

Original article:

A cross sectional study for assessing the diagnostic yield of bronchoscopy and other procedures in the evaluation of bronchogenic carcinoma at S.P. Medical College , Bikaner, Rajasthan

¹Dr. Pramod Thakral , ²Dr. Tarun Baid, ³Dr. Manak Gujrani , ⁴Dr Abhishek Kawatra

¹Junior specialist, Department of Respiratory Medicine & Tuberculosis, S.P.Medical College, Bikaner, Rajasthan

² Senior Registrar, Department of Respiratory Medicine & Tuberculosis , SP Medical college Bikaner , Rajasthan

³ Head & Professor, Department of Respiratory Medicine & Tuberculosis, S.P.Medical College, Bikaner, Rajasthan

⁴Assistant Professor, Department of community Medicine, S.P.Medical College, Bikaner, Rajasthan

Corresponding author: Dr. Sivaranjani R

Abstract:

Lung cancer is a leading cause of cancer deaths and the incidence is rising. The overall therapeutic results have changed very little in the past decade in the face of an increasing incidence of this disease throughout the world. Most patients are found to have advanced disease at the time of diagnosis and thus treatment of this population is disappointing, very often only palliative. Several studies however, have demonstrated that early detection, localization, and aggressive treatment of lung cancer results in five year survival rate of 70 to 80 %. Bronchogenic carcinoma is being diagnosed in India with increasing frequency but it is uncertain whether this reflects a rise in its incidence or a greater availability of improved facilities for diagnosing it. The aim of this study to compare the diagnostic yield of various bronchoscopic procedures and overall diagnostic yield in the evaluation of bronchogenic carcinoma.

Key words: Cancer, Fiber optic bronchoscopy, bronchial brushing bronchial washing

Introduction:

Lung Cancer is the leading cause of cancer deaths worldwide. Its incidence increased dramatically throughout the twentieth century and still is increasing as the twenty first century begins. Lung cancer is among the five main types of cancer leading to overall cancer mortality contributing about 1.3 million deaths/year globally¹. In 2005 cancer killed approximately 8,26,000 people in India of which 5,19,000 were under the age of 70². Tobacco use is the single most important risk factor for cancer and various environmental & host factor may also affect the risk of lung cancer. In recent past, an increasing trend in the incidence of primary lung cancer has been reported from various parts in india³. Early diagnosis and treatment of the tumor is the only hope of cure at current state of knowledge⁴.

The cell type pattern had varied in different studies.

While squamous cell variety is the commonest seen in about one third of patient, there has been a definite increase in small cell and adenocarcinoma in recent years. The cell type is largely influenced by smoking habits, age and sex. Squamous cell carcinoma occur almost exclusively in smokers and in males, since heavy smoking is largely a habit of males in this country, females have an inverse increase in adenocarcinoma. The cell type pattern also varies with age⁵.

Bronchoscopy first performed by Killian in 1895⁶ is a useful method for direct visualization of pathologic changes in the trachea and bronchi⁷. With the introduction of flexible fiberoptic bronchoscope (FFB) by Ikeda⁸, the upper airways as well as the tracheobronchial tree to the level of segmental and subsegmental division could be

visualized and biopsy specimens obtained making FFB the most useful invasive technique for diagnosis of lung cancer. The main advantages of FFB are the visibility of the tracheobronchial tree, especially the upper lobes, the maneuverability of the bronchoscope, the comfort for the patient, the ability to detect early cancer, the improved diagnostic accuracy⁹; and the addition of useful information about staging.

The role of FFB in the diagnosis of lung cancer presenting as a bronchoscopically visible central lesion has been studied extensively. Central lesions can present as either an endobronchial mass or submucosal or peribronchial infiltrative lesion¹⁰. Various technique i.e. Bronchial biopsy, Bronchial Washing, Bronchial Brushing, and Transbronchial Neele Aspiration (TBNA) are used in conjunctions with FFB to provide specimens for histologic and cytologic analysis.

Bronchial washing (BW) is a simple technique providing diagnostic material in approximately 68% (range 27-90%) of patients with central lung cancer¹¹. Bronchial brushing (BB) provides diagnostic material in 72% (range 44 to 94%) of patients with central lung cancers¹¹. BB provide large clusters of malignant cells and has high diagnostic yield in infiltrative and stenotic endobronchial lesions. Endobronchial Biopsy (EBB) provides tissue specimens for histology from tumors as opposed to BW and BBR, which provides cytology specimen. The average diagnostic yield from EBB is 80% (range 51 to 97%)¹¹. The diagnostic yield of FB depends on the tumor size, its location in the lung, and the tumour bronchus relation. The diagnostic yield also depends on the skills of the operator¹² and quality of specimens obtained.

Therefore even with a relatively low yield, washing may still be worthwhile. Therefore, we performed this prospective study to compare the diagnostic

yield of various bronchoscopic procedures and overall diagnostic yield in the evaluation of bronchogenic carcinoma; also know the various cell type of bronchogenic carcinoma in central versus peripheral lesion.

Material & methods:

The study was carried out in 100 randomly selected cases of lung malignancy adopting a screening criteria of Radiological examination and Clinical evaluation. Thereafter these individuals were subjected to Fibre optic bronchoscopy for histopathological sampling. This accounted at 100 cases of carcinoma.

Instrument

Video Fiber-optic bronchoscopy: All suspect patients were subjected to video bronchoscopy examination. An informed written consent was taken from all the patients and kept them nothing by mouth (NBM) at least 6 hour before procedure, all the patients were premedicated with 0.6mg atropine injection intramuscularly.

First of all xylocaine sensitivity was done then. Nasal cavity was anaesthetized with 2% xylocaine jelly. The procedure was performed with the help of flexible fiber 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 oropharyngeal route.

The procedure was repeated again in those cases where the first attempt has been failed to prove the diagnosis and clinicoradiological suspicion of lung cancer was higher.

Sample Collection: Following specimens were collected

Bronchial Washing: This was the first sample collected before endobronchial biopsy or bronchial brushing with instillation of normal saline (0.9% NaCl solution), when growth was visualized, the

bronchoscope was fix in the close proximity and 10 to 15 ml normal saline was instilled through the internal channel of bronchoscope. The materials was immediately suck out again and were collected in a specimen TRAP bottle place in the suction pathway and bronchoscope. The bronchial washing was centrifuged and supernatant discarded. The sediment was smeared over 4 to 5 glass slides.

Air dry slides were fixed in 70% alcohol; later on stain with M.G.G stain (May Grunwald and Giemsa stain) for malignant cells.

Bronchial brushing: The area of suspected malignancy was brushed 4 to 5 times; and smeared directly on glass slide; smears are immediately fixed in 70 % alcohol and to be stained by Papanicolau's method.

Bronchial biopsy: When an endobronchial growth seen or any abnormal area seen on bronchoscopic examination, it was biopsied 3 to 4 times in order to provide an adequate material for histopathological examination with the help of biopsy forcep-FB-20C and place biopsy specimen in 10% formalin vial and send for histopathological examination.

Other procedures: post bronchoscopy sputum cytology, where there is peripheral mass other diagnostic method like percutaneous trans-thoracic needle aspiration (TTNA), Pleual fluid cytology

where there is associated effusion was performed to diagnosed the lung cancer.

Results:

The present study has a Male to Female ratio of 9:1 (Table 1). The overall bronchial biopsy gave highest yield (93%) followed by brushing (70%). Bronchial aspirate had a very low yield (Table 2).

Out of total 100 patients, 74% patients had squamous cell carcinoma and they were more prevalent in older age group (59.72±5.58 years). Adeno carcinoma was present in 12% of patients and their mean age was 48.58±6.71 years (Table 3). The chief variant in females was squamous cell carcinoma. Out of total 90 males, 69 had squamous cell carcinoma, 10 had adeno carcinoma, 7 had small cell carcinoma, 3 had undifferentiated CA and 1 had MCD (Table 4).

The table no 5 shows out of total 83 smokers, 74 had squamous cell carcinoma, 12 had adeno carcinoma, 9 had small cell carcinoma, 3 had undifferentiated CA while only 2 smokers had MCD. FNAC of lung mass was positive in 5 out of 9 cases where in 60% cases the diagnosis was adenocarcinoma (3 cases). Pleural fluid cytology also added to the diagnostic yield and was positive in 2 (adenocarcinoma) out of 9 cases of pleural effusion.

Table 1 : Frequency of Gender

Gender	No. of Cases	Percentage
Female	10	10.0
Male	90	90.0
Total	100	100

Table 2 :Overall diagnostic yield of Various procedures

Procedure	No. of Examination	Positive	%
Br. Biopsy	100	93	93.0
Br. Brushing	100	70	70.0
Br. Washing	100	9	9.0
Post FOB Sputum	100	0	-
Pleural Fluid Cytology	8	2	25.0
FNAC Lung Mass Neck Node	9	5	62.5

Table 3 :Histological yield in different age group

Histological Yields	Age Group										Total	
	<40		40-49		50-59		60-69		≥70		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Squamous Cell carcinoma	0	-	1	10.0	22	66.7	46	92.0	5	100	74	74.0
Adeno Carcinoma	1	50.0	5	41.7	6	20.7	0	-	0	-	12	12.0
Small Cell carcinoma	1	50.0	3	30.0	4	12.1	1	2.0	0	-	9	9.0
Unidferentiated CA	0	-	1	10.0	1	3.0	1	2.0	0	-	3	3.0
MCD	0	-	0	-	0	-	2	4.0	0	-	2	2.0
Total	2	100	10	100	33	100	50	100	5	100	100	100

Table 4 : Histological yield according to Gender

Histological yields	Gender				Total	
	Female		Male			
	No.	%	No.	%	No.	%
Squamous Cell carcinoma	5	50.0	69	76.7	74	74.0
Adeno Carcinoma	2	20.0	10	11.1	12	12.0
Small Cell carcinoma	2	20.0	7	7.8	9	9.0
Undifferentiated CA	0	-	3	3.3	3	3.0
MCD	1	10.0	1	1.1	2	2.0
Total	10	100	90	100	100	100

Table 5 : Histological yield according to smoking Habit

Histological yields	Smoking Habit				Total	
	Smoker		Non Smoker			
	No.	%	No.	%	No.	%
Squamous Cell carcinoma	65	78.3	9	52.9	74	74.0
Adeno Carcinoma	8	9.6	4	23.5	12	12.0
Small Cell carcinoma	7	8.4	2	11.8	9	9.0
Undifferentiated CA	2	2.4	1	5.9	3	3.0
MCD	1	1.2	1	5.9	2	2.0
Total	83	100	17	100	100	100

Discussion:

Fibre optic bronchoscopy represents a major advance in the diagnosis and management of pulmonary diseases. In addition to visualization of the endobronchial free procuring a sample for correct histopathological diagnosis is now possible in most central as well as some peripheral tumors. The present study observed male to female ratio were 9:1. Other studies also reveals higher male to female ratio i.e. (Hyde¹³ 7:1, Jindal et al¹⁴ 8.5:1,

Das Gupta¹⁵ 6.7:1, Huthi et al¹⁶ 16.6:1. In our study bronchial biopsy was performed in all 100 diagnosed cases of lung carcinoma, out of which 93% have positive results. Out of them 74% were squamous cell CA, 7% were small cell carcinoma and adenocarcinoma each while 3% cases were undifferentiated Ca and 2% showed metastatic carcinomatous deposits. Bronchial biopsy remain the most confirmatory FOB procedure and yield is also very high in studies. Zavola et al¹⁷ found

bronchial biopsy positive in 94%, Kavale et al¹⁸ found it in 86% cases, Choudhary¹⁹ found it in 96% cases, Lachaman²⁰ found it in 91% of cases, DasGupta et al¹⁵ found in 96%, Mazzone and Jain¹¹ found in 80%, Rhee et al²¹ found in 70%, Bodh et al²² found in 81.35% of cases. Yield in our study 93% is quite similar to that of previous studies. Yield of bronchial brushing, washings and biopsy on central tumor was significantly high (98.8%) in comparison to peripheral tumor (68.4%). This was supported by Lam et al²³. The cell type is largely influenced by the age, sex and smoking habits.

In present study squamous cell ca (74%) was the commonest cell type. It was more common in smoker (91.89%) and was relatively more common in male (76.7%) than in females (50%). This is supported by the fact that heavy smoking is largely a habit of males in this part of country. Similar observations were made by Basu et al²⁴, Shanker et al²⁵, and Devkota et al²⁶. Small cell CA was present in 9% of cases in this study and was more prevalent in smokers (77.8%) than in non

smokers (22.2%). No significant gender predilection seen. This fact is also supported by Garg et al²⁷, Jindal et al¹⁴. Adenocarcinoma was found in 12% of cases in this study and found to be more prevalent in younger age group (mean age 48.58±6.71 and good number of them were non smoker (42.5%). This was supported by earlier reported by Malhotra et al²⁸ and Jindal et al¹⁴.

Conclusion:

Fibre Optic Bronchoscopy is the most important diagnostic procedure available and is continuously updated with advancements. Ease of procedure under local anaesthesia, great maneuverability of the instrument, minimum discomfort and complications has established FOB as a first choice procedure in the diagnosis of lung cancer. FOB is the most valuable and easy procedure available in the hand of Pulmonary Physicians, which helps in proper diagnosis of suspected lung cancer patients. Both bronchial biopsy and brushing (direct or trans-bronchial) are valuable tools and gave comparable results.

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