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Diagnostic yield of bronchoscopic biopsy and bronchial washing in endoscopically visible lung malignancies

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Abstract
Flexible bronchoscopy techniques play a key role in diagnosing lung malignancies, particularly in endobronchial tumours. This study aims to assess the diagnostic yield of bronchoscopic biopsy and bronchial washing in endoscopically visible lung malignancies. Patients with endobronchial mass who had a definite cytological or histological diagnosis of lung cancer were included in the study. Of the 924 bronchoscopies conducted between June 2014 to May 2016, 95 had endobronchial mass lesions, out of which 73 were malignant. The individual diagnostic yields of biopsy and washing were 97.3% and 2.7% respectively. Cytology based sampling techniques by means of bronchial washing did not increase the diagnostic yield when compared to biopsy alone.

Keywords: Bronchoscopy, bronchial washing, bronchoscopic biopsy, endobronchial mass

1. Introduction
Flexible bronchoscopy plays a central role in the diagnosis of lung malignancy, especially in endobronchial tumours. It allows the sampling of cytological specimens as well as biopsies for histological diagnosis [1]. Prior to the introduction of the fiberoptic bronchoscope, the collection of cytologic specimens directly from the lesion was difficult in many cases. With the advent of the fiberoptic bronchoscope, a biopsy of the lesion by forceps or brushing under direct vision or by fluoroscopic control is possible in the majority of suspected bronchogenic carcinomas [2]. Pulmonologist come across significant number of intrabronchial mass lesions on bronchoscopy [3]. For endoscopically visible tumours, biopsies are the most common method of specimen collection with high diagnostic yield. Several studies have established that the overall diagnostic yield can be increased by adding cytological examination of bronchial washings in addition to forceps biopsy [1, 4-6]. Other studies have failed to show any improvement in diagnostic yield by adding bronchial brushings to biopsy in central tumours [7-9]. The aim of this study was to determine the value of bronchial washings in addition to forceps biopsy during flexible bronchoscopy in the diagnosis of endoscopically visible lung malignancies.

2. Materials and methods
The present study was a cross sectional study, conducted in the Department of Respiratory Medicine, Regional Institute of Medical Sciences (RIMS), Imphal. It was carried out between June 2014 and May 2016. Patients in whom an endoscopically visible lung mass and who had a definite cytological or histological diagnosis of lung cancer were included in the study. The diagnosis of pulmonary malignancy could have been established by either bronchoscopy or other diagnostic methods wherever applicable (sputum examination, fine needle aspiration cytology or pleural fluid examination). Out of total 95 patients with endobronchial lesions, 73 confirmed cases of lung cancer were included in the study. Uncooperative patients, patients with recent myocardial infarction and blood dyscrasias were excluded from the study.

Bronchoscopic procedures
All flexible bronchoscopies were carried out or supervised by the same bronchoscopist using the Olympus BF-1T150 fiberoptic bronchoscope. The patients were made to stay nil per orally for at least 6 hours before the procedure. Written informed consent was obtained from each patient. Topical anaesthesia was achieved with 10% lignocaine spray to the oropharynx and 2% lignocaine solution infused through the scope during the procedure. Once the endobronchial lesion was localised, biopsy was taken using the reusable round cup biopsy forceps FB-20C-1. Whenever possible, at least four biopsies were obtained from the centre of the most abnormal area and the specimens were immediately fixed in formalin and sent for histopathological examination. In each patient, biopsy was followed by bronchial washing. For bronchial washing, 10 to 20 ml aliquots of 0.9% normal saline at room temperature was instilled repeatedly and the aspirate was collected in a plastic trap bottle. The washing and biopsy specimens were sent to the laboratory for cytological and histopathological study respectively. All patients received supplemental oxygen and were monitored throughout the procedure.
When the cytological or biopsy specimens showed atypical or suspicious cells, they were considered non diagnostic.

3. Results
A total of 924 bronchoscopies were conducted during the study period, out of which 95 (10.3%) had visible endobronchial mass. Lung malignancy was proven in 73 cases. 15 lesions were benign while 7 cases gave inconclusive results.
The age group of patients ranged from 30 to 86 years (mean

age=67.9 years). Most of the patients (32.9%) belonged to the age group of 71 to 80 years (Figure 1).

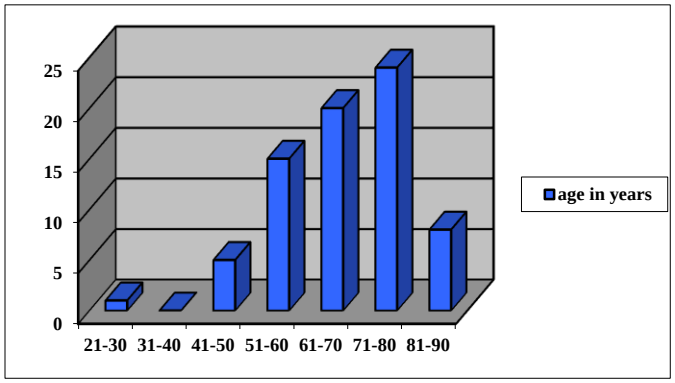

Fig 1: Age wise distribution of the cases

Figure 2 shows the distribution of cases according to the gender. Majority of the cases of lung malignancies were found in males (70%) when compared to females (30%).

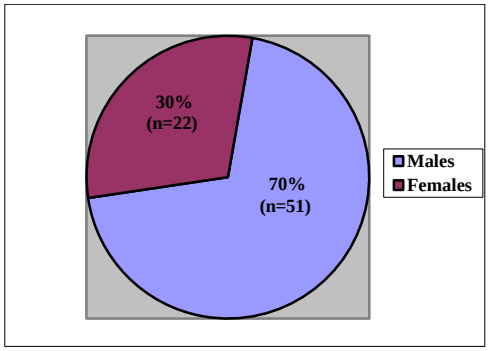

Fig 2: Gender wise distribution of the cases

Out of the total 73 confirmed cases of lung malignancies, squamous cell carcinoma was found to be the most common histological type accounting for 76.7% (n=56) followed by small cell carcinoma and adenocarcinoma which were found in 10.9% (n=8) each. 1.4% (n=1) turned out to be adenosquamous type (Table 1).

Table 1: Distribution of types of malignancies

S. No	Type of malignancy	No of patients (n=73)	Percentage (%)
1	Squamous cell carcinoma	56	76.7
2	Small cell carcinoma	8	10.9
3	Adenocarcinoma	8	10.9
4	Adenosquamous carcinoma	1	1.4

of the 73 patients with lung malignancy, a positive diagnosis was established by forceps biopsy in 71 of them giving a diagnostic yield of 97.3%. A positive cytology by bronchial washing was established in 2 cases giving a diagnostic yield of only 2.7%. Both bronchoscopic biopsy and washing were unable to provide diagnosis in 2 cases, in which a definite diagnosis of lung carcinoma was made by other investigations, namely pleural fluid cytology and fine needle aspiration cytology. The overall diagnostic yield of both the bronchoscopic procedures was 97.3% (Table 2).

When all the 95 endobronchial lesions are taken into account, including benign lesions, overall diagnostic yield of bronchoscopy was 90.5%. 7 cases gave inconclusive results (4 cases were lost to follow up while the other 3 did not give consent for repeat bronchoscopy).

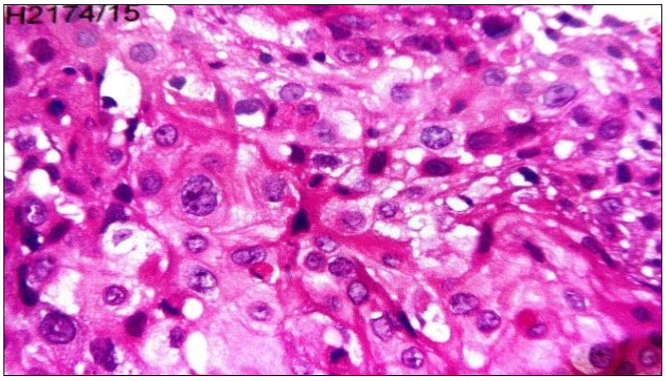

Fig 3.1: HPE of biopsy specimen showing features of squamous cell carcinoma

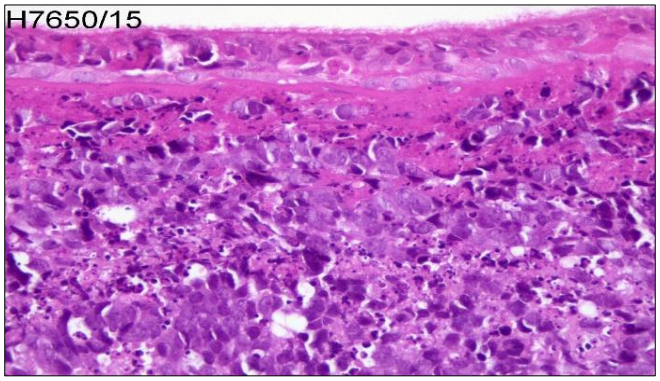

Fig 3.2: HPE of biopsy specimen showing features of small cell carcinoma

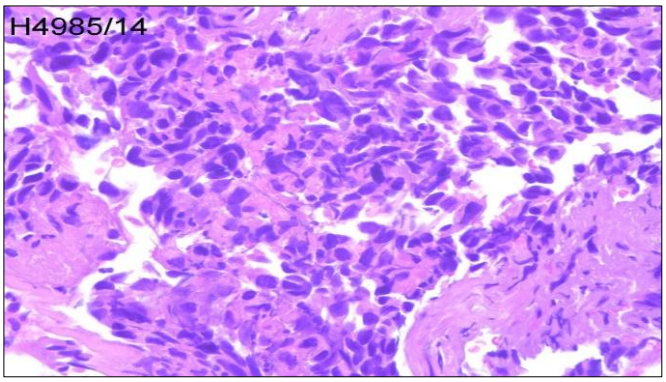

Fig 3.3: HPE of biopsy specimen showing features of adenocarcinoma

Table 2: Diagnostic yield of forceps biopsy and bronchial washing

S. No	Procedure	Positive results for malignancy (n=73)	%
1	Biopsy	71	97.3
2	Washing	2	2.7
3	Biopsy + washing	71	97.3

The diagnostic yield of forceps biopsy alone was equivalent to the overall diagnostic yield of the combined bronchoscopic procedures namely biopsy and washing. Addition of bronchial washing did not confer an additional yield when compared to forceps biopsy alone.

2 of the cases were diagnosed by other investigations. One case was diagnosed as squamous cell carcinoma from the fine needle aspiration cytology of lung mass. The histopathology findings of the forceps biopsy of this patient showed severe dysplasia. The other case turned out to be adenocarcinoma which was diagnosed from the pleural fluid cell block cytology. The biopsy of this patient also showed nuclear atypia on histological examination.

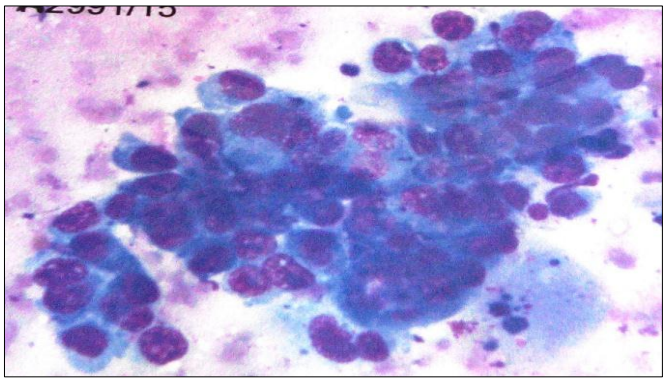

Fig 4 (a): Fine needle aspiration cytology of lung mass showing features of squamous cell carcinoma

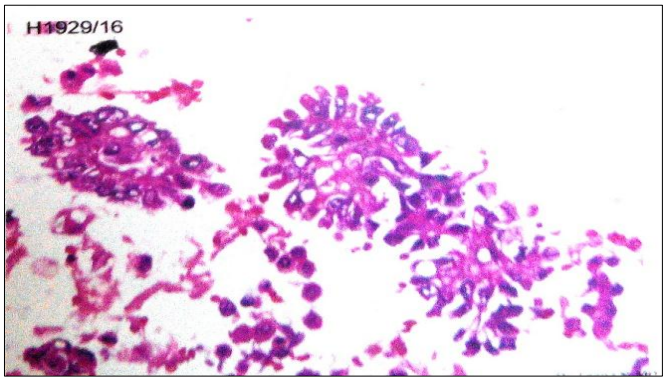

Fig 4 (b): Pleural fluid cell block cytology showing features of adenocarcinoma

4. Discussion

Flexible bronchoscopic examination remains an indispensable minimally invasive tool for diagnosis of lung cancer. However, there remains a controversy regarding the ideal combination of different bronchoscopic techniques to give the best results.

The present study shows a diagnostic yield of 97.3 % for forceps biopsy alone in endoscopically visible lung malignancies, which is similar to the findings of Zavala DC [10], who reported a diagnostic yield of 97% for forceps biopsy of endoscopically visible lung malignancies. This is also in accordance with the guidelines laid down by the American Thoracic Society / European Respiratory Society (ATS/ERS) according to which diagnostic yield of bronchoscopy should be more than 90% [11]. However the diagnostic yield was reported to be much lower (76.92%) in the study done by Fuladi *et al.* [12] who recommends adopting all the diagnostic procedures including brushing and washing, in addition to biopsy, in order to increase the overall diagnostic yield.

Among the lung malignancies, squamous cell carcinoma was found to be the most common type. This results are contrary to the findings of the more recently published studies which suggest that adenocarcinoma is the most prevalent lung cancer in India [13, 14]. The reason for this could be due to the central location of these tumours which are easier to assess by bronchoscopy when compared to adenocarcinomas which have a predominantly peripheral location which makes them nonvisible endoscopically. However, similar findings of squamous cell carcinoma as the predominant type were reported in certain other studies [3, 15, 16] of the total 73 confirmed lung malignancies, both bronchoscopic procedures i.e, biopsy and bronchial washing, failed to give a definite diagnosis in 2 cases. The diagnosis in these 2 cases were established by other investigations (pleural fluid cell block cytology and fine needle aspiration of the lung lesion). However it is important to note that the biopsy results in these 2 cases, did show nuclear atypia in one case and severe dysplasia in the other. These histological pictures were highly suggestive of malignant lesions. In the present study, for the purpose of finding the diagnostic yield, these findings were considered as non-diagnostic.

The yield of bronchial washing alone, was only 2.7%, which is much lower than most of the published data [1, 4, 5]. Although the reason is not clear, this could possibly be due to preparation technique and processing of the collected samples. The order in which the specimens were collected (before or after biopsy) is unlikely to influence the diagnostic yield.

The addition of bronchial washing did not provide an increase in the yield when compared to biopsy alone. Similar findings were reported by certain studies [7, 9] where no significant improvement was found with the addition of bronchial washing. However the findings of our study is in contrast to the results of other previous studies [1, 4, 6] which conclude that bronchial washing conferred an additional yield. The results of our present study suggests that forceps biopsy alone proves to be the most important bronchoscopic procedure in the diagnosis of endoscopically visible lung malignancies with a high diagnostic yield.

5. Conclusion

The diagnostic yield and tumour detection rate of flexible bronchoscopy in endoscopically visible lung malignancies is considerably high. Cytological based sampling by bronchial washing did not provide any additional increase in the overall diagnostic yield when compared with forceps biopsy alone. For endoscopically visible lung malignancies, forceps biopsy alone has a high diagnostic yield.

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