

Importance of Bronchial Biopsy, Brushing and BAL as Diagnostic Modalities in Respiratory Medicine

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Introduction :

Pulmonary unresolved radio-opaque shadows often poses a diagnostic dilemma for the clinicians. Flexible fiberoptic bronchoscopy (FOB) is one of the most useful tests available to the respiratory physician. It is used widely for diagnosing both central airway and peripheral parenchymal lesion¹⁻⁵.

The method allows a direct inspection of the lesion as well as tissue diagnosis from the biopsy material and cytological materials⁶. About 80% of the lung cancers can be seen and sampled at bronchoscopy which is indicated in most patients in whom the diagnosis is suspected⁷.

As the tip of the fiberoptic bronchoscope is manoeuvrable, the bronchial tree can be inspected to segmental level, the tumour is more easily reached and the histological diagnosis is therefore more likely to be made⁸.

Flexible fiberoptic bronchoscope was introduced by Dr. Shigeto Ikeda of the National Cancer Institute, Tokyo in the late 1960s. By the mid 1970s the fiberoptic bronchoscope was widely utilized in the United States. Within only a few years, the practice of pulmonary medicine was radically changed by this instrument. It has made a revolution in the diagnosis and management of inflammatory, infectious and malignant diseases of the chest. It enables the collection of materials by means of

- Bronchial washes, brushing and biopsy
- Broncho alveolar lavage (BAL)
- Transbronchial lung biopsy
- Endobronchial needle aspiration

Flexible fiberoptic bronchoscopy can be readily performed in spontaneously breathing patients following anaesthesia of the upper airway mucosa with topically applied agents. The tip of the scope can be passed through the nose or mouth with the patients sitting or supine.

Flexible fiberoptic bronchoscopy is relatively contra-indicated in patients with uncorrected coagulopathies, severe airway obstruction, hypoxia, hypercercbia or cardiac arrhythmias. Complications of flexible fiberoptic bronchoscopy are rare but potentially include drug reaction, cardiac arrhythmia, haemorrhage, pneumothorax, pneumonia and exacerbation of airway diseases.

Whenever possible, both the brush and forceps should be used for the lesions. This combination of brush and biopsies produces the highest diagnostic yield⁹.

Aims & Objectives

- To find out the causes of unresolved shadows on chest radiograph after broad-spectrum antibiotics for adequate time.
- Unexplained respiratory symptoms, especially haemoptysis and wheezing.
- To compare the sensitivity of bronchial biopsy, brushing and BAL in the diagnosis of the tumours of the lung.
- To find out the frequency of different types of lung cancer.
- To elucidate the role of fiberoptic bronchoscope for the collection of different types of bronchial specimens for histopathological and microbiological examinations.

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Materials & Methods

Types of study : Prospective study

Place of Study : Institute of Diseases of the Chest & Hospital (IDCH)

Mohakhali, Dhaka-1212,
Bangladesh

Period of Study : July 1998 to June 1999

Population : As Institute of Diseases of the Chest & Hospital / IDCH is the only referral centre for the chest diseases patients in Bangladesh and patients were coming from every corner of the country, for this reason the patients of IDCH were selected. Though it was a hospital based study, but it would represent to some extent whole of Bangladesh. So, all the patients having a suspicious radiological shadow in the chest x-ray, fulfilling the inclusion criterion comprised our total population.

Sample Size : 504 (five hundred & four) patients whom radiological shadow did not improve after broad spectrum antibiotics and if their sputum were negative for AFB and malignant cells were included in the study.

Study Procedure

Consent Taking

In each case consent from the patient was obtained after discussion with the patient about the study procedure.

- Routine investigation done for inclusion criteria and to rule out exclusion criterion
 - Blood for total count of WBC
 - differential count of WBC
 - erythrocyte sedimentation rate (ESR)
 - haemoglobin concentration
 - bleeding time (BT) and clotting time (CT)
 - platelet count, ECG
- Chest x-ray, postero-anterior and lateral view

- Sputum for AFB and malignant cells

Observations and Results :

Total number of cases were 504. Of them 421 (84%) were male and 83 (16%) were female.

Table-I

Showing total number of patients with sex distribution

Sex	No(s) of patients	Percentage (%)
Male	421	84
Female	83	16
Total	504	100

Table-II

Age distribution of the patients

Age in years (s)	No(s) of patient	Percentage (%)
< 20	03	<1
20-29	15	3
30-39	31	6
40-49	78	15
50-59	101	20
60-69	159	32
70 & above	117	23

• We had taken the biopsy only in the cases of obvious endobronchial lesion

Table-III

Findings of Bronchial Biopsy (n=246)

Diagnosis	No(s)	Percentage (%)
Squamous cell carcinoma	94	38
Small cell carcinoma	28	11
Large cell carcinoma	07	3
Adenocarcinoma	03	1
Atypical cell	02	<1
TB	03	1
No malignancy	97	39
Miscellaneous	12	5

* We had taken the biopsy only in the cases of obvious endobronchial lesion.

Table-IV
Findings of bronchial brushing (n-87)

Diagnosis	No(s) of patients	Percentage (%)
Squamous cell carcinoma	15	17
Small cell carcinoma	08	09
Large cell carcinoma	03	03
Adenocarcinoma	01	01
Atypical cell	10	11
TB	03	03
No malignancy	37	43
Miscellaneous	10	11

We had taken brushing from inflamed area – when there is no obvious endobronchial lesion.

Table-V
Findings of Bronchial Lavage (n-372)

Diagnosis	No(s) of patients	Percentage
Squamous cell carcinoma	14	4
Small cell carcinoma	06	2
Large cell carcinoma	02	<1
Adenocarcinoma	02	<1
Atypical cell	04	1
TB	08	2
No malignancy	278	75
Miscellaneous	09	2
Inconclusive	49	13

· Similarly BAL were taken when there is no endobronchial lesion

Table-VI
Final Diagnosis among the patients (n=504)

Diagnosis	No(s) of patients	Percentage
Squamous cell carcinoma	104	21
Small cell carcinoma	33	07
Large cell carcinoma	10	02
Adenocarcinoma	05	<01
Atypical cell	06	01
TB	11	02
No malignancy	309	61
Miscellaneous	26	05

Table-VII

Showing comparison between Bronchial Biopsy, Bronchial Brush & BAL during FOB (504)

Biopsy	Brush	BAL	Malignant (%)	Non-malignant (%)
36	36	36	29 (81%)	7 (19%)
4	4	0	3 (75%)	1 (25%)
86	-	86	55 (64%)	31 (36%)
120	-	0	52 (43%)	68 (57)
-	8	0	3 (37%)	5 (63%)
-	39	39	11 (28%)	28 (72%)
-	-	211	5 (2%)	206 (98%)
246	87	372	158	346

Discussion :

The aim of this study was to find out the causes of unresolved shadows on chest radiograph after broad-spectrum antibiotics for adequate time and the causes of unexplained respiratory symptoms especially haemoptysis and localised wheezing and also to find out the efficacy of bronchial biopsy, brushing and BAL in the diagnosis of lung cancer with their histological pattern and to compare the methods. This is so the first study of this kind was carried out in Bangladesh. Total number of cases were 504 in our series of them 421 (84%) were male and 83 (16%) were female. Less percentage of female in this study can be explained by the fact that in our country, social and religious factors, dependence of female on husband and or guardian and over and above lung cancer is not common in female. Male : Female ratio was this is very much similar with the findings of AM Mahmud et al¹⁰. The male : Female ratio was 9:1 in his series. This has also correlated with the findings of Crofton and Douglas⁸, have shown that the ratios being approximately 5:1. In the USA and Britain in 1970, falling to around 2:5:1 in 1982. This finding is not consistent with our finding. The likely reason for this is that tobacco smoking in women of these countries became increasingly popular.

Maximum patients in our series belong to 50-70years age groups. Of them 51% patients had malignancies (Table 2 & 3). This findings is similar with others. In a series of 473 patients Baum et al. 1998 found 51% of them belongs to above 50 years age groups. This finding is also consistent with the

finding of AM Mahmud et al.¹⁰. In his series majority of the patients was aged between 50-60 years.

Fibreoptic bronchoscopy was done in all patients, n=504. Of them bronchial biopsy was taken in n=246 patients. Biopsy was taken only in those patients where obvious endobronchial lesion was seen. The findings of bronchial biopsy were shown in Table-III. Among the lung cancer cases squamous cell carcinoma was predominating n = 94 (38%), next small carcinoma n=26 (11%), 07 (3%) patients had large cell carcinoma, 03 (1%) patient had adenocarcinoma. Malignancy was not found in 97 (39%) patients.

Endobronchial tuberculosis was found in 03 (1%) patients and 12 (5%) patients were kept in miscellaneous groups, which comprises pneumonia, lung abscess, fungal diseases of the lung.

The findings of bronchial brushings were shown in Table-IV. The total number of patients were no = 87, brushing was taken from the inflamed area where there is no obvious endobronchial lesion. Among the lung cancer again the squamous cell carcinoma is predominating n = 15 (17%) patients next small cell carcinoma 08 (9%) patients, large cell carcinoma 03 (3%), and adenocarcinoma 01 (1%) patients and 10 (11%) patients had atypical cells but no definite histological patterns were ascertained. Malignancy was not found 37 (43%) patients. Tuberculosis was diagnosed in 3 (3%) patients.

The findings of bronchoalveolar lavage were shown in Table-V. The total number of patients were n = 375 and BAL was taken only in those patients where there is no endobronchial lesion. Among the lung cancer again squamous cell carcinoma predominating and other findings were also similar like that of biopsy and brushing findings.

Finally the comparative findings of bronchial biopsy, brushing and BAL were shown in Table-VII.

In our series, 54% of lung cancer were diagnosed by biopsy alone, 41% patients by brushing and 9% patients by BAL. As we do not take biopsy, brushing and BAL in all the cases so our findings is not consistent with the findings of others authors. In 1986, Matsuda et al.¹¹ showed that among the total 443 cases of lung cancer, 400 (90.3%) cases were diagnosed to be lung cancer by bronchial brushing and 287 (64.8%) cases were diagnosed by bronchial

biopsy. Kvale et al.¹² found in their series 53 (77%) cases were diagnosed as lung cancer by bronchial brushing and 49 (79%) by bronchial biopsy.

But we have shown in Table-VII that when the three modalities that is bronchial biopsy, brushing and BAL were taken at that time diagnostic yield is very high that is about 81% irrespective of single procedure. When two modalities that is biopsy and brushing were taken diagnostic yield is 75% and biopsy and BAL 64%; brushing and BAL 28% cases. We have also showed that when there is no obvious endobronchial lesion or with minimum lesion like only signs of inflammation at that time if only brushing or BAL was taken that can be helpful for the diagnosis of unresolved shadows on chest x-ray.

Complications were very minimum, bleeding occurred in only 12 cases out of 504 cases patients at the site of lesion. 8 (eight) patients had developed bronchospasm, 5 patients developed fever after bronchoscopy. No other major complications were noted.

Conclusions :

- Fibreoptic bronchoscopy is a safe, informative and easy procedure for the diagnosis of suspected radiological shadows on chest radiography and is well tolerated by the patients.
- It can be done as an out patient procedure and patient can go home immediately after the procedure and complications are minimum.
- Multiple specimens that is bronchial biopsy, brushing and BAL can be obtained for achieving tissue diagnosis.
- In the evaluation of haemoptysis, fibreoptic bronchoscopy has been used to localize the anatomic sites of bleeding and it helps surgeons to take the decision of operability.

Recommendations

- Diagnostic yield of suspected pulmonary lesion is high if brushing, biopsy. BAL are taken from the suspected lung lesion.
- In case of no obvious endobronchial lesion at least BAL and brushing may give a clue for diagnosis of suspected lung lesion.
- The diagnostic yield of bronchial biopsy is much better than BAL and brushing in case of obvious endobronchial lesion.

- Fibreoptic bronchoscopy may be an important diagnostic tool for the diagnosis of pneumonia, lung abscess, viral & fungal diseases of the lung. Specially in immunocompromised patients.

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