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Cytology of mediastinal tumors

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Our experience with cytological examinations of tumorous mediastinal lesions is evaluated. A group of 117 patients with mediastinal tumor have been included into the study. Among them carcinomas prevailed (60.7%), followed by lymphomas (18.8%), other tumors (15.4%) and thymic neoplasms (5.1%). Malignant or suspicious cells were found in 77.4% of patients with carcinoma. The cells indicating a possibility of non-Hodgkin's lymphoma were found in 9 out of 14 patients. In 5 out of 6 thymic neoplasms the cytological pattern was consistent with the diagnosis of thymic neoplasm. One case of thymoma was cytologically falsely diagnosed as malignant lymphoma. One case of neurofibroma was falsely diagnosed as adenocarcinoma. The sensitivity of cytological examinations was 67.5%. If 18 patients with diagnostically unsatisfactory material were excluded from the analysis, the sensitivity would increase to 80.8%. Owing to the wide variety of primary and metastatic tumors that can occur in the mediastinum, apart from the routine cytological techniques, additional staining methods should be used. For final cytological diagnosis the integration of cytological findings with clinical and radiological data is often required. Owing to the characteristics of the obtained material and biological behaviour of some mediastinal tumors, some tumors cannot be definitively diagnosed by cytological examinations alone.

Key words: mediastinal neoplasms-pathology; biopsy, needle

Introduction

The mediastinal space is the site of many benign and primary or metastatic malignant tumors. The introduction of transthoracic fine needle aspiration biopsy (TFNAB) has facilitated the determination of the cytopathologic nature of the mediastinal lesions.[1,2] It may provide information otherwise obtainable only by more invasive diagnostic techniques, such as mediastinoscopy, thoracoscopy or thoracotomy. It can also be performed at a relatively small discomfort to the patient; in experienced hands it provides a rapid and reliable guidance to further treatment.[3,4]

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This article reports our experience with cytological examinations of tumorous mediastinal lesions. The results and reliability of cytological examinations are evaluated. A special attention is paid to the possibility of cytological determination of mediastinal tumors and diagnostic problems. Other factors that may influence the cytological examination are also taken into account.

Materials and methods

In ten years' period (1986-1995), 204 TFNAB of the mediastinum from 182 patients were cytologically examined. In this study 117 patients with mediastinal tumors were included. Final diagnoses were established by means of histopathological examination, clinical documentation and follow-up. All TFNAB of the mediastinum were performed under radiologic guid-

ance. In some cases a cytopathologist was present to evaluate the quality of the specimen. The smears were air dried, stained by May-Grünwald-Giemsa method and fixed in Delaunay solution followed by Papanicolau staining method. If material was suitable, immunocytochemistry was performed as well. Mediastinal tumors were classified into carcinomas, lymphomas, thymic neoplasms and other tumors. The carcinoma group includes squamous cell, small cell carcinoma, adenocarcinoma, large cell carcinoma and nonspecified carcinoma. Lymphomas were divided into Hodgkin's and nonHodgkin's. Thymic neoplasms included thymomas and thymic carcinoids. Other tumors included germ-cell tumors, neurogenic tumors, benign soft tissue tumors and miscellaneous tumors. Cytological diagnoses were categorized as positive, suspicious and negative. By these terms, the presence or absence of tumorous cells was indicated regardless of their biological potential. In statistical analysis the samples with nondiagnostic material were included among negative ones.

Results

In 117 patients with proved mediastinal tumor, there were 76.5% males and 32.5% females (Table 1). Among tumors of the mediastinum, carcinomas prevailed (60.7%), followed by lymphomas (18.8%), other tumors (15.4%) and thymic neoplasms (5.1%). Among carcinomas (Table 2) the adenocarcinomas prevailed (22.5%), followed by large cell carcinomas (21.1%), small cell carcinomas (16.9%), squamous cell carcinomas (11.3%) and nonspecified carcinomas (9.9%). In 18.3% of patients carcinoma was microscopically verified by examination of the extramediastinal lesions. Among lymphomas, 63.6% were nonHodgkin's and 36.4% Hodgkin's lymphomas. Among thymic neoplasms there were 5 cases of thymoma and one case of thymic carcinoid. Among other tumors there were 6 germ-cell tumors, 4 neurogenic tumors, 5 benign soft tissue tumors and 3 miscellaneous tumors (angiosarcoma, plasmocytoma, unclassified epithelial tumor).

Table 1. TFN AB of mediastinal tumors

Tumors	Men	Women	N	Total %
Carcinomas	56	15	71	60,7
Lymphomas	11	11	22	18,8
Thymic neoplasms	3	3	6	5,1
Other tumors	9	9	18	15,4
Total	79	38	117	100

Table 2. Frequency distribution of mediastinal tumors

Carcinomas	N	%
Squamous cell carcinoma	8	11,3
Small cell carcinoma	12	16,9
Adenocarcinoma	16	22,5
Large cell carcinoma	15	21,1
Nonspecified carcinoma	7	9,9
Nonverified	13	18,3
Total	71	100
Thymic neoplasms	N	%
Thymomas	5	83,3
Thymic carcinoid	1	16,7
Total	6	100
Lymphomas	N	%
Hodgkin's	8	36,4
nonHodgkin's	14	63,6
Total	22	100
Other tumors	N	%
Germ cell tumors	6	33,3
Neurogenic tumors	4	22,2
Benign soft tissue tumors	5	27,8
Miscellaneous tumors	3	16,7
Total	18	100

The results of cytological examination were most satisfactory in carcinomas, as malignant or suspicious cells were found in 77.4% of cases. Cells indicating the possibility of nonHodgkin's lymphoma were found in 9 out of 14 patients with nonHodgkin's lymphoma. In 8 cases with Hodgkin's lymphoma suspicious cells were found in two patients. In thymic neoplams one case was cytologically falsely diagnosed as malignant lymphoma. In four patients cytological pattern was consistent with the diagnosis of thymic neoplasm (three thymomas and one thymic carcinoid). In one patient with thymic neoplasm the obtained material was not diagnostically relevant. In the group of other tumors, in nearly half of the patients the tumorous cells were correctly identified so that cytological findings were consistent with final diagnoses. An exception was the case of neurofibroma which was cytologically diagnosed as adenocarcinoma.

These data indicate that in patients with mediastinal tumors the sensitivity of cytological exami-

Table 3. Cytological examination of TFN AB of mediastinal tumors

	Positive		Suspicious		Negative	
Tumors	N	%	N	%	N	%
Carcinomas	50	70,4	5	7,0	16	22,5
Lymphomas	7	31,8	4	18,2	11	50,0
Thymic neoplasms	4	66,7	1	16,7	1	16,7
Other tumors	7	38,9	2	11,1	9	50,0
Total	68	58,1	12	10,3	37	31,6

nation was 67.5%. If 18 patients, with unsatisfactory material (Table 3), were excluded from the analysis, the sensitivity of cytological examination would rise up to 80.8%.

Discussion

TFNAB has proved to be a useful diagnostic procedure in the evaluation of patients with mediastinal lesions.2,5 By cytological examination of this type of material more than 80% of tumorous mediastinal lesions may be diagnosed.

Owing to the wide variety of primary and metastatic mediastinal tumors, interpretation of cytologic pattern requires large experience and precautions. Most metastatic carcinomas (Figure 1) and some non-malignant mediastinal tumors can be accurately diagnosed by cytological examination of only routinely stained smears. However, reliable determination of lymphomas, thymic neoplasms, neurogenic tumors and some other tumors often requires additional cytological techniques. Immunocytochemistry has mostly been used in the last years. In some cases even the electron microscopy is recommended.[6] According to our experience, some mediastinal tumors cannot be definitively diagnosed by cytology. The reasons are different.

In our patients with lymphomas, the lymphatic cells were present in only about half of the samples.

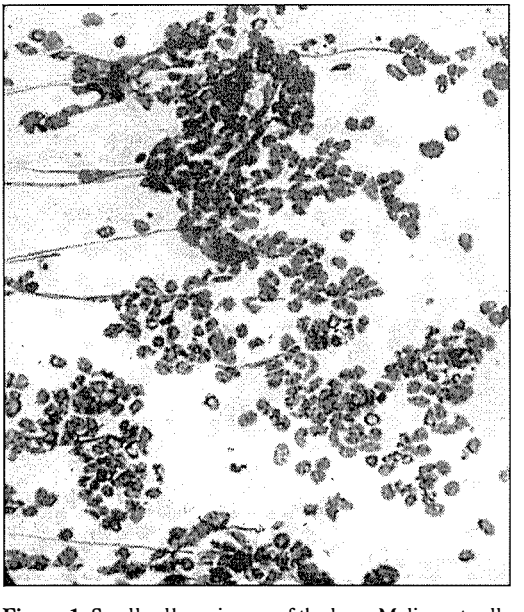

Figure 1. Small cell carcinoma of the lung. Malignant cells are in loose groupings. Mostly only stripped nuclei are visible.

Apart from that, even if lymphatic cells were present, there were frequently only few of them, or they were destroyed (Figure 2), so that the obtained material was often not suitable for performing the necessary immunocytochemistry, without which lymphoma can not be diagnosed and classified reliably.[7,8]

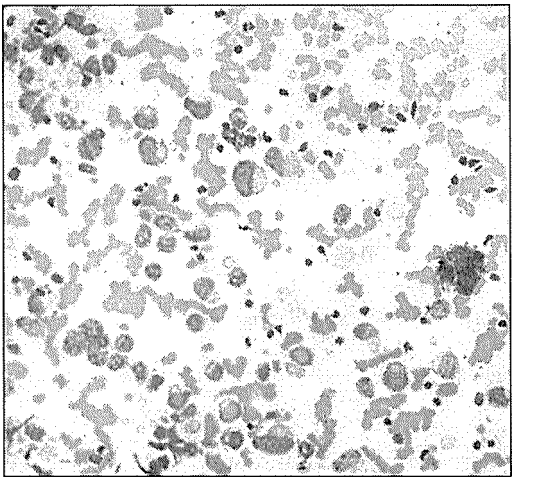

Figure 2. Malignant lymphoma of the mediastinum. Poorly preserved abnormal lymphoid cells with enlarged nuclei and small amount of cytoplasm.

In the thymic neoplasms one case of thymoma was cytologically falsely interpreted for malignant lymphoma. So, our experience is in accordance with the opinion that although thymomas have characteristic biphasic pattern,[9,10] a few other differential diagnostic possibilities should be considered as well.[11]

In the group of other tumors all three neurogenic tumors were diagnosed correctly. Namely, the cytological features of benign schwannoma (Figure 3)

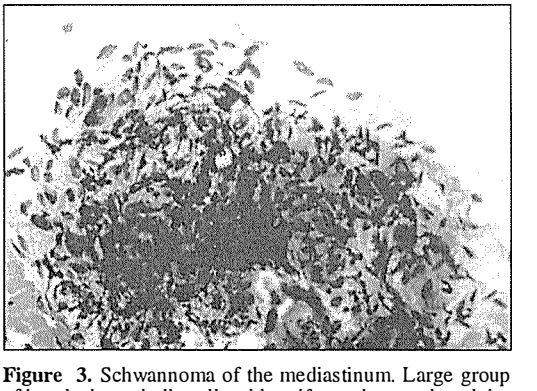

Figure 3. Schwannoma of the mediastinum. Large group of interlacing spindle cells with uniform elongated nuclei.

reproduce characteristic and distinctive pattern of interlacing spindle cells[12] thus allowing a reliable cytologic diagnosis. In one female patient the neurofibroma was cytologically falsely diagnosed as adenocarcinoma. By re-examination of the smears it was proved that several groups of interlacing spindle cells have been overlooked, while numerous atypical epithelial cells, being also in groups, were falsely identified as malignant.

It could be concluded that our results of the cytological examination of mediastinal tumors are comparable with the results of other authors.[13,14] However, it should be considered that the mediastinum is a host of numerous relatively unusual primary neoplasms as well as a frequent site of metastatic tumors. Therefore, the performance of TF-NAB of mediastinal tumors is an exciting field of diagnostic cytology. For carcinomas, where the concordance between cytopathological and histopathological examination is high,[15] cytopathological diagnoses do not need to be additionally verified prior to therapy procedure. In most other tumors, apart from the routine cytological techniques, immunocytochemistry should be used frequently. In addition to cytological examination, a cytopathologist always needs to integrate both clinical and radiological data to formulate the final diagnosis. For different reasons, some mediastinal tumors cannot be definitively diagnosed by cytological examination alone.

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