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

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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 globally[1]. In 2005 cancer killed approximately 8,26,000 people in India of which 5,19,000 were under the age of 70[2]. 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 india[3]. Early diagnosis and treatment of the tumor is the only hope of cure at current state of knowledge[4].

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 age[5].

Bronchoscopy first performed by Killian in 1895[6] is a useful method for direct visualization of pathologic changes in the trachea and bronchi[7]. With the introduction of flexible fiberoptic bronchoscope (FFB) by Ikeda[8], the upper airways as well as the tracheobronchial tree to the level of segmental and subsegmental division could be

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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 maneurability of the bronchoscope, the comfort for the patient, the ability to detect early cancer, the improved diagnostic accuracy[9]; 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 lesion[10]. 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 maternal in approximately 68% (range 27-90%) of patients with central lung cancer[11]. Bronchial brushing (BB) provides diagnostic material in 72% (range 44 to 94%) of patients with central lung cancers[11]. BB provide large clusters of malignant cells and has high diagnostic yield in infiltrative and stenotic endobronchial lesions. Endobronchial Biopsy (EBB) provdes 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 is the lung, and the tumour bronchus relation. The diagnostic yield also depends on the skills of the operator[12] 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 Clincal 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 inform 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 perform 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

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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 undifferenciated 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

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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

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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
Unidferentiated 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 endobronhcial 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. (Hyde[13] 7:1, Jindal et al[14] 8.5:1, Das Gupta[15] 6.7:1, Huthi et al[16] 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 confirmatry FOB procedure and yield is also very high in studies. Zavola et al[17] found

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bronchial biopsy positive in 94%, Kavale et al[18] found it in 86% cases, Choudhary[19] found it in 96% cases, Lachaman[20] found it in 91% of cases, DasGupta et al[15] found in 96%, Mazzone and Jain[11] found in 80%, Rhee et al[21] found in 70%, Bodh et al[22] 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 al[23]. 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 al[24], Shanker et al[25], and Devkota et al[26]. 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 al[27], Jindal et al[14]. 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 al[28] and Jindal et al[14].

Conclusion:

Fibre Optic Bronchoscopy is the most important diagnostic procedure available and is continuously updated with advancements. Ease of procedure under local anaesthesia, great maneurability 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.

References:

1. World health organizations. Cancer.http://www.who.int/ mediacentre/factsheets/fs297/en/index.html accessed on February 02, 2010.
2. World Health Organization. Global Info base**.** https://apps.who.int/ infobase/report.aspx?iso=IND&rid=119&goButton=Go last accessed on February 02, 2010.
3. Bhera D. Lung cancer in India. Indian Journal of Chest Diseases Znd Allied Sciences 1992; 34:91-101.
4. Murrey JF and Nadal JA. Bronchogenic carcinoma. Text Book of Respiratory Medicine 1994, 2:1558-60.
5. Jindal SK, Malik SK, Malik AK, Singh K, Gujral JS, and Sodhi JS. Bronchogenic carcinoma review of 150 cases. Ind J Chest Dis 1979; 21:59-64.
6. Killian G. Direct endoscopy of upper air passages and esophagus. Its diagnostic and therapeutic value in search for and removal of foreign body. J laryngol Rhinol Otol 1902; 18 : 461-468.
7. Ikeda S, Yawai N, Ishikawa S. Flexible bronchofiberscope. Keio J Med 1968; 17 : 1-133.
8. Ikeda S. Flexible bronchofiberscope. Ann Otol Rhinol Laryngol 1970; 79 : 916-927.
9. Fergusson MK. Diagnosing and staging of non small cell lung cancer. Hematol Oncol Clin North Am 1990; 4 : 1053-1068.
10. Shure D. Fiberoptic bronchoscopy: Diagnsotic applications. Clin Chest Med 1987; 8 : 1-13.

11. Mazzone P, Jain P, Arroliga AC, Matthay RA. Bronchoscopy and needle biopsy techniques for diagnosis and staging of lung cancer. Clinics in Chest Med 2002; 32 : 137-158.
12. Minami H, Ando Y, Nomura F. Inter bronchoscopist variability in the diagnosis of lung cancer by flexible bronchoscopy. Chest 1994; 105 : 1658-1662.
13. Hyde L, Hyde CI. Clinical manifestations of lung cancer. Chest 1974; 65 : 299-306.
14. Jindal SK, Malik SK, Dhand R, Gujral JS, Malik AK, and Datta BN. Bronchogenic Carcinoma in Northern India. Thorax 1982; 37: 343-7.
15. Das Gupta A, Jain P, Minai OA et al. Utility of trans bronchial needle aspiration in the diagnosis of endobronchial lesions. Chest 1999; 115:1237-1241.
16. Huthi E, Sutinen S, Reinila A. Lung cancer in a define geographical area: history and histological types. Thorax 1980; 35 : 660-667.
17. Zavala DC. Diagnostic fiberoptic bronchoscopy. Techniques and results of biopsy in 600 patients. Chest 1975; 68:12-19.
18. Kavle PA, Bode FR, Kini S. Diagnostic accuracy in lung cancer; comparison of technique used in association with flexible fiberoptic bronchoscopy. Chest 1976; 69:752-757.
19. Choudhary BA, Yoneda K, Burki NK. Fiberoptic bronchoscopy. Comparison of procedures used in the diagnosis of lung cancer. Carciovasc Surg 1978; 76(1);33-7.
20. Lachman MF, Schofield K. Bronchoscopic diagnosis of malignancy in the lower airways. A cytological review. Acta Cytol 1995; 39:1148-1151.
21. Rhee CK, Kang HH, Kang JY, Kim JW, Kim YH, Park SA, Moon HS, Lee SH. Diagnostic yield of flexible bronchoscopy without fluoroscopic guidance in evaluating peripheral lung lesions. J Bronchology Interv Pulmonol. 2010; 17(4):317-22.
22. Bodh A, Kaushal V, Kashyap S, Gulati A. Cytohistological correlation in diagnosis of lung tumors by using fiberoptic bronchoscopy: study of 200 cases. Indian J Pathol Microbiol. 2013; 56(2):84-8.
23. Lam WK, So SY, Hsu C, et al. Fibreoptic bronchoscopy in the diagnosis of bronchial cancer: comparison of washings, brushings and biopsies in central and peripheral tumours. Clin Oncol (R Coll Radiol) 1983; 9:35–42.
24. Basu BK, Ghosh TN. A study of bronchogenic carcinoma. Ind J Chest Dis 1971; 13: 1-9.
25. Shankar PS. Bronchogenic carcinoma. Indian J Chest Dis 1967; 9 : 161-64.
26. Devkota KC, Pathak R, Khanal A, Chokhani R. Fiber-optic bronchoscopy: seven-year experience at Nepal Medical College Teaching Hospital. Nepal Med Coll J. 2010; 12(4):260-3.
27. Garg UK, Srivastava VK, Rajwanshi VS, Maheshwari BB. Carcinoma of lung: A correlative cytological and histopathological study. Indian J Cancer 1973; 10: 204-11.
28. Malhotra V, Malik R, Beohar PC, Goudal R, Khanna SK, and Narayan PS. Tumours of the lung a histomorphological study Ind J Chest Disease and Allied Science 1986; 28: 28-40.

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