



Original Article

Diagnostic Yield of Fibre-Optic Bronchoscopy in Clinically and Radiologically Suspected Cases of Bronchial Carcinoma

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Abstract

Background: Bronchial carcinoma is one of the most common neoplastic disorders in which the majority of patients present at advanced stages. Fibre- optic bronchoscopy is an established investigational procedure in bronchial carcinoma, and is of paramount importance in tumor staging and hispathological typing. But there are a few studies regarding the diagnostic yield of fibre-optic bronchoscopy in our country.

Methods: This was a cross-sectional study done in the respiratory medicine ward of National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka from September 2011 to February 2012. All consecutive patients who were suspected clinically and radiologically as a case of bronchial carcinoma and attending in NIDCH were included in this study. There were inclusion and exclusion criteria for selecting the patients. A standard proforma and questionnaire were designed and filled up for each patient. Data was analyzed in computer using software (SPSS) and mean \pm SD was applied.

Results: Among the total 68 cases 56 patients (82.35%) revealed bronchial carcinoma by fibre-optic bronchoscopy (FOB). Among the 50(73.63%) patients having central lung lesion, 42(84%) patients revealed bronchial carcinoma by bronchial biopsy. Bronchial brushing was taken from 30 patients having central lung lesion and it revealed bronchial carcinoma in 18 patients(60%). Peripheral lung lesions was found in 18 cases. Bronchial biopsy and bronchial brushing were taken in 6 cases but revealed nonspecific result. Bronchoalveolar lavage was taken in all 68 cases and revealed bronchial carcinoma in 46(67.65%) cases. Bronchial biopsy, bronchial brushing and bronchoalveolar lavage were performed on 56, 30 and 68 cases which yielded bronchial carcinoma in 42 (75%), 18 (60%) and 46 (67.65%) cases respectively. Stepwise performance of bronchial biopsy, bronchial brushing and bronchoalveolar lavage provided a diagnostic yield of 82.35% of cases who had subsequently proven bronchial carcinoma. Combined biopsy, brushing and bronchoalveolar lavage technique is more effective than single technique ($P=<0.001$), which is highly significant, gives the diagnostic yield of 82.35%. Out of 50 patients having central lesion in chest X-ray the fibre-optic bronchoscopy yielded bronchial carcinoma in 45 patients (90%). But out of 18 patients having peripheral lesion in chest X-ray the fibre-optic bronchoscopy revealed bronchial carcinoma in 11 patients (61.11%). So fibre-optic bronchoscopy is more effective in the diagnosis of central mitotic lesion than peripheral mitotic lesion. The effectiveness of the combined technique (bronchial biopsy, bronchial brushing and bronchoalveolar lavage all together) is increased to 82.35%. The effectiveness is significantly lower when applied a single technique.

Conclusion: By Combined bronchial biopsy, brushing and bronchoalveolar lavage 82.35% cases were diagnosed as bronchial carcinoma which is significantly higher than a single

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technique. Bronchoalveolar lavage may be an important diagnostic procedure in the peripheral lung lesions.

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Introduction

Flexible fibre-optic bronchoscopy is a well-tolerated technique that helps to visualize the endobronchial lesions and permits brushing, washing and biopsy specimens to be taken from any visible suspected lesion. Bronchoscopy performed under fluoroscopic guidance permits biopsies to take from more peripheral lesions. The diagnostic yield is 90% when six to ten biopsy specimens of endoscopically visible carcinomas are obtained. The diagnostic yield of non-visualized, peripheral lesions is about 60% if both biopsy specimens and brushings are obtained.¹ Bronchial biopsy, bronchial brushing and bronchoalveolar lavage were performed on 100, 64 and 37 cases which yielded diagnostic specimens for bronchial carcinoma in 69%, 78.1% and 62.2% cases respectively. Stepwise performance of bronchial biopsy, bronchial brushing and bronchoalveolar lavage provided a diagnostic yield of 85% of cases who had subsequently proven bronchial carcinoma.²

Materials and Methods

This was a cross-sectional study done in the respiratory medicine ward of National Institute of Diseases of the Chest and Hospital (NIDCH), Mohakhali, Dhaka from September 2011 to February 2012. All consecutive patients who are suspected clinically and radiologically as a case of bronchial carcinoma and attending in NIDCH will be included in this study. Sample size was calculated 68 where expected proportion of event was considered 85%.

Results

Mean age was 58.62 (SD±12.68). Age ranged from 35-85 years. Two patients (2.94%) belonged to the age group <40 years, 17 patients (25%) belonged to 41-50 year group, 22 patient (32.35%) belonged to 51-60 year group, 20 patient (29.41%) belonged to 61-70 year group, 6(8.82%) belonged to 71-80 year group and 1 (1.48%) belonged to age group above 80 year. Most of the patients (61.76%) belonged to 51-70 year age group.

Among the total 56 cases of lung cancer, highest frequency was in service holder (36%) followed by farmers (24%). Smoking habit revealed that 8 patients were non-smokers (11.77%). Maximum patients were smokers (88.23%). Two patients smoked for less than 10 pack year (2.94%), 22 patients smoked for 10-20 pack year (32.35%), most of the patients smoked for more than 20 pack year (52.94%). Out of 56 lung cancer cases, 02 (3.57%) were non-smoker and 54 (96.42%) patients were smokers. 01 (1.79%) patient smoked for less than 10 pack year; 21(37.5%) patients smoked for 10-20 pack year and 32(57.14%) patients smoked for more than 20 pack year.

Table 1: Smoking status of patients

	Smoking status			Total	
	Non smoker	Smoker			
Duration of smoking in pack year		<10 pack year	10-20 pack year	>20 pack year	
Number of patients	8 11.77%	02 2.94%	22 32.35%	36 52.94%	68 (100%)
Number of lung cancer	02 3.57%	01 1.79%	21 37.5%	32 57.14%	56 (100%)

Regarding prominent symptoms and signs of the lung cancer patients, cough was the most prominent symptom in the series (85.71%), followed by weight loss (71.43%) and dyspnoea (71.43%), chest pain (58.93%), haemoptysis (57.14%), clubbing (53.57%), Palpable lymph nodes (19.64%) and hoarseness of voice (17.86%).

Site of lesion (Radiologically):

Forty(58.81%) patients had right sided lesion; 28(41.17%) patients had left sided lesion. None had lesions occupying both side. Out of 40 right sided lesions, 30 (44.11%) patients had central lesion and 10 (14.7%) had peripheral lesions. On the other hand, out of the 28 left sided lesions, 20(29.41 %) patients had central lesion, and 8(11.76%) had peripheral lesions.

Associated findings in chest x-ray:

Fifty(73.53%) patients did not show any associated complications in chest x-ray. 20 (29.41%) patients had pleural effusion. Rib erosion was found in 5 (7.35%) patients. 2 (2.94%) patients showed cavitations while 15 (22.06%) patients had COPD and 6 (8.82%) patients had intrapulmonary metastasis. Only 3 (4.41%) patients had pulmonary fibrosis.

Size of the lesion in chest x-ray:

Thirty nine(57.35%) patients had suspected lesions >4cm in diameter and 29(42.65%) patients had <4 cm diameter suspected lesions on chest radiograph.

ESR values:

Five (7.35%) had ESR <50 mm in 1st hour, 40 (58.82%) ESR between 50-100 mm, while 23(33.82%) had ESR above 100 mm in 1st hour. Out of 50 lung cancer cases, 1(2%) patient had ESR less than 50 mm in 1st hour. 30(60%) patients had ESR value between 50-100 mm in 1st hour and 19(38%) had ESR value above 100 mm in 1st hour.

FOB findings:

Types of lesion found in FOB in 50 cases having central radiological lesion

FOB was done in 50 cases having central radiological lesion. Suspected lesions were found in all the patients (n=50). Bronchial brushing, biopsies were taken from the suspected lesions. Bronchoalveolar lavage (BAL) fluid was collected from all the patients. 45(90%) patients revealed lung malignancy and their histological types were ascertained. Among the malignant cases, squamous cell carcinoma was the highest (54%), followed by small cell carcinoma (24%) and

adenocarcinoma (12%). However 5(10%) Patients had inconclusive result.

Types of lesion found in FOB in 18 cases having peripheral radiological lesion

Bronchial biopsy and bronchial brushing were taken from 6 lesions. Bronchoalveolar lavage (BAL) was taken from all 18 cases. 11(61.11%) patients revealed lung cancer. 7(38.88%) patients revealed inconclusive results. 6(33.33%) revealed squamous cell carcinoma, 2(11.11%) small cell carcinoma, 3(16.66%) adenocarcinoma. Bronchial biopsy and bronchial brushing from 6 lesions yielded inconclusive result.

Findings of Bronchial biopsy in 56 patients

Twenty four(42.86%) patients had squamous cell carcinoma, 12(21.43%) had small cell carcinoma, 6(10.71%) had adenocarcinoma, and 14 (25%) patients revealed non specific findings. Total 42 (75%) patients were diagnosed as lung cancer by bronchial biopsy.

Table 2: Types of lesions found in FOB in 50 cases having central radiological lesion

Types of lesion in FOB		No. of patients	Percentage
Lung malignancy	Squamous cell carcinoma	27	54
	Small cell carcinoma	12	24
	Adenocarcinoma	6	12
Nonspecific		5	10
Total		50	100

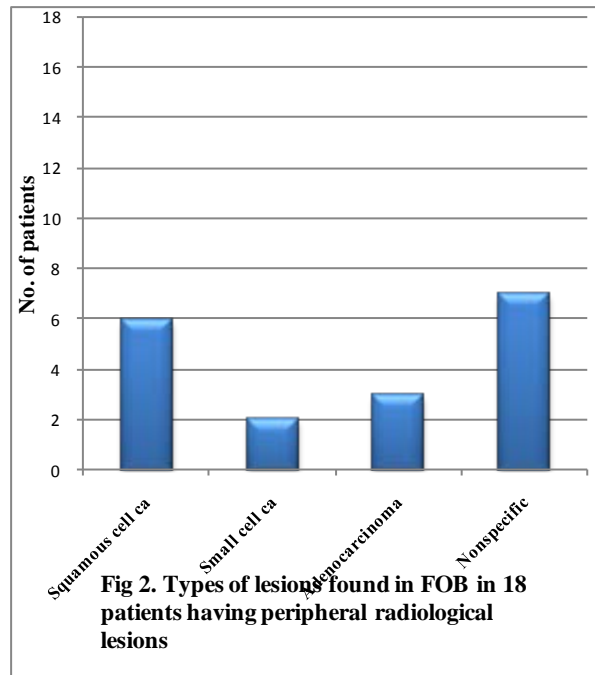
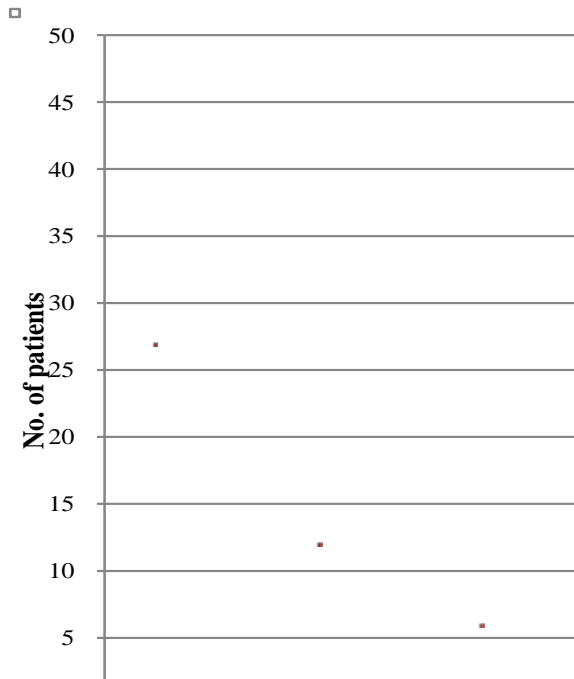


Fig 2. Types of lesions found in FOB in 18 patients having peripheral radiological lesions

Table 3: Types of lesions found in FOB in 18 cases, having peripheral radiological lesion

Types of lesion in FOB			No. of cases	Percentage
Lung malignancy	Squamous carcinoma	cell	6	33.33
	Small cell carcinoma	cell	2	11.11
	Adenocarcinoma		3	16.66
	Total		11	61.11
Non specific			7	38.88

Table 4: Histopathological Findings of Bronchial biopsy in 56 patients

Histological type		Number of patients	Percentage
Squamous	cell carcinoma	24	42.86
Small	cell carcinoma	12	21.43
Adenocarcinoma		6	10.71
Non specific		14	25
Total		56	100

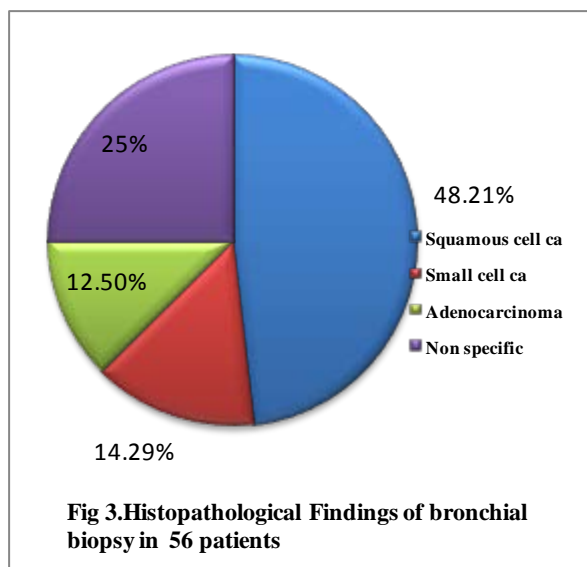


Fig 3. Histopathological Findings of bronchial biopsy in 56 patients

Findings of bronchial brushings in 30 cases

Eighteen(60%) patients revealed lung cancer, 12(40%) had inconclusive result, 10(6.66%) had squamous cell carcinoma, 5(10%) had small cell carcinoma and 3(43.33%) had adenocarcinoma.

Findings of broncho-alveolar lavage (BAL) in 68 patients

Out of 68 patients 46 (67.65%) patients revealed bronchial carcinoma, 23 (33.82%) patients had squamous cell carcinoma, 14 (20.59%) had small cell carcinoma, 9 (13.24%) had adenocarcinoma and 22 (32.35%) revealed nonspecific result.

Histological findings.

Thirty three(58.93%) patients had squamous cell carcinoma, 14 (25%) patients had small cell carcinoma; 9 (16.07%) patients had adenocarcinoma.

Table 5: Histological types in 56 cases of lung cancer (n=56)

Diagnosis	Number of cases	Percentage
Squamous cell carcinoma	33	58.93
Small cell carcinoma	14	25
Adenocarcinoma	9	16.07
Total	56	100

Comparison between bronchial biopsy, bronchial brushing and broncho-alveolar lavage (BAL):

Bronchoalveolar lavage was performed whether or not there was a bronchoscopically visible lesion. But bronchial biopsy and bronchial brushing were taken only when a lesion could be visualized. So, bronchial biopsy, bronchial brushing and bronchoalveolar lavage were performed on 56, 30 and 68 cases which yielded diagnostic specimens for bronchial carcinoma in 42 (75%), 18 (60%) and 46 (67.65%) cases respectively. Stepwise performance of bronchial biopsy, bronchial brushing and bronchoalveolar lavage provided a diagnostic yield of 82.35% of cases who had subsequently proven bronchial carcinoma.

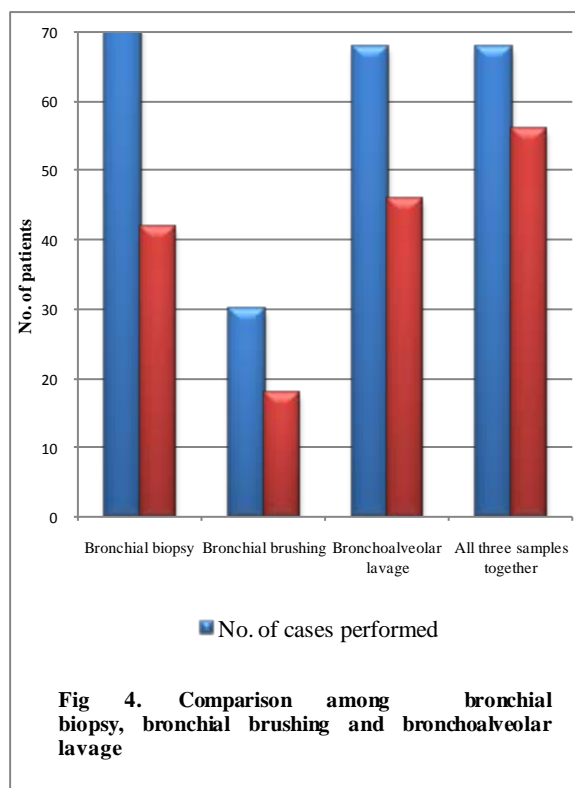
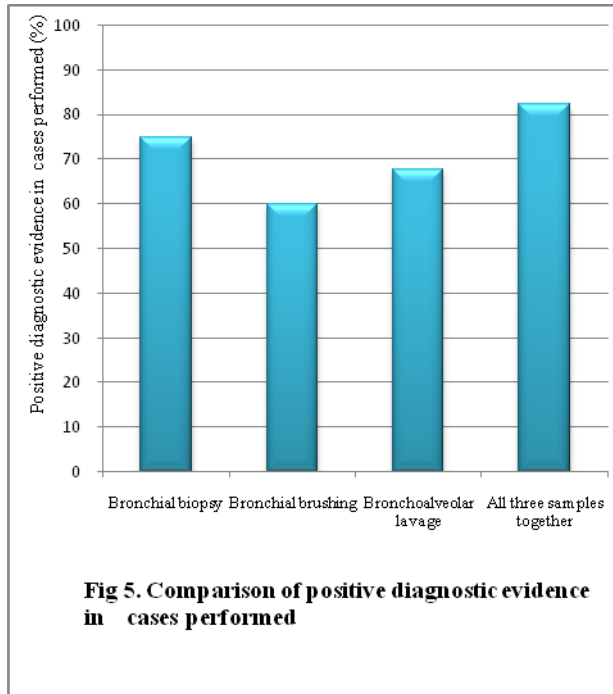


Fig 4. Comparison among bronchial biopsy, bronchial brushing and bronchoalveolar lavage



Discussion

Total number of cases were 68 in this series, of them 63(92.65%) were male and 5(7.35%) were female. Male and Female ratio is 12.6:1. Among the 56 lung cancer patients 51 (91.07%) were male and 5 (8.93%) were female. The male and female ratio was 10.2:1. Male:Female ratio was 5:1 in a study by Mostafizur Rahman in 1999. Most of the patients in my series belong to 51-70 years age groups, n=44(61.76%). Of them 56(82.35%) were proved to have malignancies. This finding is consistent with the finding of Mahmud et al. 1999. In his series majority of the patients were aged between 50-60 years.

Majority of the patients were also 50-70. years age group by another study - carried out by Mostafizur Rahrnan in 1999. In this study, lung cancer is more common in Service holders (36%). Sixty(88.23%) patients were smoker. Among the lung cancer patients most of them were heavy smoker (57.14%). In a series of 100 patients with bronchial carcinoma, David et al.⁵ 1994 found 89% of lung cancer patients were smoker. This is also comparable with our findings. Forty two(61.76%) patients presented with chest pain, of

them 33(58.93%) cases were lung cancer. This symptom is highly significant statistically in relation to lung cancer. Ahmad et al.³ 1999 reported 83.8% of their cases presented with chest pain. This is not similar with this findings. This may be due to the fact that he carried out his study on patients with peripheral lesion. Forty(71.43%) lung cancer cases presented with dyspnoea. In Murray and Nadel.⁶ series 12% patients reported with dyspnoea. Among the lung cancer cases 40(71.43%) presented with weight loss. Thirty(57.14%) patients with lung cancer reported haemoptysis. Among the lung cancer cases 30(53.57%) presented with clubbing. Ahmed et al. 1999, reported 40% clubbing in lung malignant cases. This is not similar to this findings. Ten(14.7%) patients presented with hoarseness of voice. Among the patients with hoarseness of voice all were having lung malignancy 10(17.86%). X-ray chest was done in all patients. Right sided lesion was dominating n=40(58.81%). Of them 30(44.11%) patients had central lesion and 10(14.7%) had peripheral lung lesion. Out of 28(41.17%) patients having left sided lesion, 20(29.41%) had central lesion and 8(11.76%) had peripheral lung lesion. Thirty nine(57.35%) patients had lesions more than 4 cm in diameter and 29(42.65%) patients had lesion less than 4 cm in diameter. FOB was done in 50 having central radiological lesion. Suspected lesions were found in all the patients (n=50). Bronchial brushing, biopsies were taken from the suspected lesions. Bronchoalveolar lavage (BAL) was collected from all the patients. 45(90%) patients revealed lung malignancy and their histological types were ascertained. Among the malignant cases, squamous cell carcinoma was the highest (54%), followed by small cell carcinoma (24%), adenocarcinoma (12%). However, 5(10%) Patients had inconclusive result. FOB was also done in 18 patients having peripheral lung lesion. Bronchial biopsy and bronchial brushing were taken from 6 lesions and bronchoalveolar lavage (BAL) was taken from all 18 cases. 11(61.11%) patients revealed lung cancer. 7(38.88%) patients revealed inconclusive results. 6(33.33%) revealed squamous cell carcinoma, 2(11.11%) small cell carcinoma, 3(16.66%) adenocarcinoma. Bronchial

biopsy and bronchial brushing revealed inconclusive result.

Results of bronchial biopsy in 56 patients showed 27(48.21%) patients had squamous cell carcinoma, 8(14.29%) had small cell carcinoma, 7(12.5%) had adenocarcinoma, and 14(25%) patients revealed no specific findings. Total 42 (75%) patients were diagnosed as lung cancer by bronchial biopsy. Results of bronchial brushing in 30 patients showed that 18 (60%) patients had lung cancer, 12(40%) had inconclusive result. 2(6.66%) had squamous cell carcinoma, 3(10%) had small cell carcinoma and 13(43.33%) had adenocarcinoma. Results of bronchoalveolar lavage showed that out of 68 patients 46 (67.65%) patients had bronchial carcinoma, 23 (33.82%) patients had squamous cell carcinoma, 14 (20.59%) had small cell carcinoma, 9 (13.24%) had adenocarcinoma and 22 (32.35%) revealed nonspecific result. Histological type in 56 cases of lung cancer showed that 28(50%) patients had squamous cell carcinoma, 18 (32.14%) patients had small cell carcinoma; 10 (17.86%) patients had adenocarcinoma. Bronchial biopsy, bronchial brushing and bronchoalveolar lavage were performed on 56, 30 and 68 cases which yielded diagnostic specimens for bronchial carcinoma in 42 (75%), 18 (60%) and 46 (67.65%) cases respectively. Stepwise performance of bronchial biopsy, bronchial brushing and bronchoalveolar lavage provided a diagnostic yield of 82.35% of cases who had subsequently proven bronchial carcinoma. Another study in 2000 done by A. Quyum where out of 95 patients, 84(88.4%) patients with lung cancer were diagnosed by bronchial brushing and 57(60%) patients with lung cancer were diagnosed by bronchial biopsy. This findings are not consistent with my findings. In 1999 another study was done by Mustafizur Rahman. He showed that out of 36 patients 29(88.56%) patients were diagnosed by combination of bronchial biopsy, bronchial brushing and broncho alveolar lavage (BAL) as lung malignancy. This finding is consistent with my findings. By taking bronchoalveolar lavage (BAL) from 50 patients with central lesion, 20(29.41%) patients were diagnosed as lung

cancer . Among the 20 cases 3(6%) patients were diagnosed by bronchoalveolar lavage (BAL) who were undiagnosed by biopsy and brushing. Results of bronchoalveolar lavage showed that out of 68 patients 46 (67.65%) patients had bronchial carcinoma, 23 (33.82%) patients had squamous cell carcinoma, 14 (20.59%) had small cell carcinoma, 9 (13.24%) had adenocarcinoma and 22 (32.35%) revealed nonspecific result. By taking bronchoalveolar lavage 14 more patients were diagnosed as lung cancer who were undiagnosed by bronchial biopsy and brushing. Among the 18 peripheral lung lesion 11(61.11%) were diagnosed as bronchial carcinoma by bronchoalveolar lavage. Javier deGracia et al. 1993 showed in their series that out of 55 patients in peripheral lung cancer, 18(32%) patients had diagnosed as lung cancer by broncho alveolar lavage (BAL). This findings is not consistent with my findings. Although CT guided FNAC from peripheral mitotic lesion of lung cancer can be done for tissue diagnosis bronchoalveolar lavage is less costly and possess good diagnostic yield (61.11%). So, bronchoalveolarlavage (BAL) will be an effective means for the diagnosis of peripheral mitotic lesion of lungs. Combination of biopsy, brushing & BAL is more effective than a single procedure in the diagnosis of mitotic lesion of the lungs. Statistical analysis was done (chi—square test) and this was highly significant, $P < 0.001$. It is seen from the present study that diagnostic yield in the combination procedure in 82.35%. Among the 68 study subjects 5 patients (7.35%) developed fever after fibre-optic bronchoscopy. The fever was low grade in nature and subsided after taking anti-pyretics within 24 hrs of the procedure in all cases. 4 patients (5.88%) developed hypoxaemia which improved after oxygen inhalation through nasal cannula within 4 hrs of the procedure. Three patients (4.41%) developed bronchospasm and laryngospasm during the procedure but both were transient and did not require any intervention. Only one patient(1.47%) developed haemorrhage in the form of haemoptysis. It was not severe and managed with one unit of whole blood transfusion.

Conclusion

Flexible fiberoptic bronchoscopy is a safe, informative and easy procedure which is well tolerated by the patients. It can be done as an out patient procedure and the patient can go home immediately after the procedure. Complications are minimum.

The result of the present study showed that bronchial carcinoma could be diagnosed efficiently by using fibre-optic bronchoscopy and it's associated sampling techniques.

- 48% cases having central lung lesions were diagnosed to have bronchial carcinoma by bronchial biopsy.
- But by Combined bronchial biopsy, brushing and bronchoalveolar lavage 82.35% cases were diagnosed as bronchial carcinoma..
- Bronchoalveolar lavage may be an important diagnostic procedure in the peripheral lung lesions.

References

1. Strauss GM. Bronchogenic Carcinoma, Chapter 68, Text Book of Pulmonary Diseases. Baum GL (editor), Lippincott-Raven Publishers, Philadelphia, 1998; 1356.
2. Respirology (2000) volume 5, Issue 3, pages 265-270.
3. Ahmad MM, Hiron MM, Bhuiyan SS. Role of Fine Needle Aspiration Cytology in the Diagnosis of Pulmonary Lesion. Scientific paper presented in the International Conference on Asthma and Chest Diseases, November 2-4, 1999.
4. Hossain MA, Ahmad MM, Hasan MR. Fiberoptic Bronchoscopy, Experience in IDCH. Paper presented in 19th AGM & Scientific Session of Chest & Heart Association of Bangladesh, 1997.
5. David TC, Paul YH, Waun KH. Bronchogenic carcinoma, in Textbook of Respiratory Medicine, Murray & Nadel editors WB Saunders Company, 1994, Vol-2, P. 1541.
6. Murray JF, Nadel JA. Bronchogenic Carcinoma, Chapter 48, Text Book of Respiratory Medicine, Vol. 2, Sec. edn. 1994; 154 1-1543.

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