

Sensitivity and Specificity of Transbronchial Lung Biopsy (TBLB)

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Twenty-five patients underwent flexible fiberoptic bronchoscopic examination under fluoroscopic guidance. All patients had an endoscopically invisible pulmonary lesion suggestive of malignancy. A diagnostic specimen was obtained in 23 of the 25 patients (92%). A pathological finding of lung cancer was obtained in 14 patient (56%) through the transbronchial lung biopsy (12 cases) and by washing cytology (2 cases).

Remaining 11 patients who were undiagnosed for pulmonary malignancy were followed by clinically and roentgenographically over 6 months. We evaluated the sensitivity and specificity of the TBLB procedures including brushing cytology and noted an 82.4% in sensitivity and 100% in specificity.

Key Words: Transbronchial Lung Biopsy, Lung Cancer, Fiberopticbronchoscopy.

Transbronchial lung biopsy has been used through a rigid bronchoscope in the diagnosis of diffuse lung disease since 1965 (Andersen *et al.*, 1965). And TBLB has become more popular with the newly developed fiberoptic bronchoscope (Levin *et al.*, 1974).

In consequence, this procedure was performed along with the classic approach for peripheral lung lesions such as percutaneous lung biopsy (Zavala and Bedell, 1972) and aspiration (Hyde, 1972).

We performed TBLB during fiberoptic

bronchoscopy in 25 cases which were suggestive of localized lung malignancy.

MATERIALS AND METHODS

Twenty five patients with localized pulmonary infiltrates underwent TBLB between April 1980 and March 1981.

All patient received nothing by mouth for at least 6 hours prior to the procedure. Atropine sulfate and demerol were given as premedication. The oropharynx of the patient is sprayed with 4% lidocaine. Usually the bronchofiberscope was introduced through the mouth.

The segmental location of the pulmonary lesion should be reviewed prior to the examina-

Received March 18, 1982

* Presented in part at the VII Asia Pacific Congress on Diseases of the Chest Meeting, Hong Kong, Nov., 1981.

tion by posteroanterior and lateral view of the chest x-ray. And as much as possible the forcep is passed to the peripheral lesion under fluoroscopic guidance.

RESULTS

Transbronchial lung biopsies were performed in 25 patients with lesions suggestive of localized lung malignancy. They were 14 men and 11 women and the age range was from 25 to 68 years (Table 1).

Table 1. Age and Sex

Age	Male	Female	Total
- 29		1	1
30 - 39	3	1	4
40 - 49	2	3	5
50 - 59	4	4	8
60 -	5	2	7
Total	14	11	25

Among the 25 patients with localized lung lesions, 14 had lung cancer and 11 patient were not diagnostic for lung cancer (Table 2).

The most frequent lung cancer was epidermoid carcinoma (8 patients), small cell carcinoma (2 patients) and adenocarcinoma (2 patients).

Follow up observation was done for the other

Table 2. Results of the TBLB in 25 patients

Results	No. of patients
Epidermoid carcinoma	8
Small cell carcinoma	2
Adenocarcinoma	2
Large cell carcinoma	1
Malignant cell	1
Non-diagnostic, for cancer	11
Total	25

Table 3. Results of 11 non-diagnostic forcep biopsies

Result	No. of patients
Malignancy present	3
Pancreatic cancer, explo-lapa	1
Undiff. metastatic cancer, bone biopsy	1
Metastatic cancer, clinically	1
Malignancy absent	8
Tuberculosis, TBLB	2
No change, without treatment	2
Organizing pneumonitis, thoracotomy	1
Tuberculosis, anti-TB therapy	1
Tuberculosis, by thoracotomy	1
No change, with anti-TB therapy	1

11 patients.

The clinical and pathological results on those 11 patients are shown in table 3. Three

Table 4. Sensitivity and specificity of TBLB procedures in diagnosis of peripheral malignancy

	Malignancy Present		Malignancy Absent	
	TP	FN*	FP**	TN
No. of patients	14	3	0	8
True positive (sensitivity) = $\frac{TP}{TP + FN}$	$\frac{14}{17}$			
True negative (specificity) = $\frac{TN}{TN + FP}$			$\frac{8}{8}$	

* FN : false negative

**FP : false positive

of these patients had malignant disease. Eight patients were proved to have benign disease.

Two patients were confirmed as having tuberculosis by transbronchial lung biopsy. Two patients underwent thoracotomy and one had organizing pneumonitis and the other pulmonary tuberculosis with pleural adhesions.

The other four patients were proven to have non-malignant disease by close clinical follow up.

By including the clinical outcome these observations revealed a true positive ratio of 82.4% and a true negative ratio of 100% (Table 4).

Complications included 3 cases of bleeding, 2 cases of pneumothorax and 1 case of unusual subluxation of temporomandibular joint (Table 5). No specific treatment was required for these complications.

Table 5. Complications

Complications	No. of cases
Bleeding	3
Pneumothorax	2
Subluxation	1
	6/59(10.1%)

DISCUSSION

Various biopsy techniques have been developed to help in making a diagnosis of questionable lung infiltrations or densities of varying size. Before the development of the bronchofiberscopy, the most popular technique had been percutaneous needle aspiration (Lalli *et al.*, 1967) or percutaneous cutting needle biopsy (Zavala *et al.*, 1972). With these techniques, however, a significant complication rate was noted. Pneumothorax has been reported to occur in as high as 30 percent of the patients

(Levin *et al.*, 1974).

Infrequently, serious complications have been noted, such as hemorrhage (Lalli and Zajicek *et al.*, 1967), air embolism (Wescott, 1973) and seeding of the tumor (Sinner and Zjicek, 1976).

Since the development of the flexible bronchofiberscope, Levin *et al.* (1974) introduced the technique to get biopsy tissue through the fiberscope under the guidance of fluoroscopy. They reported an excellent yield and confirmed the diagnostic value in comparison with the exploratory thoracotomy.

They reported good results on biopsy under fluoroscopic guidance in six of eight cases of carcinoma that were not endoscopically visible. Schoenbaum *et al.* (1974) obtained good results in eight of 11 cases (73%) of primary bronchial carcinoma that were not visible endoscopically and 72% by Ellis (1975) and 69% by Zavala (1975). Ellis (1975) reported on 43 cases of primary lung cancer that were not visible through the bronchoscope and of these 43 patients brushing cytology studies revealed abnormal findings in 31 patients (72%).

Zavala (1975) has reported on 26 with peripheral tumors that were not endoscopically visible. Eighteen of the patients had abnormal biopsies(69%). Some authors reported a rather lower diagnostic rate by the biopsy only (Stringfield *et al.*, 1977, Cortese and McDougall, 1979).

Stringfield *et al.* reported on 29 cases of primary peripheral bronchogenic carcinoma. Of 29 patients eight had abnormal results on biopsy (28%) and nine had abnormal brushings (31%). This study gives an overall rate of abnormal results for the bronchoscopic procedures of 14 out of 29 (48%). Cortese and McDougall (1979) reported on 48 patients of primary cancer of the lung. A diagnostic specimen was obtained by the bronchoscopic procedures in 29 patients (60%). In addition they reported that success in obtain-

ing diagnostic tissue was related to cellular type, location, size of the tumor and the distance of the tumor from the hilum.

Zavala and Schoell (1981) reported on 25 patient suggestive of having lung malignancy by using a thin needle. In their series, sensitivity was 90% and specificity 100%.

Poe and Tobin (1980) reported on ninety-five patients with pulmonary parenchymal lesions suggestive of malignancy. They used an 18 gauge Rotex biopsy needle. The overall sensitivity of the procedure was 90% and the specificity was 95%. And they reviewed the data on previously reported series of the patients who underwent aspiration biopsy. The overall sensitivity was 83% and the specificity was 98% for about 1826 cases. The present series revealed almost the same sensitivity (82.4%) and specificity (100%) as the results of aspiration.

However, bronchofiberscopic procedures have become popular and the chance of getting a good lung specimen by TBLB has improved (Fennessy, 1967, Ellis, 1975, Cortese and McDougall, 1979). Consequently we have to evaluate the sensitivity and specificity of the procedures.

For the diagnostic approach of the peripheral or localized lung lesion, TBLB procedures should be considered because of relatively good correlation between the clinical and pathological diagnosis and because of possibility of searching for an endobronchial lesion and studying the carina at the same time.

Of course there are very few complications compared to the percutaneous lung biopsy in which pneumothorax or seeding of the tumor may occur.

REFERENCES

Andersen HA, Fontana RS, Harrison EG Jr.: *Trans-*

bronchoscopic lung biopsy in diffuse pulmonary disease. Dis Chest 48:187, 1965

Cortese DA and McDougall JC: *Biopsy and brushing of peripheral lung cancer with fluoroscopic guidance. Chest 75:141, 1979*

Ellis JH Jr.: *Transbronchial Lung biopsy via the fiberoptic bronchoscope: Experience with 107 consecutive cases and comparison with bronchial brushing. Chest 68:524, 1975*

Fennessy JJ: *Transbronchial biopsy of peripheral lung lesion. Radiology 88:878, 1967*

Hyde I: *Aspiration needle biopsy of the lung. Br J Radiol 45:393, 1972*

Lalli AF, Naylor B, Whitehouse WM: *Aspiration biopsy of thoracic lesions. Thorax 22:404, 1967*

Levin DC, Wicks AB, Ellis JH Jr.: *Transbronchial lung biopsy via the fiberoptic bronchoscope. Am Rev Respir Dis 110:4, 1974*

Poe RH, Tobin RE: *Sensitivity and specificity of needle biopsy in lung malignancy. Am Rev Respir Dis 122:725, 1980*

Schoenbaum SW, Koerner SK, Ramakrishna B, Goldman ML: *Transbronchial biopsy of peripheral lesions with fluoroscopic guidance - Use of the fiberoptic bronchoscope. J Canad Ass Radiol 25:39, 1974*

Sinner WN, Zajicek J: *Implantation metastatic after percutaneous transthoracic needle aspiration biopsy. Acta Radiol 17:473, 1976*

Stringfield JT III, Markowitz DJ, Bentz RR: *The effect of tumor size and location. Chest 72:474, 1977*

Zavala DC and Bedell GN: *Percutaneous lung biopsy with a cutting needle - An analysis of 40 cases and comparison with other biopsy techniques. Am Rev Respir Dis 106:186, 1972*

Zavala DC: *Diagnostic fiberoptic bronchoscopy. Chest 68:12, 1975*

Zavala DC, Schoell JE: *Ultrathin needle aspiration of the lung in infections and malignant disease. Am Rev Respir Dis 123:125, 1981*

Wescott JL: *Air embolism complicating percutaneous needle biopsy of the lung. Chest 63:108, 1973*