

Mediastinoscopy

Its Role and Value Today in the Differential Diagnosis of Mediastinal Pathology

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Mediastinoscopy has been an important method in the differential diagnosis of mediastinal pathology since it was presented by Carlens in 1959. Present investigation methods in radiology such as computed tomography and magnetic resonance imaging as well as the new developments in ultrasonography have resulted in a decrease in the number of mediastinoscopies performed. In addition, better results of fine-needle aspiration and core-needle biopsy investigations together with new techniques in thoracoscopy have brought alternative possibilities in examining mediastinal masses. To evaluate the role of mediastinoscopy today, a retrospective study was conducted comprising 249 consecutive patients who had undergone mediastinoscopy in the years 1989–1997 at Turku University Central Hospital. Mediastinoscopy was technically possible in 229 of the 249 cases (92.0%) and a definitive diagnosis was obtained in 210 cases (84.3%). The mortality rate was zero and only 13 complications (5.2%) were reported. Six cases of paresis of the left recurrent nerve were reported, four of which were temporary. There were also five minor intraoperative and two postoperative bleedings, which were easily controlled. We still consider mediastinoscopy as a safe and efficient way of examining mediastinal pathology.

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The modern midline cervical mediastinoscopy was presented by Carlens in 1959 (1). For the first time it was possible to investigate both paratracheal sides at the same time, and it was also easier to prevent vascular complications. During the three subsequent decades, mediastinoscopy was widely used in the differential diagnosis of mediastinal processes and in preoperative staging of pulmonary carcinoma. Since the 1980s, the development of imaging procedures has reduced the demand for mediastinoscopy. Both computed tomography (CT) and magnetic resonance imaging (MRI) visualize the mediastinum accurately. Negative findings in these investigations usually result in mediastinoscopy being unnecessary (2). Radiologic criteria have been developed to estimate the nature of mediastinal nodes, but despite this, the reliability of differential diagnosis has been poor (3–6). Ultrasound (US) investigation with fine-needle aspiration biopsy (FNAB) has proved to be a valuable investigation modality because it enables cytologic confirmation of the diagnosis. To achieve accurate biopsies, the visualization must be precise and thus the method is limited to the anterior mediastinum (7, 8). In addition, the small tissue sample makes it partic-

ularly difficult to diagnose and subclassify lymphomas (9). FNAB has also been taken transbronchially when it has been difficult to reach a particularly small lesion (10). Recently, endoscopic ultrasound-guided FNABs have been proposed. The value of this investigation is limited to the posterior mediastinum (11, 12). Lately, core-needle biopsies taken both US-guided and transternally CT-guided have been presented. The purpose is to obtain better biopsies and the results have been promising (13–15).

Thoracoscopy is an alternative to mediastinoscopy. The advantage of thoracoscopy is the visibility, even to the subcarinal anterior mediastinum. This approach is considered preferable if multiple biopsies in various thoracic areas are needed. However, with thoracoscopy, only one side of the mediastinum can be investigated at a time, and in comparative studies, the complication rate has been higher compared to mediastinoscopy (16). The purpose of the present study is to estimate, in a tertiary referral center, the value of mediastinoscopy in a selected patient material, where imaging studies were unable to confirm the nature of the mediastinal pathology. Special attention was paid to the success rate, the histopathologic result, complication rate and to additional complementary investigations.

MATERIAL AND METHODS

Between 1989 and 1997, in the Department of Otorhinolaryngology–Head and Neck Surgery, Turku University Central Hospital, 249 patients (87 females, 162 males) underwent mediastinoscopies. The hospital records were reviewed and the clinical data of these patients analyzed. Mean age of the patients was 53.5 years (range 8–83 years including three children under 15 years). The patients were referred from oncology, pulmonology and the department of internal medicine. Preoperatively, all patients had undergone either CT-scans or MRI-investigations. If a bronchoscopy had not been previously performed, it was done before the mediastinoscopy. If possible, FNAB was also taken preoperatively. Mediastinoscopy was performed if all these other investigations failed to confirm the diagnosis.

Most (194/249) of the procedures were carried out by two of the authors (J.S. and R.G.) but there were six surgeons in all performing the mediastinoscopies. The mediastinoscopy was performed under general anesthesia using standard Karl Storz® mediastinoscope without video assistance. The incision was made in the suprasternal notch and the dissection was performed caudally to the thyroid isthmus and continued by blunt dissection into the pretracheal space. Biopsies were taken by forceps systematically from both paratracheal areas, tracheobronchial angles and under the main bifurcation.

The purpose was to achieve a biopsy consisting of a whole node or a tissue specimen measuring at least 0.5 cm in diameter, but avoiding any risks. Diffuse bleeding was controlled with hemostat matrix (Surgicel®, Johnson & Johnson INTL B-1130, Brussels, Belgium) and minor arterial bleeding with surgical clips. The hospital follow-up after the procedure varied between two and three days.

RESULTS

The indications for mediastinoscopy are listed in Table 1. Mediastinoscopy was technically possible in 229

Table 1

The indication for mediastinoscopy, n = 249

Indication	No. of patients
Tumor pulmonum NAS	90
Suspected sarcoidosis	14
Mediastinal mass/lympadenopathy	81
Pulmonary carcinoma	22
Suspected lymphoma	15
Mediastinal metastasis, other carcinoma	22
Paresis n. recurrens	2
Mediastinitis	1
Suspected tuberculosis	1
Extraluminal tracheal compression	1

Table 2

The definitive mediastinoscopy diagnoses, n = 210

Diagnosis	No. of patients
Benign mediastinal nodes	70
Sarcoidosis	59
Mediastinal metastasis/pulmonary carcinoma	48
Lymphoma	10
Mediastinal metastasis/other carcinoma	13
Ectopic thyroid tissue	5
Tuberculous nodes	4
Mediastinal cyst	1

(92.0%) cases. Four failures were due to the patient's anatomic relationships. In two cases there was not enough space between the sternum and the trachea. One procedure was prohibited because of cervical spine stiffness, and another was discontinued because the mediastinoscope compressed the smooth, immature trachea, inhibiting ventilation in a 5-year-old child. In 16 cases the tumor could not be reached because of its anatomical location.

The mediastinoscopy was considered successful when a definitive diagnosis was obtained. This was the case in 210 of the 249 patients (84.3%). These results are presented in Table 2. The diagnosis of a benign node was confirmed at an average clinical follow-up of four years, with a minimum of two years.

There was no intra- or postoperative mortality in this material. No major bleeding necessitating further surgical treatment occurred. There were five (2%) minor, but noticeable intraoperative bleeding problems, which made it necessary to discontinue the operation, thus decreasing the quality of the biopsy material. There were two (0.8%) minor superficial postoperative hemorrhages, which were controlled by resuturing the wound under local anesthesia. There were also two superficial wound infections, which cleared up within two weeks after antibiotic therapy. Postoperatively, a paresis of the left recurrent nerve was noticed in six patients; two (0.8%) of which were permanent, while four (1.6%) recovered during the following five months.

In 39 cases, the diagnosis was not clarified by the first mediastinoscopy. In 20 (8%) cases, the endoscopist could not reach the pathologic area either because of the location of the tumor (16 cases) or because of the patient's anatomic relationship (4 cases). Thirty patients underwent further investigations (Table 3). In nine patients the final diagnosis remained unknown. Because of their poor general condition, six of these patients were considered unsuitable for thoracotomy or any other further investigation. None of these six patients survived over six months. The remaining three undiagnosed cases have not shown any progression in their mediastinal findings during the follow-up.

Table 3

Further investigations of undiagnosed cases after mediastinoscopy (n = 30) and diagnoses achieved by complementary investigations

Investigation modality	No. of patients	Diagnosis	No. of patients
Thoracotomy	19	Pulmonary carcinoma	13
		Lymphoma	4
		Metastasis/other carcinoma	2
Re-bronchoscopy	4	Pulmonary carcinoma	4
Re-mediastinoscopy	3	Pulmonary carcinoma	2
		Lymphoma	1
Open neck biopsy	2	Pulmonary carcinoma	1
		Metastasis/other carcinoma	1
Tuberculosis culturing	1	Tuberculosis	1
US+ FNAB	1	Pulmonary carcinoma	1

DISCUSSION

In our material, the results were as good and the complication rates as low as those presented in earlier larger materials (17, 18). The high number of surgeons (six) and the relatively small number of procedures did not affect the success rate. In 1968–1987 an annual average of 101 mediastinoscopies was performed in Turku University Central Hospital from which the frequency dropped to the present average amount, which has varied between 20 and 30 in a year up until the present. This number seems to be enough to maintain the operative skills of a surgeon, but surely this procedure should preferably be concentrated to specific centers.

In 20 cases (8%) the lesions were beyond the anatomical reach of the mediastinoscope, despite preoperative evaluation with imaging investigations. Attention should be paid to the evaluation of the exact site of the pathology, so that unsuccessful and unnecessary mediastinoscopies can be avoided. In our material, there were a few cases in which we intentionally tried to make a diagnosis by doing biopsies of the mediastinal nodes, although knowing that the main tumor was beyond the reach of mediastinoscope. In one case the diagnosis was revealed by FNAB after a mediastinoscopy. Because of the lower complication risks of the FNAB investigation, it should always be tried before mediastinoscopy, if it is anatomically possible.

The role of mediastinoscopy has been questioned because of the new diagnostic possibilities of mediastinal pathology. Both MRI and CT scan investigations offer reliable information about the mediastinum. Good results have been shown for percutaneous FNAB in diagnosing anterior mediastinal lesions (6, 7). Good visibility of the tumor with US is crucial for safe and successful biopsing. Because of the small amount of FNAB material, both US- and CT-guided core-needle biopsy techniques have also been developed. These are done under local anesthesia and the results are promising (13–15).

Moreover, flexible transbronchial biopsies have been used for diagnosing mediastinal pathology. The value of this technique seem to be higher in investigating lung tissue itself,

because the accuracy is not good enough to reach small lesions (9).

The advantage of thoracoscopy is its better approach to the subcarinal anterior mediastinum. However it is possible to investigate only one side at a time and the bleeding complications may be more difficult to control. The paratracheal space is easier to reach by mediastinoscopy than by thoracoscopy. In general, thoracoscopy is recommended if the lesion is beyond the reach of the mediastinoscope and when multiple biopsies from various areas in the thoracic cavity are needed. Although in comparative studies both methods have produced good results, it has been shown that mediastinoscopy is safer and causes fewer complications (16).

Although imaging procedures together with FNAB are the primary investigation modalities of mediastinal pathology, we still consider mediastinoscopy a reliable and safe subsequent investigation method. An explorative thoracotomy can nearly always be avoided when mediastinoscopy, along with other complementary investigation modalities, is used.

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