

BRONCHOSCOPIC BRUSH CYTOLOGY IN THE DIAGNOSIS OF LUNG LESIONS

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ABSTRACT

BACKGROUND

Respiratory cytology has assumed a primary diagnostic place in the makeup for patients with pulmonary disease. Diagnosis of cellular specimens from the respiratory tract is established throughout the world as a vital diagnostic procedure in evaluation of any patient with a suspected lung lesion in which morphological confirmation is indicated. At present, most of the major medical institution throughout the world utilise some combination of various cytological specimens in the diagnostic workup of patient with suspected lung cancer.

MATERIALS AND METHODS

Samples were collected from patients with definite lung lesions and subjected to fiberoptic bronchoscopy referred from various departments of V.S.S. Medical College Hospital. Specimens of brush cytology and biopsy from the site of lesion of histopathological study were included.

RESULTS

Majority of them were males (88%). Majority of cases were in the age group of 51 to 60 years and were of inflammatory origin. Inflammatory cases age range was from 21-70 years, whereas for malignant cases, the age range was from 31-70 years. Both inflammatory and malignant lesions were more common in older age groups (5th to 6th decade). Radiologically, the zonal distribution of lesions revealed maximum number of cases in the mid zone 16 cases (37.20%), which coincided with the central lesions of bronchoscopy.

CONCLUSION

Bronchoscopic brush cytology is a simple, safe and inexpensive procedure for diagnosis of lung lesions.

KEYWORDS

Bronchoscopy, Brush cytology, Biopsy.

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BACKGROUND

Diagnosis of cellular specimens from the respiratory tract is established throughout the world as a vital diagnostic procedure in evaluation of any patient with a suspected lung lesion in which morphological confirmation is indicated.¹ At present, most of the major medical institution throughout the world utilise some combination of various cytological specimens in the diagnostic workup of patient with suspected lung cancer.

Though sputum cytology continues to be the most frequently examined specimen than bronchial washing, brushing, BAL and FNAB, which are gaining irreplaceable position in the use of cytology. Each technique has its own indication, limitation and frequently complements each other. Sputum examined as multiple specimens will show

more central tumours, whereas bronchial brushings and FNAB will show more peripheral and subpleural lesions.²

Recalling the histogenesis of lung cancer (primary) is a very persuasive aid for comprehending exactly why is that cytological diagnosis of respiratory tract maybe successful. The reason is mainly that most primary lung cancers arise from epithelial lining of respiratory passages and have the potential of shedding cancer cells has rested for cytological diagnosis by method of fiberoptic bronchoscopy, BAL or FNAB.³ Of all methods, the cytological diagnostic yield of brush cytology is of great value and has been proved by various studies. Hence, this present study was conducted to determine the usefulness of bronchoscopic brush cytology in the diagnosis of lung lesions.

MATERIALS AND METHODS

The present study entitled bronchoscopic brush cytology in the diagnosis of lung lesions was conducted in the Department of Pathology, V.S.S. Medical College, Burla, over a period of one year. Samples were collected in the chest department from patients with definite lung lesions subjected to fiberoptic bronchoscopy referred from various departments of V.S.S. Medical College Hospital. Specimens included of both brush cytology and biopsy from the site of lesion for histopathological study.

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A prebronchoscopic clinical assessment of the patients was done according to the definite plan of study followed by bronchoscopic studies with the flexible fiberoptic bronchoscope (Pentax FB-19Tx) was performed. The patients were premedicated with Intramuscular (IM) Injection (Inj.) of midazolam 1 mg and IM Inj. of atropine 0.6 mg. Oxygen was given to assist ventilation. Topical anaesthesia was accomplished with lidocaine spray of the nose and pharynx. Additional lidocaine was installed through the suction channels of bronchoscope. The transnasal approach was used in nearly all patients. The fiberoptic bronchoscope catheter being inserted through the nose and passed under fluoroscopic control into the trachea, bronchi and manipulated into appropriate segmental bronchus until it comes close to the lesion. Nylon brush was passed through the catheter to obtain specimen from the lesion. The brush is smeared into 2 glass slides and immediately immersed in 95% of alcohol. In most cases, a total of four smear studies were submitted by two passages through brush. Papanicolaou stain (modified Papanicolaou-Traut technique) was used for cytological staining. This technique uses Harris haematoxylin regressively. The cells are intentionally overstrained and excess haematoxylin was removed by differential extraction of hydrochloric acid (acid-alcohol).

All the lung lesions diagnosed by fiberoptic bronchoscopy were based according to the cytopathologic finding of exfoliative respiratory cytology of Koss (1979) and

Cytopathology of Pulmonary Disease - Dorothy L. Rosenthal (1988).

RESULTS

The present study of bronchoscopic brush cytology in the diagnosis of lung lesions with histopathological correlation included 43 cases during the study period. The patients subjected to bronchoscopy included those with the definite lung lesion proved clinically and radiologically.

Age (Years)	Male	Female	Total	Percentage
21-30	3	1	4	9.30%
31-40	4	1	5	11.62%
41-50	10	1	11	25.58%
51-60	13	1	14	32.55%
61-70	8	1	9	20.93%
Total	38 (83.3%)	5 (11.6%)	43	-

Table 1. Distribution of Study Subjects Based on Age and Sex

38 cases (88.37%) were males and 5 cases (11.63%) were females with a male:female ratio 7.5:1. Male predominance was seen in all age groups. The largest number of cases presenting with lung lesions were in the 51 to 60 years age group (32.55%) followed by 41-50 years age group (25.57%). Lowest incidence was seen in the age group 21-30 (9.34%).

Lesion		Apical	Mid Zone	Lower Zone	Diffuse	Total	Percentage
Normal	2	-	-	-	-	2	4.65
Inflammatory	-	7	7	6	4	24	55.81
Malignant	-	2	9	1	5	17	39.53
Total	2	9	16	7	9	43	-
Percentage	4.65	20.93	37.20	16.27	20.93	-	-

Table 2. Radiological Distribution of Lung Lesion

There were 24 cases of inflammatory origin (55.81%) and 7 cases of malignant origin (39.53%). The maximum number of lesions was observed in the mid zone both inflammatory (7 cases) and malignant (9 cases) with an average total percentage of 37.20% (16 cases).

Site	Inflammatory		Malignant		Total	Percentage
	Intrabronchial	Extrabronchial	Intrabronchial	Extrabronchial		
Normal	6	-	-	-	6	13.95%
Central	-	8	17	4	29	69.44%
Peripheral	-	5	1	2	8	18.62%
Total	6	13	18	6	43	-
Percentage	13.95%	23.23%	41.86%	13.95%	-	-

Table 3. Fiberoptic Bronchoscopic Distribution of Lung Lesion

Maximum number of cases 29 (69.44%) were centrally placed with 8 cases of inflammatory origin and 21 malignant cases. Out of 21 centrally-placed malignant lesions, 17 were intrabronchial and rest 4 were extrabronchial. There were 8 peripherally placed lesions (18.62%), out of which, 5 were of inflammatory origin and 3 malignant. Six cases (13 95%) were found to have normal FOB findings.

Lung Lesions	Number of Cases	Percentage
Inflammatory	27	62.79
Malignant	13	30.23
Inadequate	3	6.97
Total	43	100

Table 4. Cytodiagnosis of Different Lung Lesions

Out of 43 cases, 27 cases (62.79%) were of inflammatory origin and 13 (30.23%) malignant cases. Three cases (6.97%) were inadequate for any opinion. Incidence of inflammatory lesions was more than the malignant lesion.

Lung Lesion	Age in Years					Total Number of Cases	Percentage
	21-30	31-40	41-50	51-60	61-70		
Inflammatory	4	3	6	8	6	27	62.79%
Malignant	-	2	4	5	2	13	30.23%
Inadequate	-	-	1	1	1	3	6.97%

Table 5. Distribution of Lung Lesion Based on their Age

Out of 43 cases, 27 cases (62.79%) were of inflammatory origin and 13 cases (30.22%) were malignant. Age range of inflammatory cases was from 21-70 years and malignant cases were from 31-70 years. Both inflammatory and malignant lesions were more common in older age groups in 5th to 6th decade.

DISCUSSION

Bronchial brushing using x-ray television fluoroscopy for the diagnosis of lung lesions had gained acceptance since described by Hattori et al.⁴ The present study describes the new technique of bronchial brushing through the fiberoptic bronchoscope for diagnosis of lung lesions through the manner similar to that used by Ikeda et al.⁵ The major advantage of this method is combination of flexible endoscopy for biopsy and bronchial brushing in a single procedure. The instrument is easier to manipulate, can be rapidly withdrawn and inserted repeatedly for multiple biopsies or clearing of the distal lens.

Visible lesions were brushed directly and the material obtained from surface of a lesion is sufficient for the diagnosis. The accuracy of making a positive diagnosis of lung lesion depended on proper positioning of the brush, good procedural technique in collecting of samples and accurate cellular interpretation by an experienced cytologist. Fiberoptic bronchoscopic brush cytology is an excellent procedure for diagnosis of central and mid lung lesions, but in peripheral lesions, the diagnostic accuracy is decreased due to difficulty in getting the brush on target. This problem could be solved by brushing through a mobile control tip catheter or taking biopsy by the recently available modified curette.⁶

This study reveals that combining roentgenography, fiberoptic bronchoscopy and cytology offered the best possible chance of discovering early lung lesions, accurate typing of lung cancer and estimation of spread of the tumour within the bronchial tree.

Fiberoptic bronchoscopy has been very successfully used by many authors^{7,8,9} as a diagnostic tool for assessment of various lung lesions and many reports are currently available concerning the safety, rapidity, cost effectiveness and sensitivity of this technique. In light of the above-mentioned advantages, this study was undertaken to assess the accuracy of brush cytology in the diagnosis of lung lesions.

A total of 43 cases were subjected to fiberoptic bronchoscopy. Of the smears available for examination, cytological evaluation was done in 40 cases (93.02%) with 27 (62.79%) inflammatory and 13 (30.25%) of malignant origin. Three cases (6.97%) were inadequate for any opinion.

In all cases, the nylon brush was passed through the catheter through fiberoptic bronchoscope to obtain specimen from the lesion. The brush was then smeared into two glass slides and immediately fixed in 95% alcohol. Smears were prepared by the passages of brush through the tube. Satisfactory smears was obtained in 40 cases (90.02%). A satisfactory smears was characterised by cellular smear, well preserved and stained bronchial epithelial cells and increased amount of cells arranged in irregular sheets.

In our study, the number of unsatisfactory smear was seen in 3 cases (6.93%) due to error in localising lesions of the pulmonary segment.

Brush smear taken from necrotic debris from centre of degenerating lesion and parenchymal growth not projecting into the bronchus. Similar incidence of unsatisfactory smear were reported by different authors like 6 cases (11.53%) by Zavala et al⁶ and one case (2.27%) in Shroff (1985).¹⁰

Fixed smear were stained by standard PAP stain. It is a polychrome stain consisting of a nuclear (haematoxylin) and two cytoplasmic stains (Eosin Azure (EA) and Orange G (OG)). It gives a good nuclear chromatin detail, differential cytoplasmic counterstaining and cytoplasmic transparency (Koss 1979). The regressive method was used.

In our study, the age range was from 21-70 years. The highest incidence was in the age group of 51-60 years with a mean of 57.8% years. Similar high incidence was reported by Tanaka et al with mean age of 62.8 years.¹¹ Our study also shows a gradual increase in the incidence of both inflammatory and malignant lesions with age. Malignant lesions were commonly seen in the 50-70 years of age group, whereas only two cases were encountered in below 40 years. Incidence of inflammatory lesions also increases with gradually increasing age. Kobzik et al also described that diminished resistance and lack of immunity in the older age group predisposes to infection.¹²

The distribution of lung lesions was viewed radiologically and directly through the fiberoptic bronchoscope. Radiologically, maximum lesions were seen in mid zone (37.20%, 16 cases), which coincided with the central lesions of bronchoscopy. Fiberoptic bronchoscopic distribution of lung lesions revealed maximum number of centrally placed (29 cases, 69.44%) lesion. The number of peripherally placed lesions was 8 cases (18.62%). Similar high incidence of central lesion in bronchoscopy were also reported by Stringfield et al with 66 out of 80 cases.¹³ Zavala et al found 52 cases of central lesions out of 75 cases, rest being peripherally placed.⁶ Kvale et al reported that maximum cases diagnosed by bronchoscopy were centrally placed (83.33%, 69 cases), whereas peripheral tumours were only (17.8%, 15 cases).⁹

CONCLUSION

Considering all the above facts, it is observed that bronchoscopic brush cytology is a simple, safe and inexpensive procedure for diagnosis of lung lesions.

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