Diagnostic Value Of Transthoracic Needle Biopsy In 121 Cases With Peripheral Pulmonary Mass

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Abstract

Transthoracic needle biopsy was performed in 121 cases with peripheral pulmonary mass and presumed diagnosis of pulmonary cancer. Although histologic diagnosis was made in 89 cases (73,5%), obtained tissue was not sufficient for diagnosis in 39 cases. Among the cases diagnosed, 32 (36%) were epidermoid carcinoma, 12 (13%) were adenocarcinoma, 15 (17%) were undifferentiated small cell carcinoma, 8 were (9%) undifferentiated large cell carcinoma, 8 (9%) were metastatic carcinoma and 9 (10%) were undefinable carcinoma. While malignity was detected in 84 (94,4%) of 89 total cases, different benign lesions were seen in the remaining 5 (5,6%) (2 benign teratoma, 1 tuberculosis, 1 giant cell benign tumor, 1 hamartoma). Pneumothorax had developed in 19 patients (15,7%) 4 requiring introduction of a thoracic tube. No significant complications were not seen except for self-limited mild hemoptsy in 8 cases.

INTRODUCTION

Transthoracic biopsy is an important diagnostic tool in those patients with peripheral pulmonary mass inaccessible by bronchoscopy thus hindering the diagnosis by transbronchial biopsy. Pulmonary needle biopsy was used by Leyden in 1883 to detect microorganisms ($_1$). Three years later Menetrier succeeded in diagnosing pulmonary neoplasms by transthoracic aspiration ($_2$). Needle aspiration and biopsy has been in widespread use in recent years with an acceptable safety. The most important complications in transthoracic biopsy are pneumothorax and bleeding.

In our study, results of transthoracic needle biopsy are presented for 121 patients with presumed pulmonary cancer in whom diagnosis could not be established with other diagnostic means.

METHOD AND MATERIALS

Between 1987 and 2003, 121 patients, hospitalized in the Bronchopneumology Department at Cerrahpaşa Medical School with peripheral mass lesion clinically suggesting pulmonary tumour, underwent transthoracic needle biopsy. The age of the patients ranged between 17-79 years, the average being 57,71 (+- 12,41). Of the 121 cases 106 (87,6%) were male, 15 (12,4%) were female. Diagnosis could not be established in non of them, neither with bronchoscopy nor by other diagnostic means.

Biopsy was performed by using computed pulmonary tomography in 95 cases and by using chest X-ray in the remainder. Needle biopsies are performed by sure-cut needle. Following a skin incision the needle is controlled perpendicular to the chest wall. After being certain that the needle is in the lesion, it is moved back and forth under negative pressure, then the material is obtained by removing the mandrel.

A smear is prepared on a sterile microscope slide and sent for histopathologic examination in formaline. The smear is air dried, stained with May-Grünwald Gimsa dye and microscopically examined at x100 magnification.

RESULTS

Figure 1

Table 1: Diagnoses established by transthoracic biopsy, their percentages and mean ages.

DIAGNOSIS	NUMBER OF PATIENTS	- PERCENTAGE	AGE
UNESTABLISHED DIAGNOSIS =	-32-	%26,5	56, 4 + -- 11,45
EPIDERMOID CA=	-32-	%26,5	61,59 +-- 9,02
ADENO CA=	-12-	%9,9	63,33 +-- 10,24
SMALL CELL CA =	-15-	%12,4	59,06 +-- 9,39
LARGE CELL CA =	-8-	%6,6	62,87 +--12,1
CA WITHOUT A DEFINABLE TYPE =	-9-	%7,4	49,33 +-- 14,1
METASTATIC CA =	-8-	%6,6	51,57 +-- 19,0
BENIGN LESIONS =	-5-	%4,1	42,33 +-- 15,89

Elderly patients were with adenocarcinomas while the younger with benign lesions as seen in the table. However there was no statistical difference between the groups by age ($p > 0,05$).

Figure 2

Table 2: Localisation of the masses by diagnosis. (* 1=right apex, 2 = right upper zone, 3 = right middle zone, 4 = right lower zone, 5 = Left apex, 6 = left upper zone, 7 = left middle zone , 8 = left lower zone)

DIAGNOSIS	Localisation*	Incidence	Percentage (%)
	1	2	6,3
EPIDERMOID CA	2	8	25
	3	8	25
	4	1	3,1
	5	2	6,3
	6	5	15, 6
	7	3	9,4
	8	3	9,4
ADENO CA	2	3	25
	3	1	8,3
	5	1	8,3
	6	6	50
	7	1	8,3
SMALL CELL CA	1	1	6,7
	2	5	33,3
	3	2	13,3
	4	1	6,7
	5	2	13,3
	6	3	20
	7	1	6,7
LARGE CELL CA	1	1	12,5
	2	4	50
	4	1	12,5
	6	1	12,5
	8	1	12,5
METASTASIS	2	2	25
	3	2	25
	4	1	12,5
	7	2	25
	8	1	12,5
CA WITHOUT A	2	1	11,1
DEFINABLE TYPE	3	1	11,1
	5	1	11,1
	6	3	33,3
	7	3	33,3
BENIGN LESIONS	2	1	20
	4	1	20
	6	1	20
	8	1	20

As represented in the table 2 more frequent sites were the right middle and upper zones for epidermoid carcinoma, left middle zone for adenocarcinoma, right upper zone for small and large cell carcinomas, left middle and lower zones for carcinomas without a definable type. However these differences were not statistically significant (Mann – Whitney Test).

DISCUSSION

Percutaneous biopsy is useful both for diagnosing the malignancy and deciding on treatment in those patients with

peripheral mass inaccessible by bronchoscopy and when other diagnostic tools failed in diagnosis. For instance, especially those patients with small cell undifferentiated bronchogenic carcinoma do not benefit from surgical resection ([3]). Most frequent complications of transthoracic needle biopsy are pneumothorax (14-20%), intrapulmonary hemorrhage (5-10%), hemoptisis (3-10%), air embolism and rarely, tumor implantation along the needle trajectory. Tumor implantation along the needle trajectory was seen in only one case in Sinner's series of 5300 cases ([4]).

Most important contraindications of transthoracic biopsy are chronic respiratory insufficiency, pulmonary arterial hypertension, hemorrhagic diathesis, highly vascular lesions and echinococcal infestation ([5]). Risk of pneumothorax is high in patients with severe emphysema and multiple small pulmonary metastases. In our study we have seen pneumothorax in 19 cases (15,7%). However only 4 required fitment of a thorax tube. Remaining pneumothorax cases healed spontaneously. In addition self-limiting hemoptisis occurred in total 8 cases (6,6%).

Diagnostic value of fine needle aspiration biopsy is high in cancer. Accuracy of cancer-negative biopsies is lesser and only around 71% ([6]). Accuracy of cancer-negative biopsies relies on the increase in definition of specific benign lesions because false-negatives in benign lesions are low ([6]). A specific benign lesion is demonstrable in approximately 10% of cancer-negative patients ([7]). In our study a benign lesion was found in 13,5% of cancer-negative patients. There could be mistakes in determining the cellular type of the cancer by needle aspiration biopsy. Previous studies reported an 18% error in determining the cellular type of the cancer ([8], [9]).

Reportedly, some manoeuvres improve results of the biopsy. Repeat biopsy was recommended to reduce the possibility of a false-negative biopsy ([7], [10]). This method certainly reduces the rate of false-negatives, however it doubles the risk of complications. Biopsy was repeated in total of three cases in our study. Another method for obtaining suffient tissue is to use a large bore biopsy needle. However this method is not widely employed due to the risk of fatal complications ([11],[12],[13],[14]). In general although epidermoid and small cell carcinomas could easily be identified by cytology, this is not true for adenocarcinomas. Moreover acid-fast or silver dyes facilitate visualization of benign lesions. Even if factors such as experience of the physician, quality of the needle, reliability of the cytologist and patient population are optimal, the rate of diagnosing the malignity by thoracic needle aspiration biopsy ranges between 74 and 99 percent ([4], [15],[16],[17]). In our study 72% rate of histopathological diagnosis was achieved which was verified in all cases. As a result we may put forward that transthoracic needle aspiration biopsy is a valuable method devoid of important complications in diagnosing peripheral pulmonary masses.

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