well. Non-smoker
- Presented to ER with acute onset breathlessness
- Observations all within normal ranges and looks comfortable.
HE HAS A LARGE PNEUMOTHORAX

Horizontal measurement between Lung and chest wall at level of the hilum (B) BTS.

Lung apex to cupola distance (A). ACCP
18F SELDINGER DRAIN PLACED IN A AND E (AFTER FAILED ASPIRATION ATTEMPT)
PATIENT TRANSFERRED TO RESPIRATORY WARD.

AT 3 DAYS, DRAIN IS STILL BUBBLING.

INFORM AND TRANSFER TO THORACIC SURGEONS FOR SURGICAL VATS
DAY 4 – STILL BUBBLING
UNDERWENT VATS

Post-op
european respiratory society  every breath counts
INDICATIONS FOR THORACIC SURGERY

• Persistent air leak or failed lung expansion despite 3-5 days drainage with patent chest drain
• Spontaneous haemothorax
• Second ipsilateral pneumothorax
• First contralateral pneumothorax
• Bilateral PSP
• Professions at risk – divers /pilots
• Onset in pregnancy
PRIMARY PNEUMOTHORAX

Age >50 and significant smoking history
Evidence of underlying lung disease on exam or CXR?

SECONDARY PNEUMOTHORAX

Size >2 cm

---

Spontaneous Pneumothorax
If Bilateral/ Haemodynamically unstable proceed to Chest drain

* In some patients with a large pneumothorax but minimal symptoms conservative management may be appropriate
PRIMARY PNEUMOTHORAX

- **Success of aspiration (Noppen, 2002):**
  - Needle aspiration vs chest drain = equivalent
  - Randomised trial 27 manual aspiration, 33 chest tubes
  - No difference in success at 1 week (93 vs 85%) or recurrence rates at 1 year (26 vs 27%)
FLYING

- Not shown to increase recurrence risk but an in-flight pneumothorax is dangerous to manage.

- BTS guidelines suggest avoiding flight for 7 days following complete radiographic resolution and major airlines have consistent policies.

- Risk of recurrence falls after 1 year – some patients may choose to avoid flying for this period.
SMOKING AND PNEUMOTHORAX

• Primary spontaneous pneumothorax (PSP) lifetime risk in smokers is 12% compared to 0.1% in non-smokers

• Smoking is the only truly modifiable risk factor for PSP recurrence

• 86% smokers with PSP continue to smoke!!
HOT TOPICS
PNEUMOTHORAX

Conservative management of spontaneous pneumothorax

PETER STRADLING AND GRAHAM POOLE
From the Hammersmith Chest Clinic and Postgraduate Medical School of London

The management of spontaneous pneumothorax

C. V. RUCKLEY AND R. J. M. MccORMACK
From the Thoracic Surgical Unit, Royal Infirmary, Edinburgh
AUSTRALIAN RCT LOOKING AT CONSERVATIVE MX VERSUS CHEST TUBE IN

Trial from ANZCTR

Trial ID: ACTRN12611000184976
Trial Status: Registered
Date Submitted: 14/02/2011
Date Registered: 16/02/2011
Prospectively registered

Public title:
A study to investigate the treatment of pneumothorax (collapsed lung)

Study title in 'Participant-Intervention-Comparator-Outcome (PICO)’ format:
A randomised controlled trial of conservative versus interventional treatment of primary spontaneous pneumothorax

Secondary ID [1]
Nil

UTN
U1111-1118-2820

Condition category:
Respiratory
Condition code:
Other respiratory disorders / diseases
PREDICTING OUTCOME?

• Measuring air leak
  – Thopaz (Medela)
Primary Pneumothorax

- PSP - Issues with chest drains
- Painful to Good re-expansion post-thoracoscopy

Patient

First name
Last name
Birth date
Sex

Remarks
Cytology negative exudative effusion, irregular thickening on CT? MPE.
No acute complications. Pleurodesed.

Drainage

Start 29.04.2013 / 10:37
Stop 29.04.2013 / 16:46
Duration 0 d 6 h 8 min

Pressure

Max 1.5 kPa
Min 0.5 kPa
Number of changes 0

Flow

Max 84 ml/min measured on 29.04.2013 / 10:47
Min 1 ml/min measured on 29.04.2013 / 11:07

Graph showing pressure changes over time.
Patient with “air leak” post-thoracoscopy

Remarks
PNEUMOTHORAX

• **Ambulatory Management?**

• **Theory:**
  – Increase mobility (reduce DVT/infection)?
  – Earlier discharge with device in situ?

Heimlich Valve
Pneumostat (Atrium)
Thoracic Vent (Rocket)
Ambulatory treatment in the management of pneumothorax: a systematic review of the literature

Fraser John H Brims,¹,² Nick A Maskell³

• Thorax 2013
• 18 studies using HV in 1235 pt
• Success with HV alone 1060/1235 (86%)
• Treatment as OP successful 761/977 (78%)
• Conclusions – high quality data lacking. Urgent need for RCT
Outpatient management of primary spontaneous pneumothorax: a prospective study

Massongo MASSONGO\(^1,2\), Sylvie LEROY\(^2\), Arnaud SCHERPEREEL\(^1,3,4\), Fabien VANIET\(^1,5\), Xavier DHALLUIN\(^1,2\), Bachar CHAHINE\(^3\), Céline SANFIORENZO\(^2\), Michaël GENIN\(^1,6\), and Charles-Hugo MARQUETTE\(^2\)

- **Observation study** - 8.5 F ‘pig-tail’ catheter with Hemlich valve.
- **60 patients** (48/60 - 80% large)
- **4hr observation before discharge**
• Success rate at 7 days 83%
• 1 year recurrence rate 17%
• 50% had full o/p management
• Mean hospital stay was 2.3 days
• 40% reduction in hospitalisation
• Safe
Simple aspiration and drainage and intrapleural minocycline pleurodesis versus simple aspiration and drainage for the initial treatment of primary spontaneous pneumothorax: an open-label, parallel-group, prospective, randomised, controlled trial

Jin-Shing Chen, Wing-Kai Chan, Kung-Tsao Tsai, Hsao-Hsun Hsu, Chien-Yu Lin, Ang Yuan, Wen-Jone Chen, Hong-Shiee Lai, Pan-Chyr Yang

- Open label, parallel-group, prospective, RCT two hospitals in Taiwan
- Pt 15-40 years old – first PSP (large)
- Pigtail insertion and complete lung expansion with no air leak
- 1:1 300mg minocycline or removal of catheter FU 1 year
CHEN ET AL LANCET 2013

• 214 patients (106 minocycline, 108 control)
• Early failure – 14 mino and 20 control
• 1 year recurrence – 29% minocycline and 49% control p=0.003
253 patients gave consent and underwent pigtail catheter insertion

39 patients were ineligible for inclusion
  38 had persistent air leaks
  1 had a haemopneumothorax

214 patients randomly assigned after successful aspiration

106 patients assigned to minocycline pleurodesis
  14 patients had treatment failures that necessitated intervention*
  92 patients treated successfully
  106 patients in intention-to-treat analysis

108 patients assigned to no further treatment
  20 patients had treatment failures that necessitated intervention*
  88 patients treated successfully
  108 patients in intention-to-treat analysis
HR at 1 year 0.52 (95% CI 0.33–0.81); overall HR 0.54 (0.35–0.83)

Reduction at 1 year 40.4% (95% CI 13.7–67.1; p=0.003); overall reduction 41.6% (18.1–65.1; 0.004)*

Figure 2: Kaplan-Meier curves of freedom from pneumothorax recurrence in the minocycline versus control groups.

<table>
<thead>
<tr>
<th>Time (months)</th>
<th>Control (n=108)</th>
<th>Minocycline (n=106)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>108</td>
<td>106</td>
</tr>
<tr>
<td>12</td>
<td>55</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>33</td>
<td>48</td>
</tr>
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<td>36</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>48</td>
<td>7</td>
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</tr>
<tr>
<td>60</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
SUMMARY - PSP

- True recurrence rates of PSP after first episode & drainage alone – 17% to 50%
- Conservative management - reasonable for first episode as more likely than not will not have another episode.
- Ambulatory management (HV) – increasingly used to reduce in-patients
- Surgical management in high risk groups after first episode
MANAGEMENT OF SPONTANEOUS PNEUMOTHORAX

**Primary Pneumothorax**
- **Size >2cm and/or Dyspnoea**
  - NO
  - **Consider discharge**

  - YES*
    - **Aspirate 16-18G cannula Aspirate <2.5l**
      - **Success (<2cm and SOB improved)**
        - NO
        - **Aspirate 16-18G cannula Aspirate <2.5l Or observe closely**
          - **Success Size now<1cm**
            - NO
            - **Chest drain Size 8-14Fr Admit**
          - **YES**
            - **Admit High flow oxygen (unless know oxygen sensitive) Observe for 24 hours**
        - **NO**
          - **YES**
            - **Admit**

**Secondary Pneumothorax**
- **>2cm or Breathless**

  - NO
    - **NO**
      - **NO**
        - **NO**
          - **YES**
            - **Aspirate 16-18G cannula Aspirate <2.5l Or observe closely**
              - **Success Size now<1cm**
                - NO
                - **Chest drain Size 8-14Fr Admit**
              - **YES**
                - **Admit High flow oxygen (unless know oxygen sensitive) Observe for 24 hours**

* In some patients with a large pneumothorax but minimal symptoms conservative management may be appropriate
SPS

- More serious
- Need to admit – even if small and just for observation
- Mean length of stay – 10-12 days
- Many not fit enough for surgery – therefore may need to consider talc slurry pleurodesis
BENIGN MEDIASTINAL DISORDERS

Nick maskell
Ant /Middle /Post mediastinum
# Normal Mediastinal Contents

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Contents</th>
</tr>
</thead>
</table>
| Anterior    | Thymus gland  
Substernal thyroid  
Lymph nodes  
Connective tissue |
| Middle      | Heart  
Pericardium  
Aortic arch  
SVC  
Trachea and main bronchi  
Lymph nodes  
Connective tissue |
| Posterior   | Eosophagus  
Descending aorta  
Thoracic duct  
Lymph nodes  
Sympathetic chains  
Connective tissue |
ANTERIOR – (4 T’s)

• Thymoma (can be benign or malignant – needs removal)
• Teratoma (germ cell tumour)
• Thyroid neoplasms
• Terrible lymphoma!

• (parathyroid neoplasma, lipoma, fibroma, haemangioma, diaphragmatic hernia (Morgagni))
THYMOMA
• Lymphadenopathy including angiofollicular lymphoid hyperplasia (Castleman’s disease)

• Lymphoma

• Developmental cysts – pericardial cyst, bronchogenic cyst

• Diaphragmatic hernia – hiatal
PERICARDIAL CYST
Pericardial cyst
BRONCHOGENIC CYST
LYMPHOMA
POSTERIOR

- Neurogenic tumours
- Meningocele
- Eosophageal tumours
- Diaphragmatic hernia (Bochdalek)
Ganglioneuroblastoma
Ganglioneuroblastoma
Pleural fibroma
Pleural fibroma
PNEUMOMDIASTINUM

Most commonly results from microscopic alveolar rupture can result from air escaping from:

- URT
- Intrathoracic airways
- Gastrointestinal tract
- Gas can be generated by bacteria causing infection
- Outside air can reach mediastinum after surgery or trauma
MEDIASTINITIS

- Sudden onset high fevers
- Chills
- Signs of systemic toxicity
- Severe substernal chest pain
- Coughing and SOB

- Clinical classification – infection in superior mediastium secondary to infection from neck
- Anterior mediastinitis often after surgery
- Posterior mediastinitis – TB and pyogenic spinal abscesses
Boerhaave’s syndrome – eosophageal rupture

- Often after forceful vomiting
- Always think about this in patients presenting with a hydropneumothorax and sepsis
- Diagnosis often with oesophageal swallow
- Treat with iv antibiotics and drainage of pleural space first
Thank you
Any questions?