ORIGINAL ARTICLE

The role of mediastinoscopy in the diagnosis of thoracic disease: 107-case analysis

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ABSTRACT

Aim To evaluate the efficacy, safety and feasibility of mediastinoscopy in 107 cases with mediastinal lesions that could not be diagnosed histopathologically with other methods.

Methods A total of 107 cases (73 males, 34 females; mean age 57.4, range 30-88 years) with mediastinal lymphadenopathy, who underwent mediastinoscopy between 12 September 2012 and 29 November 2018 were examined retrospectively. The cases were evaluated in terms of age, gender, complaint, operation time, histopathological diagnosis, postoperative morbidity and mortality parameters.

Results Upon histopathological examination 32 (30%) patients were diagnosed with lung cancer metastasis (N2 stage), which was the most common diagnosis. With this diagnosis unnecessary thoracotomy was prevented. In patients with pathological lymphadenopathy found by imaging histopathological results were examined to evaluate the presence of N2 stage. In 25 (23.5%) cases biopsy results were reported as reactive lymph nodes. In addition, 23 (21.4%) patients had sarcoidosis, 16 (15%) had tuberculosis lymphadenitis, seven (6.5%) had lymphoma, one of each (0.9%) had benign epithelial cyst (0.9%), malign epithelial tumour (invasive ductal carcinoma of breast), chronic lymphocytic leukaemia (CLL), and adenocarcinoma metastasis (renal cell cancer).

Conclusion When other non-invasive procedures are ineffective, mediastinoscopy is an efficient diagnostic method with high diagnostic value, which is applicable also in places other than advanced centres, with low morbidity and mortality.

Key words: lung cancer, lymphadenopathy, mediastinal staging, thoracic surgery

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INTRODUCTION

Cervical mediastinoscopy (CM) is one of the methods to evaluate mediastinal lymph nodes. This surgical procedure was developed in Europe in the beginning of the 20th century, but it had been seldom performed outside Europe until the end of 1950's when Eric Carlens introduced mediastinoscope as a surgical device (1). This new method allowed a surgeon to enter the mediastinum via suprasternal incision while using a rigid instrument and carry out a biopsy from paratracheal and hilar lymph nodes (1,2). Cervical mediastinoscopy is an invasive diagnostic procedure used during lung cancer staging and mediastinal tumour diagnosis and identification of their etiology (3). In order to determine the most appropriate treatment modality in patients with mediastinal lymphadenopathy, histopathological tissue diagnosis is primarily needed. It is essential that the diagnostic intervention for this purpose provides adequate tissue sample for histopathological and immunological studies (4).When other procedures are ineffective for diagnosis, cervical mediastinoscopy is an effective invasive diagnostic method that provides adequate tissue sample. It can be performed safely with low morbidity and mortality rates (4-5). Cervical mediastinoscopy is commonly used in the diagnosis and staging of primary lung cancer, however, it also provides valuable information in the diagnosis of some other diseases such as sarcoidosis, tuberculosis, lymphoma and mediastinal masses (6).

Even though in the literature there are many comprehensive studies on the staging of primary lung cancer by mediastinoscopy, there are limited studies on the efficacy of mediastinoscopy in the diagnosis of diseases associated with mediastinal lymphadenopathy (6,7). In various publications 74% sensitivity, 94% specificity and 0.15% mortality rates for mediastinoscopy were reported (6-8).

The aim of this study retrospectively analysed 107 patients who underwent mediastinoscopy in order to evaluate the efficacy and safety of mediastinoscopy in diagnosis and staging.

PATIENTS AND METHODS

Patients and study design

A total of 107 patients (cases) with mediastinal lymphadenopathy, in which other procedures were unable to ensure precise diagnostics, underwent mediastinoscopy. All these surgeries took place between 12 September 2012 and 29 November 2018 in Izmit Seka State Hospital and Canakkale Onsekiz Mart University Hospital.

Methods

The cases were evaluated in terms of age, gender, complaint, histopathological diagnosis, postoperative morbidity and mortality. Before the operation, all patients underwent the following tests: PA / L (posteroanterior / lateral) chest X-ray's, computed tomography (CT) of the thorax, pulmonary function tests (PFTs), electrocardiography (ECG), complete blood count, and basic biochemical blood tests (sodium, potassium, chloride, bicarbonate, *blood* urea nitrogen -BUN, magnesium, creatinine, glucose).

Regardless of the presence of a mass in the lungs, mediastinal lymph nodes larger than 10 mm short axis diameter were considered as pathologic, and underwent mediastinoscopy. Intraoperative frozen section was not used in any patient.

All patients underwent prior interventions by fiberoptic bronchoscopy and transbronchial biopsy. Some patients with parenchymal lesions underwent transthoracic needle biopsy, but none of them had diagnostic pathological results. After that all patients underwent mediastinoscopy for certain diagnosis. Patients under general anaesthesia were intubated with spiral tube and the tube was fixed to the left corner of the oral cavity. Mediastinoscopy procedure was performed by the method described by Carlens (1). Multiple biopsies were obtained from lymph nodes or masses seen by thorax CT. Multiple punch biopsies were performed with cervical mediastinoscopy. Biopsies were taken from upper paratracheal (2 right, 2 left), lower paratracheal (4 right, 4 left) and subcarinal lymph nodes: N2 was defined as ipsilateral lymph nodes or subcarinal lymph nodes positive, while N3 was defined as contralateral lymph nodes positive (9).

Statistical analysis

Clinical findings, pathologic diagnoses and sociodemographic qualities of the patients operated in our clinic were presented in numbers and percentages as descriptive data.

RESULTS

The mean age of the patients who underwent mediastinoscopy was 57.4 (30-83) years, 34 (32%) were females and 73 (68%) were males. One patient had postoperative hoarseness; however, it completely improved after a month. Another patient with right paratracheal tumour invasion developed bleeding from tumour tissue after biopsy, but the bleeding was controlled after partial sternotomy; this patient was discharged on the third postoperative day. Meanwhile all other patients were discharged the next day. There was no mortality. The most common complaint was chronic cough and chest pain (Table 1).

Table 1. Complaints of 107 patients who underwent mediastinoscopy at the time of admission

Complaint	No (%) of patients
Chest pain	20 (18)
Chronic cough	39 (36)
Shortness of breath	19 (18)
Weight loss	21 (19)
Back pain	15 (9)
Hoarseness	5 (4)
Hemoptysis	5 (4)
Night sweats	16 (15)

Histopathological results showed that 32 (30%) patients had cancer with lung cancer metastasis (11 cases of squamous cell carcinoma, 11 cases of adenocarcinoma and 10 cases of small cell lung cancer) (N2). In 25 (23.5%) cases biopsy results were reported as reactive lymph nodes. In addition, 23 (21.4%) cases had sarcoidosis, 16 (15%) had tuberculosis lymphadenitis, seven (6.5%) had lymphoma, one case of each (0.9%) had benign epithelial cyst, malign epithelial tumour (invasive ductal carcinoma of breast), chronic lymphocytic leukaemia (CLL) and adenocarcinoma metastasis (renal cell cancer) (Table 2). The most common disease was lung cancer, 32 (30%).

Table 2. Histopathological diagnosis of patients after mediastinoscopy

Histopathology	No (%) of patients
Benign lesion	
Reactive lymph node	25 (23.5)
Sarcoidosis	23 (21.4)
Tuberculosis	16 (15)
Benign epithelial cyst	1(0.9)
Malignant lesion	
Squamous cell cancer	11(10.3)
Adenocarcinoma	11(10.3)
Small cell cancer	10 (9.4)
Lymphoma	7(6.5
Chronic Lymphocytic leukaemia	1 (0.9)
Malignant epithelial tumour (invasive ductal carcinoma of breast)	1 (0.9)
Metastasis of adenocarcinoma (renal cell carcinoma)	1 (0.9)

DISCUSSION

Standard cervical mediastinoscopy is used for surgical exploration of middle-superior mediastinum. The most common indication for mediastinoscopy is preoperative nodal staging of lung cancer (10). Mediastinoscopy has high diagnostic value and low rates of mortality and morbidity, resulting in mediastinoscopy as a widely used method for mediasitnal pathology (11). Nowadays, the search for non-invasive diagnostic methods has been rapidly continuing, while fluoreso-2-deoxy-D-glucose positron emission tomography (FDG-PET) has been widely used for mass detection and lung cancer staging (12). However, in FDG-PET scanning false negative (1 cm or less non-small cell lung carcinoma, bronchoalveolar carcinoma, atypical carcinoid tumour etc.), false positive results (inflammation or diseases causing inflammation such as atelectasis or bronchiectasis, pneumonia, granuloma, sarcoidosis, tuberculosis, hamartoma etc.) should be considered (12). However, the diagnosis and appropriate treatment of the patient should be first determined by histopathological tissue sample (6,13). Mediastinoscopy has been replaced by less invasive techniques such as endobronchial ultrasound-guided fine-needle aspirations (EBUS-FNA) and endoscopic ultrasound-guided fine-needle aspirations (EUS-FNA) for lung cancer staging (14). Equipment shortage and high cost, experienced medical staff requirement allowed only certain centres to implement this process. Besides, there are some opinions that cervical mediacinoscopic method with high sensitivity, specificity and accuracy rates is supe-

rior to these methods (15,16). EBUS FNA- EUS FNA particularly allows a better assessment of mediastinal lymph node station compared with one technique only. Sensitivity, specificity, negative predictive value and diagnostic accuracy of EBUS FNA- EUS FNA combined 91%, 100%, 96% and 97%, respectively (17). On the other hand, cervical mediastinoscopy has quite a high diagnostic value. In addition, the mortality rate is 0.09% and morbidity rates are between 1.5-3 % for mediastinoscopy (18,19).

The common complications of mediastinoscopy include bleeding, pneumothorax, wound infection, tracheal injury, and recurrent nerve injury (1-15). The fatal complications of mediastinoscopy include innominate artery, aortic arch, superior vena cava, esophagus and azygos vein injuries (1,15,20). In our study, transient hoarseness was observed in one patient for one month, and in one patient bleeding from tumour tissue after biopsy was developed, which was consistent with publications (21-22). In our study bleeding rate was 0.9% which was consistent with the literature (22). Lemaire et al. reported the rate of haemorrhage of 0.3%, and Park et al. of 0.4%. In both studies the biopsy area causing bleeding was reported as right paratracheal area (21,22), which is consistent with our study. Although mediastinoscopy is mostly used in staging of lung cancer, it is also useful for diagnosing extrapulmonary mediastinal lymph node diseases (23,24). Staging of mediastinal lymph nodes with mediastinoscopy is still considered as the gold standard in lung cancer (25). The diagnosis of the patient is sometimes delayed due to the intensity and the heavy workload in major health centres. This can lead to financial loss for health economics, and moral loss for patients. In our study, most cases were operated in a small state hospital; 30% of patients were diagnosed with N2 disease, which reduced the workload of advanced health centres, and prevented the loss of time and economy for patients and their relatives. In histopatological examination 30% of patients were diagnosed with lung cancer metastasis (N2), which was the most common diagnosis. Even though the existence of N1 disease is known to increase the probability of N2 disease (26), additional treatment strategies can be followed in the presence of potentially resectable N2 metastasis using mediastinoscopy (26). These strategies include surgical operation following induction chemotherapy or induction chemoradiotherapy followed by either surgery or standard chemoradiotherapy (27). Lung cancer is widespread disease worldwide with 1.8 million new cases each year (28). The fact that the vast majority of the cases in Turkey were from a large industrial city (Kocaeli) might have led to an increase in cancer rates. According to Turkish Statistical Institute's 2017 data, mean mortality rate due to the benign and malignant tumour was 19.5% (29). Meanwhile in Kocaeli, which is a large industrial city, mean mortality rate due to the benign and malignant tumour was 23.2%, which is a significantly higher than Turkey's average (29). This partially explains the findings in our study that the largest group of patients were N2 lymph node positive and who were diagnosed with mediastinoscopy. Our country has received intensive migration recently. Chronic diseases which emerge from poor conditions during immigration probably are long-term consequences of migration (30). We have found that tuberculosis was a widespread disease with 15% prevalence rate, and consequently we would expect an increase in tuberculosis cases in our country.

In conclusion, although cervical mediastinoscopy is an invasive diagnostic method, because of low morbidity and mortality rate it could be safely applied outside advanced centres. Mediastinoscopy could be used in staging bronchial carcinomas and diagnosis of thoracic diseases which cannot be diagnosed with less invasive methods.

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TRANSPARENCY DECLARATION

Conflicts of interest: None to declare.

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