

**Mediastinoscopy**

**A Valuable Diagnostic Aid**

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*Mediastinoscopy is a safe and simple endoscopic procedure for the exploration of the superior mediastinum. It provides useful information as to the possible resectability of bronchogenic carcinoma, or for establishing the diagnosis of primary tumors of the mediastinum, metastatic disease and a variety of chronic granulomata.*

**Mediastinoscopy is an effective and safe procedure** for palpation, direct inspection or biopsy of lesions in the superior mediastinum. The yield of positive tissue diagnosis is much higher than with scalene node biopsy and as an alternative to open thoracotomy it is far less traumatic. In spite of the advantages of mediastinoscopy over older surgical diagnostic methods, the technique is not widely used in North America. This paper will give reasons why it should be.

Harken and associates\(^1\) described the lateral cervico mediastinal exploration in 1954. Due to a high incidence of complications, the method they used was replaced by a more logical midline approach introduced in 1959 by Carlens.\(^2\) Initially, mediastinoscopy was proposed as an extension of scalene node biopsy to determine the resectability of bronchogenic carcinoma. It was later found to be an effective diagnostic tool for other mediastinal masses, including chronic granulomatous disorders, metastatic tumors, cysts and lymphomas.

The evidence that mediastinoscopy provides a higher diagnostic yield has been demonstrated both in man and in experimental animals. Tegner\(^3\) performed mediastinoscopy in 163 instances in which disease was present, and the diagnostic result was "positive" in 39 percent of cases of pulmonary carcinoma and in 98 percent of cases of pulmonary sarcoidosis. With use of scalene node biopsy in 311 cases the apposite figures fell to 19 percent and 64 percent, respectively. Johner\(^4\) inoculated dogs intrabronchially with *Histoplasma capsulatum*. Several weeks later both scalene node biopsy and mediastinoscopy were performed. The former method yielded 27 percent positive results, whereas a 91 percent positive diagnostic rate was made by mediastinoscopy.

When mediastinal node biopsy is negative in a case of pulmonary carcinoma, the rate of resectability is approximately 90 percent.\(^5\) This figure falls to 60 percent for negative scalene node biopsy. The positive yield of mediastinal node biopsy diminishes as the lesion moves peripherally. Reynders\(^6\) 300 cases illustrate this fact. In central lesions mediastinoscopy gave a 60 percent positive diagnosis; 50 percent positive when only aplectatic or poorly defined lesions were encountered; 10 percent for peripheral lesions, and 7 percent for coin lesions.

With present preoperative diagnostic methods, carcinoma of the lung is found to be unresectable in 35 to 40 percent of cases by the time operation is carried out. By using mediastinoscopy\(^8\) this
number can be lowered to about 10 percent, as shown in Table 1. A great number of patients with unresectable tumors, therefore, are spared the expense and morbidity of thoracotomy.

The usefulness of mediastinoscopy in the diagnosis of pulmonary sarcoidosis is shown in Table 2.

**Indications**

There are two main indications for mediastinoscopy:

1. Diagnosis of mediastinal and parahilar pulmonary masses without an exploratory thoracotomy.
2. Determination of resectability of pulmonary carcinoma.

**Surgical Technique**

The patient is placed supine with the neck extended. The upper thorax, chin, and neck are prepared and draped and 1 percent Xylocaine® with epinephrine is injected subcutaneously over the trachea and suprasternal notch. A 6 cm transverse skin incision is made approximately two fingerbreadths above the manubrium and dissection is carried down to the pre-tracheal fascia. It is important that the pre-tracheal fascia be divided because the plane for finger dissection lies between the trachea and the fascia. At this point, approximately 2 ml of 1 percent Xylocaine® solution is injected into the tracheal lumen to reduce the cough reflex. Blunt dissection, between the trachea and pre-tracheal fascia, is carried gently down along the anterior surface of the trachea into the mediastinum. It is extremely important that the surgeon be thoroughly familiar with the anatomical configuration of the mediastinum (Figure 1). Anteriorly, the innominate artery and the aortic arch can be readily palpated, as can the left common carotid artery. An assessment of the mediastinum can be made with the index finger as it passes downward; and should the patient complain during this procedure, a small amount of Xylocaine® may be placed into the field of dissection. Blunt dissection is continued until the tracheal bifurcation and right and left mainstem bronchi can be clearly palpated. Masses or nodes may be partially dissected free with gentle blunt dissection. This portion of the technique progresses with great ease unless fibrosis has developed there, as from previous irradiation or inflammation.

Following finger dissection, a mediastinoscope (Figure 2) is introduced into the pre-tracheal space and is passed inferiorly into the mediastinum. Two points must be kept in mind: The surgeon must see the tracheal rings, and he must never push the mediastinoscope into an undissected area. Further dissection is carried out either with the index finger or, under direct endoscopic vision, with a pair of long forceps carrying a small dissection sponge marked with a black silk suture, or with a specially designed spreader that accompanies the mediastinoscopy set. Should sharp dissection through fibrous bands be required, blunt-tipped laryngeal scissors may be used. Para-tracheal, tracheal, bronchial, and subcarinal lymph nodes can all be readily reached and partially dissected in preparation for biopsy. Generally, many of the nodes encountered in the adult city dweller are stained with anthracotic pigment and are thus readily identified.

It is imperative that needle aspiration be employed if the operator is at all in doubt before a specimen for biopsy is excised from a mass. Non-fatal bleeding problems from nicking the superior vena cava,azygous vein and bronchial arteries have been reported in the literature. The other great veins which lie anterior to the arteries are not at risk. The right pulmonary artery is out of harm’s way, as it lies anterior to the subcarinal nodes. However, the bronchial artery as it crosses in front of the left and right mainstem bronchi tends to pass through this mass of lymphoid tissue. The left recurrent laryngeal nerve is generally well away from the field of dissection between the

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**TABLE 1.—Comparison of Diagnostic Value of Mediastinoscopy and Scalene Node Biopsy for Determination of Resectability of Bronchogenic Carcinoma**

| Reported by | Percent Resectable when Negative by 
<table>
<thead>
<tr>
<th>Node Biopsy</th>
<th>Mediastinoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson®</td>
<td>55</td>
</tr>
<tr>
<td>Reynders®</td>
<td>60</td>
</tr>
<tr>
<td>Hosie®</td>
<td>60</td>
</tr>
<tr>
<td>Bergh®</td>
<td>—</td>
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</tbody>
</table>

**TABLE 2.—Diagnostic Value of Mediastinoscopy as Compared with Scalene Node Biopsy in Pulmonary Sarcoidosis**

| Reported by | Percent Yield for Positive Diagnosis by 
<table>
<thead>
<tr>
<th>Scalene Node Biopsy</th>
<th>Mediastinoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reynders®</td>
<td>—</td>
</tr>
<tr>
<td>Carlens®</td>
<td>—</td>
</tr>
<tr>
<td>Skinner®</td>
<td>70</td>
</tr>
<tr>
<td>Tegner®</td>
<td>64</td>
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layers and a small pressure dressing applied.

Despite the fact that general anesthesia has been exclusively employed by other investigators in order to keep the patients more comfortable, the patients we have operated upon under local anesthesia have not reported undue discomfort during the procedure and are ambulatory and on a full diet immediately following the operation. They are generally discharged the next day.

Ward and coworkers expressed preference for local anesthesia, for bleeding was less, the hazard of general anesthesia was eliminated and the operating room time was shortened.

Complications

Mediastinoscopy is regarded as an unusually safe procedure. In a series of 1,087 cases analyzed and reported by Flynn, the mortality rate was 0.3 percent (four cases), and the morbidity 2.6 percent (31 cases). In a series of 300 cases over a four-year period, Bergh and associates noted the following complications: Two cases of pneumothorax; three cases of left recurrent laryngeal nerve paralysis, in one of which function returned completely over a one-year period; three cases of hemorrhage, all responding to packing; and two deaths within a two-week period following the procedure. It was felt, however, that mediastinoscopy was not the cause of death in either case. Other reports in the literature give a very low morbidity and mortality rate for this procedure, as compared with a reported mortality rate of 10 percent for thoracotomy.


esophagus and the trachea. If the node in question cannot be entirely dissected free, cup forceps may be used following aspiration identification. A slight ooze from the biopsy site is expected, but bleeding of any significant nature following excision of a specimen is rare and generally stops after brief compression. If bleeding is a problem, gelfoam may be packed over the bleeding site and pressure exerted for a period of minutes. The gelfoam packing may be left in place following completion of the procedure. Following removal of the mediastinoscope, the dissected space is obliterated by a collapse of the soft tissue, providing additional hemostasis. The wound is closed in
Reports of Cases

Case 1. A 44-year-old white man was in good health until four weeks before admission to Stanford University Hospital in January, 1968, with a slowly enlarging lump on the right side of the forehead. This mass was excised and found to be anaplastic carcinoma. In a thorough examination, with emphasis on the gastrointestinal tract and thyroid gland, no significant abnormality was noted except for the presence of a very small left hilar mass (Figure 3).

Bronchoscopy and left scalene node biopsy were negative. Mediastinoscopy was performed under general anesthesia. Biopsy of an anthracotic carinal node revealed carcinoma. Later, a follow-up report from the referring physician indicated the primary lesion had been found in the colon.

Case 2. A 30-year-old male radiologist presented with self diagnosis of Hodgkin's disease made on the basis of bilateral hilar adenopathy on a routine x-ray film of the chest. Restrospective examination of previous chest films revealed no abnormalities a year earlier.

Other than anxiety engendered by his assumption that he had Hodgkin's disease, the patient was virtually asymptomatic. Physical examination was normal except for mild psoriasis. Laboratory tests and appropriate skin tests were negative. Mediastinoscopy was performed and biopsy of lymph nodes revealed sarcoidosis.

Case 3. A 24-year-old healthy white woman was admitted to Stanford University Hospital in June 1967 for the evaluation of a totally asymptomatic mediastinal mass discovered on a routine x-ray film of the chest. Physical examination was unremarkable, as were all laboratory studies save for a positive histoplasmin skin test.

Bronchoscopy and right scalene node biopsy were negative. In July 1967 mediastinoscopy was carried out. Microscopic evaluation of tissue removed from a firm mediastinal mass revealed a typical granulomatous process compatible with histoplasmosis. The patient was subsequently treated with amphotericin-B and when last observed was asymptomatic and the mediastinal mass as observed radiographically, was regressing.

REFERENCES