

Bronchoscopy in Lung Malignancies At Indian Ruralcentre

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Abstract:

Background and objectives:

Lung cancer is the leading cause of cancer death around the world and the incidence is increasing. Lung Cancer incidence is also increasing in India with being the most common cancer in males in India. More than 70% of lung cancers are in stage III or IV when diagnosed making curative surgery difficult. Bronchoscopy for early detection of lung cancer is a promising tool. Bronchoscopy is beneficial for visualizing central lung cancer in very early stages or in a premalignant state, such as carcinoma in situ.

Method and methodology: A cross sectional study. Total 50 patients suspecting of central lung malignancies on history and chest X ray basis were taken from Department of Respiratory Medicine, Smt. B. K. Shah Medical Institute & Research Centre, Vadodara. All patients had undergone detailed clinical examination, CT scan and bronchoscopy. Broncho-alveolar lavage, brush cytology and biopsy were taken from all patients.

Result: We investigated 39 male and 11 female patients ranging from 31 to 80 years of age. Most common type of malignancy is adenocarcinoma (25/50) followed by squamous cell carcinoma (14/50). Bronchoscopic BAL was positive in 15(30%) individuals, bronchial brush was positive in 44(88%) individuals and bronchoscopic biopsy was positive for malignancy in 46(92%) individuals.

Conclusion: The bronchial brushings and biopsy samples have better diagnostic utility in diagnosis of central malignant lesions. Early interventions in form of CT chest and bronchoscopy may increase early detection of lung cancer.

Keywords: Computed Tomography of chest, Broncho-alveolar lavage, Brush cytology, Bronchoscopic biopsy

I. Introduction

Lung cancer is the leading cause of cancer death around the world and the incidence is increasing.^[1] Lung cancer has been the most common cancer worldwide since 1985 both in terms of incidence and mortality. There has been a large relative increase in the numbers of cases of lung cancer in developing countries. By the time patients present to the clinicians the condition is fairly advanced and at best only 25-30% of patients can be offered curative treatment.^[1]

Lung cancer arises from cells of the respiratory epithelium and can be divided into two broad categories. Small cell lung cancer (SCLC) is a highly malignant tumor derived from cells exhibiting neuroendocrine characteristics and accounts for 15% of lung cancer cases. Non small cell lung cancer (NSCLC) which accounts for remaining 85% of the cases is further divided into 3 pathologic subtypes: adenocarcinoma, squamous cell carcinoma, and large cell carcinoma.^[2]

In the past several decades the incidence of adenocarcinoma has increased greatly and adenocarcinoma has replaced squamous cell carcinoma as the most prevalent type of NSCLC. Patients with localized disease at diagnosis have a 5 year survival rate of 52%; however more than 52% of patients with distant metastasis at diagnosis have a 5 year survival rate of 3.6% which begs for need for better diagnostic methods for early detection of lung cancer.^[2]

Tobacco smoking is the single most important risk factor for lung cancer. The risk increases with longer smoking history and with more packs of cigarettes smoked per day.^[3] Although all histologic types of lung cancer are associated with cigarette smoking in smokers the association is stronger for SCLC and for squamous cell carcinoma. In contrast adenocarcinoma of lung is more common in non smokers and in young patients.^[4]

The risk of lung cancer increases with both the number of cigarettes smoked per day as well as the lifetime duration of smoking.^[5] Other factors that may influence the likelihood of developing lung cancer in smokers include the age at onset of smoking, the degree of inhalation, the tar and nicotine content of the cigarettes, and the use of unfiltered cigarettes.^[6]

Bronchoscopic technique for early detection of lung cancer are a promising tool as it might allow to visualize changes of early lung cancer and also permit sampling for histopathological confirmation. Fibre optic bronchoscopy allows direct evaluation of endoluminal and mucosal lesions and can guide biopsies for histological analysis. Bronchoscopy helps to visualize apical segments of upper lobes as well as segmental and

subsegmental bronchi in all lobes. Bronchoscopy is beneficial for visualizing central lung cancer in very early stages or in a premalignant state, such as carcinoma in situ. The diagnostic yield increases when computed tomography (CT) images are available for review before bronchoscopy, due to better ability to localize bronchial segments containing tumor. ^[7]The two major limitations of standard flexible bronchoscopy are its inability to reach peripheral segments of the lung and its limited diagnostic yield from lesions less than 3 cms in diameter. ^[8]

A cytological evaluation of bronchoscopic material will aid in early detection of lung cancer. Broncho Alveolar Lavage (BAL) cytology can be useful in detecting lung malignancy when compared to sputum cytology. With the advent of bronchial brush biopsy and bronchoscopic biopsy the emphasis shifted to respiratory cytology as first line diagnostic procedure in the diagnosis of lung cancer ^[9].

Here in this study an attempt is made to compare the efficiency in diagnosis by BAL and bronchial brushings and biopsy, as the three samples can be routinely done in the same sitting, but in view of cost effectiveness while using molecular methods in diagnosis, anyone can be used, whichever is better.

II. Material & Methods

This is a cross sectional study. Total 50 patients suspecting of central lung malignancies on history and chest X ray basis have been taken for the study at Dhiraj Hospital, SBKS MI & RC, Piparia, Vadodara. The subject included between the age of 31 to 80 years with informed and written consent.

The patients which were not made as a part of the study were the one with contraindicated for bronchoscopy like recent myocardial infarction, severe bronchospasm, deranged coagulation profile, severe hypoxemia and arrhythmias.

All the patients selected were asked for the detailed clinical history and examination of respiratory system and patients were investigated for routine investigations like complete blood count, renal functions, randomised blood sugar, HIV & HBsAg and further for a chest x-ray, CT Thorax and Fiber Optic Bronchoscopy were done. BAL, brush cytology and endobronchial biopsy were taken from all patients and sent for cytological and histopathological examinations respectively.

III. Results And Observation

We investigated 39 males and 11 females in the age group of 31 to 80 years as shown in figure 1. Out of total 50 patients 32 (64%) patients were smokers and 18 (36%) patients were non smokers as shown in figure 2. Figure 3 shows the common presenting complaints of the patients.

The most common associated finding on CT Scan is collapse of part of lung 46/50 (92%), next to which is pleural effusion 20/50 (40%), followed by mediastinal nodal involvement 15/50 (30%) & consolidation 13/50 (26%), which has been displayed in Table 1.

Out of 50 patients, the most common malignancy detected was adenocarcinoma in 30(60%) patients, followed by squamous cell carcinoma in 9(18%) patient as described in Table 2. The most common malignancy detected in males was adenocarcinoma in 25/39 (64%) patients followed by squamous cell carcinoma in 7/39 (18%) patients as shown in Table 2. The most common malignancy seen in females was adenocarcinoma in 5/11 (45.4%) patients followed by small cell carcinoma and squamous cell carcinoma in 2/11 (18.2%) patients.

Table 3 shows that out of 50 patients who have undergone bronchoscopy BAL was positive for malignancy in 15(30%) patients, bronchial brush cytology was positive for malignancy in 44(88%) patients and bronchoscopic biopsy was positive for malignancy in 46(92%) patients. Bronchoscopic brush cytology was inconclusive in 6(12%) patients and bronchoscopic biopsy was inconclusive in 4(8%) patients.

Legends to figure:

Figure 1: Age and Sex distribution

Figure 2: Smoking history

Figure 3: Chief complaints in patients

Table 1: CT thorax findings

Table 2: Histopathological subtypes with respect to sex

Table 3: Sensitivity of BAL, brush cytology & biopsy

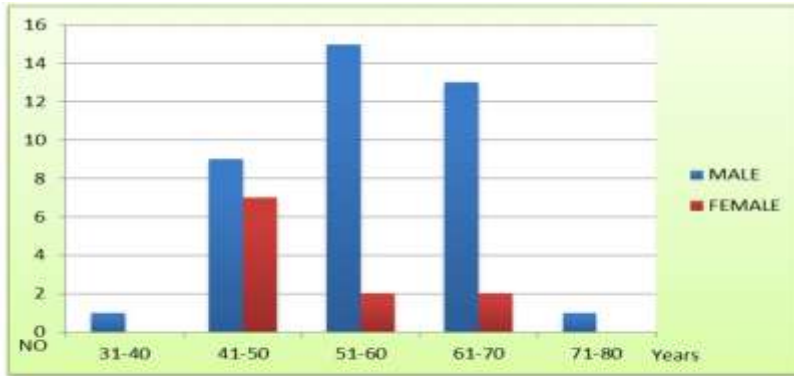


Figure 1. Age and Sex distribution

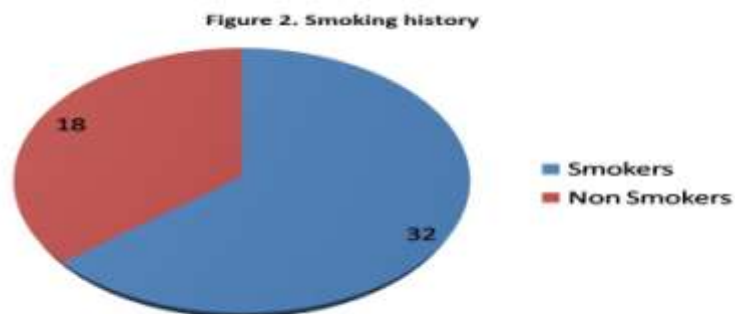


Figure 2. Smoking history

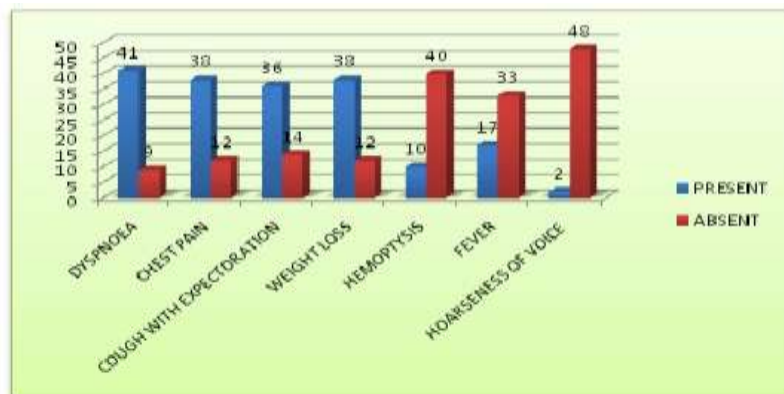


Figure 3. Chief complaints in patients

Finding	Present	%
Pleural Effusion	15	30
Collapse	46	92
Consolidation	13	26
Chest Wall Involvement	8	16
Mediastinal Nodes	15	30

Table 1: Ct Thorax Finding

Histopathology	Case	%	Male	%	Female	%
Squamous cell carcinoma	9	18	7	18	2	18.2
Adenocarcinoma	30	60	25	64	5	45.4
Bronchiolo alveolar cell carcinoma	2	4	2	5.1	0	0
Small cell carcinoma	2	4	0	0	2	18.2
Carcinoid	1	2	1	2.6	0	0
Inconclusive	4	8	3	7.7	1	9.1
Adenosquamous carcinoma	1	2	1	2.6	0	0
Large cell carcinoma	1	2	0	0	1	9.1
Total	50	100	39	100	11	100

Table 2: Histopathological subtypes with respect to sex

Type	BAL	%	Bronchial Brush Biopsy	%	Bronchoscopic Biopsy	%
Adenocarcinoma	9	18	28	56	30	60
Squamous cell carcinoma	6	12	9	18	9	18
Small cell carcinoma	-	-	2	4	2	4
Carcinoid tumor	-	-	1	2	1	2
Bronchiolo Alveolar carcinoma	-	-	1	2	1	2
Large cell carcinoma	-	-	2	4	2	4
Adenosquamous carcinoma	-	-	1	2	1	2
Inconclusive	35	70	6	12	4	8
Total positive	15	30	44	88	46	92

Table 3. Sensitivity of BAL, brush cytology & biopsy

IV. Discussion

Diagnosis of a disease using simple investigations that are cost effective and specific with shorter hospital stay is preferred by both physician and patient. This study aims at comparing the diagnostic utility between BAL, bronchial brushings, & bronchoscopic biopsy so that the most effective of the procedures can be used alone if feasible or in combination, which can be accommodated in the same sitting. This will also help to cut down the cost while using the newer techniques such as molecular methods.

An early, safe and rapid method of evaluation is needed to diagnose majority of lung parenchymal lesions to plan or institute most appropriate treatment protocols. Clinical and imaging evaluation can only indicate the probability of malignancy or otherwise of these lesions. But to choose definitive treatment options, confirmation by tissue diagnosis becomes mandatory.

Bronchoscopy provides a means of correlating imaging studies with direct visualization of the airways, and it also permits more focused sampling which is extremely helpful for endo-luminal or centrally located lesions. Endobronchial lesions can be visualized directly by bronchoscopy, biopsy & brushings can be used to sample the lesion directly, whereas washing and lavage sample a larger anatomic region through traumatic exfoliation. Hence these cytological samples yield better than sputum cytology.

Cytological and histopathology samples of BAL, brushings & biopsy were obtained from 50 patients suspected of malignancy radiologically and who were undergoing bronchoscopic examination.

In our study accuracy of BAL in diagnosing malignancy was 15(30%) out of 50 patients.

J Rawat et al in their study suggest that bronchial washing should be done after endobronchial biopsy to increase the yield of malignant cells in the washings. However they were able to make additional diagnoses of lung cancer from bronchial washing in only 1.86% of the cases^[10].

Karahalli et al^[11] recommended omission of washing in patients with endoscopically visible lesions and felt unlikely to produce any additional diagnosis in combination to forceps biopsy and brushing.

In our study bronchial brush biopsy is positive for malignancy in 44(88%) patients & bronchoscopic biopsy is positive in 46(92%) of the patients.

Karahalli et al concluded in their study that the combination of forceps biopsy and brushing cytology gave best results with a positive result for cancer in 57 cases (90.5%)^[11] which is comparable to our study.

Piaton et al in their view, biopsy is the cornerstone of diagnosis; however the cytological materials may provide critical information on accurate typing of small cell and non small cell carcinoma of lung. This differentiation is crucial in therapeutic and prognostic implications.^[12]

In case of bronchial brushings, the lesions are scraped and cells thus dislodged have better preservation of morphology, yield better in well differentiated lesions and benign lesions too.^[13]

In the present study bronchial brushings showed 44 cases were positive for malignant lesions, with 88% positivity, and bronchial biopsy were positive for malignancy in 46 cases, with 92% positivity. Comparing the positivity with bronchial washings of 30%, bronchial brushings seem significantly better than the bronchial washings in this study. Out of the 4 negative cases, 4 were clinically suspected to be malignant. However brushings with adequate material was negative for malignancy in 6 cases and biopsy was negative in 4 patients and both bronchial brushings and biopsy were negative in 4 cases. In case of bronchial brushings, the brush reaches on to the lesion after visualization. This favours the possibility of better cellular yield in bronchial brushings. Not only the quantity of the yield, the quality of the cells so as to be able to diagnose malignancy seems better for the same reason.

Cytological features in bronchial brushings were appropriate for the type of malignancy in majority of the cases. The ability of the brushings to detect malignancy was almost equal to the biopsy. With available number of biopsies to correlate, the data was subjected to chi square test. This revealed a p value of >0.05 implying that biopsy and brushings gave similarly efficient results both when positive and negative.

However, Advantage of brushing is that it is simpler, takes less time, easier to perform, complications are less when compared to biopsy. All lesions may not be amenable to biopsy, some patients may not be fit due to compromised lung function. Combination of biopsy and brushing is ideal for definitive diagnosis, but brushing also gives equally good results as a biopsy.

V. Conclusion

The bronchial brushings and biopsy samples have better diagnostic utility in diagnosis of central malignant lesions. Early interventions in form of CT chest and bronchoscopy may increase early detection of lung cancer.

References

- [1]. Humphrey EW, Smart CR, Winchester DP, Steele GD (jr), Yarbro JW, Chu KC, et al. National Survey of the Pattern of the pattern of care for carcinoma of the lung. *J ThoracCardiovascSurg* 1990;100:837-43.
- [2]. Herbst RS, Heymach JV, Lippman SM, Lung Cancer. *N Engl J Med* 2008;359(13):1367-80.
- [3]. Doll R, Hill AB, Smoking and carcinoma of the lung; preliminary report. *Br Med J* 1950;2(4682):739-48.
- [4]. Liu NS, Spitz MR, Kemp BL, et al. Adenocarcinoma of the lung in young patients: the M. D. Anderson experience. *Cancer* 2000;88(8):1837-41.
- [5]. Mattson ME, Pollack ES, Cullen JW. What are the odds that smoking will kill you? *Am J Public Health* 1987; 77:425. (22)
- [6]. Harris JE, Thun MJ, Mondul AM, Calle EE. Cigarette tar yields in relation to mortality from lung cancer in the cancer prevention study II prospective cohort, 1982-8. *BMJ* 2004; 328:72. (23)
- [7]. Laroche C, Fairbairn I, Moss H, et al. Role of computed tomographic scanning of the thorax prior to bronchoscopy in the investigation of suspected lung cancer. *Thorax* 2000;55:359-63.
- [8]. Rivera P, Mehta A, American College Of Chest Physicians. Initial diagnosis of lung cancer: ACCP cancer: ACCP evidence based clinical practice guidelines(2nd edition).*chest* 2007;132:131S-148S.
- [9]. James Linder. Something old something new. *Am J clinpathol* 2000;114:169-171. (54)
- [10]. Rawat J, Sindhwani G, Saini S, Kishore S, Kusum A, Sharma A. Usefulness and Cost effectiveness of bronchial washing in diagnosing endobronchial malignancies. *Lung India* 2007, 24: 139-141. (66)
- [11]. Ergün Karahalli, Adnan Yılmaz, Hatice Türker, Kürs, at Özvaran. Usefulness of Various Diagnostic Techniques during Fiberoptic Bronchoscopy for Endoscopically Visible Lung Cancer: Should Cytologic Examinations Be Performed Routinely? *Respiration* 2001; 68:611-614. (67)
- [12]. Piaton E, Djelid D, Duvert B, Perrichon M, Saugier B. Sequential use of bronchial aspirates, biopsies and washings in the preoperative management of lung cancers. *CytoJournal* [serial online] 2007 [cited 2009 Jun 12];4: p 11. Available from: <http://www.cytojournal.com/text.asp> 2007/4/1/11/41214 (62)
- [13]. Gaur DS, Thapliyal NC, Kishore S, Pathak VP. Efficacy of broncho-alveolar lavage and bronchial brush cytology in diagnosing lung cancers. *J Cytol* [serial online] 2007 [cited 2009 Jun 12];24: pp 73-7. Available from: <http://www.jcytol.org/text.asp> 2007/24/2/73/41955 (63)