

Evaluation of Cell Block Technique as a Mandatory Diagnostic Tool for Serous Effusions

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Abstract: The accurate morphological identification of the cells is a diagnostic problem in conventional smears. By using 10% alcohol formalin as a fixative and obtaining cell block gives effective diagnosis regarding cellular morphology in serous effusions. This study was carried out to evaluate cell block technique as a diagnostic tool for serous effusions. It is expected that cell block technique will give better morphological details and thereby improve the sensitivity of the diagnosis in comparison with conventional smears. This retrospective study was conducted in cytology section in a tertiary care hospital, 46 fluid samples were subjected to diagnostic evaluation over a period of 10 months. The cell blocks were prepared by using 10% alcohol-formalin as a fixing agent along with the conventional smears. The nucleo-cytoplasmic details were evaluated as benign, suspicious for malignancy and malignancy in both conventional smears and cell block method. Out of 46 cases only 3/46 cases (6.53%) found to be malignant in conventional smears and using cell block technique 6/46 cases (13.043%) were positive for malignancy. Cell block technique is a useful adjuvant evaluating fluid cytology for the more presumptive diagnosis, when combined with conventional smear method. Cell blocks can be stored for a longer period for further evaluation and can be used for special stains, Immunohistochemistry and molecular diagnosis in order to obtain specific diagnosis.

Keywords: Serous effusions, cellblock, smear.

INTRODUCTION

Providing accurate diagnosis is an essential part of healthcare, especially for diagnosis of malignancies. Cytodiagnosis of serous effusions are done as a routine investigation procedure in cytology. However, diagnosis of reactive mesothelial cells has been a challenge in serodiagnosis [1]. The specimens are routinely processed by the conventional smear method. There are nevertheless, a wide range of advantages in using cell block technique for the diagnosis. Several studies have shown that cell block technique prepared using 10% alcohol formalin as a fixative has a better power of accuracy, in serodiagnoses. But this study highlight the importance of cell block technique combined with it for an accurate cytological diagnosis. The main advantages of using a cell block technique have been related to the preservation of tissue architecture and feasibility of obtaining multiple tissues for special stains and immunochemistry [2]. This study was carried out to evaluate the cell block technique as a mandatory diagnostic tool for evaluating serous effusions.

METHODOLOGY

This study was carried out as a retrospective cross sectional study on the cytology sections in the Pathology department of our tertiary care hospital. Based on a study done by Shivakumaraswamy, cell block technique provided an additional yield of 15% in detecting malignancies [3]. Based on this, at 95% level of significance and 10.5% absolute precision, the final sample size was calculated as 44.4 and was rounded off to 45.

About 46 fluid samples were taken up for the study by simple random sampling method. The sample consisted of 26 ascitic fluids and 20 pleural fluids. All the samples were subjected to diagnostic evaluation over a period of 10 months. Ten milliliters of fresh fluid samples were received and divided into two equal parts and subjected to conventional smear method and cell block technique.

Preparation of conventional smear

Each 5 milliliters sample was centrifuged at 2500rpm for 15 minutes. A minimum of two thin smears

were prepared from the deposited cell button. Among the air dried smears one of them stained with May-Gruwald Giemsa stain and another with papanicolaou stain after fixation with 95% alcohol.

Preparation of Cell Block

Each 5ml fluid for cell block technique was centrifuged for 2500 rpm for 15minutes and kept for overnight. Next day after discarding the supernatant fluid, residual fluid was allowed to drain on a filter paper placed in a cassette and fixed in 10% formalin. Later this paraffin embedded blocks were sectioned into 4-6 μ and mounted on albuminized glass slides. The cell block sections were stained and categorized as benign, suspicious for malignancy and malignancy.

Data analysis

The data was entered and analyzed using Microsoft Excel spreadsheet. Percentages were computed for the prevalence of benign, suspicious and malignant lesions. Validity of the diagnostic tool was calculated as sensitivity, specificity, positive and negative predictive values.

RESULTS

A total of 46 cases were analyzed. A majority of the participants belonged to 45-75 years of age. The distribution of the fluid samples is given in figure-1. Majority of the samples were from ascitic tap (71.7%) while the remaining samples consisted of pleural fluid.

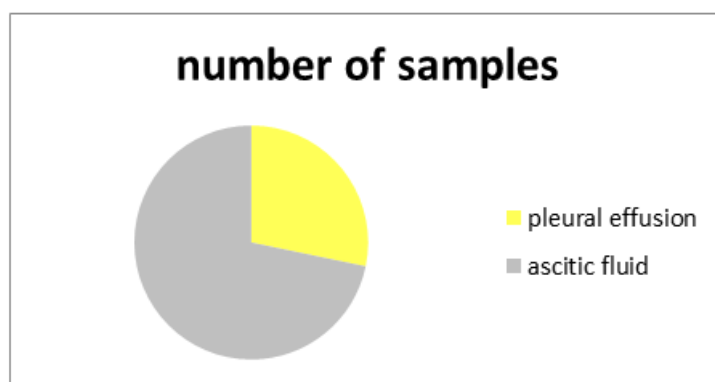


Fig-1: Fluid samples analyzed in the study

The prevalence of malignancies by conventional smear methods is given in table-1. The prevalence of malignancies in the study population

detected by the conventional method was 6.5%. Moreover, 13.4% of the samples were found to be suspicious of malignancy, by the conventional method.

Table-1:

S. No	Type of lesion	Frequency (N=46)	Percentage (%)
1	Benign	37	80.4
2	Suspicious of malignancy	6	13.4
3	Malignancies	3	6.5

The validity of cell block technique as a diagnostic tool is described in table 2. A total of 46 cases were analyzed. Out of 46 cases only 3 (6.52%)

were to be malignant in conventional smears and using cell block technique 6 cases (13.04%) were positive for malignancy.

Table-2: Validity of cell block technique as a mandatory diagnostic test

Fluid material	Conventional Smears			Cell block technique		
	Benign	Suspicious of malignancy	Malignancy	Benign	Suspicious of malignancy	Malignancy
Pleural fluids	10	2	1	20	---	2
Ascitic fluids	27	4	2	26	---	4
Total	37	6	3	40	---	6

DISCUSSION

The study of cells in serous effusions is of prime importance in diagnostic, therapeutic and prognostic indicator. There are several constraints in using conventional smears which include the need for adequate material for diagnosis. Conventional smears needs less turnaround time but with limitations and high

percentage of suspicious diagnosis, needs to be correlated with detail history and radiological diagnosis. Whereas cell block technique is concentration of cellular material, preservation of nuclear morphology and it bridges a gap between cytology and histopathology.

Cell block technology has been in use for significant number years now. It has been advocated for mandatory diagnosis and complements the conventional methods [4]. In this study, the cell block technique has been effective in diagnosing malignancies in both pleural and ascitic fluids alike. However, the chances of detecting suspicious cases were higher with conventional techniques. It is therefore prudent that cell block technique is performed as a mandatory diagnostic procedure, along with conventional smear in serous effusions. It is also to be noted that conventional smears give immediate diagnosis, however they are often not confirmatory, and provides a large volume of suspicious cases. When cell block technique is performed in addition, which acts as a bridge between cytology and histopathology, it gives 90% results. Cell block technique is in line with histopathological diagnosis, where we can perform immunohistochemistry using cell block technique and give the accurate diagnosis than conventional smear.

There are a variety of methods available for cell block preparation for specimens with significant quantity of material. It is essential that the processing in cell block technique should be similar to formalin-fixed-paraffin-embedded (FFPE) tissues. Any alteration in the protocol potentially compromises and nullifies the validity of the results [5].

CONCLUSION

The cell block method is a minimally invasive and cost effective. The concentration of cellular material gave precise morphological details and good yield for malignant cells. The cell block technique is

useful adjuvant evaluating fluid cytology for the presumptive diagnosis when combined with conventional smear method. Cell blocks can be judiciously used for special stains, immunohistochemistry and molecular diagnosis in order to establish a primary diagnosis and documentation of recurrence or metastatic diseases.

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