Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Pathology and Oncology

Journal homepage: www.ijpo.co.in

Original Research Article

To evaluate the sensitivity of cytological examination of endobronchial biopsy, BAL, bronchial brushing and sputum in diagnosing lung carcinoma

Surekha Sharma[1], **Jai Singh**[2,*]

[1] *Paras Pathology, Gwalior, Madhya Pradesh, India*
[2] *Dept. of Pathology, CHC, Fatehpur, Uttar Pradesh, India*

ARTICLE INFO

Article history:
Received 14-12-2020
Accepted 23-12-2020
Available online 20-02-2021

Keywords:
Cytology
Endobronchial
Biopsy
BAL & Carcinoma

ABSTRACT

Background & Method: All the cases of suspected bronchial malignancy were included in present study in which broncho-alveolar lavage (BAL) and bronchial biopsy samples were received in pathology department for evaluation. Respective bronchial brushings & sputum samples were also studied where ever available.
Study Designed: Cross sectional study.
Result: In our study, correctly diagnosed adenocarcinoma of lung on BAL were 27.7%, sqaumous cell carcinoma were 26.6%, small cell carcinoma were 40% and BAL cytodiagnosis from miscellaneous tumor could only be made in 14.2% cases.
Conclusion: Endobronchial biopsy and BAL, both were studied, sensitivity of cases increases and number of false negative cases decreases for diagnosis. Bronchial brushing has better sensitivity than BAL for diagnosis of lung carcinoma. Sputum is less sensitive than bronchial brushing for diagnosis of lung carcinoma.

1. Introduction

Johannes Müller (1801-1858), was the first, in 1838, to show cancer cells. In 1846, the same author described and illustrated cancer cells in blood-stained sputum. A French pathologist, collected specimens for cytologic examination from effusions, tracheobronchial secretion, and urine, and published his cytology atlas in 1845.[1] Cytologic examination of sputum was soon introduced as routine laboratory procedure and microscopic examination of ascitic fluid was employed for diagnosis of peritoneal carcinomatosis. Malignant cells were recovered from cerebrospinal fluid in 1904 and shortly thereafter gastric washing was introduced.[2]

Bronchioloalveolar carcinoma is a rare subtype of lung adenocarcinoma and it has not been definitely linked to cigarette smoking. It accounts for 1-5% of primary lung cancers and can be unifocal or multifocal.[3] The tumor is characterized by cuboidal or low columnar tumor cells with conspicuous nucleoli growing along pre-existing alveolar walls. It can be mucinous or nonmucinous and intranuclear cytoplasmic inclusions may be present. In sputum, small cuboidal tumor cells with oval nuclei are seen predominantly in tridimensional clusters. In materials obtained by bronchial brushing or FNA the tumor cells are commonly seen in large monolayer sheets with nuclear crowding and overlapping. Intranuclear cytoplasmic inclusions may be noted. Cells from a mucinous bronchioloalveolar carcinoma are CK7, CK20 positive and TTF1 negative. Tumor cells from a non-mucinous tumor may express surfactant proteins (SP-A, pro-SP-B, pro-SP-C).[4]

* *Corresponding author*.
E-mail address: dr.surekhasharma@gmail.com (J. Singh).

https://doi.org/10.18231/j.ijpo.2021.014

2. Materials and Methods

The present study was conducted in department of Pathology at Lok Nayak Jai Prakash Hospital, New Delhi over a period of 02 Years & One Month from March 2018 to April 2020. 343 BAL samples were received in our department, of which 216 cases were suspicious of malignancy on their clinical provisional diagnosis.

All the cases of suspected bronchial malignancy were included in present study in which broncho-alveolar lavage (BAL) and bronchial biopsy samples were received in pathology department for evaluation. Respective bronchial brushings & sputum samples were also studied where ever available.

2.1. Inclusion criteria

1. First time visiting patients.
2. Clinically suspicious adult cases of bronchial cancer.
3. Patients whose BAL and bronchial biopsy both were received.

2.2. Exclusion criteria

1. Patients of paediatric age group.
2. Patients with known inflammatory lung disease.
3. Patient with lung mass with no endobronchial component.
4. Patients whose either BAL or bronchial biopsy was not received.
5. Inadequate bronchial biopsy sample.
6. Previously diagnosed cases of carcinoma lung or bronchial carcinoma.

All the BAL, bronchial brushings, sputum & bronchial biopsy samples received in pathology department in study period were collected & further processed as follows:

Sterile wide mouth containers of 30 ml capacity with label to write details of patient like name, registration number, ward number, date of sample collection were provided to department of Respiratory Medicine for collection of sputum & BAL samples.

3. Results

Out of 117 cases of BAL cytology, 23 (19.6%) cases were diagnosed as malignancy, 33 (28.2%) cases were of acute inflammatory infiltrate, 19 (16.2%) cases were of chronic inflammatory infiltrate, 22 (18.8%) cases were of mixed inflammatory cell infiltrate, 13 (11.1%) cases were reported as normal and 7 (5.9%) cases were found to be inadequate for any microscopic conclusion.

BAL cytology of 4 cases out of 117 initial cases, were diagnosed as malignant BAL, in which endobronchial biopsy was not helpful.

Of the 72 confirmed cases of carcinoma of lung, BAL cytodiagnosis was positive in 19 cases. Thus, in our series, the pickup rate of lung cancer by cytology was 26.3%. In 30 Squamous cell carcinoma patients, BAL cytology was positive for malignancy in 8 (26.6%) cases, for 18 cases of adenocarcinoma 5 (27.7%) cases were positive, for 10 cases of small cell carcinoma 4 (40%) were positive and for 14 cases of miscellaneous carcinoma's of lung, 2 cases (14.2%) were positive on BAL cytology.

In our study, correctly diagnosed adenocarcinoma of lung on BAL were 27.7%, sqaumous cell carcinoma were 26.6%, small cell carcinoma were 40% and BAL cytodiagnosis from miscellaneous tumor could only be made in 14.2% cases.

4. Discussion

In our study sensitivity of bronchial brushing is 54.16%, which is in concordance with Cheng Wang et al[5] 61.9%, and with Gaber K A[6] 41%. Anupam Sarma[7] concluded higher bronchial brushing sensitivity percentage of 87.3 and 71.43 respectively. A "false negative" finding in bronchial brushing study can be expected whenever the nylon brush is inaccurately placed or the bronchus draining the lesion is obstructed.

Comparison of the cytological characters of bronchial brushings and BAL showed that cellularity of the smear was greater in brush specimens with numerous columnar cells noted against a clear background whereas BAL samples tended to shed mostly single malignant cells with occasional cell clusters which were larger in brush than in washing samples.

In bronchial brushing the surface of the malignant lesion is scraped by the brush, the cells retrieved show better preserved morphological details in comparison to the cells which have already exfoliated into the bronchial cavity. Thus this technique manages to 'dislodge' the cells from the surface of those well differentiated malignant lesions too, which do not exfoliate cells readily. Thus, the chances of getting adequate diagnostic cytological sample by BB greatly increase in comparison to BAL samplings.Bronchial brushing is a much superior technique in the diagnosis and morphological typing of lung cancers, as it demonstrates far better Specificity, Sensitivity and Accuracy, in comparison to BAL.[8]

Sputum cytology was positive in 1 of 3 confirmed cases of carcinoma lung. Thus, the sensitivity (pick up rate) was 33.3% this is comparable with that of 31.6% of Choi Y D[9] study, 36% in case of Gledhill A[10] study, 40% in case of Sing A[11] study and 45.3% in Khalid M[12] study.

5. Conclusion

Endobronchial biopsy and BAL, both were studied, sensitivity of cases increases and number of false negative cases decreases for diagnosis. Bronchial brushing has better sensitivity than BAL for diagnosis of lung carcinoma.

Table 1: Distribution of 117 BAL cases

	Carcinoma	Acute inflammatory infiltrate	Chronic inflammatory infiltrate	Mixed inflammatory infiltrate	Normal	Inadequate	Total
BAL	23 (19.6%)	33 (28.2%)	19 (16.2%)	22 (18.8%)	13 (11.1%)	07 (5.9%)	117 (100%)

Table 2: Diagnostic efficacy of BAL cytology in different types of carcinoma

Type of carcinoma	Total/ histological diagnosis	Bal cytodiagnosis
Squamous cell carcinoma	30	8 (26.6%)
Adenocarcinoma	18	5 (27.7%)
Small cell carcinoma	10	4 (40%)
Other tumor	14	2 (14.2%)
Total	72	19 (26.3%)

Table 3: BAL cytodiagnosis of histologicaly proven specific carcinomas

Cytological diagnosis	Adenocarcinoma	Squamous cell carcinoma	Small cell carcinoma	Others
Malignant fluid	5 (27.7%)	8 (26.6%)	4 (40%)	02 (14.2%)
Acute inflammatory lesion	-	9 (30%)	1 (10%)	04 (28.5%)
Chronic inflammatory lesion	4 (22.2%)	-	-	03 (21.4%)
Mixed inflammatory cell lesion	4 (22.2%)	9 (30%)	2 (20%)	02 (14.2%)
Normal	4 (22.2%)	2 (6.6%)	2 (20%)	02 (14.2%)
Inadequate sample	1 (5.5%)	2 (6.6%)	1 (10%)	01 (7.14%)
Total	18	30	10	14

Sputum is less sensitive than bronchial brushing for diagnosis of lung carcinoma.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

References

1. Webb J, Clarke SW. A comparison of biopsy results using rigid and fibreoptic bronchoscopes. *Br J Dis Chest*. 1980;74:81–3. doi:10.1016/0007-0971(80)90012-1.
2. Choudhury M, Singh S, Agarwal S. Efficacy of bronchial brush cytology and bronchial washings in diagnosis of non neoplastic and neoplastic bronchopulmonary lesions. *Turk J Pathol*. 2012;28(2):142–6. doi:10.5146/tjpath.2012.01113.
3. Humphrey PA, Dehner LP, Pfeifer JD. The Washington manual of surgical pathology. 4th ed.; 2011.
4. Johnston WW. Cytologic Diagnosis of Lung Cancer. *Pathol Res Pract*. 1986;181(1):1–36. doi:10.1016/s0344-0338(86)80184-4.
5. Wang C, Duan Q, Kelly M. Accuracy of bronchial brush and wash specimens prepared by the Thin Prep method in the diagnosis of pulmonary small cell carcinoma. *Cancer Cytopathol*. 2014;122(8):577–85.
6. Gaber KA, Goldman JM, Farrell DJ. Cytological examination of the whole endobronchial brush in bronchoscopic diagnosis of lung cancer. *Respir Med*. 2002;96(4):259–61. doi:10.1053/rmed.2001.1263.
7. Sarma A, Sharma JD, Bhuyan C. A Study of Cytological Evaluation of Bronchial Washing and Brushing In Bronchogenic Carcinoma. *Int J Sci Res Publications*. 2013;3(8):2250–3153.
8. Llamas R, Gupta SK, Ortiz J, Viamonte M, Giraldo H, DeSouza W, et al. Role of Bronchial Brushing in the Evaluation of Peripheral Lung Lesions. *Chest*. 1971;59(1):56–8. doi:10.1378/chest.59.1.56.
9. Choi YD, Han CW, Kim JH, Oh IJ, Lee JS, Nam JH. Effectiveness of sputum cytology using Thin Prep method for evaluation of lung cancer. *Diagn Cytopathol*. 2008;36(3):167–71.
10. Gledhill A, Bates C, Henderson D, DaCosta P, Thomas G. Sputum cytology: a limited role. *J Clin Pathol*. 1997;50(7):566–8. doi:10.1136/jcp.50.7.566.
11. Sing A, Freudenberg N, Kortsik C, Wertzel H, Klosa B, Hasse J. Comparison of the Sensitivity of Sputum and Brush Cytology in the Diagnosis of Lung Carcinomas. *Acta Cytol*. 1997;41(2):399–408. doi:10.1159/000332531.
12. Khalid M, Younus M, Rehman AU, Zafar SF, Bukhari SMH. The Importance of Sputum Cytology in the Diagnosis of Lung Cancer. *Ann*. 2010;16(3):198–204.

Author biography

Surekha Sharma, Consultant Pathologist

Jai Singh, Medical Officer, Incharge Blood Bank

Cite this article: Sharma S, Singh J. To evaluate the sensitivity of cytological examination of endobronchial biopsy, BAL, bronchial brushing and sputum in diagnosing lung carcinoma. *Indian J Pathol Oncol* 2021;8(1):68-70.