



ANALYSIS OF CELL BLOCK VERSUS CONVENTIONAL SMEAR STUDY IN FLUID CYTOLOGY

Pathology

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ABSTRACT

Background: The cytological examination of body fluids is routinely accepted, simple and minimally invasive technique. Cell block preparation along with conventional smear increases sensitivity of detecting malignancies by preservation of tissue architecture and obtaining multiple sections for special stain and immunohistochemistry. **Objectives:** To assess and compare the diagnostic yield of conventional smear (CS) and cell block (CB) techniques in fluid cytology. **Materials And Methods:** A total of 62 body fluid specimen were simultaneously processed and examined by conventional smear and cell block technique. The morphological details, cellularity, architecture, nuclear and cytoplasmic details were studied in both CS and CB techniques. **Results:** Out of 62 fluid samples a total of 47 smears and 58 cell blocks had adequate material. On smears a total of 11 cases were malignant, 3 were suspicious and 33 were benign. On cell block a total of 15 cases were malignant, none was suspicious and 43 were benign. **Conclusion:** CB technique is superior to CS technique as it plays a significant role in resolving the gray zone while determining the nature of cells on effusion whether reactive, atypical or malignant. Also it provides diagnostic advantage by making residual material available for special stains and IHC.

KEYWORDS

Cell block (CB), Conventional smear (CS), Body Fluid

INTRODUCTION

Diagnostic Cytopathology is a rapid, inexpensive and simple diagnostic tool. It is the interpretation of exfoliated cells from various epithelial surfaces^[1]. Cytological examination of body fluids is used for diagnosis, staging, prognosis and management of patients^[2,3]. For a pathologist its challenging to differentiate between benign and malignant effusions. Sensitivity of cytological diagnosis of effusions is 40-60%^[1]

The two methods by which fluids can be examined are conventional smear (CS) method and a more recent and advanced cell block (CB) method. The conventional smear method is a simple method but has got low sensitivity. It is because of overcrowding, overlapping of cells, lack of tissue architecture, cell loss as useful material can be left behind in the centrifuge tube, artifacts and obscuring of atypical or suspicious cells by abundant inflammatory cells. While cell block method is particularly useful when there is dilemma between atypical and reactive mesothelial cells^[4]. Cell block method is like a mini biopsy bridging the gap between cytology and histology with an advantage of preservation of tissue architecture and better morphological details. Also multiple sections can be taken for special stains and immunohistochemistry examination^[2,4,5,6].

The present study was undertaken to assess the utility of combine approach by both cell block and conventional smear method and thereby increasing sensitivity and specificity of cytodiagnosis of body fluids.

OBJECTIVES

To assess and compare the diagnostic yield of conventional smear (CS) and cell block (CB) techniques in fluid cytology.

MATERIALS AND METHODS

The present study was an analytical study conducted at S.S.G Hospital and Medical College Baroda, Gujarat for a period of 1 year from July 2021 to June 2022. A total of 62 body fluid specimens were simultaneously processed and examined by CS and CB techniques.

The fluids received in the cytopathology section of pathology department were examined grossly for volume, color and appearance

and findings were noted. Then the fluids were divided in two equal parts. One part was kept for CS and another part for CB. After processing by both techniques, observations and results were recorded for individual case and were correlated for both techniques.

Conventional smear method

For smear preparation fluid taken in test tube was centrifuged at 1500 rpm for 15 mins. 3 smears were prepared from the sediments of the centrifuged sample. 2 smears were methanol fixed followed by staining with Haematoxylin and Eosin (H&E) and Papanicolaou stain (PAP) each. 1 smear was air dried and stained with Giemsa.

Cell block method

For cell block method the sample was added to 1:1 solution of 5 ml of ethanol and 10% formalin and was fixed for 1 hr. The mixture was agitated often for uniform fixation of the material. After fixation, the specimen was centrifuged. The supernatant was decanted and the sediment was mixed with 1:1 mixture of ethanol and 10% eosin tinted formalin and was kept for 24 hrs. Then after discarding the supernatant fixative, the sediment which contained the cell button of fluid sample was scooped out on to a premoistened filter paper and placed in a cassette. Tissue cassette was processed by routine histological process.

The smears and cell blocks were evaluated independently and observations were recorded. Both the findings were correlated.

RESULTS

In the present study 62 fluid specimens were simultaneously processed by cell block and conventional smear method. Of the 62 cases, there were 39 pleural fluid (62.9%), 13 ascitic fluid (21%), 4 Bronchoalveolar lavage (BAL) fluid (6.5%), 3 Intercostal drainage (ICD) fluid (4.8%), 1 Breast Cyst fluid (1.6%), 1 peritoneal wash (1.6%), and 1 urine (1.6%). The age of the study subject ranged from 11 to 80 years. Maximum number of cases were recorded in the age group of 41-50 years (27.4%), followed by 51-60 years (19.4%). The youngest patient was a 18 year old female and oldest patient was a 80 year old male. Male patients (61.3%) outnumbered female patients (38.7%) with M:F ratio of 1.6:1.

Out of 62 smears 47 smears had adequate material (75.8%) and 15 had

inadequate (24.2%). Out of 62 cell blocks, 58 cell blocks had adequate material (93.55%) and 4 had inadequate material (6.45%) [Table 1]. A total of 11 cases were malignant on smears (17.74%), 3 were suspicious for malignancy (4.84%), 33 were benign (53.22%). A total 15 cases were malignant on cell block (24.19%), None was suspicious for malignancy, 43 were benign (69.35%) [Table 2].

Discrepancies were observed between the results by both methods. Among 33 benign lesions diagnosed by smears (53.22%), 32 diagnoses on cell block preparation concurred with smears (51.61%) and 1 was diagnosed as malignant on cell block examination (1.61%). 3 cases diagnosed as suspicious for malignancy on conventional smear (48.4%) turned out to be malignant on cell block examination (48.4%). 15 conventional smears were inadequate or scantily cellular (24.19%). Out of 15 only 4 cases remained inadequate (6.45%) while 11 cases turned out to be benign on cell block (17.74%) [Table 3].

The statistical analysis of the 62 body fluids showed higher cellular yield by the CB method than by CS method. The utility of CB method in the diagnosis of malignant effusion was found to be highly significant as compared to CS method.

Table 1: Adequacy comparison between CS and CB methods

METHOD	ADEQUATE MATERIAL	INADEQUATE MATERIAL	TOTAL
Conventional method (CS)	47	15	62
Cell block method (CB)	58	4	62

Table 2: Comparison of diagnosis in conventional smear and cell block examination

DIAGNOSIS	CONVENTIONAL SMEAR (N=62)	CELL BLOCK (N=62)	INFERENCE
Malignant	11	15	P value <0.05
Suspicious for malignancy	3	0	
Benign	33	43	
Inadequate	15	4	

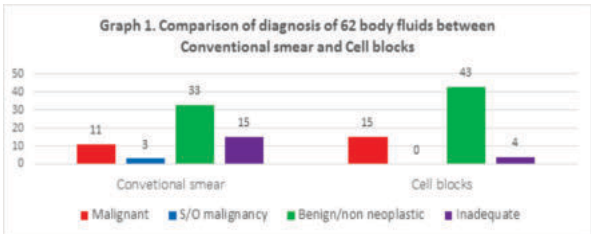


Table 3: Discrepancies observed between performance of conventional smear and cell block method

Conventional Smear	Cell Block						
Benign	Suspicious	Malignant	Inadequate	Benign	Suspicious	Malignant	Inadequate
1	-	-	-	-	-	1	-
32	-	-	-	32	-	-	-
-	3	-	-	-	-	3	-
-	-	11	-	-	-	11	-
-	-	-	11	11	-	-	-
-	-	-	4	-	-	-	4
Total-33	Total-3	Total-11	Total-15	Total-43	Total-0	Total-15	Total-4

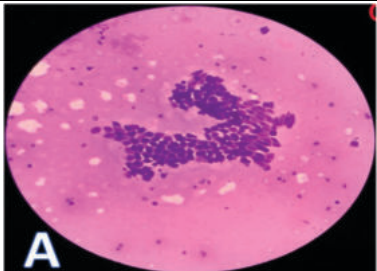


Figure A: Photomicrograph showing atypical cell cluster in conventional smear of pleural fluid reported as suspicious for malignancy (Giemsa, 40x)

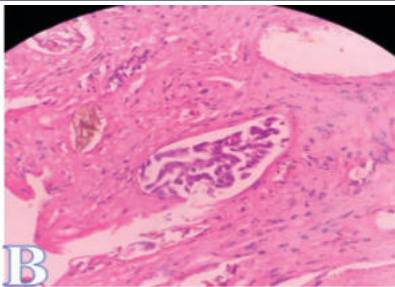


Figure B: Photomicrograph showing glandular pattern in cell block section of pleural fluid reported as malignant effusion (H&E, 40x)

DISCUSSION

The current study studied 62 body fluids from different sites among which pleural fluid was the commonest (62.9%). This is in concordance with Bhanvadia et al [7] (53%), Ramappa Katti et al [8] (49%), Thapar et al [9] (58%) and Goswami et al [5] (58.8%).

In the present study most number of cases were noted in 41-50 years of age group which showed concordance with Bhanvadia et al [7] and Ramappa Katti et al [8]. M:F ratio was 1.6:1 in present study concordant with Bhanvadia et al [7] (1.5:1), Shivakumarswamy et al [10] (1.4:1), Datta P. et al [2] (1.21:1) and Goswami et al [5] (1.9:1).

In the present study, diagnostic category suspicious for malignancy was significantly reduced in cell block method as compared to conventional smear method. Also statistically significant increase in identification of malignancy was seen in cell block method over conventional smear method. These findings were comparable with other studies like Bhanvadia et al [7], Ramappa Katti et al [8], Jyotsna et al [11], Ravi singh et al [12], Goswami et al [5] and Syed qaiser husain naqvi et al [13].

Bhanvadia et al [7] studied 150 cases, 116 (77%) were benign, 16 (11%) were suspicious for malignancy and 18 (12%) were malignant on conventional smear. While on cell block 117 (78%) were benign, none were suspicious for malignancy and 33 (22%) were malignant.

Ramappa Katti et al [8] studied 110 cases, 84 (76%) were benign, 16 (15%) were suspicious for malignancy and 10 (9%) were malignant on conventional smear. While on cell block 83 (75%) were benign, none were suspicious for malignancy and 27 (25%) were malignant.

Jyotsna et al [9] studied 72 cases, 62 (86%) were benign, 4 (6%) were suspicious for malignancy and 6 (8%) were malignant on conventional smear. While on cell block 58 (81%) were benign, none were suspicious for malignancy and 14 (19%) were malignant.

Ravi Singh et al [12] studied 98 cases, 74 (76%) were benign, 5 (5%) were suspicious for malignancy and 19 (19%) were malignant on conventional smear. While on cell block 76 (78%) were benign, none were suspicious for malignancy and 22 (22%) were malignant.

Goswami et al [5] studied 68 cases, 44 (64%) were benign, 4 (6%) were suspicious for malignancy and 8 (11%) were malignant on conventional smear. While on cell block 41 (60%) were benign, 1 (1%) was suspicious for malignancy and 9 (13%) were malignant. Syed Qaiser Husain Naqvi et al [13] studied 92 cases, 83 (90%) were benign, 4 (4%) were suspicious for malignancy and 5 (6%) were malignant on conventional smear. While on cell block 80 (87%) were benign, none were suspicious for malignancy and 12 (13%) were malignant.

Hence in the present study an additional yield of 6% was seen in diagnosis of malignancy in cell block method. This is because of preservation of architectural details like cell balls, three dimensional clusters and papillae, better nuclear and cytoplasmic details. Thereby increasing sensitivity and specificity of the cell block method [3]. The only drawback of cell block method is delay in diagnosis, risk of losing material while processing. Sometimes as a part of centrifugation artefacts, mesothelial cells can form rosettes and pseudo acini resulting in misdiagnosis [12].

CONCLUSION

The present study hence concludes that cell block method is a good

adjuvant to conventional smear method for reaching the final diagnosis as it provides better cellularity with good architectural and morphological details. Thereby increasing the final diagnostic yield of malignancy in body fluids.

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