

Tanaffos (2004) 3(9), 7-11

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The Value of Percutaneous Core Needle Biopsy in the Diagnosis of Anterior Mediastinal Tumors

Enayat Safavi, Seyed Majid Hosseinian, Shahram Firoozbakhsh

Department of Internal Medicine, Pulmonary Division, Imam Khomeini Hospital, Tehran University of Medical Sciences and Health Services, TEHRAN-IRAN.

ABSTRACT

Background: Tissue diagnosis of anterior mediastinal tumors is very important for making correct therapeutic decision. To evaluate the value of performing percutaneous core needle biopsy in these tumors, we decided to perform this study.

Materials and Methods: CT guided core needle biopsy was performed in 17 patients with anterior mediastinal tumor during an 18-month period. The biopsy specimens were sent for histopathological study, and if the result was not definite, immunohistochemical studies were performed.

Results: Percutaneous core needle biopsy provided adequate material in 15 from 17 cases. Of these 17 patients, 15 were diagnosed correctly by percutaneous core needle biopsy whereas 2 were not diagnosed definitely (one was "spindle cell tumor" and another one was "suggestive for lymphoma"). The procedure was technically successful in 15 cases, and no complications occurred.

Conclusion: CT-guided core needle biopsy of the anterior mediastinal tumors may be a safe, cost-effective and reliable method which can provide a precise diagnosis in the majority of mediastinal tumors and may obviate the need for anterior mediastinotomy or exploratory thoracotomy in cases which are medically treatable or non-resectable. (Tanaffos 2004; 3(9): 7-11)

Key Words: Anterior mediastinal masses, Core needle biopsy, Immunohistochemical study

INTRODUCTION

Many reports have indicated that needle biopsy is highly effective in diagnosing between benign and malignant lesions of the mediastinum (1,2,3). This method may obviate the need for more invasive diagnostic procedures such as mediastinoscopy, thoracoscopy, mediastinotomy, or exploratory

thoracotomy (4,5,6).

Fine needle aspiration biopsy yields material for cytologic evaluation, but in many cases, making a specific diagnosis is not possible with this method, and only a classification into "malignant cells" or "non malignant cells" will be achieved (4,7,8,9). In certain tumors such as lymphoma, cytology may be even less specific, and fine needle aspiration biopsy is, therefore, not adequate for a definite diagnosis in

Correspondence to: Safavi E

Tel.: +98-912-1099170 Fax: +98-21-6933930

E-mail address: enayatsafavi@hotmail.com

most with mediastinal tumors (8). A larger sample of tissue obtained by core needle biopsy allows more sophisticated laboratory analysis (10,11) such as immunohistochemical studies, which will increase the diagnostic specificity (11). We undertook the present study to evaluate the reliability of percutaneous core needle biopsy technique for the diagnosis of anterior mediastinal tumors.

MATERIALS AND METHODS

During an 18-month period (December 2001-June 2003) at Imam Khomeini Hospital, all patients with anterior mediastinal tumor, greater than 3 cm in diameter (with part of the tumor being in contact with the chest wall), were considered for CT guided core needle biopsy.

Exception to this rule was CT findings in favor of stage I thymoma (round or oval, well circumscribed lesion replacing the normal thymus location). The patients were informed about the procedure and had an intravenous route available. Prior to the biopsy, coagulation tests were obtained, and Chest CT with contrast was performed and a suitable area for biopsy was chosen. Only for children under 12 years old, midazolam (0.1 mg/kg) was used. After skin cleaning and local anesthesia with lidocaine, CT-guided biopsy was performed. We used an automatic biopsy device with a cutting needle. Needle diameter was 1.2 mm (18 gauge) in all cases. Two punctures were routinely performed, and two biopsy specimens were immediately fixed in 10% formalin and sent for routine histopathologic examination. If the result of histopathologic study was not definite, immunohistochemical studies were performed. After the biopsy, the patients were kept in bed for 4 hours, and then a chest radiography was obtained and patients were discharged after 24 hours.

RESULTS

During an 18-month study period, 17 patients with anterior mediastinal tumor underwent percutaneous core needle biopsy. There were 10 men

and 7 women with the mean age of 37.94 (6-74 years).

In 15 cases the pathologist considered the biopsy material adequate for evaluation and stated a definite diagnosis (10 cases with routine histopathological examination and 5 cases with immunohistochemical studies). The results of the biopsies are listed in table 1.

Table 1. Results of percutaneous core needle biopsy of anterior mediastinal tumors.

| Definite diagnosis | Histopathological study | Immunohistochemical study | Total |
|----------------------|-------------------------|---------------------------|-------|
| Hodgkin's disease | 5 | 1 | 6 |
| Lymphoma | 3 | 1 | 4 |
| Thymoma | 2 | 2 | 4 |
| Metastatic carcinoma | - | 1 | 1 |
| Total | 10 | 5 | 15 |

Final diagnosis in these 15 patients was obtained through open thoracic surgery (4 thymoma and 1 metastatic carcinoma) or by evaluation of the clinical course and the response to therapy after 6 months (6 Hodgkin's disease and 4 lymphoma). Thus, in 15 cases the biopsy results were identical to the final diagnosis.

In 2 cases the diagnosis in histopathological study was not definite ("spindle cell tumor" and "suggestive for lymphoma"), and the biopsy materials were not adequate for immunohistochemical studies. Because these patients were not interested in further studies, definite diagnosis was not achieved.

Out of 17 patients, only 1 case had a known tumor (cervical tumor), and in the remaining 16 cases no previous tumor was detected and the CT guided core needle biopsy was the first invasive diagnostic procedure.

No complication occurred as a consequence of the biopsy procedure, and in all cases the chest radiograph after biopsy was unchanged from the pre-biopsy examination.

DISCUSSION

The knowledge of the nature of anterior mediastinal tumors is very important for making correct therapeutic decisions. For example, thymomas are primarily treated by surgical resection, whereas lymphomas are treated by radiation and/or chemotherapy. Non-invasive techniques such as CT and MR imaging are widely used for detection of mediastinal masses and their extension (12, 13). Tissue characterization by these techniques usually is not sufficient for classifying malignant mediastinal tumors and even for distinguishing malignant from benign tumors (12). Therefore, mediastinoscopy, thoracoscopy, mediastinotomy, or thoracotomy were traditionally used for determining the nature of these tumors.

Percutaneous needle biopsy has several advantages over open biopsy. It can be performed swiftly and almost without any discomfort for the patient. Also, in percutaneous biopsy, hospitalization is short and the total costs are minimal. Percutaneous cutting needle biopsy techniques are extensively used in the liver, pancreas, and kidneys but have been considered too hazardous for routine use in mediastinal tumors (14-16). However, our study and those of others (5-8) indicate that anterior mediastinal biopsies can indeed be safely performed.

The purpose of this study was to evaluate the clinical utility of percutaneous core needle biopsy in the diagnosis of these tumors and to determine whether it should be the initial diagnostic procedure in these cases.

In our study, the sensitivity of core needle biopsy (with histopathological study) in the diagnosis of anterior mediastinal tumors was low (60%), and it

was similar to Herman et al. study (5), but sensitivity reached to 88% when immunohistochemical studies were applied.

Pneumothorax is the most frequent complication resulting from core needle biopsy in thoracic lesion (2,7), which was not seen in our study. It can be explained by the superficial location of the biopsied lesions. None of our patients had hemoptysis.

Considering the large number of mediastinal entities that are medically treatable such as lymphomas or that are clearly non-resectable such as metastatic carcinoma, it is clear that a precise histopathological diagnosis is essential.

Based on this study and our experiences, we believe that CT-guided core needle biopsy of anterior mediastinal tumors is an easy and safe procedure, which can provide accurate diagnostic information in the majority of the patients and in many cases may obviate the need for more extensive diagnostic surgical procedures (6,17). Therefore, we believe that core needle biopsy is suitable as an initial diagnostic procedure in the evaluation of the anterior mediastinal tumors although we recommend a multicentric study with larger sample to evaluate the precise value of this procedure.

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