Fascination for Pleural Disease

- 25% of Pulmonologist’s practice involves pleura
- Pleural Effusion (PE) poses diagnostic challenge

Diagnostic algorithm for evaluation of pleural effusion

Approaching a patient with pleural effusion, we should ask ourselves three questions:
1. Is thoracentesis indicated?
2. Is the pleural fluid a transudate or exudate?
3. What is the etiology of the exudate?

Diagnostic Algorithm for pleural effusion

**Q 1: Is thoracentesis indicated?**
- All patients with pleural effusions should undergo diagnostic thoracentesis unless clinical suspicion for CHF or underlying hypoalbuminemic state is high.
- Blind thoracentesis should be avoided if effusion measures <1cm between outer border of lung and inner border of chest wall on lateral decubitus CXR.

**Q 2: Is pleural fluid transudate or exudate?**

**Light’s Criteria for Exudate (≥ 1 satisfied)**
- Pleural Fluid Protein / Serum Protein > 0.5
- Pleural Fluid LDH / Serum LDH > 0.6
- Pleural Fluid LDH > 2/3 upp limits serum LDH

**Abbreviated Light’s Criteria**
- Pleural fluid LDH > 67% upp limits of serum LDH AND
- Pleural fluid cholesterol > 45 mg/dl OR
- Pleural fluid protein > 2.9 mg/dl or 29 g/l
- Pleural fluid LDH > 67% upp limits of serum LDH AND
- Pleural fluid cholesterol > 45 mg/dl
**Q3: What is the etiology?**

- Malignancy
- Infections
- Thoracic diseases: PE, sarcoidosis, BAPE, hemothorax/ chylothorax
- Cardiac: Dressler’s, post CABG
- GI: hepatic hydrothorax, abscess
- Collagen vascular
- ObGyn: Ovarian hyperstimulation syn, Meig’s, endometriosis
- Iatrogenic: drugs, misplaced central venous catheter

Up to 10% of transudates can be malignant!

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**Pleural Effusion**

- 1000 PE, 215 remain undiagnosed after 4 weeks, 150 (70%) found to be malignant via thoracoscopy, of which 35 were d/t mesothelioma [Boutin; Am Rev Resp Dis 1981]
- Diagnostic accuracy from thoracoscopy 90-100%
- Negative predictive value at 1 yr FU = 93% [Menzies R et al; Ann Intern Med 1991]

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**Algorithm for Malignant Pleural Effusion**

[Diagram showing steps for diagnosing and treating malignant pleural effusion]
<table>
<thead>
<tr>
<th>Treatment Option</th>
<th>Indication</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Observation            | - Asymptomatic
- SCLC, lymphoma, breast CA, CA | Majority of effusions will recur but time to recurrence is difficult to predict |
| Therapeutic thoracentesis | Recurrent effusion, poor performance status, <2 mth survival Performed outpt | - High recurrence rate
- Complications
1.5L/session req multiple sessions |
| Chemotherapy           | Effective in SCLC, lymphoma, breast CA | May be first presentation of recurrence                                    |
| Chest tube only        | Symptomatic effusions                          | Not effective in recurrence prevention                                     |

### Pleurodesis Agent

<table>
<thead>
<tr>
<th>Sclerosant</th>
<th>Dose</th>
<th>Dilution</th>
<th>Success Rate</th>
<th>Side effects</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracycline</td>
<td>1-1.5g</td>
<td>50–100</td>
<td>67%</td>
<td>Chest pain, fever</td>
<td>None</td>
</tr>
<tr>
<td>Talc Slurry via tube</td>
<td>2-5g</td>
<td>50–100</td>
<td>90%</td>
<td>Chest pain, fever</td>
<td>ARDS</td>
</tr>
<tr>
<td>Talc Poudrage</td>
<td>2-5g</td>
<td>None</td>
<td>&gt;90%</td>
<td>Chest pain, Fever</td>
<td>ARDS</td>
</tr>
<tr>
<td>Bleomycin</td>
<td>60 IU</td>
<td>50-100</td>
<td>81%</td>
<td>Chest pain, fever</td>
<td>None</td>
</tr>
<tr>
<td>Doxycline</td>
<td>0.5-1g</td>
<td>50-100</td>
<td>76%</td>
<td>Chest pain, fever</td>
<td>Anaphylaxis</td>
</tr>
<tr>
<td>Minocycline</td>
<td>300mg</td>
<td>100ml</td>
<td>80%</td>
<td>Chest pain, fever</td>
<td>None</td>
</tr>
</tbody>
</table>

Others: antineoplastic (mitoxantrone, cisplatin, and cytosine arabinoside ) Bacterial Ag: OK 432 (strept pyogenes) plus doxorubicin: staph superag (100- 400pg diluted in 10-20ml), interferon, IL2, corynebacterium parvum Quinacrine in Scandinavia, Silver nitrate in Brazil, TGF-beta2 (animal)

### Thoracoscopic Talc Poudrage vs Talc Slurry
- TTP efficacy > 90%
- Cochrane database 2004: TTP superior to TS
- Phase 3 Intergroup study (Dresler et al. Chest 2005;127:909)
  - no difference in primary endpoint: 30 day freedom from radiological recurrence
  - Deaths from RF were similar
  - TTP provided more comfort and medical safety.
  - Better for lung and breast CA

### Variable Pleurodesis Practice
- Higher success reported with TTP 73% vs tube pleurodesis (64%)
- Although 75% performed pleurodesis via tube, 25% preferred thoracoscopic pleurodesis
(Leu YC. Chest 2003;124:2229-38)

### Thoracoscopic Talc Poudrage for Malignant Pleural Effusions
- 360 patients: 88 mesothelioma (25%), 272 metastatic: Breast 33%, Lung CA 4%, Others (38%)
- All underwent TTP
- Median survival: 6.4 months (mesothelioma 9 mths and metastatic 5.2 mths)
- 90% success at 1 month, 82% life-long success
- Cause of pleurodesis failure: trapped lung

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### Treatment Option

<table>
<thead>
<tr>
<th>Indication</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>With Sclerosant via Chest tube</td>
<td>Symptomatic recurrent effusions 60-90% success, requires hospitalization outpatient pleurodesis</td>
</tr>
<tr>
<td>Small bore catheter</td>
<td></td>
</tr>
<tr>
<td>Theracoscopic with talc poudrage</td>
<td>Symptomatic effusions in patients with good performance status (KPS &gt;70 or ECOG 1-2) Success &gt;90% Requires hospitalization More effective breast, lung CA</td>
</tr>
<tr>
<td>Long-term indwelling catheter</td>
<td>Intractable effusion with poor performance Trapped lung \ Infection, obstruction Tumor seeding in mesothelioma</td>
</tr>
<tr>
<td>Pleuroperitoneal shunt</td>
<td>Other options fail, good performance status \ Chylothorax, intractable effusion without ascites</td>
</tr>
<tr>
<td>Pleurectomy</td>
<td>100% effective, only in prolonged life span \ Requires thoracotomy</td>
</tr>
<tr>
<td>Pleurodesis Agent</td>
<td></td>
</tr>
<tr>
<td>Tetracycline</td>
<td>1-1.5g 50–100 67% Chest pain, fever None</td>
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<td></td>
</tr>
</tbody>
</table>
Complications of TTP:
- Fever >38.5 deg C (9.8%)
- Increases in wbc, % neutrophils, CRP without evidence of infection suggestive of systemic inflammatory reaction due to TP not thoracoscopy
- Pain: more likely due to chest tube than TP
- Infections: 2.5% pleural space, 0.8% parenchymal
- Malignant seeding of scar by mesothelioma: 7 Gy for 3d, 2 weeks after procedure

Recommendations:
- Don’t wait too long for pleurodesis (tumor load, trapped lung, loculations from repeated thoracentesis)
- TP preferred than TS: achieves even distribution whilst TS gets eliminated through tube, and shorter drainage time (4 days vs 6 days for TS), Hartman DI et al. J Thorac Cardiovasc Surg 1993

Our Data on TTP for malignant pleural effusion
Our data 128 patients: 2005-2008
European talc from Germany
Majority due to lung cancer (70%)
15% MPE were recurrent
No RF, 25% fever, 7% pain after TP
TP 93% success over 9 mths (range, 7-13)
58% alive over 11 mths (range, 8-18)
- Consistent with reports: patients with MPE who have had successful pleurodesis seem to demonstrate prolonged survival
- Concurrent early talc poudrage at first diagnosis confers advantages
  - Effective pleurodesis req viable mesothelial cells and fibroblast
  - Risk for trapped lung is reduced
  - Better drug penetration with fluid drainage and pleural apposition: oral EGFR TKI

Talc and Apoptosis of Lung Cancer?
- Our results demonstrate that in addition to pleural inflammation and fibrosis, talc also causes apoptosis of lung adenocarcinoma cells in a dose and time dependent fashion
- No apoptosis of normal mesothelial cells
- Comparing with Bleomycin and Doxycycline, talc causes selective apoptosis which could be one of the reasons supporting its observed superior clinical efficacy
  Lee P. ERJ 2010

Comparison of pleurodesis efficacy: thoracoscopic talc with other sclerosants

<table>
<thead>
<tr>
<th>Technique</th>
<th>Series</th>
<th>No. of Events</th>
<th>3 mo</th>
<th>6 mo</th>
<th>12 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talc poudrage</td>
<td>Feunen et al.</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>(80 patients)</td>
<td>Breslau and Carsten et al.</td>
<td>270</td>
<td>120</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>(20 patients)</td>
<td>Hartman et al.</td>
<td>30</td>
<td>23</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Our series</td>
<td>100</td>
<td>50</td>
<td>30</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Mesothectomy</td>
<td>Canavina et al.</td>
<td>50</td>
<td>40</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>(20 patients)</td>
<td>Hartman et al.</td>
<td>37</td>
<td>27</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Thorascopy</td>
<td>50</td>
<td>40</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>(32 patients)</td>
<td>Bruns et al.</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Sherman et al.</td>
<td>150</td>
<td>120</td>
<td>100</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Mill et al.</td>
<td>50</td>
<td>40</td>
<td>35</td>
<td>30</td>
<td>25</td>
</tr>
</tbody>
</table>

Our results demonstrate that in addition to pleural inflammation and fibrosis, talc also causes apoptosis of lung adenocarcinoma cells in a dose and time dependent fashion.

Normal baseline cellular apoptotic rate < 3%.
The results with silicone beads and controls are not included as no apoptosis was observed.

Algorithm for Pleural Infection Management
Algorithm for pleural infection management

Who should be referred for surgical treatment?

- Patients with pus aspirated at presentation with or without loculations, split pleural sign
- Patients NOT making clinical progress within 7 days despite appropriate antibiotics and chest tube drainage
- Wait et al demonstrated that patients with complicated PPE randomized to immediate VATS had better outcome and shorter hospital stay than those who received intrapleural streptokinase.

Algorithm for pleural infection management

- In high risk patients unfit for general anesthesia, meticulous CT/US guided placement of small catheters and intrapleural instillation of fibrinolytics
- Alternatively, empyema can be drained by the creation of a pleural window by means of rib resection performed under local anesthesia.

Case

- 77 yr old male
- Known advanced NSCLC LLL (stage 3B)
- Presented with progressive dyspnea
- CXR L effusion
- U/S Pleural tap: pus

Management

- Pleural catheter drainage
- IV antibiotics for 14d
- Culture: strep milleri

Goals of Pneumothorax Management

Primary goals of treatment for pneumothorax are:

- Evacuation of intrapleural air
- Re-expansion of collapsed lung
- Pleural healing
- Prevention of recurrence

Table 1: Categorizing risk for poor outcome* in patients with PMO empyema

<table>
<thead>
<tr>
<th>Pleural space</th>
<th>Fluid fluid content</th>
<th>Risk for poor outcome</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal free air with normal thoracic epidural</td>
<td>Culture and Gram stain results unknown</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>Small to moderate free air (10 mm, &lt;2 of total air)</td>
<td>Positive culture or Gram stain</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Large, free flowing or hemothorax</td>
<td>Culture and Gram stain</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Culture and Gram stain</td>
<td></td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

*Defined as prolonged hospitalisation, prolonged re-expansion, chest with increased risk for respiratory impairment, higher mortality and morbidity.

72 patients, S. milleri accounted for 68%. 53 empyema, 14 lung abscesses, and 5 both. 46 had underlying diseases: Malignancies—diabetes—CNS. All viridans streptococcal isolates were susceptible to penicillin, 21% mortality despite IV antibiotics for 4-6 wks, median stay 60d. Multivariate analysis of data for patients with empyema alone (n = 53) showed increased risk of death in those with underlying malignancy (OR = 16.0, p = 0.023). These data imply a strong clinical significance of viridans streptococci in the pathogenesis of empyema and lung abscess.

Jerng JS. AJRCCM 1997
Choice of Treatment

Depends on:
- Patient’s symptoms and clinical status
- Size of p’thorax
- First episode, recurrent, bilateral or contralateral?
- Occupation/ hobby risk?

Size of p’thorax

Volume based on ratio of cubed difference between diameters of lung and hemithorax to cube diameter of hemithorax

2.5 cm rim occupies 50% 

(12³ – 9.5³) / 12³ = 50%

BTS: small p’thorax < 2 cm
Large p’thorax ≥ 2 cm

ACCP: small < 3 cm
Large > 3 cm

Case discussion

- 80 yr old COPD, FEV1 30%
- C/o SOB,
- CXR: 10% p’thorax
- What do you do?
  - Admit, High flow oxygen and watch
  - Manual aspiration, oxygen, and admit for observation
  - Manual aspiration and d/c after repeat CXR showed complete resolution with next day respiratory outpatient appointment
  - Chest tube and oxygen
  - Discharge with advice to return and next day respiratory outpatient appointment
  - None of the above

Indications for Recurrence Prevention:
high risk occupation, 2nd SP, 1st contralat SP, bilateral SP, 1st SSP

- Bullae
- Stapler resection
- Loop ligation
- Electrocoagulation
- Laser ablation
- Wedge resection
- Oversewing

- Pleural symphysis
  - Talc insufflation
  - Mechanical abrasion
  - Pleurectomy

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  - Laser ablation
  - Wedge resection
  - Oversewing

- Pleural symphysis
  - Talc insufflation
  - Mechanical abrasion
  - Pleurectomy
Surgical vs Medical Interventions

- Bleb-/bullectomy alone has lower success rates compared to talc poudrage by pleuroscopy (90-96% success)
- Treatment of blebs/bullae with associated pleurodesis is more efficient than bleb-/bullectomy alone
- VATS is associated with higher morbidity and mortality and is a lot more expensive compared with pleuroscopy

MT-TP for COPD with P’thorax

- Mean age = 70.7 ± 7.2 years (range: 54-87)
- COPD
- FEV1 / FVC < 70%
- Mean FEV1 (% predicted) = 41.0 ± 14.0
- Mean FEV1 (liters) = 0.88 ± 0.28
- All were current or ex-smokers.

PNEUMOTHORAX
- 20-50% of hemithorax
- 14 of SP (34%) were recurrent.

Spray Catheter Technique

- novel method for pleural anesthesia and pain control before talc poudrage for SSP
- Flex-rigid pleuroscopy, trocar
- Lidocaine 1% (250 mg) administered over pleura via spray catheter inserted through working channel

Patients with SSP due to COPD were recruited for flex-rigid pleuroscopy and talc poudrage (TP) under LA

COPD
- FEV1 / FVC < 70%
- FEV1 (% pred) = 48% (40-53%)
- FEV1 (L) = 0.98 (0.66-1.08)
- BMI 16 kg/m² (13-17)
- All were current or ex-smokers (median 50 pkpyr)

PNEUMOTHORAX
- 2 patients: 20-50%
- 2 patient: >50%
- All had chest tubes
Median dose of midazolam: 2mg

Stages I (n=2); II (n=1), IV (n=2)

25 ml of 1% lignocaine via spray catheter
TP with 3g sterilized talc powder

Complications

<table>
<thead>
<tr>
<th></th>
<th>Cough</th>
<th>S/c emphysema</th>
<th>Pain during procedure</th>
<th>Pain score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid scope</td>
<td>26 (63%)</td>
<td>27 (66%)</td>
<td>13 (32%)</td>
<td>8 (range, 7-10)</td>
</tr>
<tr>
<td>Flex-rigid scope</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3 (range, 2-4)</td>
</tr>
</tbody>
</table>

- No O2 desaturation, respiratory failure, ARDS
- No pneumonia, empyema or skin infection

Time to Pleuroscopy: 3 days (2.5-4)
Post-operative Hospitalization: 3 days (2-4)
Post-op chest tube drainage: 2 days (2-3)

Mortality
- Death (within 30d) = 0%

Outcome
- Success = 100%
  (median follow up 21 months, range 19-24)

CONCLUSIONS

- Pain better tolerated with flex-rigid pleuroscopy
  - Less discomfort from pressure of flexible trocar on the intercostal nerve supplying the space
  - Flexible tip of pleuroscope allows easy navigation within pleural cavity
- Lidocaine via spray catheter before talc:
  - VAS 3 vs VAS 8 with rigid instruments and no lidocaine
- No s/c emphysema with flex-rigid pleuroscopy c/w rigid instruments (> 60%) due to:
  - Less cough during pleural manipulation due to flexible trocar and tip of pleuroscope

Pleuroscopy in Algorithms of Pleural Diseases

- Expedites diagnostic evaluation of pleural effusions of unclear etiology
- Early TTP for malignant pleural effusions gives a higher success rate as risk for trapped lung is lower; and prolonged survival d/t selective apoptotic effect of talc on cancer cells
- Pleuroscopy in early empyema allows breakdown of loculations, drainage of infected pleural fluid and optimal chest tube placement. Thoracoscopic surgery may be necessary if thick pus is aspirated and deteriorating clinical status, decortication if split pleural sign is encountered.
- TTP is an essential step for pleural symphysis and recurrence prevention in pneumothorax management
History of Pleuroscopy

- 1910: Jacobeus described thoracoscopy where cystoscope was used
- Till 1950s, thoracoscopy was used for adhesiolysis to create artificial p'thorax for PTB Rx
- 1960-1990: thoracoscopy fell into oblivion d/t effective anti-TB drugs

History of Pleuroscopy

- 1990s: resurgence of interest in thoracoscopy
- Improved instrumentation
- Advances in videotechnology
- Historically, rigid instruments have been used

VATS Pleuroscopy

<table>
<thead>
<tr>
<th>Operator</th>
<th>Pulmonologist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>Endoscopy suite/ OR</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>Conscious sedation</td>
</tr>
<tr>
<td>MV</td>
<td>Spontaneous breaths</td>
</tr>
<tr>
<td>Ports</td>
<td>Single or double</td>
</tr>
<tr>
<td>Indications</td>
<td>Diagnostic pleural biopsy</td>
</tr>
<tr>
<td></td>
<td>CT insertion under direct visualization</td>
</tr>
<tr>
<td></td>
<td>Talc pleurodesis</td>
</tr>
</tbody>
</table>

Contraindications to pleuroscopy

- Absolute: lack of pleural space
  Because pleuroscopy is performed under conscious sedation in a spontaneously breathing patient with partial or near-total lung collapse,
- Relative:
  - allergy or hypersensitivity to the medications used,
  - respiratory insufficiency requiring MV
  - intolerable hypoxemia unrelated to pleural effusion
  - unstable cardiovascular status
  - bleeding diathesis
  - refractory cough

Complications

- Mortality from rigid pleuroscopy: 0.09- 0.24%
  - Prolonged air leak
  - Hemorrhage
  - Subcutaneous emphysema
  - Postoperative fever
  - Empyema
  - Wound infection
  - Cardiac arrhythmias
  - Hypotension
  - Seeding of chest wall from mesothelioma
- None with flex-rigid instruments when performed by trained pulmonologists

Indications for Pleuroscopy

- Diagnostic
  - Lung cancer: staging if pleural fluid cytology (-).
  - Malignant effusion due to breast/ ovarian CA: hormone receptor assays.
  - Malignant mesothelioma: diagnosis and staging
  - Assessment of lung expandability during fluid aspiration
Diagnostic:

TB effusion:
TB culture from fibrinous adhesion (78%)
c/f pleural fluid & closed needle bx (39%).
Indicated in suspected drug resistant TB.

Diffuse pulmonary disease of unknown etiology.

Therapeutic Indications

- Malignant effusion:
adhesiolysis, recurrence prevention by talc pleurodesis if expected survival > 2 months (fair performance status, Karnofsky score >40).

Therapeutic Indications

Empyema/parapneumonic effusion:
Aggressive management with chest tube, intrapleural fibrinolytics and early pleuroscopy/ VATS.
Advantages: break up loculations, evacuation of purulent fluid and fibrinous debris, optimal CT placement under direct visualization.
Colic et al. CHEST 2000

Therapeutic Indications

- Pneumothorax: pleuroscopy with talc pleurodesis is excellent alternative procedure to open thoracotomy for recurrence prevention

Vanderscheuren Type III
small blebs/ bullae <2cm

Type IV: large bullae >2cm

Advantages of Flex-rigid Pleuroscope

- Similar in handling to bronchoscope
- Outer diameter: 7mm
- Shaft: proximal 22cm rigid; distal 5cm flexible
- Tip has 2 way angulation (160° up and 130° down)
- 2.8mm working channel
- Compatible with electrosurgical, laser Rx
- Interfaces well with existing processor (CV-160) and light source (EVIS EXERA 160, EVIS 100, 140)

PROSPECTIVE EVALUATION OF FLEX-RIGID PLEUROSCOPY FOR INDETERMINATE PLEURAL EFFUSION: ACCURACY, SAFETY AND OUTCOME:

- Patients with indeterminate exudative pleural effusions
- Negative diagnostic thoracentesis and closed pleural biopsy
- Indications for Pleuroscopy:
  - Diagnostic evaluation
  - Talc poudrage at the same sitting if endoscopic appearance suggests malignant effusion
  - Clinical data, length of hospitalization, chest tube drainage, outcome, diagnostic accuracy of pleuroscopy, major/ minor adverse events.

- Endoscopy Suite
- Premedication: IM pethidine, atropine
- Placed in lateral decubitus position
- IN O2
- IV midazolam for conscious sedation
- Patient is breathing, ECG, BP, HR monitored

**Results**

- Prospective study
- No of patients with indeterminate exudative pleural effusion = 51
- Median age: 53 years (range, 45-67)
- Male: female: 20: 31
- Smoking Status
  - Current and previous smoker: 15 (29%)
  - Passive smoker: 36 (71%)

**Clinical Presentation**

- Cough: n= 46 (90%)
- Weight loss: n= 45 (88%)
- Dyspnea: n= 43 (84%)

**Size of effusion**

- 1/3 hemithorax n= 6 (12%)
- 2/3 hemithorax n= 32 (63%)
- Massive n= 13 (25%)

**Rx:**

- Chest tube n= 28 (55%)
- Therapeutic tap n=17 (33%)

**Results**

- Malignant 36 (71%)
  - Lung cancer 24
  - Mesothelioma 2
  - Ovarian cancer 2
  - Gastrointestinal tract 2
  - Head and Neck 3
  - Breast 1
- Benign 15 (29%)
  - TB effusion 10
  - Meig’s syndrome 2
  - Empyema 1
  - Rheumatoid pleurisy 1
  - Urinothorax 1
- Indeterminate 2

**Indications for pleuroscopy:**

- diagnostic (n=51)
- therapeutic talc pleurodesis (n=33/36 malignant effusion based on macroscopic appearance)

**Accuracy:**

- Diagnostic yield= 96%
- Sensitivity = 96%
- Specificity = 100%
Results

- Median time to pleuroscopy: 3 days (2-4)
- Median dose of midazolam: 2 mg (2-3)
- Duration of procedure: 30 min (30-40)
- Hospital stay/ chest tube after diagnostic pleuroscopy: 1 d
- Hospital stay/ chest tube after talc pleurodiesis: 3d

Complications

- Major:
  - No respiratory failure, hemodynamic compromise, bleeding, blood transfusion or surgical bail-out
  - No pneumonia/ empyema/ subcutaneous emphysema

- Minor
  - Fever 8 (16%)
  - Perioperative pain 5 (10%)
  - Median pain score (VAS) 3 (range, 2 to 4)

Results

- 30 day mortality: 0%
- Median follow-up: 9 (4-17) months
  - Benign effusion 11.5 mths (5-22)
  - Malignant effusion 7.5 mths (3-13)

- Success with talc poudrage not requiring second intervention:
  - 94% at 3 mths
  - 92% at 6 mths
  - 90% at 12 mths

Lee P; Respirology 2007

Conclusions

- Improvements in forceps design should be undertaken to allow larger biopsies and facilitate adhesiolysis

- May herald a change in paradigm for early pleuroscopy and replacing time honored closed pleural biopsy

79 male smoker 50 pkyrs
Increasing dyspnea, COPD
FEV1 30% predicted
CXR:
What would you do?
1) Oxygen, observe
2) Oxygen, right chest tube
3) Oxygen, bilateral chest tube
4) Oxygen, manual aspirate L
5) Oxygen, CT scan and biopsy of RUL nodule
6) Oxygen, CT scan, surgical consult
CT scan
- Bilateral bullae R and L,
- Loculated p’thorax L
- Spiculated nodule 2.6cm RUL
- Treatment: left chest drain, talc pleurodesis

CT scan
- Bilateral bullae R and L,
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66 yr old female smoker present with dyspnea and weight loss. CXR R large effusion with normal mediastinum
Absence of contralateral mediastinal shift in a moderate - large effusion
- fixed mediastinum by malignant lymph nodes
- ipsilateral mainstem bronchus involvement with lung collapse
- mesothelioma
- trapped lung from extensive pleural involvement

66 male, former smoker CABG 1 year ago
Presented with dyspnea
Clinically in CHF, afebrile
CXR: right effusion
Diagnostic tap:
Straw colored fluid
Transudate
Diuresis
Post diuresis CXR

68 yr old female smoker present with dyspnea and weight loss. CXR R large effusion with normal mediastinum

Case
A 75-year-old man with hypertension presented with acute chest pain that radiated to the back.

CT angiography (CTA) shows severe aortic atherosclerosis and 6.4cm by 6cm mid thoracic aortic saccular aneurysm. Fluid collection is noted in the left upper and mid pleural space suggestive of a contained leak (white arrow)

CXR 4 months later

Without treatment, mortality from aortic dissection is 1%/hour for first 24h and 75% in 2 weeks.
Contrast aortography is gold standard but less sensitive than CT or MR-angiography. CT-angiography useful for detection of intimal flap, extent of dissection, patency of true-false lumens, and coronary arteries. MR-angiography allows faster examination, greater resolution, reduced motion artefacts, contraindicated in pacemakers. Acute dissection superimposed on degenerative descending aortic aneurysm is at risk for rupture. Endovascular stenting confers improved outcome over surgical repair.
Lauterbach SR, J Vasc Surg 2001

CXR 4 months later

Case
- 55 male non-smoker
- IHD s/p CABG, PVD, hyperlipidemia
- presented with fever, cough and LHC pain.
- CXR showed L pleural effusion
- Pleural tap showed bloody fluid.
- CT thorax/abd showed no PE, but splenic infarct (plt 239).
- Mx with antibiotics but fever and abd pain persisted, amylase raised.
- CT abd repeated showed splenic infarct and distal pancreatitis.
- Splenectomy done, histol showed foci of adenoca infiltrating splenic hilar connective tissue and clot in splenic artery
48 year old female

- Fever and cough productive of colorless sputum for 1 week, and right-sided pleuritic chest
- Non-smoker, no recent contact with anyone known to have pulmonary tuberculosis.
- Returned from India 2 weeks ago on a business trip.
- Pleural tap: straw-colored, lymphocytic exudate. Stains for acid-fast bacilli and bacteria of pleural fluid were negative.
- Closed needle biopsy: non-diagnostic
- Tuberculin skin test measured 10mm at 72 hours.

Post treatment CXR

What is the diagnosis?

49 Chinese female

- S/P renal transplant 8 years out for ESRF (DM nephropathy)
- On Cyc A, MMF, Pred
- Complicated by chronic allograft rejection, baseline Cr 200-300 mmol/l
- Chronic Hep B and C
- Presenting with cough, pleuritic chest pain, fever for 2 weeks
- CXR: R moderate effusion
- Tap: straw colored fluid, exudative, lymphocytic

What is the next step?

52-year old female c/o

- Cough productive of colorless sputum, no hemoptysis for 1 month
- Dyspnea on exertion.
- Left mastectomy for plasma cell mastitis 10 years ago.
- Life-long non-smoker
- Pleural tap: straw colored viscous fluid, lymphocytic exudate.
- CA 125 level was raised at 391.3 U/ml.
- CT thorax: no lung parenchymal pathology, pleural nodularity or enlarged mediastinal lymphadenopathy.
- CT pelvis: large mass arising from the uterus or left ovary with ascites

Benign Fibroadenoma

Meig’s Syndrome
69-year old female was diagnosed with a right kidney mass likely renal cell carcinoma and was scheduled for radical nephrectomy.

Left-sided pleural effusion on CXR.

Diabetes mellitus with renal impairment (creatinine 210 umol/l), hypertension, ischemic heart disease and multinodular goitre.

Transudate, pH 7.2, pleural fluid to serum creatinine >1 (234/210) and negative for malignant cells

What is the next step?

L urinothorax

Refused nephrectomy, Long term indwelling Small bore catheter

A 64-year old non smoker

Cough, loss of weight, fever, left-sided pleuritic chest pain, and dyspnea

She had worked as a clerk at Public Utilities while her husband was a bank supervisor

CXR: L pleural effusion

Tap: bloody lymphocytic exudate, no bacterial growth

Pleural bx: non-specific inflam

CT: thickened pleura encasing the left lingula and lower lobe with collapse/consolidation

Mesothelioma

THBSO 15 yrs ago for CA endometrium

L CA breast S/P mastectomy 6 yrs ago, on tamoxifen

MNG

C/o cough and dyspnea for 2 weeks

Life long non-smoker

Tap: slightly blood stained fluid, exudative, no malignant cells

CPB: non-diagnostic

What's the next step?

66 yr old female

CT scan: pleural masses over RUL, RLL with bone destruction of 3, 8, 10 ribs
Pleural biopsy: metastatic breast CA ER/PR positive (similar to previous mastectomy specimen)

Pleuroscopy allows visually directed biopsy of localized masses

Sufficient tissue for immunostaining to identify primary and for receptor analysis that will impact Rx

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Case

77 male, non smoker
- Laryngeal tumour s/p surgery & RT 7 years ago
- R UL nodular melanoma metastatic to lungs & T1 diagnosed in 2008 on PET scan. Local Recurrence in Dec 2009, not keen for chemoRx.
- C/o progressive dyspnea 2 wks.
- CXR: large left pleural effusion 2 wks.

CXR: large left pleural effusion with contralateral mediastinal shift. Pleural tap: malignant melanoma cells

Discharged after drainage of effusion. Readmitted 2 wks later with massive L pleural effusion.

Pleuroscopy & talc pleurodesis performed

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Case

32/ch/female, G2P1 13/52
Cough 1/12 went on cruise in Dec to Phuket, mother was sick with URTI, developed RN, sore throat, cough with white sputum. No haemoptysis
Admitted for persistent cough a/w dyspnea for 1 week. No TB contact
Physical exam: stony dullness and decreased air-entry R lower chest
Ultrasound: R moderate effusion
Pleural tap: exudative with low Glucose, Bacterial, mycobacterial stains neg
Thoracoscopy: parietal pleura with lymphangitic appearance
Histology: High grade B cell lymphoma
Staging with MRI

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Thank you

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