

ORIGINAL RESEARCH

Morphological Evaluation Of The Diagnostic Efficacy Of Cytological Smear Technique Versus Cell Block Method In The Cytology Of Body Fluids

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ABSTRACT

Background:The present study was conducted for evaluating body fluids with conventional smear and cell block at tertiary care hospital. **Materials & methods:**The present study was conducted on 50 body fluid samples (pleural, synovial, ascitic fluid) from patients were analysed in the cytopathology laboratory of our institute. All 50 fluid specimens were examined for conventional cytological smear (CS) and cell block method (CB). Each fluid specimen was divided in two equal portions with one portion subjected to conventional smear technique, Smear was immediately fixed with 95% alcohol and stained with Haematoxylin-Eosin (H&E). The other part was subjected to 10% alcohol-acetic acid-formalin cell block technique. Paraffin- embedded 4-6 μ thick sections were routinely stained with H&E. The morphological characteristics, cellularity, nuclear and cytoplasmic details were evaluated in both CS and CB techniques. **Results:**10 cases were malignant positive for both smear and cell block, 5 cases were suspicious for malignancy for smear and were positive for malignancy on evaluation in cell block, 6 cases of mesothelial cluster which were positive for malignancy in conventional smear were negative on evaluation from cell block, 29 cases were benign on evaluation from both smear and cell block. **Conclusion:**The study found that methods had high specificity. Cell- blocks were found to be more reliable to smears in typing malignancy.

Key words: Conventional smear, Cell block, Body fluids

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INTRODUCTION

Effusions frequently accompany malignancies, but are also common in infectious, inflammatory, and circulatory conditions. They may be the first manifestation of a malignancy, but more often occur as a late complication, denoting poor prognosis.^{1, 2} Cytologic examination of effusions and serous cavity washing specimens offers a minimally invasive and highly specific means of obtaining a diagnosis of malignancy. This explains the fact that in most cytopathology laboratories, body fluids are one of the most common types of specimens. However, despite the accumulated experience with such specimens, they still pose a significant diagnostic challenge, with many pitfalls and the potential to both overcall and undercall malignancy.^{3, 4}

Cytological examination of serous fluids is one of the commonly performed investigation. The accurate identification of cells as either malignant or reactive mesothelial cells is a diagnostic problem in conventional cytological smears. The cell block (CB) technique is one of the oldest methods for the

evaluation of body cavity fluids. 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.^{5- 7}Hence; the present study was conducted for evaluating body fluids with conventional smear and cell block at tertiary care hospital.

MATERIALS & METHODS

The present study was conducted for evaluating body fluids with conventional smear and cell block at tertiary care hospital. The present study was conducted on 50 bodily fluid samples (pleural, synovial and ascitic fluid) from patients were analysed in the cytopathology laboratory of our institute. All 50 fluid specimens were examined for conventional cytological smear (CS) and cell block method (CB). Each fluid specimen was divided in two equal portions with one portion subjected to conventional smear technique, Smear was immediately fixed with 95% alcohol and stained with Haematoxylin-Eosin

(H&E). The other part was subjected to 10% alcohol-acetic acid-formalin cell block technique. Paraffin-embedded 4-6 μ thick sections were routinely stained with H&E. The morphological characteristics, cellularity, nuclear and cytoplasmic details were evaluated in both CS and CB techniques. All the data was collected and analysed was done using SPSS software.

INCLUSION CRITERIA

All the body fluids (pleural and ascitic) which were exudative in nature and having protein level of >3.0 gm/dl.

All the body fluids (ascitic, pleural & synovial) which were exudative in nature and having high protein level >3 gm/dl.

EXCLUSION CRITERIA

Other fluids which were transudative in nature, i.e. having protein level <3gm/dl.

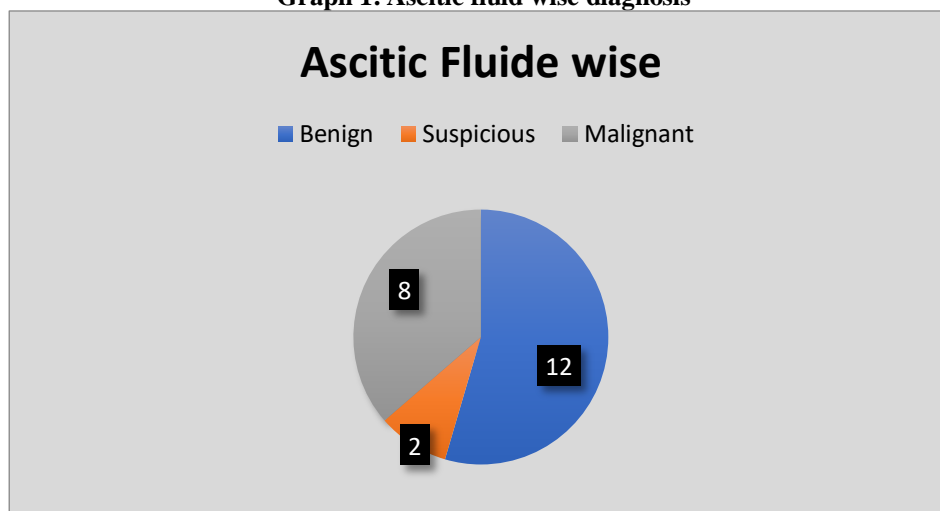
RESULTS

60 percent of the cases were of males while remaining were females. 10 cases were malignant positive for both smear and cell block, 5 cases were suspicious for malignancy for smear and were positive for malignancy on evaluation in cell block, 6 cases of mesothelial cluster which were positive for malignancy in conventional smear were negative on evaluation from cell block, 29 cases were benign on evaluation from both smear and cell block.

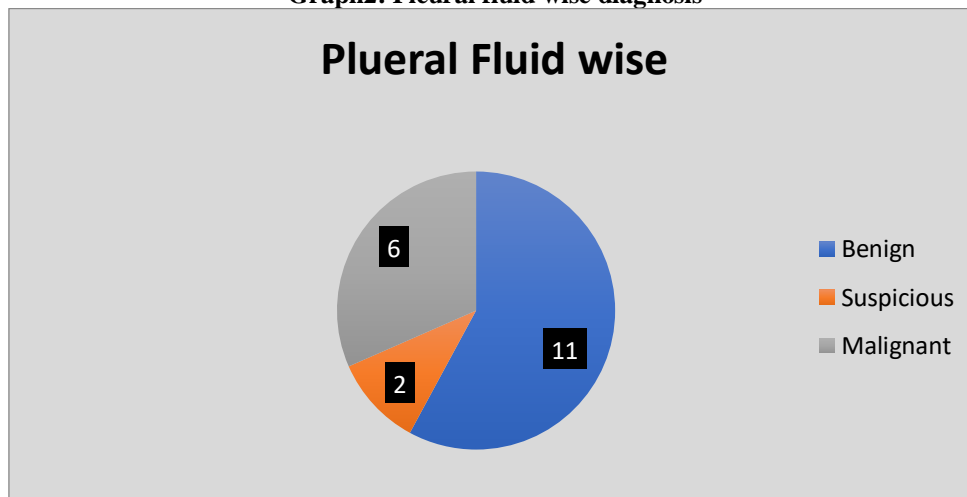
Table 1: The correlation between fluid type and cancer

Type of fluid	Benign	Suspicious	Malignant	P-value
Ascitic fluid	12	02	08	<0.001
Pleural fluid	11	02	06	<0.001
Synovial fluid	06	01	02	<0.001

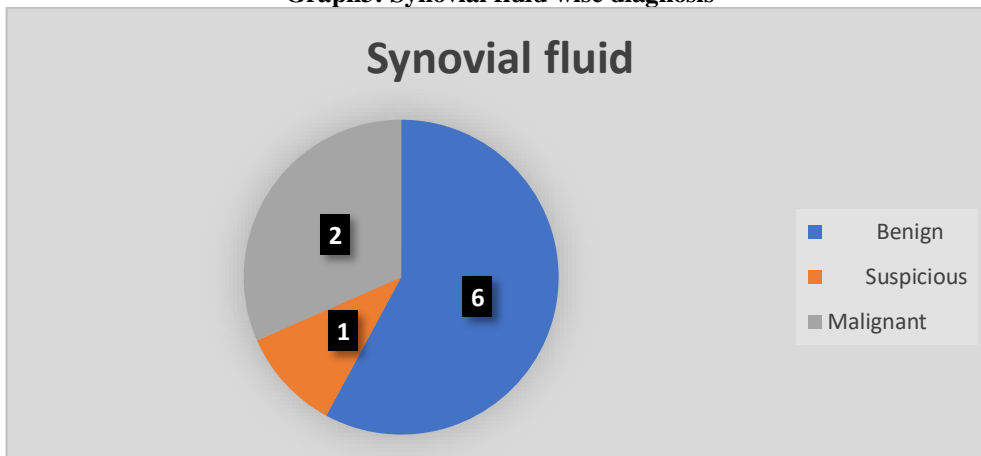
Graph 1: Ascitic fluid wise diagnosis



Graph2: Pleural fluid wise diagnosis



Graph3: Synovial fluid wise diagnosis



Graph4: Gender-wise distribution of patients

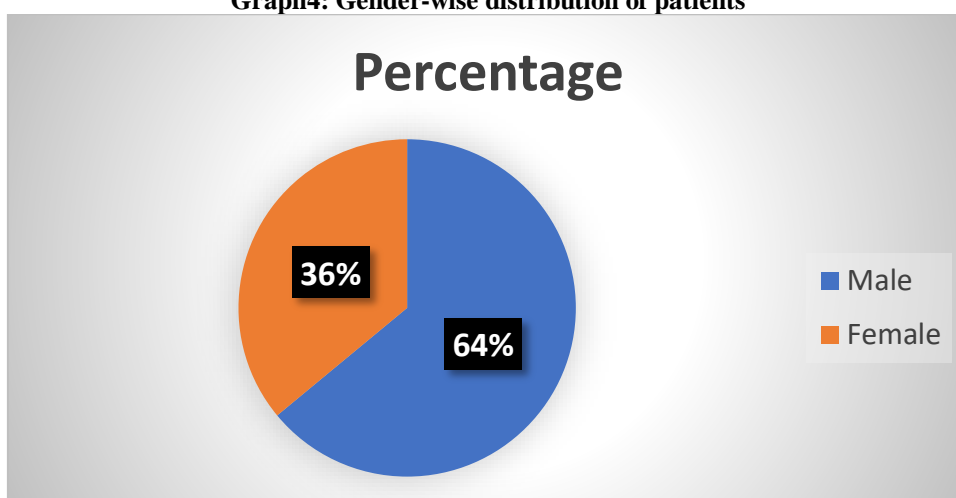
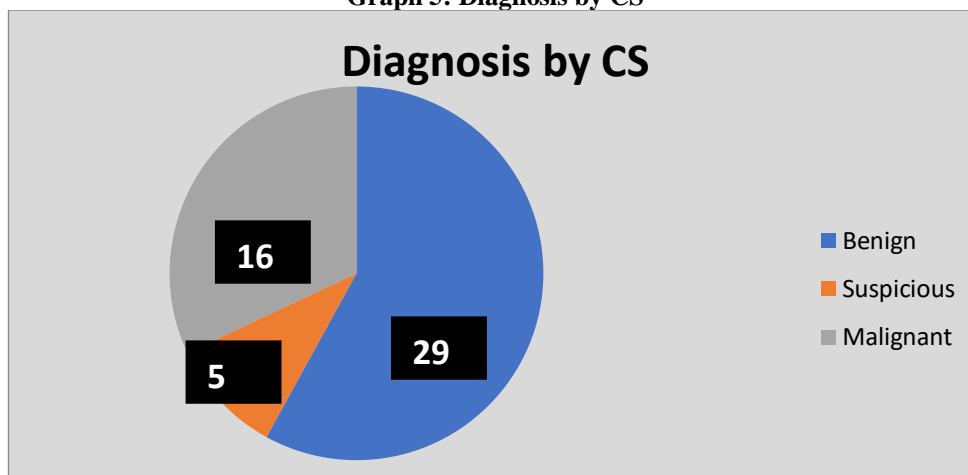


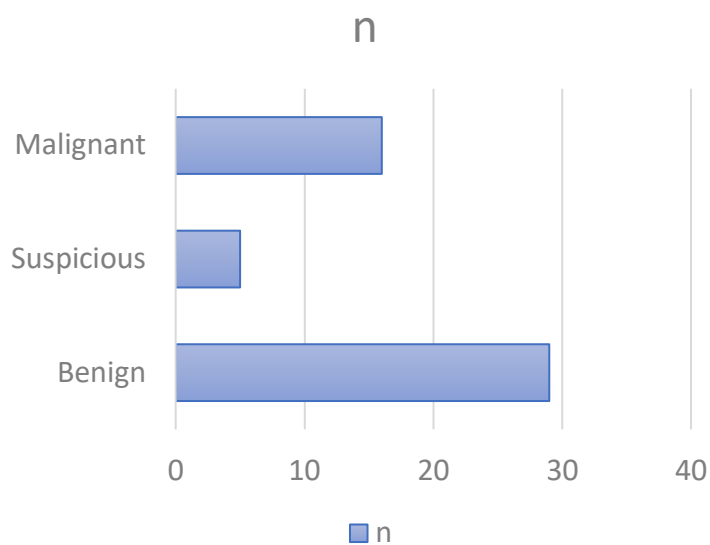
Table 2: Comparison of diagnosis by CS and CB

Diagnosis by CS	N	Diagnosis by CB			P-value
		Benign	Suspicious	Malignant	
Benign	29	29	00	00	<0.001
Suspicious	5	00	00	5	<0.001
Malignant	16	6	00	10	<0.001
Total	50	35	00	15	<0.001

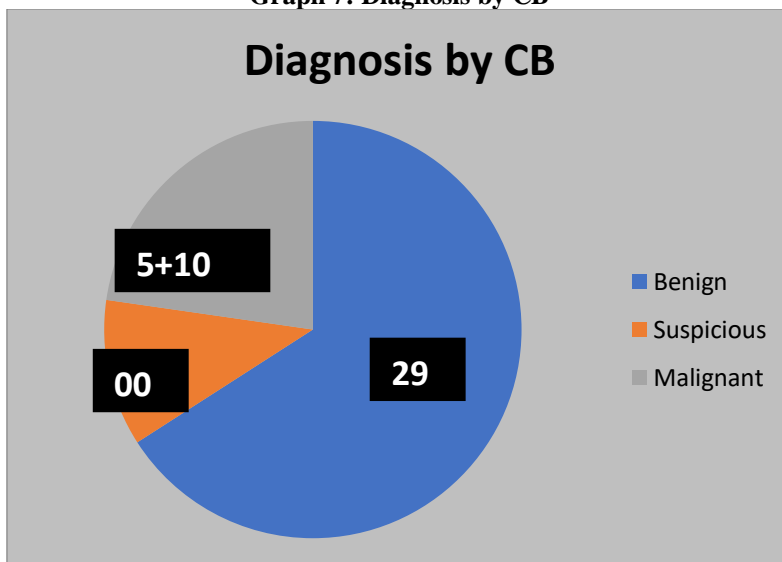
Graph 5: Diagnosis by CS



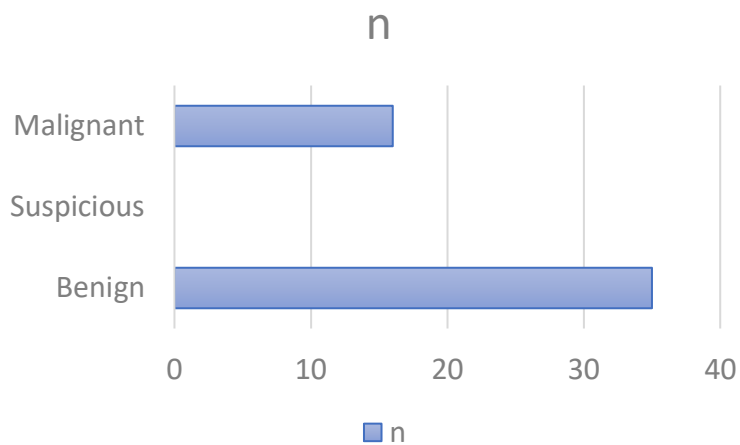
Graph 6: Diagnosis by CS



Graph 7: Diagnosis by CB



Graph 8: Diagnosis by CB



BENIGN

Figure 1: Cytology Cell Block

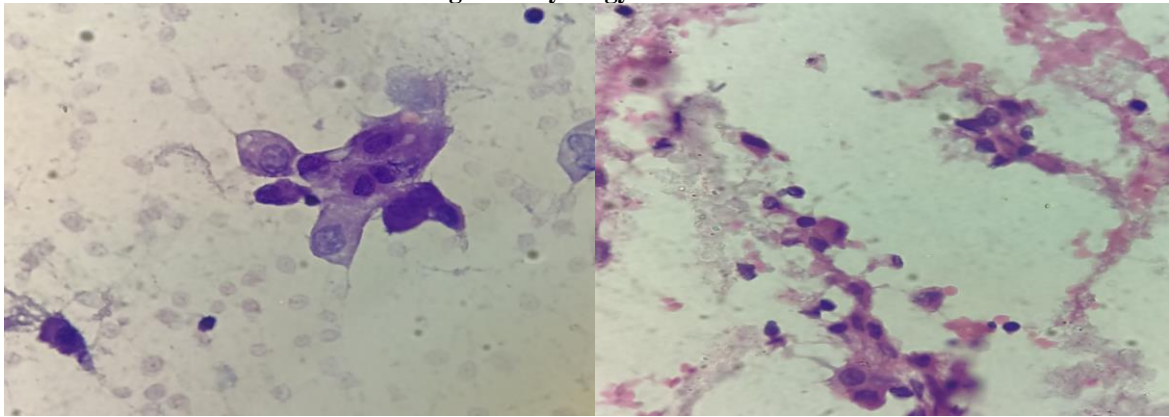


Figure 2: Suspicious Malignancy

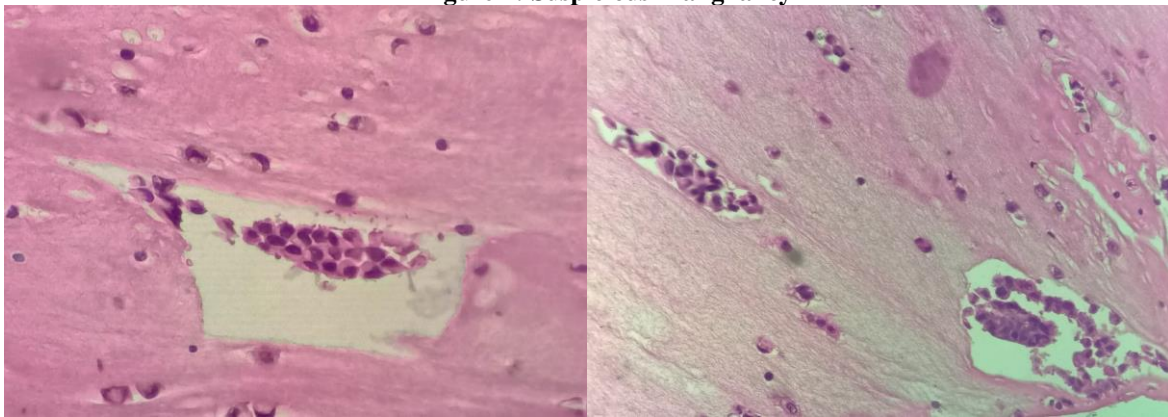


Figure 3: Adeno carcinoma

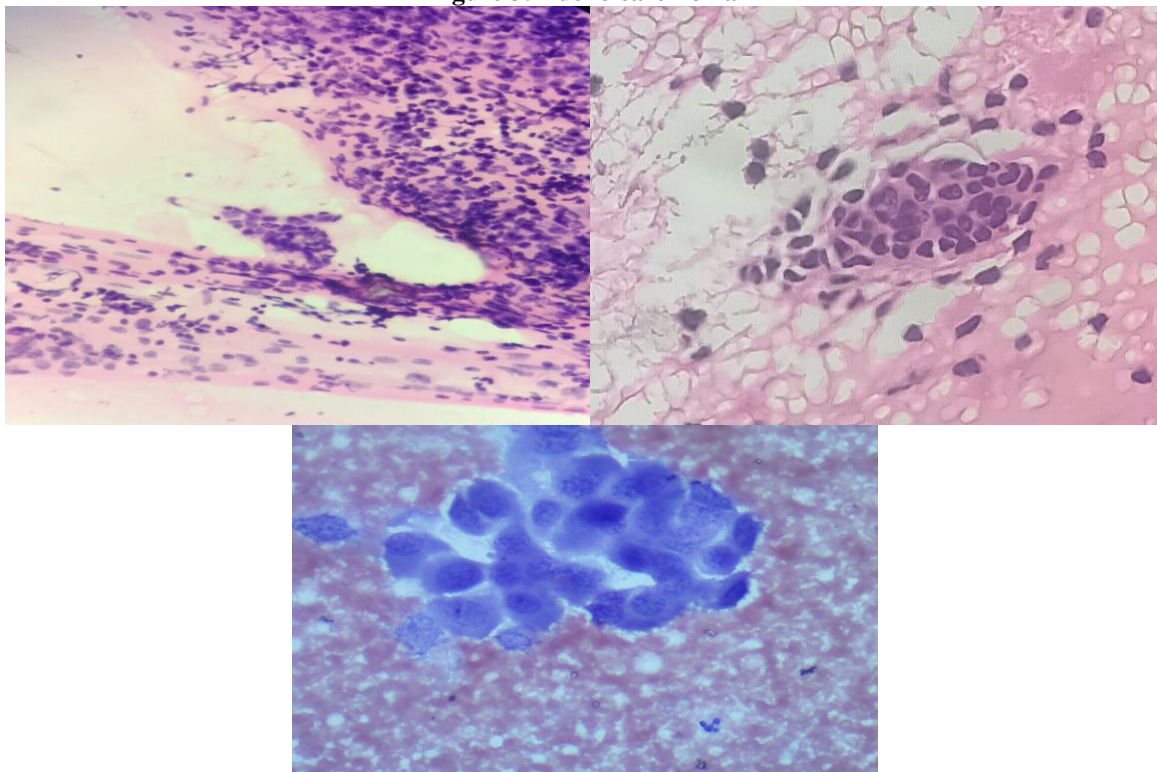
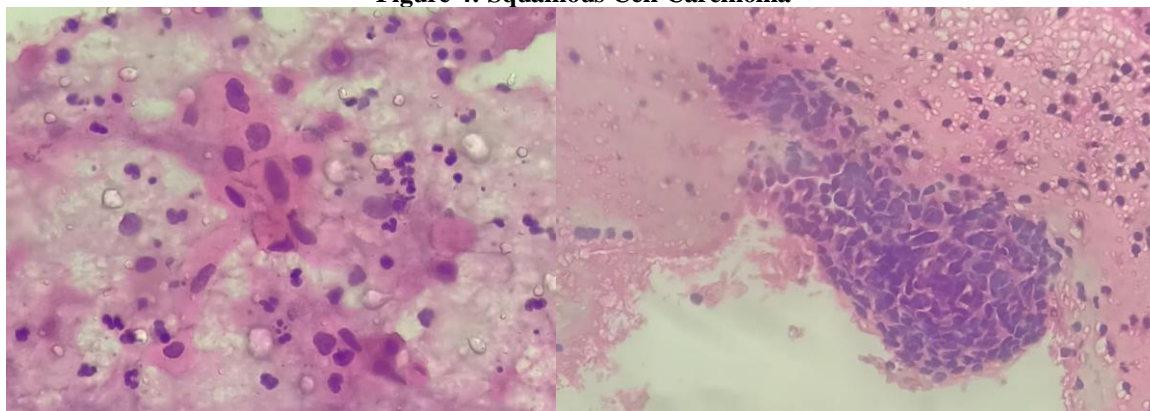


Figure 4: Squamous Cell Carcinoma

DISCUSSION

Cytological study of body fluid is a complete diagnostic modality. The information provided by body fluid analysis serves several functions. First, it assists the clinician in formulating and pointing out the etiology of effusion and list of differential diagnoses. Second, it allows one to follow the results of therapy and prognosis.⁶⁻⁸ Cytological examination of body fluids is commonly done by conventional smear (CS) method. However, the cell block (CB) method is one of the oldest but less commonly used techniques in the evaluation of body fluids even today. This is due to lack of knowledge about the method of preparation and that all ancillary studies can be done using cellular material obtained from CB such as special stains, immunohistochemistry and flow cytometry.⁸⁻¹⁰ Hence; the present study was conducted for evaluating body fluids with conventional smear and cell block at tertiary care hospital.

In the present study, 10 cases were malignant positive for both smear and cell block, 5 cases were suspicious for malignancy for smear and were positive for malignancy on evaluation in cell block, 6 cases of mesothelial cluster which were positive for malignancy in conventional smear were negative on evaluation from cell block, 29 cases were benign on evaluation from both smear and cell block. In a similar study conducted by Viral M Bhanvadia et al, authors assessed the diagnostic Value of Cytological Smear Method Versus Cell Block Method in Body Fluid Cytology. A total of 150 fluid specimens were examined for conventional cytological smear (CS) and cell block method (CB). Out of 150 fluids, 79 were pleural fluid, 69 were ascitic fluid and 2 pericardial fluid. The utility of the CB method in the cytodiagnosis of malignant effusions was found to be highly significant as compared to the CS method. The additional yield of malignancy was 10% more as was obtained by the CB method. For the final cytodiagnosis of body fluid, there is statistically significant difference between the two techniques.¹⁰ Matreja SS et al compared the cytological features of pleural and peritoneal exudative fluids by conventional smear (CS) method and cell block (CB) method and also to assess the utility of a combined

approach for cytodiagnosis of these effusions. CB method provided higher cellularity, better architectural patterns and additional yield for malignancy as compared to CS method ($P < 0.005$). Sensitivity, specificity, PPV, NPV, and accuracy by CS method were 69.2%, 95%, 56.25%, 97.08% and 92.8%, while by CB method were 92.30%, 99.2%, 92.30%, 99.28% and 98.6%. The study showed that it is advisable to routinely make CBs before discarding specimens that are suspicious for malignancy by smear examination.¹¹

The diagnostic yields of CS, CB, and the combination of both, regardless of the etiology of pleural effusion was evaluated in another previous study conducted by Theerada Assawasaksakul et al. Out of a total of 353 samples, the final diagnoses included 278 (78.8%) malignancies, 41 (11.6%) infectious diseases, 16 (4.5%) other inflammatory diseases, and 18 (5.1%) transudative pleural effusions. CS and CB provided a similar diagnostic yield (48.7% vs. 49.9%, $P=0.69$), while the combination of both gave a higher yield (57.2%). Among 278 malignant pleural effusions (MPE), the diagnostic yields of CS and CB were 61.2% and 61.9%, respectively. Combined CS and CB improved the diagnostic yield to 71.2%. However, both CS and CB had low diagnostic yields in infectious pleuritis, other inflammatory diseases, and transudative pleural effusions. In MPE, CB provides a similar diagnostic performance to CS, while application of both techniques can significantly increase the diagnostic yield.¹²

CONCLUSION

We observed that both methods have their own merits and demerits. Most importantly, the cell block serves as an adjunct to the smear method in enhancing diagnosis. The study found that methods had high specificity. Cell-blocks were found to be more reliable to smears in typing malignancy.

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