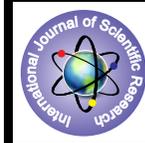# Bronchoscopic Procedures Yield in Endoscopically Visible and Peripheral Lung Malignancy: Prospective Analysis of 100 Lung Cancer Patients

Medical Science

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ABSTRACT   *Lung cancer has been reported to be presently the most common malignant disease and the leading cause of cancer death. Fibre-optic bronchoscopy (FOB) is the minimal invasive procedure that allows visualization of the tracheobronchial tree and allows sampling for histo-pathological examination under direct vision.* **Aims and objective**: *To find out diagnostic yield and histological type in endoscopically visible and non visible tumour.* **Method**: *FOB and its allied procedures were performed in 100 suspected lung cancer patients using standard procedure guideline.* **Results**: *80 patients had visible growth and 20 patients had no growth in bronchoscopic examination. Diagnostic yield of bronchial biopsy, bronchial brushing and bronchial washing was 83.78%, 60% and 32.25% respectively in visible tumour, 4 (50%), 7 (38.88%) and 7 (58.33%) respectively in non visible tumour and overall diagnostic yield was 80.48%, 65.47%, and 36.48% respectively. Small cell carcinoma and squamous cell carcinoma was mainly central tumours and adenocarcinoma was mainly peripheral tumours.* **Conclusion:** *FOB is minimally invasive diagnostic tool that visualized trachea-bronchial tree. In safe and experienced hands it has high diagnostic yield in central tumour and good accuracy in peripheral tumours.*

INTRODUCTION

Lung cancer has been reported to be presently the most common malignant disease (12.34% of all cancers) and the leading cause of cancer death (17.8% of all cancer deaths) in the world[1] in both sexes with the peak in between age 55 and 65 years. There are various diagnostic tests available not only for diagnosis of lung cancer but also for screening. Among these diagnostic tests bronchoscopy is minimal invasive procedure which allows the operator to inspect the majority of fourth order and often up to sixth order bronchi. In addition the operator may directly assess mucosal details, such as colour and vascularities.[3] Fibre-optic bronchoscopy (FOB) was developed in the late 1960 by S. Ikeda[4] and has become the mainstay investigation in the evaluation of patients suspected of lung cancers. In FOB lung cancer may seen as visible endobronchial tumour and can present as exophytic mass, with partial or total occlusion of the bronchial lumen, as peribronchial tumour with extrinsic compression of the airway of with submucosal infiltration of tumour. Central lesion usually sampled with a combination of bronchial washing, bronchial brushing and endobronchial biopsy. When an endobronchial tumour is visible at bronchoscopy, forceps biopsies are the most common specimen collected and usually have the highest diagnostic yield. In a summary of published evidence in 2003, the diagnostic yield of biopsies in endobronchial lung cancer was reported to be 74% based on the results of 20 studies.[5] Peripheral lesions too are usually sampled with a combination of bronchial wash, bronchial brush, trans-bronchial biopsy and conventional TBNA.[3] The diagnostic yield of bronchoscopy for peripheral lesion depends on a number of factors, including lesion size, distance of the lesion from the hilum and on the relationship between the lesion and bronchus. The yield of bronchoscopy for lesion < 3 cm varies from 14-50% compare with a diagnostic yield of 46-80% when the lesion is > 3 cm.[6-8] The present study aims to find out diagnostic yield of bronchoscopy and its allied procedures in central and peripheral lung cancer patients along with histological typing in patients who attend the department of Respiratory Disease and Tuberculosis, R.N.T. Medical College Udaipur.

AIMS AND OBJECTIVE

1. To find out diagnostic yield of bronchoscopic procedures in central and peripheral lesions.
2. Histological typing of lung cancer patients diagnosed by bronchoscopic procedures, having weather central or peripheral lesion.

MATERIAL AND METHOD

In this study, we perform FOB in 100 suspected lung cancer patients that were presented to chest and TB Hospital Bari, attached to RNT Medical College, Udaipur, Rajasthan, India, during the period of January 2015 to march 2016. Lung cancer was suspected on clinico-radiological basis. Before the procedure, detail clinical history, smoking history, clinical and radiological findings were recorded in structured proforma. A set of investigations were done as per the bronchoscopy protocol. An informed written consent was taken prior to the procedure. All the patients were kept nothing by mouth (NBM) at least 6 hour before procedure; all the patients were pre-medicated with 0.6mg atropine and 1ml to 2 ml midazolam, intra-vascularly. First of all, xylocaine sensitivity was done, then gargling with at least 20ml of 2% xylocaine viscous followed by spraying of oro-pharynx and epiglottis with 3-5ml of 10% xylocaine with the help of atomizer. Nasal cavity was also anaesthetized with 2% xylocaine jelly. In some cases, in which excessive coughing present, nebulization with 2% xylocaine (3ml solution) with 2 ml normal saline was done instead of gargling. The procedure was perform with the help of flexible fibre optic video bronchoscope (OLYMPUS BF TYPE 1T-150 with fully compatible with the OLYMPUS CV-150 video processor, biopsy forceps-FB-20C and cytology brush BC-9C) via nasopharyngeal or oro-pharyngeal route. Bronchial biopsy, bronchial washing and bronchial brushing were collected and sent for histo-pathological & cytological examination as per lab protocol. All the results were noted in the preformed proforma for analysis

Bronchial Washing: This was the first sample collected before endobronchial biopsy or bronchial brushing with instillation of 0.9% NaCl solution. When growth was visualized, the bronchoscope was fixed in the close proximity of

the lesion and then 10 to 15 ml normal saline was instilled through the internal channel of video bronchoscope. The material was immediately suck out and was collected in a specimen trap and sent for cytological examination.

Bronchial brushing: The brushing was taken by Nylon brush-BC-9C, an area of suspected lung malignancy was brushed 4 to 5 times and smeared directly on glass slide. Smears were immediately fixed in 70 % alcohol and sent for cytological examination after proper labelling.

Bronchial biopsy: When an endobronchial growth seen on bronchoscopic examination, 3 to 4 biopsies sample were taken out with the help of biopsy forcep-FB-20C and sent in 10% formalin for histo-pathological examinations. Patients with peripheral lesions, bronchial biopsies were taken from suspected sites (abnormal widened secondary carina, bulging and abnormal mucous area).

C-TBNA: Transbronchial needle aspiration was performed in lung cancer patients with peripheral lesions where no growth was seen endoscopically but they had N3 involvement as subcarinal lymph node (7) and right lower paratracheal nodes (4R). TBNA needle (21G and 19G) were used as per requirement and the procedure was done by jabbing & hub against the wall technique. Samples were directly transferred and spread on glass slide, then fixed with alcohol and sent for cytological examination.

RESULTS
Out of 100 suspected cases of lung cancer patients, 66 (66%) patients were male and 34 (34%) patients were female, the male to female ratio was 3.5: 1 and mean age of presentation was 54.98 years. In the present study majority 78 (78%) patients were smoker while 22 (22%) patients were non-smoker. On bronchoscopic examination, 80 (80%) patients had visible growth in bronchus of different lobes. In 38 (47.5%) patients, endobronchial growth was cauliflower like, whereas 19 (23.75%) patients, had polypoidal like growth in their airway. We found nodular growth and complete airway occlusion during endoscopic examination in 15 (18.75%) and 8 (10%) patients respectively. In 20 (20%) patients, we were unable to found obvious mass in the airway on bronchoscopy, although X-ray chest and CECT of the thorax of those patients were suggestive of lung malignancy. Out of 20 patients in which no endobronchial growth was seen, 15 (75%) patients had peripheral mass in medial 1/3 of the hemithorax in CECT thorax. Characteristics of the study populations displayed in **Table-1**. Bronchial biopsy, bronchial brushing and bronchial washing were performed in 74 (92.5%), 66 (82.5%) and 62 (77.5%) patients respectively, in bronchoscopically visible tumour and we were able to get correct diagnosis in 62 (83.78%), 48 (60%) and 20 (32.25%) by bronchial biopsy, bronchial brushing and bronchial washing respectively. In peripherally situated mass bronchial biopsy, bronchial brushing and bronchial washing were performed in 8 (40%), 18 (90%) and 12 (60%) patients respectively. The definitive diagnosis we get by bronchial biopsy, bronchial brushing and bronchial washing in peripheral situated lung mass were 4 (50%), 7 (38.88%) and 7 (58.33%) respectively. In addition to these procedures, we performed C-TBNA in 5 (25%) patients of peripheral lung lesion, presented with right para-tracheal lymph node (4R) and subcarinal lymph node (nodal station 7). C-TBNA was diagnostic in 4 (80%) patients **(Table-2)**. Commonest malignancy diagnosed in central tumour was small cell carcinoma, seen in 47 (58.75%) patients, followed by squamous cell carcinoma, in 25 (31.25%) patients, and adenocarcinoma in 4 (5%) patients. In 4 (5%) patients, exact typing could not be reached

and labelled as unclassified NSCLC. Adenocarcinoma and squamous cell carcinoma were commonly associated with peripheral tumour and seen in 7 (35%) and 6 (30%) patients respectively. Large cell carcinoma was the other variety of lung cancer, present in 4 (20%) patients with peripheral situated lung mass. In 3 (15%) patients definitive typing were not possible and were labelled as unclassified NSCLC. **(Table-3)** Overall diagnostic yield of bronchial biopsy, bronchial brushing and bronchial washing was 80.48%, 65.47%, and 36.48% respectively.

DISCUSSION
Bronchoscopy is an essential tool in respiratory medicine, which allows visualization of airway and has been utilizing extensively in the initial evaluation of patients suspected of having pulmonary malignancies. In the present study the diagnostic yield of bronchial biopsy, bronchial brushing and bronchial washing in macroscopically visible tumor was 83.78%, 60%, and 20% respectively. Kjetil Roth et al [9] in their study reported diagnostic yield of bronchial biopsy 77.8 %, bronchial brushing 43.9% and bronchial washing in 43.9% in endoscopically visible tumour. Schreiberg G et al [10] systematically reviewed the lung cancer patients who were diagnosed as endobronchial tumour by bronchoscopy in 30 studies, showed the highest yield for endobronchial biopsy (74%) followed by cytobrushing (59%) and washing (48%). In the study by C.C. Dobler et al [11] the tumor detection rate by bronchial biopsy was 77 %. The diagnostic yield of bronchial brushings and bronchial washings were 38% and 50% respectively in the same study. A. B. Fuladi et al [12] in their study reported that bronchial biopsy was diagnostic in 76.92 % patients, bronchial brushing in 38 % patients and washing in 50%. Liam C K et al [13] in 340 bronchoscopically visible tumor reported diagnostic yield of bronchial biopsy (77.5%), bronchial brushing (53.7%) and bronchial washing (28.3%). In comparison of the above studies, yield of bronchial biopsies in our study was little bit higher whereas, diagnostic yield of bronchial brushings were almost similar to Liam C K et al [13] and Schreiber G et al [10] where as yield is higher than the Kjetil et al [9], C C Dobler et al [11] and A B Fuladi et al [12]. As far as the diagnostic accuracy of bronchial washing concern, the yield was lower in comparison to above said studies. High diagnostic yield of bronchial biopsy may attribute to the good technical skill as well experience of the operator in field of interventional pulmonology. Extension of visible tumour, and pathologist experience could be the cause of high diagnostic yield of bronchial biopsy. Sampling technique is unlikely to be the reason for low yield of bronchial washing in comparison to other studies because this technique is relatively easy. Preparation technique and processing of the collected samples may possibly influence the diagnostic yield. In present study diagnostic yield of bronchial biopsies, bronchial washings were 50%, 38.88% and 58.33% respectively in endoscopically non-visible tumour. Yield of bronchial brushing was 48.71% and bronchial washing was 66.66% by A B Fuladi et al [12] in peripheral lesion which were somewhat higher in comparison to our study. Kjetil et al [9] reported yield in peripheral lesion 25% by bronchial brushing and 6.5 % by bronchial washing which were lower in comparison to our study. Lower diagnostic yield might also be explained by procedure of taking a small sample of 10-20 ml from the fluid aspirated and the lack of wedging the bronchoscope into the affected bronchus for patients whose tumour was not visible bronchoscopically. Liam C K et al [13] found diagnostic yield of 35.5%, 22.9% and 31.5% by bronchial washing, bronchial brushing and TBB, respectively in peripheral situated lung cancer. We perform TBNA in 5 patients, out of which diagnosis was unveiled in 4(80%) patients. Ladina Foos et al [14] was able to get di-

agnosis in 17 patients out of 39 patients (43.6%) in which TBNA were performed for peripheral lesions. Kjetil et al[9] obtain diagnosis in 4 out of 21 patients (19%) by TBNA in peripheral lesion. K. Katis el al[15] get 62 % diagnostic yield of TBNA in peripheral lung masses. In 1984 Wang et al[16] having performed TBNA in peripheral lesion with 22 gauge, 1.3 cm needle, reported a 48% yield. Schenk et al[17] in 1987 reported a 40% yield for TBNA in patients with peripheral lesion. Diagnostic yield of TBNA is determined mainly by the accessibility (size, relationship between the airway and the lesion) and the nature of the abnormality. It is obvious that, if the bronchoscopist can't reach the lesion, no diagnosis can be established. We select those patients for C-TBNA who had subcarinal lymph node and right paratracheal lymph node (4R) along with peripheral lung mass which was easily accessible through bronchoscope by trained pulmonologist. This could be the one of the reason behind high diagnosed yield beside experience of the observer in comparison of other published studies. Apart from the sample size one of the limitation of associated with the use of these data is that we cannot account for the possibility that, patients who were excluded from our study because malignancy was not proved, had further investigations outside our hospital system, leading to a diagnosis of malignancy.

CONCLUSION

Bronchoscopy is minimally invasive procedure but important investigation in the evaluation of lung cancer. It is obvious that the diagnostic accuracy is highest in endoscopically visible tumour but with safe hands, it is also valuable in evaluation of peripheral lesions. Performer should thoroughly inspect the airway to find out any bulging, widening of secondary carina or any abnormal sites as far as possible. After identification of any abnormality, bronchial washing should performed first, followed by bronchial brushing and bronchial biopsy. TBNA can be considered in patients who have external compression of the airway to get higher diagnostic yield.

Table-1. Baseline characteristic of the 100 patients of confirmed lung malignancy

Characteristic	
Mean age of presentation	54.98 years
Male	78 (66%)
Female	22 (22%)
Smoker	78 (78%)
Non-smoker	22 (22%)
Central lesion	80 (80%)
Cauliflower growth	38 (47.5%)
Polypoidal growth	19 (23.75%)
Nodular growth	15 (18.75%)
Complete Airway occlusion	8(10%)
Peripheral lesion	20(20%)

Table- 2. Results of bronchoscopic procedures in visible and peripheral lesion

Procedure	Visible growth (n=80)		Peripheral lesion (n=20)	
	No. (%)	Diagnostic yield	No. (%)	Diagnostic yield
Bronchial biopsy	74 (92.5%)	62 (83.78%)	8 (40%)	4 (50%)
Bronchial brushing	66 (82.5%)	48 (60%)	18 (90%)	7 (38.88%)
Bronchial washing	62 (77.5%)	20 (32.25%)	12 (60%)	7 (58.33%)
Conventional TBNA	0 (0%)	0 (0%)	5 (25%)	4 (80%)

Table-3. Lung cancer cell types with bronchoscopically visible and peripheral lesion.

Bronchoscopically visible tumor	Adenocarcinoma	Squamous cell carcinoma	Small cell carcinoma	Large cell carcinoma	Unclassified NSCLC
Yes (n=80)	4 (5%)	25 (31.25%)	47 (58.75%)	0 (0%)	4 (5%)
No (n=20)	7 (35%)	6 (30%)	0 (0%)	4 (20%)	3 (15%)

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