Exploring the Pleural Space: Opening Windows

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Vellore, INDIA
Pleural biopsy

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Pleural biopsy: historical aspects

- Needle biopsy was first introduced by De Frances et al. using Vim-Silverman’s needle.
- Technique soon became important for the diagnosis of pleural pathology.
Vim-silverman - Puncture type
Cope needle - Hook type
I reviewed the results of 143 Cope needle biopsies in 121 patients.

Diagnostic biopsies were obtained in 26 patients.

Pleural biopsy was the sole means of diagnosis in only two patients.

In the diagnosis of malignancy, pleural fluid cytology was superior to pleural biopsy.

In the diagnosis of tuberculosis, pleural fluid culture was as good as pleural biopsy.

Cope needle biopsy should be done only when a strong suspicion of pleural malignancy or tuberculosis exists.
Abrams needle

- Abrams - Guillotine type
Pleural Biopsy with Cope and Abrams Needles*

Nelson Morrone, Ph.D.; Eduardo Algranti, M.Sc.; and Elci Barreto, M.D.

The object of this study was to compare the diagnostic yield of Abrams and Cope needles. Pleural biopsies were performed in 24 patients with both needles. In two patients, the procedure was repeated within a few days. All patients had pleural effusion. The biopsies were performed at the same time; the biopsy sites were no more than 5 cm distant from each other. Diagnoses were exclusively pathologic. There was no difference between the needles in relation to diagnosis; greater size of the fragment, mesothelial cells, and fibrin were most frequently obtained by Abrams needle, while muscle was better obtained with the Cope needle. The biopsies with both needles were very similar regarding chronic inflammation, granuloma, caseous necrosis, neoplastic tissue, granulation, neutrophils, hemorrhage, vessels, nerves, adipose tissue and epidermis. The advantages of more pleural tissue obtained with the Abrams needle was not translated into better diagnostic yield in the present series.
The yield depended on:

- Pathologic condition
- Operator’s experience
- Pathologist

But is the type of needle important?
In 31 patients with exudative pleural effusions,
Each patient was randomly biopsied - total of 153 pleural biopsies were done (73 Abrams & 80 Raja)
Etiologic diagnoses: 38 (52%) biopsies using Abrams VS 66 (82.5%) using Raja (p < 0.01)
Size of the pleural specimens obtained larger (p < 0.001)
Raja pleural biopsy needle: easy and safe to use,
Despite smaller diameter. yields a significantly larger pleural tissue sample and diagnostic yield
Raja pleural biopsy needle
Tru-cut pleural biopsy

- The needle has 2 parts: the outer sheath and the inner needle
- The outer sheath has a sharp cutting edge in the front
- The depth of the pleura is assessed as the point at which fluid is aspirated when the needle is advanced into the pleural space
Singapore medical Journal 1997

DJ Christopher
JV Peter
AM Cherian
Results

- Performed in a total of 27 patients with Tru-cut needle
- There were no complications
<table>
<thead>
<tr>
<th>Final diagnosis</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis</td>
<td>16</td>
</tr>
<tr>
<td>Malignancy</td>
<td>7</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>1</td>
</tr>
<tr>
<td>Wegener's Granulomatosis</td>
<td>1</td>
</tr>
<tr>
<td>Syn-pneumonic</td>
<td>1</td>
</tr>
<tr>
<td>Undiagnosed</td>
<td>1</td>
</tr>
<tr>
<td>Disease</td>
<td>Biopsy Diagnosed</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Malignancy</td>
<td>5(7)</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>12(16)</td>
</tr>
</tbody>
</table>

Specific diagnosis obtained
Published reports of pleural biopsy with Tru-cut needle

<table>
<thead>
<tr>
<th>Authors</th>
<th>Numbers</th>
<th>Adequate</th>
<th>Tuberculosis</th>
<th>Malignancy</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present study</td>
<td>27</td>
<td>100%</td>
<td>75%</td>
<td>71%</td>
<td>Nil</td>
</tr>
<tr>
<td>Chang et al</td>
<td>25</td>
<td>-</td>
<td>86%</td>
<td>70%</td>
<td>Nil</td>
</tr>
<tr>
<td>McLeod et al #</td>
<td>37</td>
<td>84%</td>
<td>100%</td>
<td>66%</td>
<td>Nil</td>
</tr>
</tbody>
</table>

# The yield fro Tru cut needle in this study has been calculated against the total histopathologic diagnosis obtained with this or the Abrams needle, with which it was compared. There is no mention in this study of the yields from the other methods available to make a specific diagnosis like cytology and mycobacterial studies of pleural fluid etc.,

* Specific diagnosis of tuberculosis or malignancy obtaine
Comparison of the Tru-cut biopsy needle with the Abrams punch for pleural biopsy

D T McLeod, I Ternouth, N Nkanza

From the Departments of Medicine and Histopathology, Godfrey Huggins School of Medicine, University of Zimbabwe, Harare, Zimbabwe

ABSTRACT In a prospective study pleural biopsy specimens obtained with a Tru-cut needle were compared with those obtained with an Abrams pleural biopsy punch from 36 patients in Zimbabwe judged to have an effusion of at least 1.5 litres; one patient had two biopsies. Both instruments were used on each patient, the Abrams punch being followed by the Tru-cut needle. There were no serious complications. The diagnoses determined by biopsy were: tuberculosis (11); carcinoma (12); chronic inflammation (9); and pleural fibrosis (4); one biopsy showed nothing abnormal. In 23 (62%) patients both biopsy needles produced adequate diagnostic material; in eight the Tru-cut needle alone produced diagnostic material and in six the Abrams punch alone. Thus diagnostic material was obtained in 31 patients from the Tru-cut needle and in 29 from the Abrams punch. The Tru-cut needle was useful and safe for pleural biopsy in this series and appeared to be particularly useful when the pleura was thickened.
Prospective RCT of Tru-cut biopsy needle VS Abrams punch for PLEURAL BIOPSY:

DJ Christopher,
RT Chacko &
V Srivastava
Entry criteria & Methodology

- Forty four consecutive adult patients
- The effusion obscuring the dome of the diaphragm on CXR
- Each patient was biopsied once using both needles through the same skin incision.
- Each biopsy carried out by experienced investigator
- The needles were used alternatively to obtain 3 – 6 pieces of pleural tissue with each needle.
An equal number of attempts were performed with both the needles.

Biopsies with Abrams punch were obtained using the technique described by Raja and Lalor\textsuperscript{1} and with the Tru-cut needle as described by McLeod DT et al\textsuperscript{2}. 
Thus adjacent parts of the pleura would be sampled without interference in diagnostic yields.

The pathologist was blinded to the method.
Results (cont)

PATHOLOGICAL DIAGNOSIS

Malignancy - 13
Tuberculosis - 14
Non specific inflammation - 17

*Pleural tissue was obtained on all patients by both the methods.
## Comparison of the Results Obtained by the Two Methods

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignancy diagnosis:</td>
<td>16</td>
</tr>
<tr>
<td>Both methods</td>
<td>12</td>
</tr>
<tr>
<td>Tru-cut needle only</td>
<td>1</td>
</tr>
<tr>
<td>Abrams punch only</td>
<td>0</td>
</tr>
<tr>
<td>Other methods</td>
<td>3</td>
</tr>
<tr>
<td>(Pleural cytology - 2 &amp; FNA lung in 1)</td>
<td></td>
</tr>
</tbody>
</table>
Comparison of the Results Obtained by the Two Methods (cont)

<table>
<thead>
<tr>
<th>Tuberculosis diagnosis:</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both methods</td>
<td>11</td>
</tr>
<tr>
<td>Tru-cut needle only</td>
<td>3</td>
</tr>
<tr>
<td>Abrams punch only</td>
<td>0</td>
</tr>
<tr>
<td>Mycobacterial culture</td>
<td>0</td>
</tr>
</tbody>
</table>
### Pleural tissue yield

<table>
<thead>
<tr>
<th></th>
<th>Specific disease +</th>
<th>Specific dis -</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (44)</td>
<td>All (30)</td>
</tr>
<tr>
<td>Greater Tru-cut</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63.3%</td>
</tr>
<tr>
<td>Greater Abrams</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.3%</td>
</tr>
<tr>
<td>Equal</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3%</td>
</tr>
</tbody>
</table>
Comparison of the Results Obtained by the Two Methods (cont)

* Tru-cut needle biopsy yielded a definite diagnosis of tuberculosis in 3 and malignancy in 1 patient in whom, biopsy with Abrams punch did not yield a diagnosis.

- Abrams punch did not yield additionally in any of the patients
- Trucut yielded more pleural tissue in diseased pleura, particularly in tuberculosis
Presented at the winter meeting of the BTS 1997

P143 COMPARATIVE TRIAL OF TRU-CUT BIOPSY NEEDLE VS ABRAMS PUNCH FOR PLEURAL BIOPSY

D J CHRISTOPHER, R T CHACKO and V SRIVASTAVA

Departments of Thoracic Medicine & Medicine unit II and Pathology Christian Medical College & Hospital, Vellore, India

We prospectively compared the diagnostic yield of the Tru-cut biopsy needle with the Abrams pleural biopsy punch in 44 patients, in a Southern Indian referral hospital, with an effusion of sufficient size to obscure the dome of the diaphragm on a chest radiograph. Each patient was biopsied once and pleural tissue was obtained on all the patients with both needles. The histopathology diagnoses were: malignancy in 10 (9 carcinoma & 1 lympho-proliferative); tuberculosis in 12; non-specific inflammation in 17; suggestive of malignancy in 3 and suggestive of tuberculosis in 2. In all the 10 patients in whom a definitive diagnosis of malignancy was made, the material obtained from both the needles was diagnostic. Among the 12 patients in whom a definitive diagnosis of tuberculosis was made; in 9 the material obtained by both the needles was diagnostic and in 3, the material obtained by Tru-cut needle alone was diagnostic.
9F sheath was inserted by Seldinger technique on the mid-axillary line.

Under fluoroscopic guidance, an 8F bioptome introduced through it.

Several biopsy specimens from costal & diaphragm pleura.
Percutaneous visceral pleural biopsy with fenestrated cup biopsy forceps

P P Prabhudesai, A A Mahashur, S N Murudkar, R Ajay
In cytology-negative suspected malignant pleural effusions,
- Abrams' biopsy diagnosed malignancy in eight of 17 patients (sensitivity 47%, specificity 100%)
- CT-guided biopsy correctly diagnosed malignancy in 13 of 15 (sensitivity 87%)
- Difference 40%, 95% CI 10-69, p=0.02).
- Diagnostic advantage was similar in patients proving to have mesothelioma.

**INTERPRETATION:** Primary use of CT-guided biopsy would avoid doing at least one Abrams' biopsy for every 2.5
- CT-guided pleural biopsy is a better diagnostic test than Abrams' pleural biopsy.
Conclusions: Pleural biopsy techniques

- Closed pleural biopsy is a useful test for evaluation of exudative effusions
- Most useful in TB – 75% yield. Should be performed in all PI fluid non-diagnostic exudates
- Raja pleural biopsy needle is probably the best – not easily to procure
- Tru-cut biopsy yields more pleural tissue (when abnormal) and superior to Abrams punch
- Image guided especially (CT guided) pleural biopsy superior to closed biopsy
Medical Thoracoscopy
Pleural Disease in Pulmonology

- Approximately 25% of pleural abnormalities remain undiagnosed after thoracentesis & closed pleural biopsy
Medical thoracoscopy/pleuroscopy is a minimally invasive procedure that allows access to the pleural space using a combination of viewing and working instruments. It also allows for basic diagnostic (undiagnosed pleural effusion or pleural thickening) and therapeutic procedures (pleurodesis) to be performed safely.
Thoracoscopy by pulmonologists: History

- Developed by Jacobeus in 1910
  - Induction of pneumothorax in tbc

**Figure 1: Instruments of Jacobaeus**
Rigid Nitze n. 14 cystoscope attached to electric lamp with lateral viewing.
Thoracoscopy by pulmonologists: History

- Reduced popularity after 1950
- Resurrected as a diagnostic procedures after 1960:
  - France: Boutin
  - Germany: Brandt
  - The Netherlands: Swierenga
- Local anestheisia
Thoracoscopy: A window to the pleural space
Rigid Thoracoscopy
Semirigid thoracoscope

- Outer diameter 7-9mm
- Working channel 2- 2.8 mm
- Excellent view of the pleura
- Restricted size of biopsy specimens
- Lack of power of rigid forceps
- Flexible tip in a 3D space

Ernst A et al. Chest 2002; 122:1530-1534
# VATS vs Medical Thoracoscopy

<table>
<thead>
<tr>
<th>VATS</th>
<th>Medical T</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operator</strong></td>
<td>Thoracic Surgeon</td>
</tr>
<tr>
<td><strong>Site</strong></td>
<td>OR</td>
</tr>
<tr>
<td><strong>Anesthesia</strong></td>
<td>GA</td>
</tr>
<tr>
<td><strong>MV</strong></td>
<td>Double lumen ETT, S-L ventilation</td>
</tr>
<tr>
<td><strong>Ports</strong></td>
<td>Multiple</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>Minimally invasive surgery</td>
</tr>
<tr>
<td>- resection of PN</td>
<td>CT insertion under</td>
</tr>
<tr>
<td>- lobectomy</td>
<td>direct visualization</td>
</tr>
<tr>
<td>- pneumonectomy</td>
<td>Talc pleurodesis</td>
</tr>
<tr>
<td>- pericardial window</td>
<td></td>
</tr>
</tbody>
</table>
Access to the pleural space: Trocar insertion
Parietal pleura

- Smooth and translucent
- Able to see the ribs, vessels, and the muscles
- Divided into cervical, costal, diaphragmatic, and mediastinal surfaces
Pleural Biopsies

- Most pleural pathology in the posterior costal pleura
- Biopsy specimens from the parietal pleura over the rib
- Ideally, specimens should not be taken from the apex, anterior parietal pleura
**Pleural Pathology: Tuberculosis**

- Diagnostic yield from closed pleural biopsy is 75% and up to 80-90% (if pleural tissue & fluid are sent for mycobacterial cultures)

- Repeat pleural biopsy is +ve in 10-40% only

- Thoracoscopy offers higher diagnostic yields (95-100%)
Thoracoscopy in Pleural Malignancies

- Yield of pleural fluid cytology is 65%
- Yield of closed Pl biopsy = 44%
- Combined yield = 75%
- Thoracoscopy indicated in patients suspected of having malignancy, despite –ve results
- The diagnostic yield - 95% in malignant effusions.
- Patchy involvement of pleural cavity, involvement of the visceral pleura, lower hemithorax/ diaphragm involvement
- Allows receptor analysis
Thoracoscopy in Pleural Malignancies

- Pleurodesis can be performed during the same procedure
  - if the biopsy/pleural fluid (on-site cytology) during thoracoscopy
  - if the macroscopic appearance is strongly suggestive of malignancy and adequate biopsies have been taken
Malignant effusion

- Talc poudrage
  success rate 93%
  (60-90% talc slurry thro chest drain)

- RR non-recurrence 1.68

TALC is considered a superior pleurodesis agent, when compared with other commonly used sclerosants such as Bleomycin or tetracycline.

De Campos et al Chest 2001;119:801-6

Cochrane Review, 2004
Talc pleurodesis for malignant pleuritis

- Parietal pleura less sensitive
- Pleurodesis under local anesth. possible
Is the use of talc dangerous...

- Talc induced ARDS never reported in UK and Europe – due to graded talc – does not have particles $<10 \mu$.  
- US talc – ungraded talc – ARDS due to systemic absorption
Empyema

- Non-loculated diagnosis/drainage
- Loculated divide adhesions
- **Not** useful in chronic/organised

Semirigid Thoracoscopy: Initial Experience From a Tertiary Care Hospital

Balamugesh T, Christopher DJ, James P, Gupta R
Duration - 20 months (Mar 06 to Jan 08)

Subjects - 333 patients with exudative pleural effusion

Medical thoracoscopy done in 21 patients.

Indication:

• 18 (85.71%) as the initial pleural fluid cytology and closed pleural biopsy were inconclusive or negative.
• 2 as initial procedure for biopsy
• 1 for pleurodesis of recurr Pneumothrax
Results (n=18)

- Positive biopsy 12 (66.7%)
  - Adenocarcinoma 6
  - Tuberculosis 3
  - Non-Hodgkin’s lymphoma 1
  - Mesothelioma 1
  - Inflammatory pseudotumour 1
Diagnostic yield

- Malignancy 8/9 (89%)
- Tuberculosis 3/3 (100%)
## Summary of patients with negative thoracoscopic biopsy

<table>
<thead>
<tr>
<th>Final Diagnosis</th>
<th>Contribution of thoracoscopy to Mx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug induced effusion</td>
<td>Ruled out TB/Mg. Effusion resolved with cessation of drug</td>
</tr>
<tr>
<td>Chylothorax</td>
<td>Secondary causes ruled out. Underwent thoracic duct ligation</td>
</tr>
<tr>
<td>Old hemothorax</td>
<td>Ruled out malignancy</td>
</tr>
<tr>
<td>Pleural fibrous tumour</td>
<td>Ruled out malignancy</td>
</tr>
<tr>
<td>Constrictive pericarditis</td>
<td>Ruled out malignancy</td>
</tr>
</tbody>
</table>
Diffuse lung disease

- Cup forceps lung biopsies’
- diagnostic yields 75-100% comparable with VATS
Medical thoracoscopic lung biopsy in interstitial lung disease: a prospective study of biopsy quality


ABSTRACT: The aim of this study was to analyse the quality and diagnostic value of lung biopsies for the diagnosis of interstitial lung disease (ILD), taken with diathermy coagulation cup forceps during medical thoracoscopy.

Patients with ILD, not specified after thorough clinical assessment, high-resolution CT (HRCT), bronchoalveolar lavage and transbronchial biopsy, were studied. Medical thoracoscopy was performed in an endoscopy suite under neuroleptic anaesthesia with spontaneous ventilation. Biopsy specimens were analysed prospectively by one lung pathologist blinded to the clinical findings.

Over 2 yrs, 118 samples were analysed from 24 consecutive patients. A good quality biopsy was obtained in 23 patients, and 78% of the samples were of good quality. Biopsy findings plus clinical and HRCT data revealed a relevant diagnosis in 18 patients and some diagnostic clues in four patients, for whom further examinations were needed. No major complications occurred. Chest tube drainage averaged 5.3±4.7 days, and was related to the total lung capacity (p=0.008), which mirrors the severity of ILD. Separate sampling of biopsies from different lobes proved to be useful in one third of the cases.

In conclusion, lung biopsy sampling can be performed safely by interventional pulmonary endoscopists and has a good diagnostic yield in interstitial lung disease of unknown origin.


In conclusion, lung biopsy sampling can be performed safely by interventional pulmonary endoscopists and has a good diagnostic yield in interstitial lung disease of unknown origin.

# Pulmonary biopsy DILD

<table>
<thead>
<tr>
<th>FORCEPS BIOPSY, LOCAL ANAESTHESIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author</strong></td>
</tr>
<tr>
<td>Dijkman</td>
</tr>
<tr>
<td>Boutin</td>
</tr>
<tr>
<td>Marchandise</td>
</tr>
<tr>
<td>Vansteenkiste</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VIDEO-ASSISTED STAPLER BIOPSY, GENERAL ANAESTHESIA, SELECTIVE INTUBATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Author</strong></td>
</tr>
<tr>
<td>Bensard</td>
</tr>
<tr>
<td>Molin</td>
</tr>
<tr>
<td>Krasna</td>
</tr>
</tbody>
</table>
Safety Issues

- Take multiple punch-biopsies
- Avoid major fissures
- Use electrocautery to coagulate lung surface
Is there a role in management of Pneumothorax?
Pneumothorax

- Pleurodesis for secondary PTx [especially poor FEV$_1$]
- Pleurodesis for recurrent PTx
- ? treat blebs [seen in 40-60% primary PTx]

Lee et al Chest 2004;125:1190-2
Talc pleurodesis in spontaneous pneumothorax

- Young patients
- Parietal pleura extremely sensitive
- Procedure under general anesthesia
Treatment of Patients with Spontaneous Pneumothorax during Videothorascopy

- 43 patients with 44 episodes of spontaneous pneumothorax
- Videothoracoscopy under GA performed by pulmonologist
- Talc pleurodesis performed in absence of visible abnormalities (15)
- Small lesions, blebs < 2cm coagulated prior to pleurodesis (6)
- Blebs or bullae > 2cm resected with stapling device, followed by scarification of pleura (23)
- No major complications encountered
- Average hospital stay 5.7 days after talc pleurodesis, and 6.0 days after bullectomy
Treatment of Patients with Spontaneous Pneumothorax during Videothorascopy

- 2 recurrences after follow up of 18 months (5%)
- Complications: Prolonged air-leak (7), partial re-collapse (1)
- Video-thoracoscopy a diagnostic and therapeutic procedure; low recurrence rate, shorter hospital stay; may reduce the need for thoracotomy in patients with spontaneous pneumothorax
Talcage by medical thoracoscopy for PSP is more cost-effective than drainage: RCT

Tschopp et al. ERJ 2002; 20: 1003-1009

- Prospective rand., multicentre compare short and long term efficacy of thoracoscopic talcage (TT) under LA & sedation with tube drainage (PD)
- Randomised to thoracoscopic talcage (61) or pleural drainage (47)
- Immediate success rate:
  - 10 of 47 in PD group required TT as a second procedure
Talcage by medical thoracoscopy for PSP is more cost-effective than drainage: RCT

1 of 61 in TT group required a second TT
No complications for procedure
Total costs hospitalisation and procedure were not significantly different between TT and PD patients
Pain was statistically higher during first 3 days in TT group (who were not receiving opioids)
5% (3/59) recurrence in TT group vs 34% (16/47) after PD with tube thoracostomy, after 5 years of follow up
Talcage by medical thoracoscopy for PSP is more cost-effective than drainage: RCT

Tschopp et al. ERJ 2002; 20: 1003-1009

- Thoracoscopic talc pleurodesis under local anaesthesia is superior to conservative management by chest tube drainage.
- Safe and cost effective treatment
- Less morbidity provided there is effective pain control with opioids
An audit of medical thoracoscopy and talc poudrage for pneumothorax prevention in advanced COPD
Lee et al. chest2004; 125: 1315-1320

- Determine efficiency and safety of thoracoscopic talc talcage in patients with COPD and spontaneous pneumathorax

- 41 patients (M38:F3); mean age 70.7 ± 7.2 yrs
  - Moderate COPD: 73%
  - Severe COPD: 27%
  - Mean FEV$_1$ : 0.88 ± 0.28L
  - Recurrent pneumothorax: 37%

- Medical thoracoscopy under LA and sedation
  - Procedure performed when patient clinically stable
  - Creation of pneumothorax
  - Inspection of pleural space
  - Talc poudrage
An audit of medical thoracoscopy and talc poudrage for pneumothorax prevention in advanced COPD
Lee et al. chest 2004; 125: 1315-1320

- **Vanderschueren stage**
  - 1  21 (51%)
  - 2  2 (5%)
  - 3  5 (12%)
  - 4  13 (32%)

- **Complications**
  - Cough  26 (63%)
  - Pain  13 (32%)
  - Fever  5 (12%)
  - S/c emphysema  27 (66%)
  - Air leak > 7 days  7 (17%)
An audit of medical thoracoscopy and talc poudrage for pneumothorax prevention in advanced COPD
Lee et al. chest 2004; 125: 1315-1320

- Mortality rate at 30 day : 10%
- Mortality rate at 1 year : 17%
  - \( \text{FEV}_1 \) (L), \( \text{FEV}_1 \) (%) AND IHD were risk factors predicting early mortality
- Immediate success : 100%
- Long term success : 95% (35 mth followup)

**Conclusion**
- Thoracoscopic talc pleurodesis is effective for pneumothorax prevention in advanced COPD
Conclusion

MEDICAL THOROCOSCOPY

- Effective tool for the evaluation of pleural and pulmonary diseases when pleural fluid cytology and closed needle biopsy of pleura fail.
- Effective and safe method for recurrence prevention of malignant effusion and pneumothorax
- Close working relationship between pulmonologists, chest radiologists and thoracic surgeons ensures that patients receive most optimal treatment.
Chest Sonography
Indications for pleural ultrasound

1. To clarify the nature of pleural shadowing
2. To guide thoracentesis and drainage of pleural effusions, especially those which are small or loculated
3. To determine the nature of hemithorax “white-out”
4. To differentiate between subpulmonary effusion, subphrenic collection or elevated hemidiaphragm
5. To localise pleural thickening or pleural tumours prior to biopsy
6. To exclude post-intervention pneumothorax

Adapted from Tsai et al, Curr Opin Pulm Med 2003; 9: 282-290
A higher frequency (5- or 7.5-MHz) transducer provides better resolutions of near structures, such as the chest wall and pleura.

3.5-MHz transducer is more suitable for visualization of deeper lesions.
Normal sonography of chest

- muscles and fascia
- Parenchyma-echoes are bright but formless
Anechoic- A,B
Complex nonseptated -C
Complex septated- D
Homogenously echogenic -E
Parapneumonic effusion – F
Malignant effusion - G
Transudates are anechoic, whereas an echogenicic effusion can be either a transudate or an exudate.

Complex nonseptated, complex septated, and homogenously echogenic patterns are always exudates.

Homogenously echogenic effusions are typically seen in hemorrhagic effusion and empyema.
Fig. 3.12 Pleural effusion volumetry in sitting patients. Useful parameters include the maximal extent of effusion (1), the basal distance between lung and diaphragm (4), and the subpulmonary effusion height (5). The thickness of the lateral mantle of the effusion (2), the distance between the basal lung atelectasis and the chest wall (3), and the height of the basal atelectasis (6) are not suitable parameters for estimation of the volume of effusion. (From Goecke and Schwerk 1990)
Table 3.2: Formulae to estimate the volume of pleural effusions:

<table>
<thead>
<tr>
<th>Formula</th>
<th>Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSF (cm²) × U (cm) × 0.89 = E (ml)</td>
<td>Lorenz et al. 1988</td>
</tr>
<tr>
<td>QSF (cm²) × H (cm) × 0.66 = E (ml)</td>
<td>Kelbel et al. 1990</td>
</tr>
<tr>
<td>LH (cm) × 90 = E (ml), correlation coefficient r = 0.87</td>
<td>Goecke und Schwerk 1990</td>
</tr>
<tr>
<td>LH (cm²) + SH (cm) × 70 = E (ml), correlation coefficient r = 0.87</td>
<td>Goecke und Schwerk 1990</td>
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<tr>
<td>D (mm) × 47.6–837 = E (ml)</td>
<td>Eibenberger et al. 1994</td>
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</table>

D, thickness of effusion layer, supine position; E, effusion volume empirical factors; H, effusion height; LH, lateral height of effusion, sitting position; LSF, median of planes of longitudinal sections through the effusion in six positions; QSF, horizontal plane through the effusion; SH, median subpulmonary height of effusion, sitting position; U, circumference of the hemithorax.
Pleural thickening
pleural tumors
Pneumothorax
Sings of pneumothorax

- Absence of sliding pleura sign
- Lung point – moves with respiration
- Absence of comet-tail artifacts
Consolidated lung
Lung ultrasound immediately provided diagnosis of acute respiratory failure in 90.5% of cases.
The impact of ward-based pleural ultrasound in a respiratory unit

102 patients

Pleural effusion present: 88
  Clinical detectable: 63/88
  Clinically undetectable: 25/88

Small: 31/88 (35%)
Loculated: 11/88 (13%)
Large: 46/88 (52%)

No pleural effusion present: 14

Thoracentesis: 8/88 (9%)
US guided chest drain: 7/88 (8%)

US guided chest drain 41/88 (47%)

Guided 15/88 (17%) procedures in small or loculated effusion

30/102 (29%) had no or insufficient pleural fluid to aspirate or drain

54/102 (53%) had US within 24 hours of admission

No complications

Overall ward-based ultrasound affected management in 45/102 (44%) of cases
Advantages of ward-based pleural ultrasound

1. Detects pleural pathology
2. Pleural versus parenchymal lesions
3. Guides pleural procedures
4. Monitors pleural disease
5. Performed at bedside
6. No delays
7. No radiation
Disadvantages of ward-based pleural ultrasound

1. High capital cost
2. Inadequate environment
3. Operator-dependent
4. Training requirements
The impact of ward-based pleural ultrasound in a respiratory unit
Thanks for your patient listening…