



EVALUATION OF CELL BLOCK TECHNIQUE VERSUS CONVENTIONAL CYTOLOGY ON BRONCHOSCOPY GUIDED NEEDLE ASPIRATION/ BRUSH CYTOLOGY FOR DIAGNOSIS OF LUNG CANCER

Pathology

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ABSTRACT

INTRODUCTION: Bronchoscopy is a safe and effective method for diagnosing lung carcinomas with a variation in the diagnostic yield with different bronchoscopy guided procedures. Cell block technique has shown an addition cases positivity in diagnosing carcinomas as compared to the conventional method.

AIM: The present study was aimed to evaluate the diagnostic utility of cell block technique on Bronchoscopy guided needle aspiration/ Brush and also to compare cytological preparation with cell block.

MATERIAL AND METHODS: A total of 50 cases were included in the study that was suspected to be having lung carcinoma. These patients went under bronchoscope guided aspirations (TBNA, EBNA, and Brush). Smears were immediately made for conventional cytology study and well as in another aliquot samples were collected to prepare cell blocks following which H&E staining was done.

RESULTS: Out of 50 cases, 8 cases came out to be negative on conventional smears and when compared with cell block technique 4 additional cases came out to be positive who were negative on conventional smears. The diagnosis were compared with histopathology biopsies keeping it as a gold standard and results on cell block techniques were confirmed to be true.

CONCLUSION: Out of 50 cases, an additional 4 more cases were diagnosed malignant by using the cell blocks technique but there were few drawbacks with cell block technique. In few of the cases on cell block, cellularity was very less, cells morphology was also not very clear and some showed cells entrapped in a clusters. The conclusion made out of this study is that cell block technique is more accurate than the cytological smears and when used in combination diagnostic efficacy will be improved.

KEYWORDS

Lung Carcinoma, Bronchoscopy, Cell block.

INTRODUCTION

The number one cancer related deaths seen in year 2012 are among the lung cancer patients worldwide which is around 1.6 million^[1]. Lung cancer is ranked 5th among males and 13th among the female^[2]. In the developed countries lung cancer accounts for about 22% than in developing countries where it accounts for about 14.6% of cancer deaths, respectively^[3]. Among the new cancer cases in India, lung carcinoma constitutes 6.9 per cent of total cases and 9.3 per cent of cancer related deaths in both sexes. Among male population it is the most common cancer and cause of cancer related mortality^[4]. Use of tobacco is a known major cause of lung carcinoma^[5]. The most frequent method used for evaluating and diagnosing lung cancers is cytology. There are various techniques present to collect samples for cytological analysis in the lung malignancies. These include: "exfoliative cytology samples like induced sputum, abrasive cytology samples [brochial brushing (BB), bronchial washing, bronchoalveolar lavage (BAL)] and fine-needle aspiration cytology (FNAC)", which all can be done by using endobronchial ultrasound and computed tomography (CT)^[6]. Fine needle aspiration cytology (FNAC) has been used as the gold standard diagnostic test as it has the highest sensitivity for the endobronchial malignant lesions^[7]. However, a new method of cell block preparation by using 10% alcohol-formalin as a fixative was used, to identify the sensitivity of the diagnosis in comparison with the conventional smear (CS) study^[8].

MATERIALS AND METHODS

Cytological smears including Trans-bronchial needle aspiration (TBNA), Endo-bronchial needle aspiration (EBNA) and bronchial brushings (BB) were collected from 01 January 2017 to 31 December 2017 in the Department of pathology. Personal history of the patient including life style habits along with presenting complaints and radiological investigations were noted. All the cases suspected of Lung carcinoma whose pathological and clinical examinations had been undertaken in the Institute were selected and all metastatic tumors to lung were excluded. About 50 patient's samples were taken in this study.

All samples were taken by the pulmonologist. From all the patients signed informed consents were taken. Patients were explained the

potential hazards of anaesthesia and bronchoscopy. Premedication was done using atropine, the dose was 0.6 mg. morphine in adults and it was given 20-40 min before the start of procedure in order to reduce anxiety, euphoria, and coughing. For aerosol sprays about 4% xylocaine was used to nebulise or 2% xylocaine was used.

Flexible fiberoptic bronchoscope (Olympus BF IT- 30), was used to collect TBNA, EBNA and BB samples as well as bronchial biopsy where possible. 2 air dried and 2 wet fixed smears were made. Wet fixed smears were fixed in a fixative which was containing 95% isopropyl alcohol, and sent for pathological examination. Papanicolaou and Haematoxylin & Eosin stains were used for wet fixed smears and Leishman and May-Grünwald Giemsa stains for air-dried smears. For biopsy sections, hematoxylin & eosin stains were used.

The remaining material from TBNA / EBNA / bronchial brushings were collected into two aliquots for making cell blocks in 1:1 solution of 10% alcohol and formalin for one hour. After fixation, the sample was centrifuged at 2500 rpm for 15 minutes which was followed by discarding the supernatant to which 2 drops of pooled plasma were added and mixed well. Then to this mixture 4 drops of thromboplastin were added and mixed quickly, and then tube was allowed to stand for 5 minute at 37 degree Celsius.

The resultant clot was then put onto the filter paper and was stained with eosin and put in a single cassette after proper labeling. Sample was processed by Standard processing methods using Automated Tissue Processor. Paraffin blocks were made and with help of microtome, sections were cut and then they were stained by Hematoxylin and Eosin.

RESULTS

In our study a total of 50 cases were taken and among them 43 were male and 7 were females. Maximum number of patients 19(38%) were seen in the age group of 61-70 years and least number were seen in the age group of 41-50 years accounting to 4(8%).

TBNA was performed in 8 cases, EBNA was performed in 13 cases and BB was performed in 29 cases. Out of 50 cases, about 38 (76%) were smokers and 12 (24%) were non-smokers. The most common side involved was right side, 34(68%) and 16 (32%) cases have left side involvement. The most common lobe that was involved in lung cancer was upper, 18 (36%), followed by which middle lobe and lower lobe showed involvement in the same number of cases i.e. 12 (24%). Least involvement was seen in hilar region, 8 (16%).

Among 50 cases, cytological smears 19 (38%) were positive for Squamous cell carcinoma (SCC), 12 (24%) were positive for adenocarcinoma, 8 (16%) were poorly differentiated carcinoma (PDCA), 3 (6%) were small cell carcinoma and 8 (16%) cases were negative for malignancy. On cell block, 20 (40%) were positive for Squamous cell carcinoma (SCC), 13 (26%) were positive for adenocarcinoma, 10 (20%) were poorly differentiated carcinoma (PDCA), 3 (6%) were small cell carcinoma and 4 (8%) cases were negative for malignancy (Table 1).

Table 1: Diagnosis of lung carcinoma patients on cytology and cell block (N=50)

Diagnosis	Frequency (%)on cytology	Frequency (%)on cell block
SCC	19 (38)	20 (40)
Adenocarcinoma	12 (24)	13 (26)
PDCA	8 (16)	10 (20)
Small Cell Carcinoma	3 (6)	3 (6)
Negative	8 (16)	4 (8)
Total	50 (100)	50 (100)

Biopsied were available in only 31 cases. Out of 16 cases diagnosed as SCC on histology, 07 cases came out negative on cytology and 06 cases were negative on cell block. Out of 10 cases diagnosed as adenocarcinoma, 02 cases were seen negative on cytology and 01 case was negative on cell block. 02 cases were diagnosed as PDCA, both were positive on cytology and cell block. 03 cases were diagnosed as small cell carcinoma on histopathology, cytology and cell block (Table 2).

Table 2: Association of lung carcinoma patients on histology, cytology and cell block (N=31)

Histopathology		Frequency (%)on cytology		Frequency (%)on cell block	
Diagnosis	Number of cases	Positive	Negative	Positive	Negative
SCC	16	09	07	10	06
Adenocarcinoma	10	08	02	09	01
PDCA	02	02	00	02	00
Small Cell Carcinoma	03	03	00	03	00
Total	31	31	31		

Among 50 cases, cell block detected an additional of 4 positive cases for malignancy. All these cases were confirmed on histopathology (Table 3).

Table 3: Cases positive for malignancy in lung carcinoma patients (N=50)

S.No.	Method	Cytological Smear	Cell Block	Histopathology
1	EBNA	Negative	Positive (Adenocarcinoma) (Fig.1)	Adenocarcinoma
2	BRUSH	Negative	Positive (SCC) (Fig.2)	SCC
3	BRUSH	Negative	Positive (PDCA) (Fig.3)	SCC
4	BRUSH	Negative	Positive (PDCA) (Fig.4)	SCC

Figure 1(Photomicrograph at 20X: EBNA cell block section shows tumor cells suggestive of adenocarcinoma on cell block)

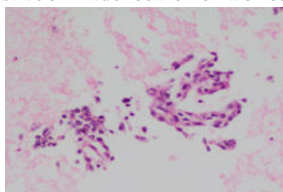


Figure 2(Photomicrograph at 20X: Brush cell block section shows tumor cells suggestive of SCC)

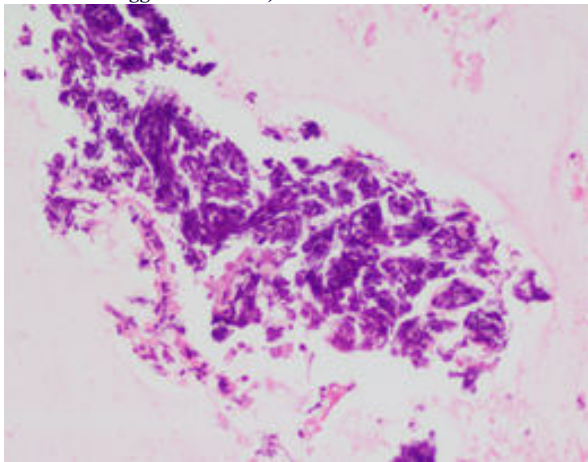


Figure 3(Photomicrograph at 40X: Brush cell block section shows tumor cells suggestive of PDCA)

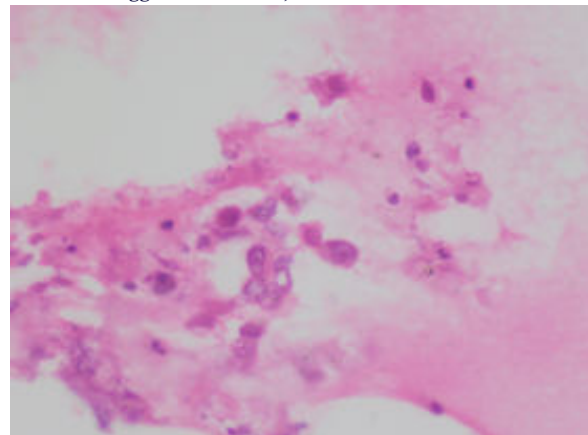
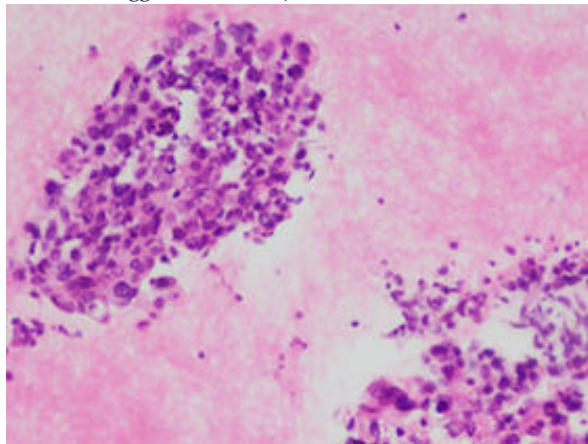


Figure 4(Photomicrograph at 20X: Brush cell block section shows tumor cells suggestive of PDCA)



Chi-square test was performed among smoking habit and side of lung involved; smoking habit and site of lung involved; clinical features and side of lung involved; clinical features and side of lung involved; and clinical features and habit of smoking. Results came out to be statistical insignificant with values being 0.551, 0.755, 0.671, 0.634 and 0.280 respectively.

Kappa test was applied to see the association of cell block and cytology smears in lung carcinoma patients and the strength of agreement was very good (Table 4).

Table 4: showing association of cell block and cytology smears in lung carcinoma patients (N=50)

Cytology	Cell block
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65	

	1	2	3	4	5
1	19	0	0	0	0
2	0	12	0	0	0
3	0	0	8	0	0
4	0	0	0	3	0
5	1	1	2	0	4

DISCUSSION

Lung carcinoma is the leading cause of cancer deaths in United States^[9], Europe^[10] and worldwide^[11]. The five year survival among lung carcinoma is poor and worldwide varies between 6% and 14% for men and 7% and 18% for women^[12]. In our study age of patients ranged from 44 to 79 years and the mean age was 62.94 years. Maximum numbers of patients were in the age group of 61-70 years. In a study by Jose sanz-santos et al. the mean age of patients with lung carcinoma were 63.3 years^[13].

Males were more commonly involved than females in our study as it was seen in similar studies done by Zubair kabir et al^[14] and Bhurgri Y et al^[15]. Right side (34/50) of lung was seen to be more commonly involved than left in the patients of lung carcinoma. Similar result was seen in a study done by Khan et al^[16] and Rawat J. et al^[17].

In our study out of 50 cases, on cytological smears about 42 cases were positive for malignancy (8 cases were negative) and on cell block 46 cases were positive (4 cases were negative). In a similar study done by Kakodkar et al. in which cytological smears were compared with the cell block. They concluded that that yield of cell block is higher than that of the cytological smears^[8]. José Sanz-Santos et al. did a similar study using transbronchial needle aspirations method. They observed that cell block provided an additional cancer diagnosis as compared to the cytological smears^[13]. Shivakumarswamy et al. did study on pleural fluids and concluded that an additional yield for malignancy was 15% more by the CB method^[18]. Study done by Koksai et al. also showed that in the benign group, adding the cell block method to conventional smear provided an additional diagnosis of malignancy in about 4 more patients^[19].

CONCLUSION

Lung carcinoma is emerging as a huge medical problem for our country due to extensive use of tobacco despite legislation to control it. This study had shown smoking is strongly associated with causation of lung cancer. It was also concluded that out of 50 cases, cytological smears showed malignancy in about 42 cases and cell block showed 46 positive cases. An additional of 4 more cases were diagnosed malignant by using the cell blocks technique but there are few drawbacks with cell block technique. In few of the cases on cell block, cellularity was very less, cells morphology was also not very clear and some showed cells entrapped in a clusters. The conclusion made out of this study is that cell block technique is more accurate than the cytological smears and when used in combination diagnostic efficacy will be improved. Even cell block technique can further help in conducting ancillary techniques.

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