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The value of cervical mediastinoscopy in the diagnosis of mediastinal lymphadenopathy

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ABSTRACT

Objectives. This study retrospectively evaluated mediastinoscopic interventions performed for diagnostic purposes in cases with mediastinal lesions remained undiagnosed by other diagnostic methods. ***Methods.*** We retrospectively evaluated the medical information of 218 patientss that underwent diagnostic cervical mediastinoscopy for mediastinal lymphadenopathy apart from lung cancer staging between January 2011 and December 2015. The patients were evaluated for age, sex, distribution of sampled lymph node stations detected to have lymphadenopathy, intraoperative and postoperative mortality and morbidity, and histopathological diagnostic parameters. The gender-based distribution of the disease types diagnosed by cervical mediastinoscopy were analyzed with the Chi-Square test. ***Results.*** Two hundred and six (94.5%) of 218 patients were diagnosed by cervical mediastinoscopy. The most common diagnosis was sarcoidosis in women and bronchogenic carcinoma in men. Nineteen (8.7%) patients suffered minor complications, with pain being the most common; no major complication occurred. ***Conclusion.*** The present study shows that mediastinoscopy is still an invasive diagnostic method with high diagnostic accuracy that can be safely used with low rates of mortality and morbidity in a large proportion of patients with mediastinal lymphadenopathy of undetermined origin.

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Keywords: Cervical mediastinoscopy, mediastinal lymphadenopathy, mediastinum, videomediastinoscopy

Introduction

Histopathological tissue diagnosis is regarded essential to determine the most appropriate treatment approach for disorders characterized by mediastinal lymphadeopathy. For this purpose, a diagnostic intervention should provide adequate amount of tissue samples for histopatological and immunological studies. Cervical mediastinoscopy is an effective minimally invasive diagnostic method that can be safely used with low mortality and morbidity rates and that effectively harvests adequate amount of tissue in cases that remain undiagnosed by other methods [1, 2].

Cervical mediastinoscopy is primarily used for the diagnosis and staging of primary lung cancer. In addition to this common indication, it also provides highly valuable information, albeit rarely, for some

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other disorders such as sarcoidosis, tuberculosis, lymphoma, and mediastinal mases. Although many large-scale studies have been conducted for staging lung cancer so far, there are only limited number of studies that explored the role of mediastinoscopy in the diagnosis of disorders with mediastinal lymphadenopathy [3-6].

In this retrospective study it was aimed to establish the efficacy, safety, and feasibility of cervical mediastinoscopy used for the diagnosis of disorders characterized by mediastinal lymphadenopathy apart from lung cancer staging.

Methods

We retrospectively reviewed the medical records of 218 patients with mediastinal lymphadenopathy who underwent diagnostic cervical mediastinoscopy between January 2011 and December 2015 after remaining undiagnosed by other diagnostic methods. In addition to demographic characteristics such as age and gender, we also recorded symptoms, mediastinoscopy indication, and pathology results. All patients underwent a posteroanterior chest X-Ray imaging, thoracic computerized tomographic imaging, complete blood count, and routine biochemistry studies. In addition to symptoms (e.g; chronic cough, dyspnea, pain), a mediastinal lymphadenopathy with a short axis diameter of greater than 10 mm and a central localization on thoracic computerized tomographic was regarded as an indication for carrying out mediastinoscopy. The mediastinal lymph node map developed by Mauntain and Dresler [7] in 1997 was used to determine lymph nodes' localization. Apart from mediastinal lymphadenopathy, the presence of lesions in lung parenchyma and lymphadenopathies in other body sites were also investigated.

Operative technique

Following single-lumen intubation under general anesthesia in supine position, neck was brought to hyperextension and turned right, and a 3-cm cut was made one finger width above the jugular notch. After passing downwards through the subcutaneous tissue and the platysma muscle, pretracheal area was accessed through the strep muscles. Thyroid gland was retracted upward, pretracheal fascia was opened up, and a video mediastinoscope with an openable tip (Richard Wolf, Germany) was placed. Both bronchi were visualized through a blunt dissection with the help of an aspirator tip above the trachea. Biopsy samples were taken from paratracheal, subcarinal, and

Table 1. General characteristics of the study group

Variables	Patients (n=218)
Age (years)	
Mean	52.7±14.7
Min-Max	16-85
Duration of stay (days)	
Mean	2.9±1.0
Min-Max	2-5
Sex	
Male	102 (46.8%)
Female	116 (53.2%)
Smoking	
Smoker	105 (48.2%)
Non-smoker	113 (51.8%)
Symptoms	
Pain and cough	31 (14.2%)
Dyspnea and cough	187 (85.8%)
Level of mediastinal lesion	
Hilar	70 (32.1%)
Paratracheal	81 (37.2%)
Subcarinal	67 (30.7%)

The values were presented as mean ± SD or number and %. Min=minimum, Max=maximum

hilar lymph nodes. After achieving hemostasis, the layers were closed on anatomic plane. The patients were extubated on operating table and transferred to their wards.

Statistical Analysis

Statistical analyses were done using SPSS v21.0 (IBM) software package. Number and percentage were used for qualitative variables and mean ± standard deviation for quantitative variables. Chi-square and Fisher's exact test were used to compare the frequency differences of observed and expected qualitative variables. A *p* value of less than 0.05 was considered statistically significant.

Results

This study included a total of 218 patients with mediastinal lesions who had a mean age of 52.7±14.7 years. One hundred and two (46.8%) patients were male and 116 (53.2%) patients were female. One hundred and five (48.2%) patients were smokers and 113 (51.8%) were non-smokers. The most common symptoms were cough, dyspnea, and pain. Among those with mediastinal lesions, the most common lesions localization was the paratracheal region (n=81, 37.2%), followed by the hilar region in 70 (32.1%) patients and the subcarinal region in 67 (30.7%) patients. Parenchymal infiltrates were present in 8 (3.6%) patients and they remained undiagnosed by bronchoalveolar lavage and transbronchial lung biopsy (Table 1). A definitive diagnosis could be made in 206 (94.5%) of 218 patients. In the present study, the most common diagnosis was sarcoidosis (n=89, 40.8%). This was followed by, in descending order, bronchogenic carcinoma in 54 (24.8%) patients, tuberculous adenitis in 43 (19.7%) patients, and lymphoma in 20 (9.2%) patients. A specific diagnosis could not be made and a non-specific diagnosis of reactive adenitis was made in 12 patients (Table 2).

A total of 19 patients developed minor postoperative complications including retrosternal pain in 8 patients, minor hemorrhage in 5, wound infection in 4, and temporary hoarseness in 2. Major vessel, tracheal injury or death did not occur (Table 3).

The majority of patients with sarcoidosis were women (27/62; 70%) while the majority of patients diagnosed with bronchogenic carcinoma were men (42/54; 65.6%). Twenty-six (60.5%) of 43 patients diagnosed with tuberculosis were women (Table 4).

Table 2. Disorders diagnosed by mediastinoscopy

Diagnosis	Number	%
Sarcoidosis	89	40.8
NHL	20	9.2
Bronchogenic carcinoma	54	24.8
Tuberculosis	43	19.7
Reactive lymph node	12	5.5
Total	218	100.0

The values were presented as number and %. NHL=non-Hodgkin's lymphoma The values were presented as number, %

Table 3. Complications of mediastinoscopy

Complications	Number	%
Wound infection	4	1.8
Pain	8	3.7
Minor hemorrhage	5	2.3
Hoarseness	2	0.9
None	199	91.3
Total	218	100.0

The values were presented as number and %

Table 4. Gender distribution of the diagnosed disorders

	Male (n=102)		Female (n=116)		*p* value
Diagnosis	n	%	n	%	
Sarcoidosis	27	26.4	62	53.5	**0.000***
NHL	9	8.8	11	9.5	
Bronchogenic carcinoma	42	41.2	12	10.3	
Tuberculosis	17	16.7	26	22.4	
Reactive lymph node	7	6.9	5	4.3	

The values were presented as number (n) and % and analyzed with Chi Square test. NHL=non-Hodgkin's lymphoma

There was a significant difference between both genders with respect to the disorders diagnosed by cervical mediastinoscopy.

Discussion

Cervical mediastinoscopy is primarily used for diagnosing and staging lung cancer. It is a minimally invasive diagnostic method that provides quite valuable information about disorders characterized by mediastinal lymphadenopathy which remain undiagnosed by other methods [1, 2, 8, 9]. Although valuable information about a lesion's main radiological properties and metabolic activity can be obtained by non-invasive diagnostic methods such as computerized tomography and positron emission tomography in a case with mediastinal lymphadenopathy with or without accompanying parenchymal lesions, a pathological tissue diagnosis is primarily required to determine the best treatment for a particular patient [2, 3, 10-12]. To achieve this goal, it is essential to perform firstly less invasive interventions such as transbronchial needle biopsy (TBNB) or transthoracic needle biopsy (TTNB) and then proceed with more invasive diagnostic methods such as cervical mediastinoscopy or thoracotomy when these methods fail. Studies on the efficacy of TBNB in patients with mediastinal lymphadenopathy showed a definitive tissue diagnosis rate of 50-78%, and suggested that TBNB should be primarily used for these patients [10, 12-14]. However, TBNB cannot always reach a final diagnosis. On the other hand, despite being a less invasive method compared with cervical mediastinoscopy, TBNB under radiological guidance has been reported to carry a significant risk for central vascular injury, and the incidence of penumothorax with this method has been reported to be 25-30% [11].

Diagnostic mediastinal lymph node aspiration with endobronchial or endoesophageal approaches under endoscopic ultrasonography has recently been introduced into clinical practice [6]. Success rates of up to 85% have been reported with endobronchial ultrasonography and up to 78% with endoesophageal ultrasonography [11]. In patients who remain undiagnosed with these methods, apart from cervical mediastinoscopy, anterior mediastinostomy developed by McNeil and Chamberlain [15] in 1966, extended mediastinoscopy developed by Ginsberg *et al.* [16] in 1987, video assisted thoracic surgery (VATS), and, as a last resort, thoracotomy can also be used for sampling mediastinal lymph nodes. Cervical mediastinoscopy allows an easy access to superior and inferior paratracheal lymph node stations on both sides as well as the anterosuperior extension of the subcarinal lymph node station (Nos 2, 4, and 7) [1, 6, 9, 17-19]. However, extended mediastinoscopy or anterior mediastinostomy can be used for sampling subaortic and paraaortic lymph node stations in the aorticopulmonary window which are inaccessible by cervical mediastinoscopy (Nos 5 and 6) [19]. While extended mediastinoscopy can be performed during cervical mediastinoscopy, there is a need for a separate incision and costal cartilage resection for anterior mediastinostomy. In addition, anterior mediastinostomy is associated with potential complications such as internal mammarian artery injury, pneumothorax, and postoperative pain. However, these complications are reportedly rare, and some researchers recommend using anterior mediastinostomy to explore this region [15].

Neither cervical mediastinoscopy nor anterior mediastinostomy can access the inferiorly located parts of the seventh lymph node station except for its anterosuperiorly located part [18]. VATS can be used for this region. VATS can also be useful for sampling aorticopulmonary, paraesophageal [8], and pulmonary ligament [9] lymph nodes. Compared to cervical mediastinoscopy, however, it is associated with a greater morbidity. VATS is indicated when lymph nodes are inaccessible with cervical mediastinoscopy or when multiple tissue sampling is needed [20].

All diagnostic interventions including cervical mediastinoscopy are complementary for each other rather than substitutes. The main point here is to select the most appropriate diagnostic method to reach a final tissue diagnosis in a patient with mediastinal lymphadenopathy. The most important factor to consider in this task is the distribution of the pathologically enlarged lymph nodes. There are insufficient number of studies investigating the rate of the involvement of different lymph node stations by different diseases. Large-scale studies employing diagnostic biopsy sampling reported that a great proportion (76%) of tissue sampling procedures involved the right paratracheal lymph nodes [3, 5]. We also had similar results.

The sensitivity of cervical mediastinoscopy has been reported between 95% and 100%. Porte *et al.* [3] reported a cervical mediastinoscopy sensitivity of 95%. The sensitivity and specificity of cervical mediastinoscopy have been reported to range between 75% and 97% in other large-scale studies [4, 12, 21]. Our study revealed a sensitivity of 94.5%.

The mortality rate with cervical mediastinoscopy ranges between 0% and 0.5% and morbidity 1% and 4.5%. Although low mortality and morbidity rates have been reported so far, some fatal complications have also been reported. These may include pulmonary artery, innominate artery, aortic arch, superior vena cava, and azygos vein injuries. Main minor complications include hemorrhage, pneumothorax, wound infection, tracheal injury, and recurrent nerve injury [1, 4, 9, 17]. We observed no mortality in our study, although there were 19 minor complications, of which 8 were postoperative pain episodes, followed by, in the order of frequency, minor hemorrhage, wound infection, and temporary hoarseness.

In the literature, sarcoidosis and lymphoma are the two main disease categories diagnosed after diagnostic cervical mediastinoscopy [3, 12, 21]. In line with this information, sarcoidosis (40.8%) was the most common diagnosis made in our study. The rate of tuberculous adenitis diagnosed by cervical mediastinoscopy as the final diagnosis was 11-24% in the domestic studies. The corresponding rate in our study was 19.7%, which was in agreement with previous reports [22, 23].

Conclusions

Our experience indicates that cervical mediastinoscopy with its high diagnostic efficacy should be used for cases with mediastinal lymphadenopathy that remain undiagnosed by other noninvasive and invasive diagnostic methods.

Conflict of interest

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References

[1] Kirby T, Fell S. Mediastinoscopy. In: Pearson FG, Cooper JD, Deslauriers J, Ginsberg R, Hiebert C, Patterson GA, Urschel H, editors. Thoracic surgery. New York: Churchill Livingstone 2002;p. 98-103.
[2] Gurses A. [Mediastinoscopy]. Turkiye Klinikleri J Int Med Sci 2006;2:53-6. [Article in Turkish]
[3] Porte H, Roumilhac D, Eraldi L, Cordonnier C, Puech P, Wurtz A. The role of mediastinoscopy in the diagnosis of mediastinal lymphadenopathy. Eur J Cardiothorac Surg 1998;13:196-9.
[4] Sarrazin R, Dyon JF. [Mediastinoscopy]. Rev Mal Respir 1992;9:99-110. [Article in French]
[5] Pattison CW, Westaby S, Wetter A, Townsend ER. Mediastinoscopy in the investigation of primary mediastinal lymphadenopathy. Scand J Thorac Cardiovasc Surg 1989;23:177-9.
[6] Eldaboosy SAM, Zeinnhom RA, Kanany H, Nour MO. The value of cervical mediastinoscopy in the diagnosis of mediastinal lesions. Egypt J Chest Dis Tuberc 2015;64:755-60.
[7] Mountain CF, Dresler CM. Regional lymph node classification for lung cancer staging. Chest 1997;111:1718-23.
[8] Hasdiraz L, Kahraman A, Bilgin M, Oguzkaya F. [Mediastinoscopy for T1 non-small cell lung carcinoma]. Turkiye Klinikleri J Med Sci 2007;27:677-9. [Article in Turkish]
[9] Borges N, Sibu Saha S. The value of mediastinoscopy in the management of thoracic disease. Indian J Thorac Cardiovasc Surg 2012;28:116-9.
[10] Deslauriers J, Letourneau L, Giubilei G. Tumors and masses: diagnostic strategies in mediastinal tumors and masses. In: Pearson FG, Cooper JD, Deslauriers J, Ginsberg RJ, Hiebert CA, Patterson GA, et al, editors. Thoracic surgery. Vol. 2, 2nd ed. New York: Churchill Livingston; 2002. p. 1655-73.
[11] Le Jeune I, Baldwin D. Measuring the success of transbronchial

needle aspiration in everyday clinical practice. Respir Med 2007;101:670-5.
[12] Hsu HS, Wang LS, Hsieh CC, Wang CY, Wu YC, Huang BS, et al. The role of mediastinoscopy in the evaluation of thoracic disease and lung cancer. J Chin Med Assoc 2003;66:231-5.
[13] Zwischenberger JB, Savage C, Alpard SK, Anderson CM, Marroquin S, Goodacre BW. Mediastinal transthoracic needle and core lymph node biopsy: should it replace mediastinoscopy? Chest 2002;121:1165-70.
[14] Raveglia F, Meda S, Conforti S, Leporati A, Calati AM, Squinzi R, et al. Diagnostic value and learning curve of transbronchial needle aspiration in thoracic surgery. Minerva Chir 2006;61:459-66.
[15] McNeill TM, Chamberlain JM. Diagnostic anterior mediastinotomy. Ann Thorac Surg 1966;2:532-9.
[16] Ginsberg RJ, Rice TW, Goldberg M, Waters PF, Schmocker BJ. Extended cervical mediastinoscopy. A single staging procedure for bronchogenic carcinoma of the left upper lobe. J Thorac Cardiovasc Surg 1987;94:673-8.
[17] Hinterthaner M, Stamatis G. [Role of mediastinoscopy and repeat mediastinoscopy today]. Chirurg 2008;79:38-44. [Article in German]
[18] Landreneau RJ, Hazelrigg SR, Mack MJ, Fitzgibbon LD, Dowling RD, Acuff TE, et al. Thoracoscopic mediastinal lymph node sampling: useful for mediastinal lymph node stations inaccessible by cervical mediastinoscopy. J Thorac Cardiovasc Surg 1993;106:554-8.
[19] Inzirillo F, Giorgetta C, Ravalli E, Tiberi S, Pona CD. Videomediastinoscopy: a ten year experience on lung cancer stadiation and non-diagnosed mediastinal lymphoadenopathy. Chirurgia (Bucur) 2014;109: 451-4.
[20] Gossot D, Toledo L, Fritsch S, Celerier M. Mediastinoscopy vs thoracoscopy for mediastinal biopsy. Results of a prospective nonrandomized study. Chest 1996;110:1328-31.
[21] Chauhan A, Kapoor S, Ganguly M, Nath P. Cervical mediastinoscopy: re-evaluation of an old technique in era of new imaging technology, Indian J Chest Dis. Allied Sci 2012;54:169-73.
[22] Kir A, Baysungur SV, Baran R, Akso F, Pandul I, Atasalihi A. [Diagnostic mediastinoscopy]. Turk Gogus Kalp Dama 1994;2:347-9. [Article in Turkish].
[23] Yuksel M, Akgun S, Pasa S. Intratorasik lezyonlarin tanisinda ve tedavisinin planlanmasinda mediyastinoskopinin rolu ve inemi. Solunum Hastaliklari Dergisi 1996;7:21-7.