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Brief communication - Thoracic general

Ultrasonically guided biopsy of anterior mediastinal masses

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Abstract

The various techniques used to perform biopsies of mediastinal masses—mediastinoscopy, mediastinotomy, extended cervical mediastinoscopy, and assisted video-thoracoscopy—have already been amply described. In this study the authors give particular attention to ultrasonically guided percutaneous biopsy. Between January 1998 and July 2001 42 patients underwent anterior mediastinal core needle biopsy with ultrasonic guidance. An accurate diagnosis was made for all the patients, with a sensitivity and specificity of 100%. Two cases of pneumothorax were seen, with pleural drainage and a 5-day hospitalization necessary in one of the cases. The remaining 40 patients were treated as outpatients and were discharged within 4 h of the procedure. Ultrasonically guided percutaneous core-needle biopsy is a safe procedure for the diagnosis of the anterior mediastinal masses.

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1. Introduction

Diagnostic techniques of mediastinal masses have been developed in order to avoid the traumas and the complications that we observe in traditional techniques, such as cervical mediastinoscopy, anterior mediastinoscopy, and assisted video-thoracoscopy.

In this paper we would like to describe our experience with percutaneous core needle biopsy of anterior mediastinal masses whilst questioning the diagnostic accuracy and the applicability of an ultrasonic guide.

2. Materials and methods

The study involves 42 patients (17 men and 25 women) aged 15–70 years with a neof ormation of the anterior mediastinum, obvious with ultrasonically investigation. Patients' scans were performed from January 1998 to July 2001 as a consecutive series. At the same time 122 patients were undergone to biopsy of mediastinal masses with diagnostic intention.

All patients underwent a CT scan of the thorax in order to locate and delineate the morphology of the lesion. In all

cases the mediastinal lesion was the only pathologic side. The ultrasonic exam was carried out using a convex probe with a variable frequency from 2 to 5 MHz. During the exam the patients were in a supine position with a parasternal intercostal approach. Once the lesion was located, its margins and vital structure were defined, and internal mammary, vascular bundle, the margin of lung and greater mediastinum vessels were identified as to avoid them during the bioptic maneuver.

Following administration of the local anesthetic (Lidocaine 2%) at the entry point of the needle, the biopsy was performed using a needle guide with a sterile disposable core biopsy needle (G.T.A. International Medical Device S.A., La Caleta D.N., Dominican Republic). The needle diameter routinely used was 18G × 15 cm, and three passes were performed.

The tissue fragment obtained was immediately examined by a pathologist, who established whether it was adequate. It was then fixed in formalin. The patient was then scanned where the biopsy had been conducted to ensure that no hemorrhage abnormalities had occurred. Approximately 3 h later a chest radiograph was done. If no pleuro-pulmonary or mediastinal complications appeared and the vital parameters remained normal the patient was discharged after about 4 h. As the prediction of malignancy in thymoma is difficult to make, even with the core needle biopsy, all

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thymomas diagnosed in this series were considered potentially malignant; a needle biopsy showing thymoma was therefore also classified as positive.

Sensitivity and specificity were calculated using these definitions of positive (malignant) and negative (non-malignant) biopsy results.

The accuracy of the biopsy was considered based on the information obtained from the clinical management of the patient and by means of the surgery confirmation in those cases where the disease required surgery.

3. Results

An accurate diagnosis was obtained for all the patients who underwent the ultrasonically guided biopsy of the mediastinal mass. There was no false positive or false negative, resulting in a sensitivity of 100% and specificity of 100%. The histology, described a non-Hodgkin's lymphoma in 17 patients (NHL), Hodgkin disease in seven patients (HD), thymoma in five patients, lung adenocarcinoma metastases in six patients, breast carcinoma metastases in two patients, microcytoma of the mediastinum without evidence of pulmonary primitiveness in two patients, and in another three patients fibrous tissue after therapy for HD of mediastinum.

In all patients with a definite diagnosis of HD and NHL, it was also possible to establish the histological subtype on the basis of the core-needle biopsy alone (Table 1). Thirty-two patients, 17 NLH, seven HD, six lung adenocarcinoma metastasis and two breast carcinoma metastasis, received therapy on the basis of the core-needle biopsy results alone, without the need for subsequent open biopsy. Surgical removal of the five thymomas confirmed the histological diagnosis obtained preoperatively.

The patients with mediastinal microcytoma underwent surgery because the absence of pulmonary lesions raised doubts as to the accuracy of the diagnosis, which, however, was confirmed in both cases.

In the three cases already treated for HD, where the tissue obtained showed no evidence of malignancy, only fibrous tissue, and the surgical approach confirmed the absence of disease.

During the bioptic maneuver, thanks to real-time ultrasonographic imaging, no complications were encountered. Two patients had a pneumothorax (4.7%), with no

need for pleural draining in one case, the problem resolving itself at home after 4 days. The second patient, however, needed a pleural drainage with a 5-day hospitalization.

The remaining 40 patients were treated as outpatients.

4. Discussion

Carlens introduced cervical mediastinoscopy allowing paratracheal, pretracheal and subcarinal lesions. The para-aortic region, instead, can be explored by anterior mediastinotomy.

However, these are invasive procedures as they require a routine costal resection, general anesthesia, and overnight hospitalization.

Muzaffer reported a hospitalization of 8 h after the procedure of extended cervical mediastinoscopy (ECM) with 89% of histological diagnosis [1], but the operation requires general anesthesia.

The diagnostic yield of video-assisted thoracoscopy (VATS) was reported to be 91.9%, comparable to that of mediastinotomy and ECM [1,2].

The specific complications of VATS such as pain, postoperative respiratory problems and vascular injuries are reported in the literature [1,3].

Video-assisted thoracoscopy also requires three thoracic incisions, double lumen intubations to produce pulmonary collapse, and chest tube insertion.

The biopsy obtained with ultrasonographic technique and real-time guide makes the maneuver easier and less risky. The percentage of complications is just between 0 and 2% [4], also with the use of core-needle biopsy.

The only complications that we observed were two cases of pneumothorax, with no need for pleural draining in one case.

The remaining 40 patients were treated as outpatients and were discharged within 4 h of the procedure.

A number of studies confirm that the use of fine needles increases diagnostic accuracy, especially for carcinomas [5,6], where histological diagnosis is achieved in 72–90% of patients.

As far as lymphomas, thymomas and benign tumors are concerned, tissue obtained from fine needle aspiration is inadequate; histological diagnosis has in fact been achieved in only 17% of cases [6–8].

In order to overcome diagnostic difficulties encountered with a fine needle in lymphoproliferative and thymic pathologies, the ultrasonic guide makes the use of large-bore needles possible.

Our series is made up of 42 patients with anterior mediastinal masses, all of whom were submitted to ultrasonically guided core-needle biopsy. The most frequent biopsy request is for lymphoproliferative pathologies.

In our study 100% of patients with lymphoproliferative disease received a correct therapy on the basis of the histological subtype. We also achieved a specificity of 100% for

Table 1
Histologic subtype of lymphoma in our series

Subtype	No.
Hodgkin's disease	7
Lymphoblastic lymphoma	7
Large cell lymphoma	10

the three cases of fibrous tissue in mediastinal lesions, which were confirmed by surgery.

Moreover, 76% of all patients who underwent a biopsy were treated on the basis of core-needle biopsy result alone, and this was sufficient to spare the patient a more extensive surgical procedure.

This diagnostic strategy in our experience drastically reduced the number of mediastinoscopies and video-thorascopies carried out for diagnostic purposes, and it lets us avoid the anterior mediastinotomy.

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