



Surgical Technique

The role of mediastinoscopy for diagnosis of isolated mediastinal lymphadenopathies

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Abstract

Mediastinoscopy is a diagnostic and/or therapeutic procedure through which it is realized visualization of the mediastinum contents, most times ending with a biopsy. Such procedure is often used in lung cancer for staging of the lymph nodes, or for a diagnosing purpose in several affections related to mediastinum (lymphoma or sarcoidosis). Morbidity is fairly low (0.2-0.5%), being encountered left recurrent laryngeal nerve injury, bleeding and pneumothorax. Contraindications are represented by previous mediastinoscopy, oncologic treatments (chemotherapy/ radiotherapy, due to development of mediastinal adhesions and fibrosis), or severe limitations in hyperextension of the neck (cervical arthritis, cutaneous tracheostomy).

This paper presents the most important advantages and utility of mediastinoscopy, which proved during a long period of time to be safe, accurate and cost effective thoracic surgery technique. It minimizes the period of hospitalization and allows appropriate treatment to be immediately commenced upon diagnosis. Although there are a number of known complications of mediastinoscopy, it remains the ultimate diagnostic investigation for paratracheal and retrovascular enlarged mediastinal lymphnodes in centers where endo-bronchial ultrasound is absent or video assisted thoracoscopic surgery is not possible.

Keywords: mediastinoscopy, isolated mediastinal lymphadenopathy



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Introduction

Cervical mediastinoscopy is an invasive procedure used for examining the superior and middle mediastinum, for staging lung carcinoma and diagnosing mediastinal masses of uncertain etiology. Sarcoidosis is a disease that implies multiple organs, especially the lungs and lymph nodes, distinguished by the existence of noncaseating granulomas and epithelioid cells growth. Sarcoidosis appears in the general population, predominantly at a young age, with most patients presenting under the age of 50 (1, 2). The pathogenesis is unidentified, etiologies as genetic and immunologic factors have been proposed. Sarcoidosis is diagnosed based on clinical data and paraclinical results, and strengthened by the histopathological outcome (3).

The imagistic findings that correlate with typical sarcoidosis include bilateral and symmetric mediastinal lymph nodes, connected or lacking concomitant parenchymal lesions. However, atypical radiologic findings are present in up to one third of cases, which lead to difficulties in establishing the correct diagnosis (4). Atypical forms of mediastinal sarcoidosis are unilateral or asymmetric lymphadenopathy, with necrosis or cavitation, ground glass opacity, airway lesions and pleural nodules (5).

Correct diagnostic decisions are important for preserving the pulmonary function. On the other hand, delayed diagnosis is frequently tied with impaired lung function. Since there are diverse forms of presentation and there is no reliable non-invasive diagnostic test, diagnosing sarcoidosis still constitutes a challenge (6). The decisive diagnosis of sarcoidosis is established by pathological examination revealing noncaseating granulomas from samples obtained through lymph node sampling or pulmonary biopsy (7).

Although able to identify mediastinal masses, non-invasive techniques such as the CT and PET-CT scans cannot differentiate between benign and malignant lesions since enlarged nodes may be inflammatory and

normal-sized lymph nodes may contain malignancy. Their utility remains in providing information regarding the position, size, consistency and shape of the mediastinal masses (8) as well as their relation to the adjacent structures (Figures 1-4).

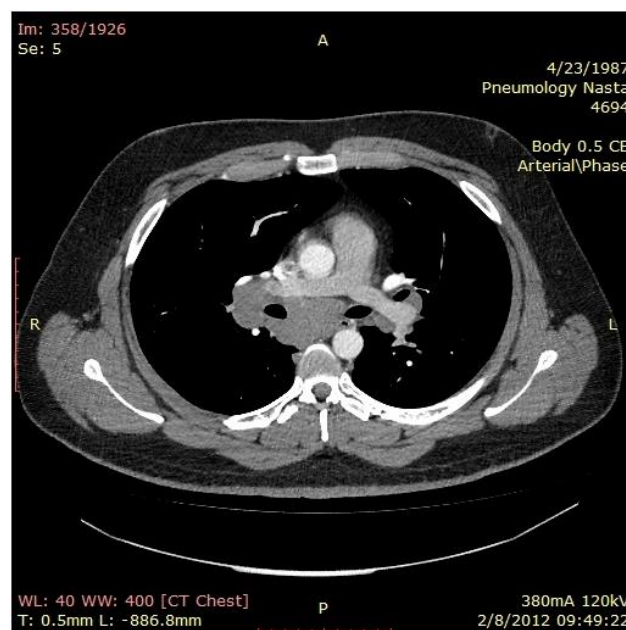


Figure 1. Axial contrast-enhanced CT scan (mediastinal window) obtained below carinal level shows bulky mediastinal lymph nodes in stations 7 and 10R, in a young male patient initially suspected of lymphoma.

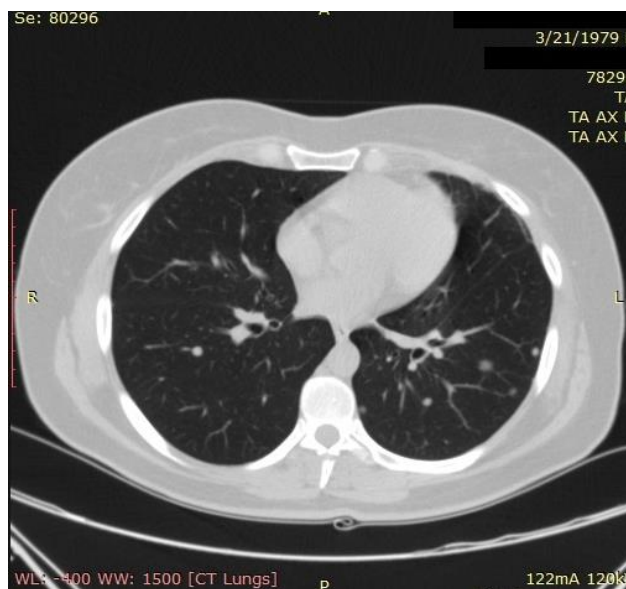


Figure 2. Axial high-resolution CT scan (pulmonary parenchymal window) in a young female patient shows bilateral pulmonary nodules suspected for lung metastasis of unknown origin.

Endo-bronchial ultrasound (EBUS) is currently the standard invasive technique for sampling paratracheal, carinal and hilar lymph nodes. It offers

low morbidity and mortality while allowing for fast diagnosis. The downside of this technique is represented by the high cost of the device which is currently available in only select Romanian centers (9).

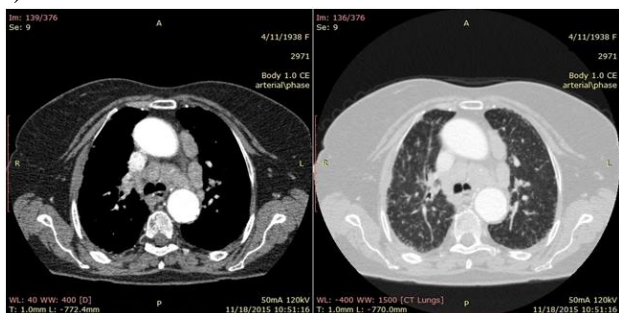


Figure 3. Axial contrast-enhanced CT scan (mediastinal window - left) obtained at carinal level shows bulky mediastinal lymph nodes in stations 5, 6, 7, 8, in an elderly female initially suspected of SCLC. Pulmonary parenchymal window – right, at same patient shows bilateral pulmonary infiltrative micronodules.

Video assisted thoracoscopic surgery (VATS) has quickly developed in the last decade as the first choice in the diagnosis and treatment of thoracic diseases. Minimally invasive surgery results in reduced operative trauma for patients, smaller incisions, less pain and blood loss, low postoperative complications rate, shortened length of hospitalization (10). VATS can also be performed for diagnosis of sarcoidosis. The disadvantages of the procedure are represented by the high cost, the need of one lung ventilation (OLV) and inability to perform the procedure in patients with tight pleural adhesences (11).

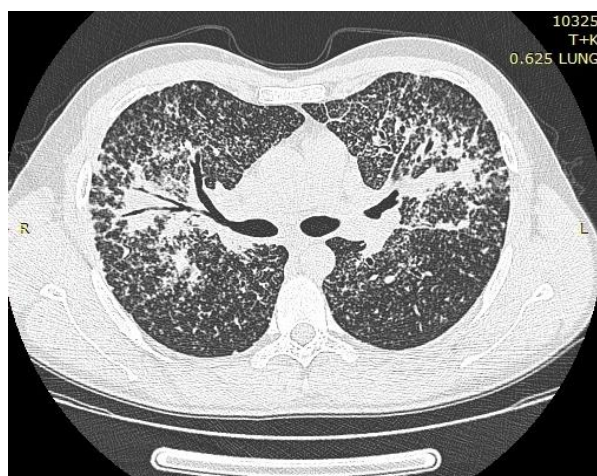


Figure 4. Axial high-resolution CT scan (pulmonary parenchymal window) shows disseminated bilateral pulmonary lesions in a young male patient suspected of miliary tuberculosis.

Cervical mediastinoscopy is an invasive procedure used for examining the superior and middle mediastinum, for staging lung carcinoma and diagnosing mediastinal masses of uncertain etiology. Most often, mediastinoscopy is used to assess mediastinal nodal enlargement present on CT in diseases such as lymphoma, Hodgkin’s disease, sarcoidosis and tuberculosis. Mediastinoscopy is essential for the histological diagnosis of isolated mediastinal lymphadenopathy centers where endoscopic or endobronchial ultrasound guided trans-bronchial needle aspiration (EUS/EBUS-TBNA) or VATS are not available (Figures 5, 6) (12).



Figure 5. The spreadable two-bladed video mediastinoscope.

Technique

Positioning

The patient is placed on the operating table in supine position with his arms at 90 degrees abduction and a pillow placed beneath the shoulders in order to extend the neck and rise the trachea.

Procedure

Under general anesthesia a horizontal cervical incision, 3-4cm in length, is performed at 2cm above

the sternal notch. After the subcutaneous tissue has been transected, the cervical white line located in-between the infrahyoid muscles is visible and can be dissected down towards the pretracheal fascia. The thyroid isthmus is sometime located before the trachea and requires division between sutures.

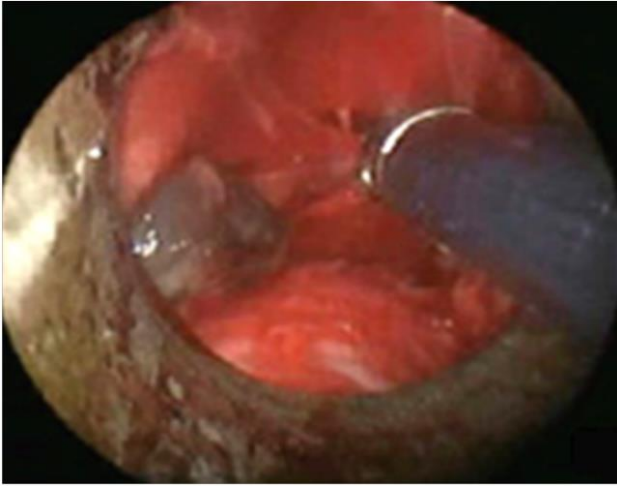


Figure 6. Intraoperative aspect of lymph node biopsy using the video mediastinoscope.

Once the pretracheal fascia has been breached, blunt dissection of the mediastinum is carried out with the index finger beneath the innominate before inserting the mediastinoscope.

After the mediastinoscope has been inserted, we advance beneath the innominate artery towards the carina. The first lymph node stations reached are the superior and inferior paratracheal lymph nodes located on both sides of the trachea in the mediastinal fat tissue. Dissection of these stations is carried out bluntly with the help of a suction device. Once the lymph nodes have been correctly identified, the capsule can be perforated with the cautery, and afterwards, further blunt dissection continues with the suction device before performing the biopsy. It's rare that we cannot find lymph nodes at these locations and need to reach the carina. Biopsy from the lymph nodes is performed with a biopsy forceps and bleeding can be controlled with a cautery.

Following the biopsy, the mediastinum is washed with iodine solution and further hemostasis is performed if needed with either the cautery or

haemostatic solutions. Closure is performed in anatomic layers with resorbable running sutures.

Complications

Complications are rare and can range from lesions to the recurrent laryngeal nerve to pneumothorax, tracheal or esophageal lesions, hemorrhage, mediastinitis, wound infection and dehiscence.

The most notable complication remains the hemorrhage from a large arterial supply, such as the innominate or pulmonary artery, which require open suturing.

Other complications such as recurrent laryngeal palsy usually, which occurs on the left side, pneumothorax, from opening the mediastinal pleural, tracheal rupture, with the mediastinoscope or the forceps, esophageal rupture, with the forceps, are extremely rare and require immediate managed.

Mediastinoscopy is performed in our center as an outpatient surgical procedure, meaning the patient can be discharged the same day.

Discussions

Although some authors believe mediastinoscopy in patients with asymptomatic bilateral hilar lymphadenopathy and normal results on physical examination, aged between 20-40 years old, is neither beneficial to patients nor cost-effective, we have to take in consideration that their observations were made while having access to EBUS or VATS (13). Furthermore, we agree that patients confirmed as stage 1 sarcoidosis will gain no additional benefit from the diagnosis, but patients with Hodgkin's disease and with non-Hodgkin's lymphoma will probably survive as a result of an early diagnosis when other less invasive techniques are not available (14).

Sarcoidosis is often confused with tuberculosis which is more common in emerging countries and these patients are often given empirical anti-tuberculosis treatment. Tuberculous lymphadenitis, bronchogenic carcinoma, non-small cell lung cancer, simple mesothelial cyst, non-specific lymphadenitis,

lymphoma, were diagnosed in our unit by mediastinoscopy based on histopathological examination of tissue sample obtained by cervical approach (15).

The benefits of an accurate diagnosis obtained by mediastinoscopy needs to be balanced against the risk of the procedure as catastrophic complications have been reported in literature: operative bleeding due to iatrogenic injury to the major vessels, postoperative pneumothorax, wound infection, recurrent laryngeal nerve palsy and tracheo-bronchial and oesophageal injuries (16).

Conclusions

Mediastinoscopy is a minimally invasive thoracic surgery techniques proven safe, accurate and cost effective. It minimises hospital stay and allows appropriate treatment to be immediately commenced upon diagnosis. Although there are a number of known complications of mediastinoscopy that include hemorrhage, pneumo-thorax, nerve injury (recurrent or phrenic), recurrent laryngeal palsy, esophageal or tracheal injury, wound infection, and other sequelae of general anesthesia (cardiac ischemia, arrhythmia, or respiratory insufficiency), mediastinoscopy remains the ultimate diagnostic investigation for paratracheal and retrovascular enlarged mediastinal lymphnodes in centers where EBUS is absent or VATS is not possible.

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