Diagnostic and Therapeutic Pleuroscopy

Experience with 127 Patients*

Dov Weissberg, M.D., F.C.C.P., and Moritz Kaufman, M.D.

Experience with 127 pleuroscopies using the mediastinoscope is reviewed. The most frequent indications were pleural effusion (73 patients), pleural involvement by tumor (14), empyema (14), and recurrent pneumothorax (14). Findings were diagnostic in 119 of 127 patients (93.7 percent). Pleural metastases were found in 63 patients, primary pleural or lung tumor in six, nonspecific or tuberculous empyema in 17, emphysematous blebs in 12 and less common findings in the remainder. Pleuroscopy was usefully employed to determine chest wall penetration by a malignant lung tumor in five patients with severely restricted pulmonary reserve. Positive findings helped to avoid unnecessary thoracotomy. There were two minor complications and no deaths. Malignant pleural effusion causing dyspnea was managed successfully by talc insufflation under direct vision in 35 of 39 patients. Talc was also used, with equal success and without complications, in eight patients with recurrent pneumothorax and in two with empyema after evacuation of pus. We conclude that pleuroscopy is a useful diagnostic and therapeutic procedure, simple and well tolerated, with the diagnostic yield of over 90 percent and virtually free of complications. It provides the best way of insufflating talc for pleurodesis.

Pleuroscopy was introduced by Jacobaeus in 1910 as a diagnostic procedure. During the era of pulmonary collapse therapy of tuberculosis, it was used mainly for the lysis of pleural adhesions. With the advent of antibiotics and the development of resectional therapy, its application in the treatment of tuberculosis disappeared, and pleuroscopy was nearly forgotten. Recently, there has been a renewed interest in this method, mostly for establishing the etiology of pleural effusion.

We have used pleuroscopy since 1975. Early in our experience, it became evident that its application could be usefully expanded to investigate a variety of conditions. This report summarizes our experience with the first 127 procedures.

Material and Methods

Pleuroscopy was performed in 127 patients, 91 men and 36 women, ranging in age from 17 to 82 years. Pleural effusion was the most common indication, accounting for 57.5 percent (73) of the procedures. All patients with pleural fluid had at least two previous thoracenteses without a positive diagnosis. Pleural tumor (14), empyema (14), and recurrent pneumothorax (14) were also relatively common. Remaining patients had disseminated lung disease (4), traumatic hemothorax (3), and suspected chest wall penetration by lung tumors. In three patients who sustained severe chest trauma and continued to bleed after tube thoracostomy, pleuroscopy was performed to determine the extent of bleeding and tears, and to evacuate blood clots under vision. In five elderly patients in whom local excision of a malignant lung tumor was considered feasible but operation of a greater magnitude seemed contraindicated, pleuroscopy was done to rule out chest wall penetration.

Pleuroscopy is performed under general endotracheal anesthesia with the patient usually in the lateral position. For visualization of any specific area, the position can be changed as desired. We have done a few pleuroscopies with the patient in the supine and prone positions.

In order to find an area without adhesions, needle aspiration of fluid or free air is performed at a convenient site, usually in the midaxillary line, fifth or sixth intercostal space. A 2-cm incision is made.

In the first 13 patients we used either the standard thoracoscope, the flexible bronchoscope, or the rigid bronchoscope. The mediastinoscope was used in the remaining 114 patients and is used currently. The mediastinoscope is inserted, fluid is aspirated and sent for cytologic and bacteriologic studies. In an organized manner, the entire lung surface, chest wall, diaphragm, pericardium, and hilar areas are inspected. Adequate biopsy specimens are taken. After removal of the mediastinoscope, a chest tube is inserted and left for one or two days.

Results

The findings of 127 pleuroscopies are summarized in Table 1. Metastatic deposits were found in 63 patients, accounting for one half of the group. Primary pleural tumor was found in two instances and primary lung tumor in four. This low incidence of primary lung tumor is explained by the fact that most patients with a known pulmonary neoplasm do not usually undergo pleuroscopy. Of the five patients in whom the procedure was performed to

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Table 1—Findings at Pleuroscopy in 127 Patients

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metastases</td>
<td>63</td>
</tr>
<tr>
<td>Primary pleural tumor</td>
<td>2</td>
</tr>
<tr>
<td>Primary lung tumor involving pleura</td>
<td>4</td>
</tr>
<tr>
<td>Emphysematous bleb</td>
<td>12</td>
</tr>
<tr>
<td>Empyema, nontuberculous</td>
<td>15</td>
</tr>
<tr>
<td>Empyema, tuberculous</td>
<td>2</td>
</tr>
<tr>
<td>Systemic disease (sarcoidosis, etc)</td>
<td>4</td>
</tr>
<tr>
<td>Congestive heart failure with effusion</td>
<td>3</td>
</tr>
<tr>
<td>Pleuritis</td>
<td>5</td>
</tr>
<tr>
<td>Food remnants and perforation of esophagus*</td>
<td>1</td>
</tr>
<tr>
<td>Pleuropericarditis</td>
<td>1</td>
</tr>
<tr>
<td>Blood (after trauma)</td>
<td>3</td>
</tr>
<tr>
<td>Postinflammatory hyaline scars</td>
<td>2</td>
</tr>
<tr>
<td>Normal†</td>
<td>2</td>
</tr>
<tr>
<td>Nondiagnostic</td>
<td>8</td>
</tr>
</tbody>
</table>

*This patient presented with empyema due to unrecognized perforation of esophageal tumor.
†Pleuroscopy was done to rule out chest wall penetration by a lung tumor.

Determine chest wall penetration by a pulmonary malignant neoplasm, the findings were normal in two, while the tumor penetrated the parietal pleura in three. In three patients with congestive heart failure and pleural effusion, other causes of effusion were ruled out; response to treatment was satisfactory in all. In three patients after trauma, blood clots were found and evacuated. In eight patients, the findings were nondiagnostic. Thus, the diagnostic yield estimated from the group of patients with no definitive diagnosis before pleuroscopy was 93.7 percent.

Of 90 patients in whom a lung biopsy specimen was taken, subcutaneous emphysema developed in two. It subsided in both patients within a few days. There were no other complications or deaths related to the procedure.

TALC PLEURODESIS

Pearson and MacGregor7 have described a method of talc insufflation to produce pleurodesis in patients with malignant pleural effusion causing dyspnea. We have used their method for a number of years with very gratifying results. Since the introduction of pleuroscopy to our service, we combine both procedures: if pleural effusion due to metastases is found at pleuroscopy, talc is insufflated through the mediastinoscope. Approximately 2 g of talc is insufflated from a bulb syringe under direct vision over the entire pleural surface. Two chest tubes are attached to an underwater seal for three or four days. One essential condition for instillation of talc into the pleural cavity is complete expansibility of the lung. If the lung cannot be expanded, the use of talc is contraindicated, and decortication is considered.

The use of talc pleurodesis in empyema has not been reported previously. We have done pleuroscopy in patients with empyema of undetermined etiology in order to obtain biopsy material and to determine lung expansibility. In some of these patients, pus was previously evacuated and closed-tube drainage instituted, but the pus reaccumulated. At the time of pleuroscopy, it was noted that a normal-appearing lung was completely expansible, and, save for pus, nothing abnormal was seen. Encouraged by our earlier gratifying experience with talc pleurodesis in patients with pleural effusion, we dared, with some apprehension, to insufflate talc in two of these patients. In both instances, total obliteration of pleural space was promptly achieved, with full recovery of the patients. While this experience is encouraging, it is limited to two patients, both with sterile pus cultures. We suggest that in these patients, talc be used with caution and only in the presence of completely expansible lung, after conventional therapy has failed and the pus reaccumulated. We have also used talc in eight patients with recurrent pneumothorax (Table 2).

In all, talc was insufflated in association with pleuroscopy in 49 patients and excellent pleurodesis was achieved in 44. There were no complications.

DISCUSSION

The most common procedure for determining the etiology of pleural effusion is pleural needle biopsy with aspiration of fluid. Unfortunately, its reliability varies and the diagnostic yield ranges between 30 and 64 percent. In contrast, the reported experience with pleuroscopy carries a yield of 74 to 100 percent of positive diagnoses.2,11-13 Clearly, direct vision pleural and lung biopsy increases the chances of obtaining satisfactory material for diagnosis.

Reports of the use of pleuroscopy for other indications are few.4,5 Our initial experience was also limited to patients with pleural effusion. However, the high diagnostic yield and low complication rate have encouraged us to expand the indications to patients with pulmonary and pleural tumors, pneumothorax, empyema, and almost any other disease process involving the pleura, when the etiology has to be determined. Valuable information is nearly always obtained.

Table 2—Pleuroscopy with Talc Insufflation

<table>
<thead>
<tr>
<th>Findings at Pleuroscopy</th>
<th>Talc Insufflated</th>
<th>Pleurodesis Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metastases with pleural effusion</td>
<td>39</td>
<td>35</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Empyema</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>44</td>
</tr>
</tbody>
</table>
Pleuroscopy was usefully employed by us to determine chest wall penetration by a malignant lung tumor. It was found to be particularly helpful in poor-risk patients in whom only limited resection was considered possible. In such patients, chest wall penetration may preclude operability.

Incidentally, these cases emphasize the potential of pleuroscopy for the clinical staging of lung cancer, as pleural penetration and pleural metastases can be easily detected. In patients with recurrent or persistent pneumothorax, an unsuspected ruptured emphysematous bleb is frequently seen. In these patients, utmost care must be exerted, while inserting the mediastinoscope, because of a theoretical possibility of actually causing a tear. In this series, we were always able to avoid this complication. The source of bleeding or a lung tear can be found following chest trauma and definitive treatment can be instituted early. The list of indications is growing, and we predict that it will continue to expand.

For visualization of the pleura, various instruments have been suggested. In our early experience, we used the standard thoracoscope. However, the two-trocar method made the manipulation sometimes difficult. We were not satisfied with the visualization of the pleura, and biopsy material was often scarce. The flexible bronchoscope was used on a few occasions but was found difficult to manipulate within the chest, and the biopsy specimens were inadequate. The rigid bronchoscope was easier to use but unnecessarily long and its lumen small. Eventually, it became obvious that the best view of the pleura, not hindered by excessive length or optics of the instrument, could be obtained through the mediastinoscope. Through its wide lumen, adequate biopsy material is easily procured, and talc can be insufflated under direct vision. Excepting the first 13 examinations, the mediastinoscope was used throughout this study.

A combination of pleuroscopy with mediastinoscopy through a single incision in the neck has been suggested recently. The idea seemed attractive and we tried it on a few occasions, but we became disappointed since only part of the pleura can be visualized by this approach, thus restricting its usefulness. Also, the applicability of the combined method is limited to those few patients who need both, mediastinoscopy and pleuroscopy. When both procedures are indicated, we see no disadvantage to looking into the mediastinum and into the pleura through two separate holes.

In order to produce pleural symphysis, various methods have been suggested. Intrapleural instillation of tetracycline, quinacrine (Atabrine), iodized oil, dextrose, human blood, caustics and various irritants gave variable results. For years many surgeons have avoided the use of talc. Some may have become influenced by a widely quoted paper of Gaensler who listed among possible harmful effects of talc severe pain, febrile reactions, thick pleural membranes, granuloma, fibrothorax with loss of pulmonary function, and even talc embolism with hemiplegia. No figures were reported, and the true incidence of these complications is not known. We have not experienced similar problems and our experience is shared by other investigators. It appears that the dangers of talc have been grossly exaggerated, although some of these complications may be possible when excessive amounts of talc are used.

No more than 2 g are needed for a complete pleurodesis, and larger amounts are neither necessary nor desirable. In this respect, our method of insufflation under vision constitutes an improvement over other methods of talc poudrage. Although we have used talc for many years and found the two-trocar method of Pearson and MacGregor quite satisfactory, we believe that insufflation through the mediastinoscope under direct vision is preferable, as talc can be seen reaching every location, and its amount can be minimized. While increasing safety, we have also expanded the indications for the therapeutic use of talc.

References

Asthma, Allergy and Immunology

The National Jewish Hospital/National Asthma Center and the University of Connecticut School of Medicine will present this one-day course on December 11 in Farmington, Connecticut. For information contact Ms. Shirley Maris, National Jewish Hospital, 3800 East Colfax Avenue, Denver 80206.

Supercourse VI Postgraduate Course on Lung Disease

The national Supercourse VI Postgraduate Course on Lung Disease will be held December 10-13 in New Orleans, sponsored by the American Lung Association of Louisiana, Inc. For information, contact the course chairman, Clay A. Waggenspack, Jr., M.D., American Lung Association of Louisiana, Inc., 333 St. Charles Avenue, New Orleans 70130.

Second Banff Hypoxia Symposium

The Second Banff Hypoxia Symposium, sponsored by the Arctic Institute of North America, will be held at the Banff Springs Hotel, Banff, Alberta, Canada, January 13-17, 1981. For information, contact John R. Sutton, M.D., The Arctic Institute of North America, University of Calgary, 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4.