Standard Cervical Mediastinoscopy in the Diagnosis of Mediastinal Masses

ABDEL RAHMAN M. ABDEL RAHMAN, M.D.
The Department of Surgery, National Cancer Institute, Cairo University.

ABSTRACT

Purpose: The present study is designated to clarify, indications, contraindications, complications, sensitivity, specificity of standard cervical mediastinoscopy to diagnose mediastinal lesions.

Material and Methods: To validate our experience with standard cervical mediastinoscopy, I conducted this study on 65 patients between January 2000 and August 2003. Mediastinoscopy was indicated for diagnostic staging of nodal disease related to lung cancer in 21 patients (group I) or for isolated mediastinal lymphadenopathy in 44 patients (group II).

Results: There were 43 males and 22 females, with a mean age of 37 years. The mean operative time was 28 minutes and the mean hospital stay was 15 hours.

In lung cancer patients, a false negative result was obtained in one patient. In patients with isolated mediastinal lymphadenopathy, malignant lymphoma was the commonest diagnosis. Sarcoidosis was the next common. There was technical failure in obtaining biopsy in two patients early in the author’s experience.

There were two cases with surgery-related morbidity in the form of mild bleeding which was controlled by local diathermy coagulation. There was no surgery-related mortality.

The sensitivity of standard cervical mediastinoscopy in this study was 97.8%, specificity 100%, PPV 100%, NPV 94.4% and total accuracy of 98.4%.

Conclusion: Standard cervical mediastinoscopy is safe, cost effective, highly specific and is still the first investigation of choice in the diagnosis of mediastinal nodal involvement.

Key Words: Mediastinoscopy - Cervical - Mediastinal - Masses.

INTRODUCTION

Standard cervical mediastinoscopy is widely employed for surgical exploration of the superior mediastinum. It allows biopsy of paratracheal lymph node stations on both sides, anterior subcarinal lymph nodes as well as direct biopsy of retrovascular mediastinal tumors [1-2]. In 1959, Carlens [3] introduced the use of cervical mediastinoscopy under general anesthesia and named the procedure “mediastinoscopy”.

It was not until mid 1960s that Pearson and colleagues began performing mediastinoscopy routinely in the pre thoracotomy staging of non small cell lung cancer [4].

The most common indication for mediastinoscopy is preoperative nodal staging of lung cancer. Other less common indications include: re-staging of non-small cell lung cancer after neoadjuvant therapy, evaluation of middle mediastinal mass, treatment of cystic mediastinal mass [5], evaluation of mediastinal adenopathy in the absence of lung masses or in the presence of diffuse lung disease of undetermined etiology [6].

However, few anatomic conditions preclude safe cervical mediastinoscopy. These include severe cervical arthritis (preventing adequate neck extension), the presence of large cervical goiter, extensive calcification or aneurysmal dilatation of the aortic arch or innominate artery and the presence of tracheostomy. Contradictory to the general belief, superior vena cava syndrome is not a contraindication to standard cervical mediastinoscopy. Repeated mediastinoscopy can be safely accomplished in most patients despite the peritracheal fibrosis [7].

Minor hemorrhage, most commonly related to the bronchial arterial supply to the mediastinal...
lymph node, is the commonest complication and is usually controlled with electrocautery or gauze packing. Massive hemorrhage from injury to a major blood vessel is potentially life threatening and requires prompt recognition, tamponade and repair. Therefore, preparation for urgent sternotomy is essential in every case of mediastinoscopy.

Tracheobronchial tear is a rare complication of mediastinoscopy. Other structures at risk are the recurrent laryngeal nerve, the mediastinal pleura and the esophagus (vulnerable in the posterior subcarinal area) [8].

The aim of this study is to clarify the indications, contraindications, complications, sensitivity, specificity and total accuracy of standard cervical mediastinoscopy to diagnose various mediastinal lesions.

PATIENTS AND METHODS

The study included 65 adult patients, with the following inclusion criteria:

- The accessibility of the lymph nodes and/or mass to the cervical mediastinoscopy.
- CT scan of the chest with contrast is considered the primary investigation needed in preoperative assessment.
- Patients with mediastinal lymphadenopathy on preoperative CT scan should not have any peripheral nodal enlargement.
- Patients with lung cancer, all have right-sided lesions or have mediastinal nodal enlargement (more than 1 cm in diameter) on preoperative CT scan.

Data regarding, age, sex, operative time and operative complications were collected. Results of examinations of surgical specimens were also recorded.

RESULTS

In the department of surgery, National Cancer Institute, Cairo University, 65 patients have undergone standard cervical mediastinoscopy during the period from January 2000 to August 2003.

Of the 65 patients, males represented 66.1% (43 patients) and females represented 33.9% (22 patients). The mean age was 37 years with a range from 21 to 63 years.

The mean operative time was 28 minutes and the mean hospital stay was 15 hours.

Standard cervical mediastinoscopy was done as a staging procedure in 21 patients with proven right sided lung cancer (32.3%) (group I) and as a diagnostic tool in 44 patients with isolated mediastinal lymphadenopathy in CT of the chest (67.7%) (group II).

In group I, 11 patients had mediastinal nodal enlargement on pre-operative CT scan (more than 1 cm in diameter), while the remaining 10 patients had right sided central lesions with no evidence of mediastinal lymphadenopathy on preoperative CT scan.

Standard cervical mediastinoscopy with frozen section of the nodes, revealed the presence of metastatic disease in 13 of the 21 patients. Of the 13 patients with positive metastatic disease by mediastinoscopy, 8 had preoperative CT scan evidence of enlarged mediastinal lymph nodes. The remaining 5 patients had right sided central lesions with no enlargement of the mediastinal lymph nodes on preoperative CT scan.

One patient with negative preoperative mediastinoscopy was found to have metastatic nodal disease in the postoperative pathology. Table (1) shows the end results in group I.

The sensitivity of CT scan in the detection of mediastinal nodal metastases in group I was 61.5%, specificity 62.5%, positive predictive value (PPV) 72.7% and negative predictive value (NPV) 50%.

In patients with metastatic disease in the mediastinal lymph nodes by frozen section, no operation was done and the patients were referred for neo adjuvant chemotherapy.

In group II successful biopsy with definite diagnosis was reached in 42 patients and there was failure to take mediastinoscopic biopsy in the remaining 2 patients early in the author’s experience. Malignant lymphoma was the commonest diagnosis found in 20 out of the 42 patients (47.6%). Table (2) shows the final pathology in group II. There was one patient in whom mediastinoscopy was considered diagnostic and therapeutic. This patient had a simple mediastinal cyst, partially excised through the
mediastinoscopy with evacuation of its fluid content. Follow up CT scan showed normal findings. Figs. (1-4) show the plain chest roentgenogram and CT scans of patients in group II.

Morbidity in relation to the procedure developed in two patients (3.1%) in the form of mild hemorrhage controlled by gauze packing and local diathermy coagulation. There was no operative related mortality in this study.

In this study, the sensitivity of standard cervical medistinoscopy was 97.8%, specificity 100%, positive predictive value 100%, negative predictive value 94.4% with total accuracy of 98.4%.

Fig. (1): Plain chest roentgenogram shows right lower paratracheal shadow.

Fig. (2): CT scan of the chest, shows right upper paratracheal lymph node enlargement.

Fig. (3): CT scan of the chest shows retrocaval lymph node.

Fig. (4): CT scan at the level of the carina, shows right hilar and subcarinal lymph nodes.
DISCUSSION

Mediastinoscopy is an important method in the differential diagnosis of mediastinal pathology since it was presented by Carlens in 1959 [3]. Mediastinoscopy in the skilled hands of a thoracic surgeon has proved to be a safe, cosmetically accepted procedure, with negligible complications.

Group I in our series included 21 patients with right sided lesions. Left sided lesions were not included as those lesions usually metastasize to aortopulmonary and preaortic lymph nodes (level 5 & 6), out of reach of cervical mediastinoscopy [9]. T1 and T2 tumors show high incidence of mediastinal lymph node metastases varying from 15% to 25% [10,11].

It is generally accepted that lymph nodes more than 1 cm in diameter are pathologically enlarged. For lymph nodes of this size, several groups have reported a sensitivity in the range of 60% to 70% and a specificity of 60% to 80% using computed tomography [12,13]. In our study, the sensitivity and specificity of CT scan was 61.5%, 62.5% which nearly match with other published data [13,14]. Even in the presence of larger lymph nodes, however, it can be misleading. More than 35% of such nodes have been found to be negative for tumor metastasis [12].

MRI does not offer substantial advantage over computed tomography in the diagnosis of tumor metastases to mediastinal lymph nodes [14].

These findings endorse the impression that CT scan is not so accurate for mediastinal staging in patients with potentially operable non small cell lung cancer.

More recently, positron emission tomography (PET) has been used in the detection of mediastinal nodal metastases. This very expensive investigation has a sensitivity of 89% to 90% and a specificity around 85% in most published studies [12,15]. In a recent study conducted by Cerfolio and colleagues [16] the sensitivity of PET scan in the detection of mediastinal nodal metastases (N2 disease) was 71%, PPV 44%, NPV 91% and accuracy 76% which are lower than those of mediastinoscopy.

In our series, of 21 patients with lung cancer, a false negative result as obtained in one patient only (4.76%), which is comparable to other results. Nicolas and colleagues [17] reported a false negative rate of 6.5% in a series of 240 patients.

Group II included 44 patients with isolated mediastinal lymphadenopathy. This number comprises nearly 2/3 of patients. In other studies regarding standard cervical mediastinoscopy, lung cancer is the commonest pathology. In a study conducted by Nicolas and coworkers [17], of the 240 patients, 174 had non small cell lung cancer. Graeter and colleagues [18] in their series of 103 patients, only 20 had a diagnosis other than lung cancer.

The explanation of this difference in patient distribution is that we are a referral center for all malignancies, but we still not a referral center for lung cancer and most of lung cancer patients presented to us with advanced disease. This is why we do not have a large number of lung cancer patients as candidates for surgery.

Malignant lymphoma was the commonest diagnosis in-group II. We had 7 patients with TB lymphadenitis, which is considered a big number in comparison to other studies. Graeter and colleagues [18] reported only three patients with TB lymphadenitis. Nicolas and co-workers [17] in their series reported only 4 cases with

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>13</td>
</tr>
<tr>
<td>Negative</td>
<td>7</td>
</tr>
<tr>
<td>False negative</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphoma</td>
<td>20</td>
</tr>
<tr>
<td>Sarcoiodsis</td>
<td>12</td>
</tr>
<tr>
<td>TB</td>
<td>7</td>
</tr>
<tr>
<td>Metastasis of unknown primary</td>
<td>2</td>
</tr>
<tr>
<td>Cyst</td>
<td>1</td>
</tr>
<tr>
<td>Failure of biopsy</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
</tr>
</tbody>
</table>

Table (1): The diagnostic yield of mediastinoscopy in group I.

Table (2): The final pathology in group II.
TB lymphadenitis. This is an indication of rising incidence of tuberculosis in Egypt in recent years.

In our patients, one of them had a simple mesothelial cyst, partially enucleated through mediastinoscopy with complete resolution by follow up CT scan. There were two reported cases of simple mesothelial cysts reported in the study published by Nicolas and colleagues, with partial excision through mediastinoscopy [17].

In group II, there was failure to obtain a biopsy in two patients because the lesion was out of reach of standard cervical mediastinoscopy early in the author’s experience.

In the present study, the sensitivity of standard cervical mediastinoscopy was 97.8%, specificity 100%, positive predictive value 100%, negative predictive value 94.4% and total accuracy of 98.4%. Our results are comparable to the results published by other investigators.

Rodriguez et al. [19] in a study of 181 patients, recorded a sensitivity of 93.6%, specificity 100%, positive predictive value 100%, negative predictive value 82.8% with total accuracy 95.1%. Nicolas and co-workers [17] performed 240 mediastinoscopies with a sensitivity of 98.3%, specificity 100% and total accuracy 98.6%. Porte and colleagues [20] in their data on 400 mediastinoscopies reported a sensitivity of 96%, specificity 100% and total accuracy 95%.

In our patients, there were two minor complications in relation to the procedure in the form of mild hemorrhage, with no major complications reported. We had no surgery-related mortality. Nicolas and colleagues [17] recorded only two complications in their series, one of them was pneumothorax not necessitating drainage and a tear of the innominate artery, thus their complication rate was lower than ours, 0.83%, versus 3.1%. Rodriguez and co-workers [19] in their study reported a complication rate of 2.7%, which is comparable to our study and they had no operative related mortality. Haggar and colleagues [21] in their series of 72 patients with mediastinal pathology reported only one surgery-related morbidity in the form of mediastinal hematoma treated conservatively. They had no surgery-related mortality.

**In conclusion:**

This study shows that mediastinoscopy is a safe, accurate and cost effective procedure minimizing hospital stay and allowing appropriate treatment to be immediately commenced upon diagnosis.

Mediastinoscopy is still the best diagnostic investigation of choice for paratracheal and retrovascular mediastinal pathology and proper studying of the preoperative CT scan will help in the identification of successful candidates for cervical mediastinoscopy, thus allowing high sensitivity and specificity of the procedure to be reached.

**REFERENCES**


---

Standard Cervical Mediastinoscopy in the Diagnosis