ORIGINAL ARTICLE

DIAGNOSTIC UTILITY OF CELL BLOCK METHOD IN PLEURAL FLUID CYTOLOGY

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ABSTRACT: BACKGROUND: The cytological study of body fluids is one of the oldest applications of cytological techniques. A variety of conditions cause pleural effusion. Specific diagnosis is a major challenge and the possibility of malignant involvement should always be considered in difficult to diagnose cases. **AIM:** The purpose of this study is to show that a malignant diagnosis in the effusions, with or without a known primary, usually signifies advanced disease. **OBJECTIVES:** (1) To know the proportion of conditions causing pleural effusion, (2) To study the cytological spectrum using various techniques, (3) To assess the sensitivity of combined techniques. Materials and Methods: One hundred samples were processed by conventional cytology, cytocentrifuge smears and cell block method using 10% Alcohol-formalin fixative. **RESULTS:** Out of 100 cases, most were exudative effusions with 15 cases of malignancy. All are secondary deposits with adenocarcinoma most common primary site was lung. One acute myeloid leukemia case presented in pleural effusion. Cell block method increased diagnostic yield by 13.3%. **CONCLUSION:** A combined approach of conventional smears and cell block technique helps to get an additional diagnostic yield for malignancy in pleural effusions.
KEYWORDS: Pleural fluid, Cytology, Cell block.

INTRODUCTION: In normal humans, differential cell counts in pleural fluid yielded a predominance of macrophages and lymphocytes. Mesothelial cells, neutrophils and eosinophils were only marginally present. There were no significant differences between males and females or between right- and left-sided pleural fluid in total and differential cell counts. In contrast, in smokers a small but statistically significant increase in pleural fluid neutrophils was observed.[1]

Cytologic evaluation of serous effusions is performed mainly to establish the cause. 25% of the cases seen by a pulmonologist involve diseases of the pleura. Specific diagnosis is a major challenge and the possibility of malignant involvement should always be considered in difficult to diagnose cases.[2] Aspiration of serous cavities is a simple and relatively non-invasive technique to achieve a diagnosis.

The cytological study of body effusions is a complete diagnostic modality which aims at pointing out the etiology of effusion as well as in certain cases a means of prognostication of the disease process.[3] Cell block technique when combined with conventional smears may improve the accuracy of the test by demonstrating the architectural pattern of cell aggregates and by facilitating the performance of histochemical and immunocytochemical stain.[4]

MATERIALS AND METHODS: The present study was conducted in cytology section of the Department of Pathology, Mysore Medical College and Research Institute, Mysore. One hundred

cases were selected by using simple random sampling method. Samples were processed immediately, cell count was done in an Improved Neubaeuer chamber with WBC diluting fluid. A part of the sample was centrifuged at 2000rpm for 10 min in a glass test tube. After discarding the supernatant, sediment was used to prepare wet mount using toluidine blue for assessing the cellularity, if the cell count found is low, then cytocentrifuged smears using semi-automatic cyto-tek were prepared.

Hematoxylin and Eosin, Papanicolaou, Leishman stains, special stains like PAS, AFB were also used. If the smears were found suspicious or malignant, the remaining fluid and the sediment were centrifuged with Alcohol-Formalin fixative. The cell button obtained was scooped out onto the filter paper and processed as a routine biopsy histological specimen to prepare cell block.

RESULTS: Majority of the cases (85%) were diagnosed as benign or inflammatory [Table 1]. Thirteen cases as malignant on cytology and 2 suspicious cases were confirmed as malignant after cell block study. Suspicious category was considered because of doubtful morphology in conventional and cytocentrifuge smears [Figure 1, 2].

Clinical diagnosis	Number	Percent
Malignant effusions	20	20
Tuberculosis	35	35
Pneumonia	11	11
Alcoholic liver disease	7	7
Empyema	3	3
HIV	5	5
Congestive heart failure	2	2
Chronic kidney disease	2	2
Anemia	5	5
COPD	6	6
Chronic pancreatitis	1	1
Polyserositis	1	1
Rhematoid arthritis	1	1
SLE	1	1
Total	**100**	**100**

Table 1: Showing frequency of clinical diagnosis

In this study, the most common clinical diagnoses were tuberculosis, followed by malignancy and pneumonia. The most common primary site of tumor was Lung, followed by Breast, GIT, Hematological and unknown.

Methods	Benign	Malignant	Suspicious
Cytological diagnosis	85	13	2
Cell block diagnosis	85	15	0

Table 2: Cytological Versus Cell block diagnosis

The above table shows that there was no difficulty in diagnosing malignancy by cytological methods but two suspicious cases were diagnosed as malignant in cell block method [Figure 3,4].

Cell block	Cytology smear Positive Negative	Total
Positive	13 02	15
Negative	0 85	85
Total	**13 87**	**100**

Table 3: Statistical analysis of pleural effusion

Sensitivity = 86.7%
Specificity = 100%
Positive predictive value = 100%
Negative predictive value = 97.7%
Accuracy = 98%

DISCUSSION: Thoracocentesis is a minimally invasive diagnostic and therapeutic technique, and the cytological examination of pleural fluid is a well-established accurate method of detecting malignancy. It has increasingly gained acceptance in clinical medicine, to such an extent that a positive diagnosis often is considered the definitive test and obviates explorative surgery.

In the majority of cases the diagnosis can be made on the basis of either the smear or the cell block alone, but using the combined technique on the same specimen leads to a more accurate diagnosis.[5] Reactive mesothelial cells simulating malignancy in smears is due to the formation of rosettes, pseudoacini or acini, with or without the presence of prominent nucleoli. The cell block effectively puts both features in their proper perspective: i.e., the nucleoli do not appear as prominent as in smears, and the pseudoacinar or acinar structures can be better appreciated when present.[6]

The cell block is a valuable tool in the evaluation of well-differentiated adenocarcinomas, such as are seen in the occasional tumors of the breast, lung, or gastrointestinal tract. These tumors may have very few malignant characteristics in smears while the presence of true acini in the cell block, together with mucin, when stained for, is indicative of malignancy.

Other advantages of cell blocks are concentration of cellular material in one small area that can be evaluated at a glance with all cells lying in the same focal plane of the microscope. Better morphological features, that is preservation of architectural details like acinar pattern, 3-dimensional (3D) clusters, cell balls and cytoplasmic and nuclear features with intact cell membrane were better appreciated in cell block.[7]

Study	Percent
Dekker and Bupp [5]	38
Khan et al.[8]	20
Bodele et al.[9]	7
Richardon et al.[10]	5
Present Study	13.3

Table 4: Additional yield of malignancy obtained in various studies by cell block

In the present study diagnostic yield for malignancy was increased by cell block method and is in agreement with studies done by Bodele and Khan et al.

CONCLUSION: The present study demonstrates that the pleural fluid cytology and cell block technique are the most useful tests in establishing the diagnosis of pleural effusion. The primary role of cytology in this setting is detection of malignancy. In cases with known malignancy the presence of tumor cells in effusion may have important prognostic implication. Cell block technique is simple, rapid, inexpensive method and does not require any special training or instrument. It bridges the gap between cytology and histology. So a combined approach of conventional smears and cell block technique helps to get an additional diagnostic yield for malignancy.

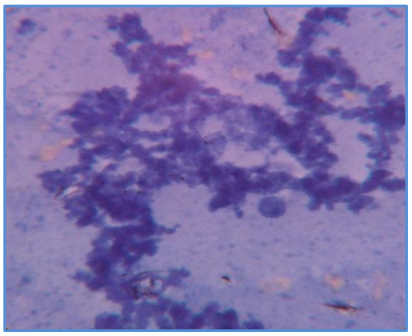

Fig. 1: Wet mount. 10x: Toluidine blue: Atypical cells in clusters

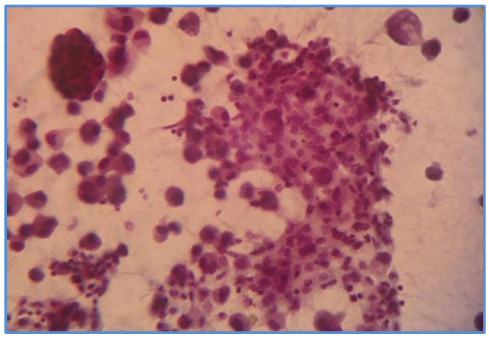

Fig. 2: Cytocentrifuge smear. 40 x: H&E; Dual population of cells, malignant cells and reactive mesothelial cells

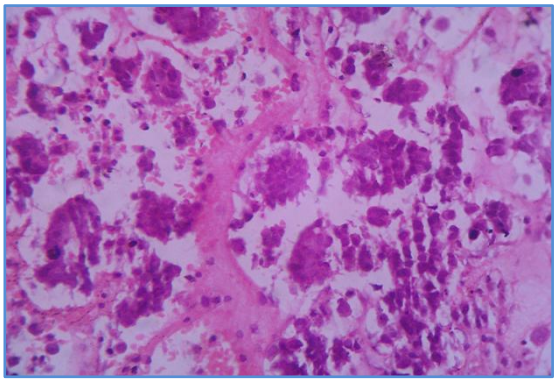

Fig. 3: Cell block. 40x: H&E; Malignant cells

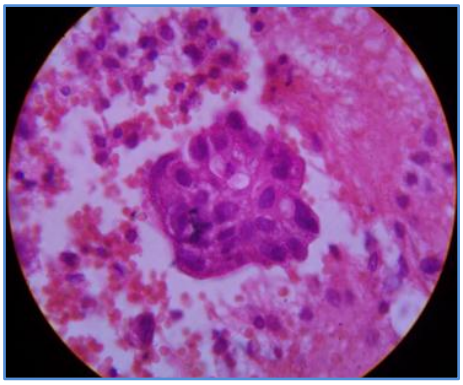

Fig. 4: Cell block. 100x: H&E; Malignant cells in acinar form with cytoplasmic vacoulation and pericellular lacunae

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