

## Original Article

# Efficacy of Bronchial Wash and Brush Cytology and its correlation with Biopsy in Lung Lesions

D Raiza<sup>1</sup>, Sudhasmita Rout<sup>2</sup>, K Prasada Reddy<sup>3</sup>, PVB Ramalaxmi<sup>4</sup>  
BK Prithvi<sup>5</sup>, K Subramanyam Harikishan<sup>6</sup>

**Abstract :** Back ground : Lung cancer is the commonest cause of cancer related deaths worldwide. So early diagnosis and management is the key to prevent mortality. Bronchoscopic guided washing and brushing can complement histological biopsy in early diagnosis as it is having good cytological yield. The aim of this study is to evaluate the efficacy of bronchoscopic washings, brushings and its correlation with subsequent biopsy in diagnosing lung lesions. Materials and methods : Prospective study of 38 cases from 20 to 70yrs of age was conducted in department of pathology, MIMS from Jan 2013 to Dec 2013. They had visible endobronchial lesions by flexible bronchoscopy and subjected to cytological washing and brushing study and subsequent biopsy. Cytological and biopsy specimens were fixed in isopropyl alcohol and formalin respectively and stained with Hemotoxylin & Eosin stain. Results : Cytology revealed 12 malignant, 13 benign, 5 suspicious and 2 inadequate smears respectively. Histopathology of these cases confirmed 23 as malignant and 14 as benign. True positive were 16 and true negative were 13 cases. 1 false positive case and 6 false negative cases were reported. The bronchial wash cytology showed sensitivity of 80.5%, specificity of 92.85% and accuracy of 80.5%. Conclusion : Bronchial cytology is a valuable tool and yields almost same information as biopsy.

**Key Words :** Bronchial washings, Biopsy, Lung Cancer

**Introduction :** Lung cancer is currently the most frequently diagnosed and the common cause of cancer related mortality worldwide. The increasing incidence could be due to increase in smoking, change in life style, increased environmental pollution and also the availability of different modern diagnostic modalities to detect lung cancer.

Similarly, pulmonary tuberculosis still remains a leading cause of death in developing countries.

To treat the disease successfully, it should be diagnosed at earliest possible stage. For early diagnosis different diagnostic modalities are available which include; radiology, bronchoscopy, bronchial biopsy, brushing, washing cytology. It is not possible to perform all techniques in each patient because each has specific advantages and disadvantages. However their combined use yields the best results.<sup>1-3</sup>

Bronchial biopsies cannot be performed in more peripheral sites or in patients at risk of haemorrhage. So alternative methods for diagnosis are sometimes required. Bronchoscopic washing, brushing may complement tissue biopsies in the diagnosis of lung lesions<sup>4,5</sup>. The bronchial washing is a safer technique. There is still disagreement as to the value and reliability of wash and brush cytology in comparison with histology for the diagnosis of malignancy. An attempt has been made to determine whether a combination of biopsy procedure is more effective than a cytological methods in both neoplastic and non-neoplastic lung lesions.<sup>6,7</sup>

**Materials and Methods :** A prospective study of 38 patients was done from January to December 2013 in Department of Pathology, MIMS. The samples for cytological and histological examination were collected from the patients with pulmonary signs and symptoms and their radiology and bronchoscopic examination suggested a lung mass. The samples were obtained by flexible fiberoptic bronchoscopy done in the Department of pulmonary medicine, Maharajahs Institute of Medical Sciences.

<sup>1</sup>Post-graduate, <sup>2</sup>Assistant Professor, <sup>3</sup>Professor, <sup>4</sup>Professor  
Department of Pathology

<sup>5</sup>Post-graduate, <sup>6</sup>Assistant Professor, Department of  
Pulmonary Medicine

Maharajahs Institute of Medical Sciences,  
Vizianagaram-535217, AP

The bronchial wash material was obtained from the bronchial tree by instilling 30 to 50 ml of isotonic saline and re-aspirating it. All the samples were preserved in 50% ethyl alcohol. The specimens were centrifuged for five minutes at a rate of 1500 revolutions per minute. Slides were prepared from cell concentrate and stained with H&E stain. The smears were grouped into malignant, benign, suspicious and unsatisfactory/inadequate category. Bronchial brushings were obtained by the use of a stiff-bristle disposable brush.

Brushing material was smeared directly on to at least three clean glass slides and stained with H&E stain. Biopsy was done with regular cup-forceps, fixed in formalin and paraffin embedded sections were stained with H/E stain. Special stains like AFB (acid fast bacilli), PAS (periodic acid Schiff) was done wherever necessary.

**Results :** Samples from 38 patients were evaluated with a male to female ratio of 6:1. The mean age of presentation was 45 to 60yrs in both males and females.

Cytological examination revealed 12 malignant cases along with 5 suspicious cases (Table-1). Out of these 5 suspicious cases, 4 proved to be malignant on histopathology. So these 4 cases were included in true positive cases. Only one case with suspicious report showed features of squamous metaplasia, so included in false positive category. 13 cases were labeled as true negative because these were confirmed on biopsy also as benign. 6 smears were false negative because cytologically these were benign and on histology proved to be malignant.

The benign cases were diagnosed as tuberculosis (5), aspergillosis (1) and non specific inflammation (13). Cytological typing of tumor (Pie chart) showed 11 cases to be squamous cell carcinoma, 1 case as adenocarcinoma. 2 smears on cytology came as insufficient or inadequate. Out of these 2 inadequate smears 1 proved as squamous cell carcinoma histopathologically.

On biopsy examination (Table-2), 23 cases (60.52%) were malignant whereas 14(36.8%) cases were proved as benign. Among the malignant cases, squamous cell carcinoma were 21 and adenocarcinoma were 02. In the category of benign lesions, chronic granulomatous inflammation was noted in 6 cases (4 tuberculous lesion and 2 as aspergillosis) and 8 cases were revealed as acute and chronic non specific inflammation.

The bronchial cytology revealed a sensitivity of 72.72%, specificity of 92.85% and an accuracy of 87.5%. As far as malignant and benign lesions are concerned, complete cytological and histological correlation was observed in 29 cases (80.5%) (Table-3).

**Table-1 Types of lesion on cytology (n=38)**

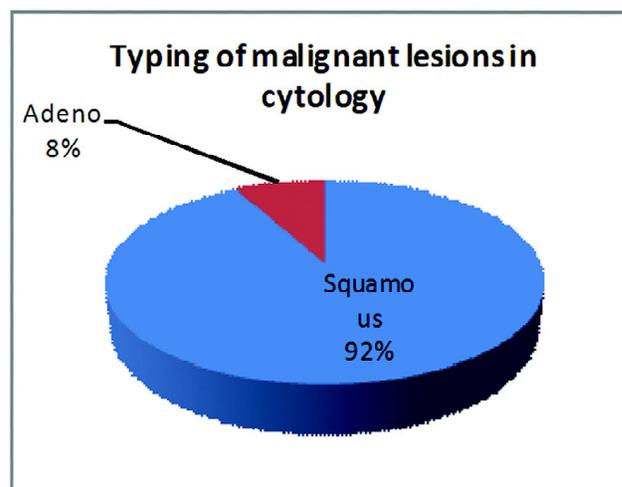
Non neoplastic lesion	19
Neoplastic lesions	12
Suspicious	05
Inadequate	02

**Table-2 Types of lesion in biopsy (n=38)**

Non neoplastic lesion	14
Neoplastic lesions	23
Inadequate	01

**Table-3 Comparison of cytological and biopsy results (n=38)**

Diagnostic Category	Cytology	Biopsy
Non neoplastic lesion	19	14
Neoplastic lesions	12	23
Suspicious	05	-
Inadequate	02	01



**Table-4 Comparison of cytological and biopsy results (n=38)**

		Cytology	Histology
Benign	Tuberculosis	05	04
	Aspergillosis	01	02
	Nonspecific inflammation	13	08
Malignant	Squamous cell carcinoma	11	21
	Adenocarcinoma	01	02
	Suspicious	05	0
Inadequate	Sample	02	01

**Discussion :** Lung tumors are the most common cause of death due to cancer in men and are now emerging as an important cause of cancer related mortality in females.<sup>8</sup>The male to female ratio in this study was 6:1 which is closer to other studies<sup>9</sup>. Majority of these cases were found in their 5th and 6th decades. This could be due to higher prevalence of smoking in males in our society. The objective of present study is to assess the sensitivity and specificity of bronchoscopic cytological procedures; bronchial washing and brushings, comparing them with biopsy of lung lesions. The first realization that cancer of the lung could be accurately diagnosed and typed by the microscopic study of expectorated cells is generally attributed to Dudgeon and Barret.<sup>10</sup>

Fibreoptic bronchoscopy was introduced in 1968 as a diagnostic procedure. Since then apart from sputum, different methods for obtaining satisfactory specimens have become available. The specimens collected by fiberoptic bronchoscope yield a higher positive rate. The sensitivity of bronchial aspirates in diagnosing lung cancers has been 75 to 88.1 % by various studies.<sup>7,11</sup> The bronchial secretion smear cytology that was used previously was discontinued because of lack of representative smears. Now bronchial brushings are favored for the cytological investigation of proximal lung cancers. From management point of view, lung tumors are generally separated into small cell carcinomas and non small cell carcinomas. For small cell carcinomas intensive chemotherapy is advised whereas the non-small cell carcinomas are better treated surgically. More than 80% cases have been correctly typed by Truong and co-workers with sputum, washing or brushing cytology.<sup>12</sup>

In our study only one case was false positive which is less than the study by Tanwani and Haque.<sup>9</sup>This false positive case was due to squamous metaplasia along with dysplasia. False positivity may occur due to misinterpretation by the cytopathologist due to chronic inflammatory cells, epithelioid cells, atypical histiocytes or squamous metaplasia. These false positive cytological results may have serious consequences for the patients in which biopsy is not possible due to risk of haemorrhage or anatomical obstruction. Therefore it is advisable to under diagnose suspicious/atypical smears.

Out of 38, six cases were false negative in the present study which is higher than the previous study.<sup>9</sup>The reasons for false negative results could be superadded inflammation, non representative sample or hypocellular aspirates. In this study the accurate correlation between histological and cytological results was found in 29 of 36 cases (80.5%) which is similar to the study by Naryshkin and Daniel.<sup>13</sup> In another two studies this correlation was 81.8%<sup>14</sup>and 88.4%<sup>11</sup> respectively. The diagnostic efficacy of cytology in our series showed 80.5% sensitivity and 92.85% specificity which is comparable to a study by Jay and colleagues.<sup>15</sup> The overall accuracy of bronchial cytology was 75% and 75.4% by two other studies by Truong et al<sup>12</sup> and Chaudhary et al<sup>16</sup> respectively, whereas in present study it was slightly higher (85.3%). As for as the typing of lung tumor on cytology is concerned, it was 92% which compared to another study where it was 90%<sup>17</sup>but histopathology revealed 100% accuracy in typing of lesion that is more than the cytological typing (92%) (table-4).The difficulties in specifying the tumor on cytology can be lack of cell groups, keratinisation, mucus production and scant cellular material. In our series the frequency of suspicious smear was 3% whereas Spjut et al<sup>18</sup> reported it as 10%. Out of 5 cases with a suspicious cytologic report in our series, four were diagnosed as malignancy in biopsy (squamous cell carcinoma) which is lower to another study at USA (1995) where 94% suspicious cases proved to be malignant on histology.

## Conclusion

Pulmonary wash and brush cytology has excellent sensitivity, specificity and accuracy. It yields almost same information as biopsy and is particularly useful in patients with evidence of obstruction or risk of haemorrhage.

It is quite safe, economical and an experienced cytopathologist is necessary for interpretation of smears. But regarding individual typing of lesions, biopsy is more effective than cytological study. The combination of endobronchial cytology with biopsy can be considered as the best procedures for the diagnosis of lung cancer during bronchoscopy.

## References

- 1) Aziz F, Ihsan H. Diagnostic evaluation of bronchial washing, brushing and biopsy in bronchogenic carcinoma: a prospective study of 97 cases. *Ann King Edward Med Cell* 1998; 4: 5-6.
- 2) Karahalli E, Yilmaz A, Turker H, et al. Usefulness of various diagnostic techniques during fiberoptic bronchoscopy for endoscopically visible lung cancer: should cytologic examination be performed routinely? *Respiration* 2001; 68:564-5.
- 3) Chaudhry MK, Rasul S, Iqbal ZH, et al. Fiberoptic bronchoscopy - role in the diagnosis of bronchogenic carcinoma. *Biomedica* 1998; 14:32-6
- 4) Young JA. Techniques in pulmonary cytopathology. *ACP Broadsheet* 140. *J Clin Pathol* 1993; 46:589-95.
- 5) Jones AM, Hanson IM, Armstrong GR, et al. Value and accuracy of cytology in addition to histology in the diagnosis of lung cancer at flexible bronchoscopy. *Respir Med* 2001; 95: 374-8.
- 6) Johnston WW, Elson CE. Respiratory tract. In : Bibbo M, ed. *Comprehensive cytopathology*. Philadelphia: WB Saunders, 1991, pp. 320-98.
- 7) DiBonito L, Colautti I, Patriarca S, et al. Cytological typing of primary lung cancer: study of 100 cases with autopsy confirmation. *Diagn Cytopathol* 1991;7:7-10.
- 8) Shopland DR, Eyre HJ, Pechacek TF. Smoking - attributable cancer mortality in 1991: is lung cancer now the leading cause of death among smokers in the United States? *J Natl Cancer Inst* 1991;83:1142-8
- 9) Tanwani AK, Haque A. Co-relation of bronchial brushing with biopsy in lung lesions. *Pak J Med Res* 2000; 39:115-20.
- 10) Dudgeon LS, Barrett NR. The examination of fresh tissues by the wet-film method. *Br J Surg* 1934; 22:4-22.
- 11) Piaton E, Grillet-Ravigneaux MH, Saugier B, et al. Prospective study of combined use of bronchial aspirates and biopsy specimens in diagnosis and typing of centrally located lung tumors. *BMJ* 1985; 310:624-7.
- 12) Truong LD, Underwood RD, Greenberg SD, et al. Diagnosis and typing of lung carcinomas by cytopathologic methods: a review of 108 cases. *Acta Cytol* 1985; 29:379-84.
- 13) Naryshkin S, Daniels J, Young NA. Diagnostic correlation of fiberoptic Bronchoscopic biopsy and bronchoscopic cytology performed simultaneously. *Diagn Cytopathol* 1992; 8:119-23.
- 14) Rosell A, Monso E, Lores L, et al. Cytology of bronchial biopsy rinse fluid to improve the diagnostic yield for lung cancer. *Eur Respir J* 1998;12:1415-8.
- 15) Jay SJ, Wehr K, Nicholson DP, et al. Diagnostic sensitivity and specificity of pulmonary cytology: comparison of techniques used in conjunction with flexible fiber optic bronchoscopy. *Acta Cytol* 1980;24:304-12.
- 16) Chaudhary BA, Yoneda K, Burki NK. Fiberoptic bronchoscopy: comparison of procedures used in the diagnosis of lung cancer. *J Thorac Cardiovasc Surg* 1978; 76: 33-7.
- 17) De Villaine S, Mesguich P, Fabien N, et al. Evaluation of the role of cytology in the diagnosis of cancer of the lung: comparison between cytology and pathological anatomy in 330 cases of proximal cancers. *Rev Mal Respir* 1996;13:295-9.
- 18) Spjut HJ, Fier DJ, Ackerman LV. Exfoliative cytology and pulmonary cancer: a histopathologic and cytologic correlation. *J Thoracic Surg* 1995;30:90-7.

Financial Support : Declared None

Conflict of Interest : Declared None