Eur Respir J
1992, 5, 763–766

TECHNICAL NOTE

Extended thoracoscopy: a biopsy method to be used in case of pleural adhesions

J.P. Janssen, C. Boutin

Extended thoracoscopy: a biopsy method to be used in case of pleural adhesions. J.P. Janssen, C. Boutin.

ABSTRACT: Extended thoracoscopy (ET) allows several large biopsies to be taken in patients with thick adhesions of the pleura when normal thoracoscopy is impossible.

Twenty patients with undiagnosed pleural effusion or thickening and two with associated pulmonary tumour close to the chest wall underwent ET because closed adhesions prevented the induction of an artificial pneumothorax.

Under local anaesthesia and neuroleptanalgesia, at the site of suspected lesions on computed tomographic (CT) scan, a cutaneous incision of 3–4 cm is made on the appropriate intercostal space. After dissection with blunt scissors, the operator introduces his finger to create a space in the pleural cavity. The thoracoscope is inserted to inspect the pleura and to take several biopsies for histopathological examination. A chest tube is inserted for a few minutes after checking airtightness and haemostasis.

The procedure is well-tolerated. In three cases no pleural biopsy could be taken; in three patients a false negative diagnosis was observed. A correct diagnosis was obtained in 16 out of 19 patients (84%).

If performed by a pulmonologist experienced with thoracoscopy ET is a rapid, safe and efficient method to obtain biopsies in cases where normal thoracoscopy after induction of a pneumothorax is not possible. It considerably reduces the need for open thoracotomy.

Eur Respir J., 1992, 5, 763–766

Dept of Pneumology, Hôpital de la Conception, Marseille, France.

Correspondence: C. Boutin, Hôpital de la Conception, 147 Boulevard Baille 13385 Marseille, France

Keywords: Mesothelioma, pleural biopsy, pleural disease, thoracoscopy thoracotomy

Received: July 15 1991
Accepted after revision January 16 1992

J.P.J. is supported by Astra and "De Drie Lichten" foundation.

Thoracoscopy is an established method to obtain diagnosis in case of pleural abnormalities of unknown cause, and is performed by pulmonologists in many European centres [1–4]. Thoracoscopy requires succesful induction of a pneumothorax in a unilateral lung, in order to inspect the visceral and parietal pleura after introduction of the thoracoscope through a small intercostal incision [1].

Sometimes thoracoscopy is difficult, due to a diminished view caused by adhesions between the visceral and parietal pleura. In some cases, this problem can be solved by cutting adhesions with a biopsy forceps or neodymium-yttrium aluminium garnet (Nd-YAG) laser [1]. In case of many thick adhesions the practitioner will be unable to inspect the whole thoracoscopic field: parietal and visceral pleura, diaphragm, mediastinum and pericardium. When histological diagnosis is necessary, biopsies can be taken only within the restricted field that can be examined.

In the case of very extended or complete adhesion of the visceral and parietal pleura, thoracoscopy is impossible. In order to obtain a diagnosis in these cases without an open thoracotomy, we performed an extended thoracoscopy (ET) in 22 patients. The technique is based on the method of direct thoracoscopy, first described by MAASSEN [5] in 1972, and later by LEWIS *et al.* [6] in 1976, although there are some important differences. In this article the indications, the technique and the results are discussed.

Material and methods

Patients

An ET was indicated when an intended thoracoscopy could not be performed due to the impossibility of pneumothorax induction. The indications for thoracoscopy have been described elsewhere [1], and include undiagnosed pleural effusion or pleural thickening (20 patients in our group) and pulmonary lesions, adjacent to the chest wall on chest roentgenogram (two patients). Before ET, most patients underwent other diagnostic procedures, including fibreoptic bronchoscopy (18 patients) and (repeated) thoracocentesis (9 patients). Only a few patients underwent blind needle biopsy, as this technique is virtually abandoned

in our institution. None of these procedures was conclusive. Patients undergoing an ET for thoracoscopic examination after intrapleural gamma-interferon treatment for malignant mesothelioma were excluded [7].

Operative technique

In our institution, ET, like thoracoscopy, is performed under neuroleptanalgesia, in combination with local anaesthesia. The patient is in the lateral decubitus position, healthy side down. Firstly, an attempt is made, or has been made the day before, to induce a pneumothorax. If it appears to be impossible to induce a pneumothorax, an ET is performed. An incision of 3–4 cm is made, usually in the 5th, 6th or 7th intercostal space in the anterior or mid-axillary line. With blunted scissors the intercostal muscles are spread, and the parietal pleura is dissected. After cutting the parietal pleura, the operator introduces his index finger to create a space between the parietal and visceral pleura, separating them by rotation of the finger. At the same time, the quality of both the pleural surfaces can be judged; smooth or irregular, hard or soft, *etc.*

When a small interpleural space has been created, the thoracoscope (Richard Wolf Co. Knittlingen, Germany) is introduced to inspect the parietal and visceral pleura. Biopsies of both the parietal and visceral pleura are taken through the thoracoscope with biopsy forceps, preferably under direct vision. The biopsies are sent to the pathology laboratory for microscopic examination. Following this procedure, it is necessary to remove intrathoracic air with a chest tube only if an interpleural space of any significance has been created. If there is no air leak, fluid or bleeding, the chest tube can be removed after only a few minutes of suction.

Follow-up

The histopathological diagnosis of malignant disease was considered to be established if confirmed by clinical follow-up. The disease was considered to be benign ("nonspecific inflammation") only after pleural disease and associated signs had disappeared or had remained stable after a follow-up period of at least one year. Follow-up was obtained by reviewing hospital records. If patients were followed by referring clinicians, the latter were contacted by telephone (May 1991).

Results

Between April 1981 and April 1990, 22 ETs were performed in our institution, among 1,500 thoracoscopies. There were 20 men and 2 women, aged 62±17.9 yrs (mean±SD) (range 15–84 yrs). An ET was performed 15 on the left side and 7 on the right side. No major complication, such as severe pleural bleeding at the biopsy site or persistant air leak requiring prolonged chest tube drainage, occurred. Only once a small pneumothorax was noted after removal of the chest tube. This resolved without further treatment within a week. In three cases (14%) it was not possible to take a pleural biopsy; in one case the interpleural space could not be found due to extensive adhesions; in two cases too much fibrinous tissue prevented the taking of a representative biopsy. One or more biopsies could be taken in 19 out of 22 patients (86%). ET yielded an immediate correct diagnosis in 16 of 22 patients (73%); in three cases where biopsies could be taken, histological diagnosis proved to be false-negative (table 1).

Table 1. – Diagnosis of 22 patients who underwent extended thoracoscopy (ET)

Immediate true diagnosis: 16 patients		
Nonspecific inflammation	4	
Mesothelioma	5	
Sarcoma	1	
Other malignancy	3	
Tuberculosis	1	
Pulmonary fibrosis	2	
No diagnosis: 3 patients		
1. Disease-free	follow-up	26 months
2. Disease-free	follow-up	60 months
3. Mesothelioma	interval*	9 months
False diagnosis: 3 patients		
1. Metastatic malignancy	interval	1 month
2. Tuberculosis	interval	3 months
3. Mesothelioma	interval	7 months

*: period between ET and final diagnosis. In 16 patients (73%) the diagnosis was immediately correct. In 3 patients no biopsy could be taken. In three patients the diagnosis proved to be incorrect. The sensitivity of the procedure was 84%.

Three patients in whom no biopsy could be taken were subsequently closely followed-up; two showed no alterations of the pleural disorder on chest roentgenogram or computed tomographic (CT) scan. They were in excellent condition 26 and 60 months after ET. The third patient had radiological progression of pleural lesions, and a thoracotomy performed 9 months later resulted in diagnosis of mesothelioma. In the three other patients the histological diagnosis appeared to be false-negative. In the first patient, radiological examination suggested mesothelioma or metastatic disease. ET was difficult because the indurated pleura was very thick, and tightly attached to the thoracic wall. Despite radiological progression of the lesions one month later, the patient refused further diagnostic examinations and died five months later.

The second patient was a 15 yr old male, with bilateral pleural thickening and pleural fluid on chest

roentgenogram. ET was performed on the left side, showing acute inflammation of the parietal and visceral pleura and many adhesions. Three months later, the tuberculin skin test, that had been negative before, became positive. After antituberculous treatment the lesions disappeared.

The third patient was a 72 yr old male, with radiologically progressive pleural thickening on the left side. Thoracoscopy performed elsewhere one year before, had not shown any sign of malignancy. Biopsies on ET showed reactive fibrosis of the pleura and asbestos bodies. Because of strong suspicion of mesothelioma, chemotherapy was started. Nevertheless, subcutaneous metastases appeared. The patient died 7 months after ET.

Discussion

If a pneumothorax cannot be induced, a thoracoscopy is generally considered to be contraindicated. Most pulmonologists stop the intended procedure and send the patient to the thoracic surgeon for exploratory thoracotomy, if there is enough evidence of significant underlying pathology to justify the procedure [8]. However, our results show, that even in case of extensive adhesions the pulmonologist may continue the procedure and obtain a diagnosis by means of ET. The technique is based on a method first described by MAASSEN [5] as "direct thoracoscopy". However, there are some important differences; Maassen's approach was primarily surgical [5]. The author never tried to induce a pneumothorax first, but immediately performed a small thoracotomy in a selectively intubated patient. Afterwards, a surgical biopsy was obtained of the lung. Our method is primarily that of a pulmonologist. We only perform an ET if a pneumothorax cannot be created, and the patient is not intubated. In addition, biopsies are taken with the biopsy forceps. Maassen's diagnostic yield proved to be acceptable; of 173 cases, a histological diagnosis was possible in 69% [9]. Later, a diagnostic yield of 86% was found [10].

The advantages of ET over Maassen's direct thoracoscopy or open thoracotomy are numerous. The procedure, scheduled as thoracoscopy, can be continued as ET without changing patient position, anaesthesia, equipment, or medical staff. Moreover, ET is less invasive, and can be performed in the bronchoscopy suite by a pulmonologist familiar with thoracoscopy techniques. The period of hospitalization can be as short as for thoracoscopy (2–5 days). Our results were quite satisfactory, as in 16 out of 22 patients (73%) an immediate true diagnosis was obtained. This is comparable with the diagnostic yield of thoracoscopy and thoracotomy [4, 9–11]. Once a biopsy could be taken (86% of the cases) the sensitivity of the procedure was 84%.

IKEZOE *et al.* [12] recently published a highly diagnostic yield with percutaneous sonographically guided needle biopsy of thoracic lesions adjacent to the chest wall [12]. In our institution there is no experience with this technique. Although his results are promising, there are some important disadvantages: the pulmonologist must be experienced in ultrasonography, or must seek the assistance of a radiologist. Direct view of the biopsy site makes it easier and safer to take multiple representative biopsies. Complications such as bleeding are immediately noted, and can be treated with suction, electrocoagulation or Nd-YAG laser.

Just as with thoracoscopy, open thoracotomy may be difficult in case of extensive adhesions, and does not always provide an immediate correct diagnosis. One study reported 35% false-negative results after thoracotomy. Thoracotomy, however, should be performed when no histological diagnosis is obtained after thoracoscopy or ET, and a strong suspicion of significant underlying pathology exists, in cases where the condition of the patient allows and justifies an invasive procedure. This was the case in one of our patients.

When it is impossible to perform biopsy during ET, the best policy, in our opinion, is to follow the patient closely, and to perform open thoracotomy if there is radiographic progression or strong suspicion of malignancy.

Special attention is needed in patients when diagnosis of "nonspecific inflammation" is made on microscopic examination of a pleural biopsy. This diagnosis may prove to be a false negative, as was demonstrated in several studies [10, 11,] and can only be confirmed after a follow-up of at least one year. In this study, this diagnosis was initially made in 7 of 22 cases (32%). It appeared to be incorrect in three patients, 1, 3, and 7 months after ET. Four others showed no progression of disease after a follow-up ranging from 23 months to 10 yrs.

In summary, when ET is performed by a pulmonologist familiar with, and experienced at, thoracoscopy, it is a safe and efficient procedure for diagnosis of pleural disorders. If thoracoscopy is impossible due to extensive adhesions, an ET can prevent exploratory thoracotomy in almost every case.

Acknowledgements: The authors thank H.G. Colt for his critical review of the manuscript.

References

1. Boutin C, Viallat JR, Aelony Y. – Practical thoracoscopy. Heidelberg, Springer Verlag, 1991.
2. Brandt H-J, Loddenkemper R, Mai J. – Atlas of diagnostic thoracoscopy. New York - Stuttgart, Thieme Inc., 1985.
3. Newhouse MT. – Thoracoscopy: diagnostic and therapeutic indications. *Pneumologie*, 1989; 43: 48–52.
4. Menzies R, Charbonneau M. – Thoracoscopy for the diagnosis of pleural disease. *Ann Intern Med*, 1991; 114: 271–276.
5. Maassen W. – Direkte Thorakoskopie ohne vorherige oder mögliche Pneumothoraxanlage. *Endoscopy*, 1972; 4: 95–98.
6. Lewis RJ, Kunderman PJ, Sisler GE, Mackenzie

JW. – Direct diagnostic thoracoscopy. *Ann Thorac Surg*, 1976; 21: 536–539.
7. Boutin C, Viallat JR, Van Zandwijk N, Douillard JT, Paillard JC, Guerin JC, Mignot P, Migueres J, Varlet F, Jehan A, Delepoulle E, Brandely M. – Activity of intrapleural recombinant gamma-interferon in malignant mesothelioma. *Cancer*, 1991; 67: 2033–2037.
8. Kirby TJ, Ginsberg RJ. – Role of open thoracotomy in undiagnosed pleural diseases. *In*: Deslauriers J, Laquet LK, Eds. International trends in general thoracic surgery. Saint Louis, CV Mosby Co., 1990; vol. 6: pp. 62–72.
9. Werdermann K, Greschnuchna D, Maassen W. – Ergebnisse chirurgischer Lungen- und Pleura-biopsien. *Thoraxchirurgie*, 1974; 22: 453–456.
10. Maassen W. – Thoracoscopie et biopsie pulmonaire sans pneumothorax initial. *Poumon Coeur*, 1981; 37: 317–320.
11. Boutin C, Viallat JR, Carnigno P, Farisse P. – Thoracoscopy in malignant pleural effusions. *Am Rev Respir Dis*, 1981; 124: 588–592.
12. Ikezoe J, Morimoto J, Arisawa J, Takashina S, Kozuka T, Nakahara K. – Percutaneous biopsy of thoracic lesions: value of sonography for needle guidance. *Am J Roentgenol*, 1990; 154: 1181–1185.