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Original Research Article

Diagnostic yield of TBNA and bronchial biopsy in lung cancer

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ABSTRACT

Background: Lung cancer has been the most common cancer worldwide since 1985, both in terms of incidence and mortality. In India, approximately 63,000 new lung cancer cases are reported each year. The study was undertaken to detect diagnostic yield of bronchial biopsy and transbronchial needle aspiration in suspected cases of bronchogenic carcinoma.
Methods: This was a prospective study including 57 patients having clinical and radiological features of malignancy. Endobronchial forceps biopsy (FB) and transbronchial needle aspiration cytology (TBNA) has been employed during fiber-optic bronchoscopy. The statistical analysis was done using chi-square test.
Results: Out of total 57 patients, 43 were found malignant on FB plus TBNA. The majority of patients (59.45%) were found to have squamous cell carcinoma on biopsy followed by Adenocarcinoma (16.21%), Small cell carcinoma (13.51%) and untypable cases (10.81%). On TBNA majority of patients (41.93%) could not be typed into any of the specific subtype. Out of rest typable carcinoma majority were squamous cell carcinoma (35.48%). Sensitivity of TBNA in diagnosing lung malignancy was 67.6%. The yield of TBNA, FB and TBNA plus FB was 54.38%, 64.91% and 75.43% respectively. Additional yield of TBNA over FB was 10.52%.
Conclusions: TBNA is a beneficial, safe and minimally invasive bronchoscopic technique and may be considered routinely during Fiberoptic Bronchoscopy procedure to increase the yield with insignificant side effects in the diagnosis of bronchogenic carcinoma.

Keywords: Bronchogenic carcinoma, Forceps biopsy, TBNA, Yield

INTRODUCTION

Lung cancer has been the most common cancer worldwide since 1985, both in terms of incidence and mortality. In India, approximately 63,000 new lung cancer cases are reported each year.[1]

Squamous cell carcinoma is the most common type of lung cancer in India as compared to adenocarcinoma in the West.[2] The incidence of lung cancer is increasing and this may be attributed to the increase in smoking, change in lifestyles of the people, increased environmental pollution and industrial hazards like uranium. Cigarette smoking is the most important cause of Lung Cancer. The risk for lung cancer increased with the duration of smoking and the number of cigarettes smoked per day.[3]

Lung cancer arises from the cells of the respiratory epithelium and can be divided into two broad categories: - (1) Small cell lung cancer (SCLC) is a highly malignant tumor derived from cells exhibiting neuroendocrine

characteristics and accounts for 15% of lung cancer cases. (2) Non–small cell lung cancer (NSCLC), which accounts for the remaining 85% of cases, is further divided into 3 major pathologic subtypes: adenocarcinoma, squamous cell carcinoma, and large cell carcinoma. Adenocarcinoma by itself accounts for 38.5% of all lung cancer cases, with squamous cell carcinoma accounting for 20% and large cell carcinoma accounting for 2.9%.[4,5] For establishing histopathological diagnosis, samples are required from the site of the lesion. These can be obtained as either biopsy samples or cytology samples. The advent of Flexible Fiberoptic Bronchoscopy has revolutionized the management of lung carcinoma by providing a plethora of options to obtain such samples such as endobronchial forceps biopsy (FB), bronchial washing (BW), bronchial brushing (BB) and transbronchial needle aspiration cytology (TBNA).[5]

TBNA is the aspiration of material using a needle that is passed through the endobronchial wall and provides cytologic or histologic sampling of mediastinal lesions that lie adjacent to the tracheobronchial tree. TBNA is superior to all other sampling modalities in peribronchial and submucosal lesions and is on par with bronchoscopic forcep biopsy in endobronchial tumour has an average diagnostic yield of 80%.[6]

Bronchial Biopsy (BB) is one of the most important applications of flexible bronchoscopy. A diagnostic BB may obviate the need for an open lung biopsy. Even though the procedure is generally safe, some-times life-threatening complications may occur during BB. Therefore, decision to proceed with BB should be taken only after a careful risk–benefit analysis. BB is the most useful sampling method for the diagnosis of peripheral lung cancer. The average diagnostic yield from BB is 57% with a range of 17–77% in patients with peripheral lung cancers.[7-9]

METHODS

This was a prospective study conducted between January 2015 to August 2015 in the Department of Pathology in collaboration with Department of Pulmonary Medicine, Dr. S.N. Medical College Jodhpur, India. Total 57 patients were included in this study meeting all the inclusion and exclusion critera. The fiberoptic video bronchoscope FUJINON EPX-201H, JAPAN was used during procedures in all patients enrolled in study.

Forceps Biopsy (FB) procedure was performed with FB-15C alligator forceps with serrated jaws (Olympus, Tokyo, Japan). At least three biopsy samples were obtained from the centre of the most abnormal area in all type of lesions like exophytic, submucosal and peribronchial (bulge). Samples were immediately transferred in 10% buffered formalin solution to the Department of Pathology for further processing. All the slides were then stained with routine H & E staining methods. TBNA was performed using MW 522 needle catheters (Mill-Rose Laboratories; Mentor, OH). The aspirated material was blown in to four or five slides, smeared, fixed with 95% alcohol and sent to Department of Pathology where they stained with Giemsa stain. Slides of all the cases were reviewed by two pathologists.

RESULTS

Out of 57 cases, 31 cases on TBNA, 37 cases on FB and 43 on both TBNA & FB were found to be malignant. Yield of TBNA, FB and TBNA+ FB are 54.38%, 64.91% and 75.43% respectively in diagnosis of lung malignancies. Yield difference of these techniques is near to significant (NS) (P=0.062) (Table 1).

Table 1: Yield of TBNA, FB and TBNA plus FB.

Results	TBNA	Forceps biopsy	TBNA plus FB	P value
Positive	31 (54.38%)	37 (64.91%)	43 (75.43%)	x^2= 5.546
Negative	26	20	14	d.f.=2
Total	57	57	57	p = 0.062 (NS)

Out of 43 malignant cases majority of lung carcinoma cases (74.42%) were belonged to rural areas (Table 2) and 93% of lung carcinoma cases (79.06% + 13.95%) were found to be associated with smoking at some time in their lifetime (Table 3).

Table 2: Residential distribution of lung carcinoma cases (n=43).

Residence	Positive (N=43)	%
Rural	32	74.42
Urban	11	25.58
Total	43	100

Table 3: Smoking status of lung carcinoma cases (n=43).

Smoking	Positive (N=43)	%
Smoker	34	79.06
Ex-smoker	06	13.95
Non-smoker	03	6.97
Total	43	100

On Forceps Biopsy, majority of cases (59.45%) were found to have squamous cell carcinoma; followed by Adenocarcinoma (16.21%), Small cell carcinoma (13.51%) and untypable cases (10.81%) (Table 4).

Most of the cases (41.93%) could not be typed into any of the specific subtype on TBNA and out of the rest typed carcinoma, mostly were of squamous cell carcinoma (35.48%) (Table 5).

Table 4: Morphological typing on Forceps biopsy (n=37).

Type	No. of cases	% of cases
Squamous cell carcinoma	22	59.45
Adenocarcinoma	06	16.21
Small cell carcinoma	05	13.51
Typing not possible	04	10.81
Total	37	100

Table 5: Morphological typing on TBNA (n=31).

Type	No. of Cases	% of Cases
Squamous cell carcinoma	11	35.48
Adenocarcinoma	06	19.35
Small cell carcinoma	01	3.22
Typing not possible	13	41.93
Total	31	100

In this study total yield of fiberoptic bronchoscopy guided procedures is 75.43% and additional yield of TBNA over FB was 10.52% (Table 6).

Table 6: Diagnostic yield of Fiberoptic bronchoscopy guided procedures.

Name of procedures (n=57)	Positive results (n=43)	Yield (%)
TBNA positive only	6	10.52
FB positive only	12	21.05
Both TBNA and FB positive	25	43.85
Total (n=57)	43	75.43

DISCUSSION

Lung tumors are the most common cause of death due to cancer in males and are now emerging as an important cause of neoplastic mortality in females also.[10,11]

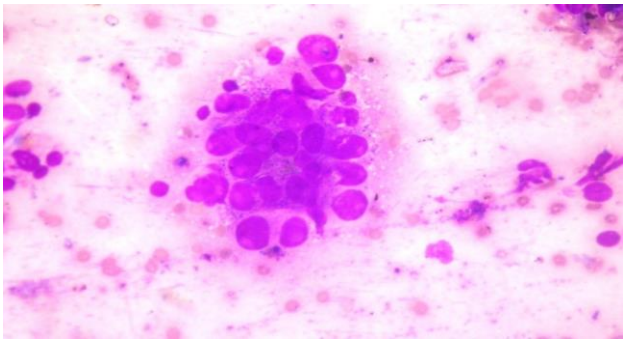

Figure 1: Squamous cell carcinoma on TBNA Cytology- Smear showing loose clusters of pleomorphic cells having multiple irregular shaped nuclei (Giemsa stain 20x).

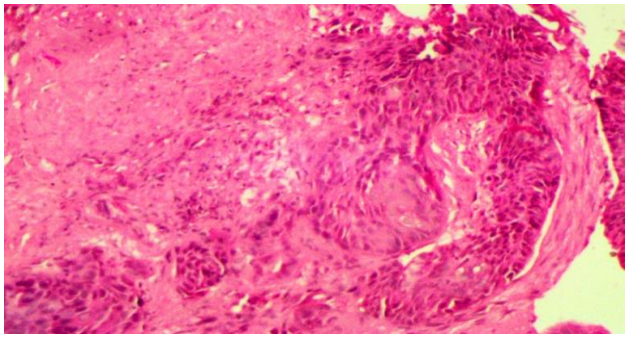

Figure 2: Squamous cell carcinoma: Histological section showing malignant squamous cells invading subepithelial tissue (H&E 10x).

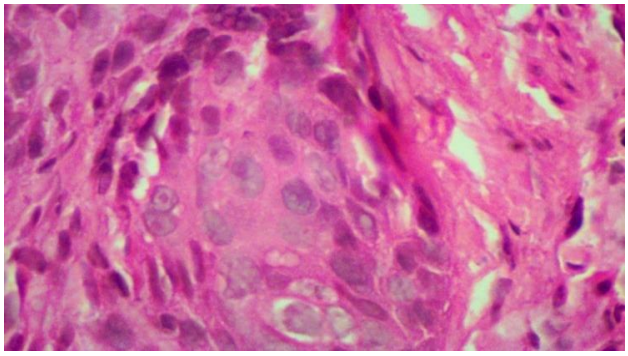

Figure 3: Squamous cell carcinoma: Histological section showing pleomorphic cells having prominent nucleoli (H&E 40x).

Timely detection of the disease plays a pivotal role in the management and for the long term survival of the patient. With the advent of Flexible Fiberoptic Bronchoscope, the diagnosis of lung carcinoma took a new turn as samples like Bronchial Brushings, Broncho-Alveolar Lavage, Trans-Bronchial Needle Aspirations and Bronchial Biopsy could be collected from the respiratory tract, yielding significant amount of diagnostic material.[12]

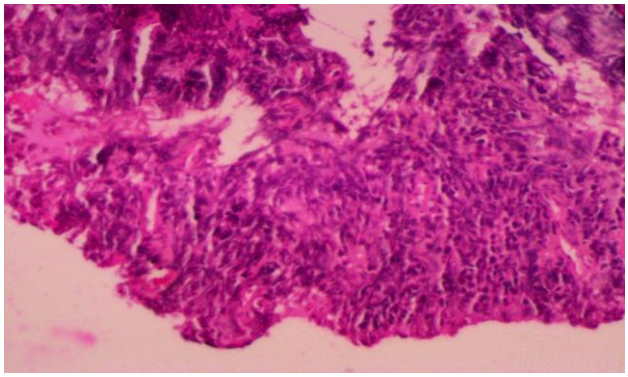

Figure 4: Small cell carcinoma- Histological section showing small cells with crush artefact in a necrotic background (H & E 10x).

A total of 37 cases were found to be positive for malignancy on forceps biopsy. Morphological typing of

these histological specimens revealed 59.45% cases to be Squamous cell carcinoma, 16.21% to be Adenocarcinoma, 13.51% to be small cell carcinoma and 10.81% were untypable.

On TBNA majority of cases (41.93%) could not be typed into any of the specific subtype. Out of the rest typed carcinoma most of the cases were squamous cell carcinoma (35.48%).

In this study the sensitivity and specificity of TBNA were found to be 67.6% and 70% respectively. Bayram N et al reported sensitivity of 76%; Zhu, Bo et al reported sensitivity of 60.9%.[13,14]

In present study yield of TBNA, FB and both TBNA and FB were 54.38%, 64.91% and 75.43% respectively in diagnosis of lung malignancies. Yield difference of these procedures is near to significant (P= 0.062). Study conducted by Salathe et al reported combination of TBNA with CDTs (Conventional Diagnostic Techniques) increase yield from 65% to 79%.[15] Caglayan et al reported increase in yield from 79% to 91% after addition of TBNA to CDTs.[16]

Only TBNA was positive in 6 cases out of 57 cases i.e. additional yield of TBNA was 10.52% in diagnosis of lung malignancies. Gullon et al reported 9.5% additional yield of TBNA in their study.[17] Roth et al reported additional yield of TBNA is 8.04% in their study.[18]

CONCLUSION

Addition of TBNA to FB improves the diagnostic yield of bronchoscopy. It may be considered routinely during Fiberoptic Bronchoscopy procedures. TBNA considered safe, especially when fleshy vascular endobronchial growth is present and risk of bleeding is high with forcep biopsy. Inadequate tissue sampling due to the presence of necrosis, blood clot over the lesion and formation of crush artifacts by FB makes TBNA valuable in these lesions. TBNA will definitely decrease need for repeat bronchoscopy.

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