



CYTOLOGICAL ANALYSIS OF BODY FLUIDS IN CONVENTIONAL SMEAR AND CELL BLOCK TECHNIQUE-STUDY OF 120 CASES

POORANA PRIYA.P*

Department of Pathology, Sree Balaji Medical college and hospital, Bharath university, Chennai India.

ABSTRACT

The cytological study of body fluids is an important diagnostic modality. It helps in finding out the etiology as well as the prognosis of the disease process. In our study, a total of 120 fluid samples were examined for conventional cytological smear and cellblock method. Out of 120 fluids, 58 were peritoneal fluid, 55 were pleural fluid, 4 were synovial and 3 pericardial fluid. Overall morphology, cellularity, architecture, cytoplasmic and nuclear details were studied in both conventional smear and cell block technique. We found statistically significant difference between both the techniques. The utility of cell block method in cytodiagnosis of malignant effusions was significant in our study.

KEY WORDS: Body fluids, Cytodiagnosis, Conventional smear, Cellblock, effusion, Malignancy.



POORANA PRIYA.P

Department of Pathology, Sree Balaji Medical college and hospital,
Bharath university, Chennai India.

*Corresponding author

INTRODUCTION

The cytological analysis of serous effusions helps in diagnostic, therapeutic and prognostic implications¹. Most of the laboratories perform direct smear prepared from centrifuged deposits of effusion. At times, lack of morphological details of the representative cells contributes to considerable difficulties in making diagnosis on conventional smears^{2, 3}. In order to overcome these difficulties in this study an attempt was made to utilize cellblock technique, in addition to the routine centrifuge method from fluid samples.

MATERIALS AND METHODS

The study was approved by the institutional ethical and research committee of Sree Balaji medical college and hospital, Chennai. The study was conducted over a period of 2 years (2012-2014) in the department of pathology. A total of 120 fluid cytology samples obtained from patients of various departments were analyzed. The clinical information including age, sex, history, provisional diagnosis were noted. 10 ml of fresh serous pleural, peritoneal, pericardial and synovial fluid samples received were first submitted for naked eye examination

for physical characteristics and then subjected to conventional smear and cellblock techniques. Around 5ml of sample was taken in test tube and centrifuged at 2500 rpm for 15 minutes. A minimum of 2 thin smears were prepared from the sediment. The rest 5ml of the sample was fixed with 5ml of 10% alcoholic formalin (90% Ethyl alcohol and 10% formalin) for 24 hours. Next day sediment which contained the cell button of the sample was scooped out on to a filter paper. This cell button was processed by dehydration, clearing and embedding. A 4 micrometer thickness cell block sections were prepared from the cell button and the smears were stained with Hematoxylin and eosin and Papanicolaou stains. All the samples were subjected to smear cytology and cellblock preparation. The morphologic criteria such as cellularity, architecture and smear background were described and scored according to scoring system by Thapar M et al (4). An impression of acute or chronic inflammation, reactive effusion, suspicious for malignancy and positive for malignancy was given after detailed cytological assessment. The cytological diagnosis was correlated with clinical diagnosis and other specific laboratory investigations. The results were tabulated and analyzed using SPSS version 15.0.

RESULTS

TABLE 1
DISTRIBUTION OF TOTAL CASES AMONG INDIVIDUAL SAMPLES

Type of fluid	Number	Percentage (%)
Peritoneal	58	48.33
Pleural	55	45.83
Synovial	4	3.33
Pericardial	3	2.5
Total	120	100

In our study a total of 120 body cavity fluid samples were studied. Table 1 shows the distribution of total cases among individual samples. Out of 120 samples, 58 samples were peritoneal fluid, 55 were pleural, 4 were synovial and 3 were pericardial. Out of 120

samples, 75 samples were from male patients and 45 were from females. The maximum number of samples were in the age group of 41-60 years. Least number of samples were in the age group of 0-20 years.

TABLE 2A
PERITONEAL FLUID ANALYSIS

Clinical diagnosis	No of cases	Cytological diagnosis	No of cases	
			CS	CB
Cirrhosis liver with ascites	30	Chronic inflammation	30	30
Alcoholic liver disease	6		6	6
Peritonitis	10	Acute inflammation	10	10
Malignancy	12	Reactive effusion	2	2
		Suspicious for malignancy	3	-
		Positive for malignancy	7	10
Total				

CS-Conventional smear, CB-Cellblock

Table 2A shows the clinical and cytological analysis of peritoneal fluid samples. In 58 peritoneal fluid samples, chronic inflammation was found in 36 cases in conventional and cellblock sections, in which 30 cases were clinically diagnosed as cirrhosis liver with ascites, 6 cases with alcoholic liver disease, 10 cases presented with peritonitis, reported as acute inflammation in both the techniques. 12 cases were clinically diagnosed as malignancy.

These malignant cases when cytologically analyzed in conventional smear, 2 cases were found to have reactive effusion, 3 cases were suspicious for malignancy and 7 cases were positive for malignancy. In cellblock sections reactive effusion was seen in same 2 cases and 10 cases were positive for malignancy so additional 3 cases were found to be malignant effusion with no suspicious cases in cellblock sections.

TABLE 2B
PLEURAL FLUID ANALYSIS

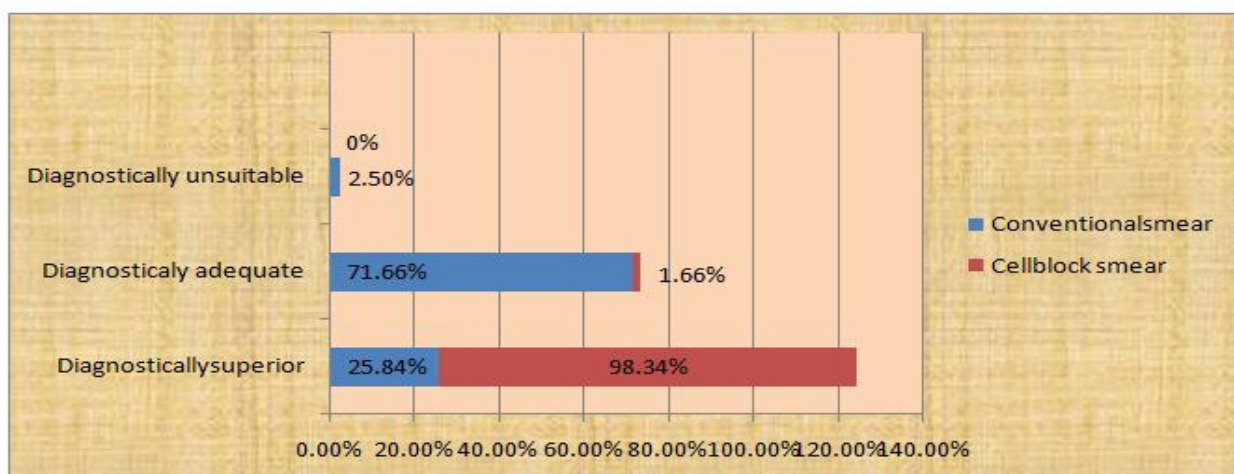
Clinical diagnosis	No of cases	Cytological diagnosis	No of cases	
			CS	CB
Tuberculosis	34	Chronic inflammation	34	34
Pneumonia	10	Acute inflammation	10	10
Malignancy	11	Reactive effusion	3	4
		Suspicious for malignancy	4	-
		Positive for malignancy	4	7
Total	55	Total	55	55

CS-Conventional smear, CB-Cellblock

Table 2B explains the analysis of pleural fluid analysis. In 55 pleural fluid samples studied, in conventional smear chronic inflammation was found in 34 cases, clinically these cases were diagnosed as tuberculosis. Pneumonia was diagnosed in 10 cases, 11 cases were clinically diagnosed as malignancy. Cytological examination of these samples by conventional smear detected 3 cases of reactive effusion, 4 cases were suspicious for malignancy and 4

were positive for malignancy. In cellblock sections 4 cases were reactive and additional 3 cases ie) 7 cases were diagnosed to be positive or malignancy with no suspicious for malignancy. 4 synovial fluid samples were reported as acute suppurative inflammation with clinical diagnosis of septic arthritis in conventional and cell block sections. In 3 pericardial samples, 3 cases presented with suppurative pericarditis.

FIGURE 1
DIAGNOSTIC SCORES OF CONVENTIONAL AND CELL BLOCK SECTIONS



The quality of the smear was interpreted according to scoring system suggested by Thapar M et al. Morphologic criteria such as cellularity, architecture and background were taken in account. The samples were classified in to three categories a score of (6-9) was considered diagnostically superior, score (3-5) as diagnostically adequate and score of (0-2) as diagnostically unsuitable. Figure 1 shows,

diagnostically superior cases of 98.34% in cellblock sections, 25.84% in conventional smear. Diagnostically adequate cases of 71.66% were found in conventional smear, 1.66% cases in cellblock sections. 2.5% cases of diagnostically unsuitable were found in conventional smear, 0% cases in cellblock sections.

TABLE 3
MALIGNANT EFFUSIONS DIAGNOSED BY CELLBLOCK METHOD IN PLEURAL FLUID SAMPLES

Malignant effusions in Pleural fluid	No of cases		Total cases	Percentage (%)
	Males	Females		
Lung	2	3	5	71.43
Breast	-	2	2	28.57
Total	2	5	7	100

Table 3 shows malignant effusions diagnosed by cellblock method in pleural fluid samples. 7 cases were detected as malignant pleural

effusions, for 5 cases the primary was from lung in 3 females and in 2 males, for remaining 2 cases the primary was from breast.

FIGURE 2
PLEURAL FLUID MALIGNANT EFFUSION IN CONVENTIONAL SMEAR AND CELLBLOCK SECTION

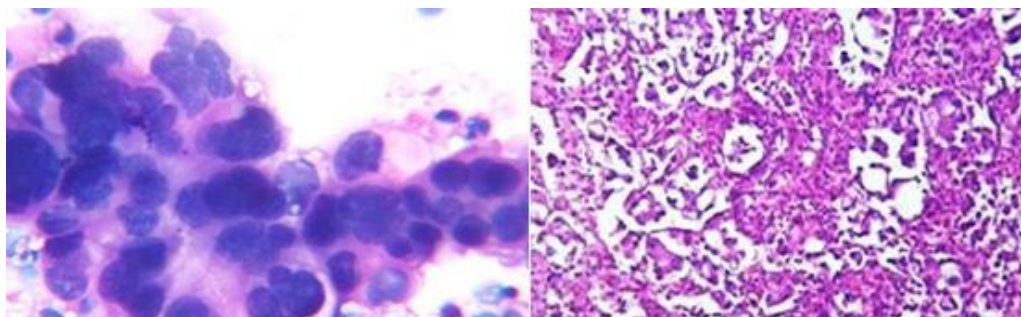


Figure 2 shows a case of adenocarcinoma , in Pleural fluid with primary from the lung, showing hyperchromatic, pleomorphic nuclei

with abundant cytoplasm in conventional(left) and cellblock section(right).

TABLE 4
MALIGNANT EFFUSIONS DIAGNOSED BY CELLBLOCK METHOD IN PERITONEAL FLUID

Malignant effusions in Peritoneal fluid	No of cases		Total cases	Percentage (%)
	Males	Females		
Colon	3	1	4	40
Rectum	2	-	2	20
Stomach	1	-	1	10
Ovary	-	2	2	20
Retro peritoneum	-	1	1	10
Total	6	4	10	100

Samples

Table 4 shows malignant effusion cases diagnosed by cellblock sections in peritoneal fluid samples. 10 cases were malignant in peritoneal effusions, for 4 cases primary was from colon, 3 from males and 1 from females. Primary from rectum was detected in 2 male cases. For 1 sample in males the primary was from the stomach. Primary from ovary was

detected in 2 female cases. 1 case of retroperitoneal soft tissue sarcoma was diagnosed as Pleomorphic Sarcoma (Figure 3) with histopathological correlation done. The predominant cytological diagnosis of malignant effusion was adenocarcinoma. There were no malignant cases in pericardial and synovial fluids.

FIGURE 3
PERITONEAL FLUID-MALIGNANT EFFUSION IN CONVENTIONAL
AND CELL BLOCK SECTION

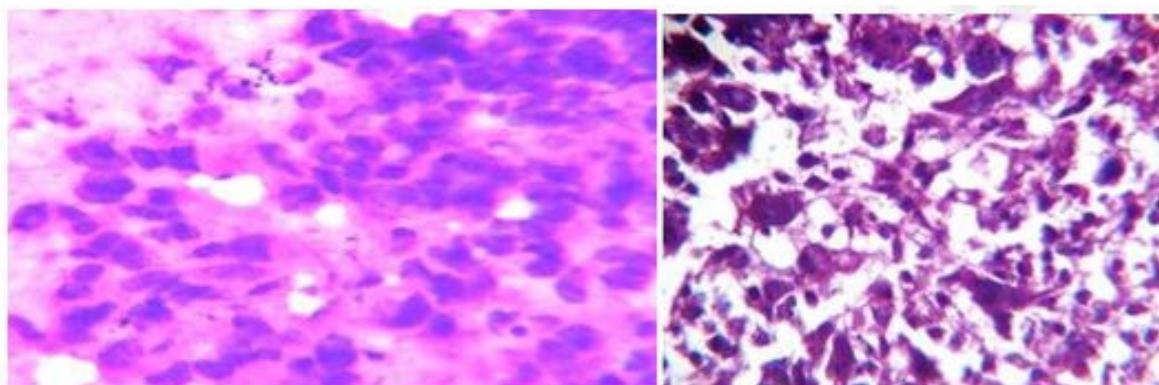


Figure 3 shows a case of retroperitoneal soft tissue tumor, Pleomorphic Sarcoma in ascitic fluid sample with pleomorphic malignant spindle cells, histiocytes in conventional smear (left) and cellblock section.

DISCUSSION

The cytological diagnosis of serous effusions is of paramount importance in diagnostic, therapeutic and prognostic aspects. Morphological details of cells are sometimes lacking in conventional smear which leads to difficult diagnosis^{2,3}. So we performed cellblock technique to avoid difficult diagnosis in centrifuged samples. In this study we used 10% alcohol-formalin as a fixative for cellblock preparation. Similar fixative was used in a study done by Bodele et al and in similar studies^{5,6}. Out of 120 samples, 58 samples were peritoneal fluid, 55 were pleural, 4 were synovial and 3 were pericardial. (Table 1). In analysis of 58 peritoneal fluid samples 30 cases were cirrhosis liver and 6 were alcoholic liver disease. Sujathan et al⁷ and Khan et al⁸ also observed the majority of cases in peritoneal fluid samples the commonest being cirrhosis liver with ascites. (Table 2 A). In pleural fluid analysis out of 55 samples, majority of 34 cases were diagnosed as tuberculosis followed by pneumonia (Table 2B) where the clinical cytological correlation was good in conventional

and cellblock method which is similar to a study by Green LK et al⁹ and Humera Q.F et al¹⁰. In our study, the cellularity was more in cellblock sections compared to conventional smears. The cellblock sections identified better architectural patterns such as sheets, acini, cellballs and papillary formation whereas conventional smears showed only singly scattered cells. The background was almost clear in cellblock sections compared to conventional smears where the background was obscuring. So cellblock sections gained diagnostically superior scores compared to conventional smears. These findings were consistent with the observations in the study done by Udasimath S et al¹¹. The additional yield of malignancy was found to be 5% more by cellblock technique compared to that obtained by conventional smear which is similar to a study by Richardson et al which reduced the false negative results. The commonest primary lesion in pleural fluid was from lung (Figure 2) followed by breast (Table 3). Similar results were observed in studies by Murphy et al¹² and Gaur DS et al¹³. Lopez and Cardoz¹⁴ reported that the most commonest primary neoplasms in peritoneal fluid were from gastrointestinal (GIT) (Figure 3) followed by ovary which is similar to our present study. (Table 4). Statistical analysis revealed significant difference at p value <0.05 in cellularity and diagnostic utility between conventional smear and cellblock techniques.

CONCLUSION

We conclude that the cellblock technique by using 10% alcohol formalin as a fixative is simple, inexpensive and does not require any special training or instrument. Cell block study has increased the diagnostic yield because of better preservation. It shows good architectural pattern, particularly in cases where there is a diagnostic dilemma between the malignancy and reactive changes. Multiple sections that can be obtained from cell blocks are useful in special stains and Immunohistochemistry study. Yet, conventional smear study is routinely practised since it is easier to perform and useful for arriving diagnosis at short period of time. In our study the overall

diagnostic accuracy of conventional smear and cell block sections in body fluid analysis was found to be 91%. This really shows that cell block preparations can be combined with conventional smears wherever possible to improve the diagnostic accuracy.

ACKNOWLEDGEMENT

I would like to thank my professor Dr. Hemalatha Ganapathy and my HOD Dr. B. O. Parijatham, department of pathology for their kind assistance and support.

CONFLICTS OF INTEREST

Conflict of interest declared none.

REFERENCES

1. Koss LG and Melamed MR, (Ed). Koss Diagnostic cytology and its histopathologic bases, 5th edition, JB Lippincott Company: Philadelphia 922-1016, (2006).
2. Grunze H. The comparative diagnostic accuracy, efficiency and specificity of cytological techniques used in the diagnosis of malignant neoplasms in serous effusions of pleural and pericardial cavities. *Acta Cytol*, 8(2):150-63, (1964).
3. Fetsch PA., Simsir A. Brosky K., Abati A. Comparison of three commonly used cytologic preparations in effusions. *Diagn Cytopathol*, 26(1):61-66, (2002).
4. Thapar M., Mishra RK., Sharma A., Goyal V. Critical analysis of cell block versus smear examination in effusion. *J Cytol*, 26(2):60-64, (2009).
5. Nathan NA., Narayan E., Smith MM., Horn MJ. Cytology-improved preparation and its efficacy in diagnostic cytology. *Am J Clin Pathol*, 114(4):599-606, (2000).
6. Mair., Dunbar F., Becker PJ., Du Plessis W. Fine Needle cytology: Is aspiration suction necessary. A study of 100 masses in various sites. *Acta Cytol*, 33(6):42-44, (1989).
7. Sujathan K., Kannan S., Mathew A., Pillai KR., Chandralekha B., Nair MK. Cytodiagnosis of serous effusions: A combined approach of morphological features in Papanicolaou and MGG stained smears and a modified cell block technique. *Journal of cytology*, 17(2):89-95, (2000).
8. Khan N., Sherwani RK., Afroz N., Kapoor S. The cytodagnosis of malignant effusions and determination of the primary site. *J cytol*, 22(3):107-110, (2005).
9. Green LK., Griffin J. Increased Natural killer cells in fluids. *Acta cytol*, 40(6):1240-1245, (1996).
10. Humera Q.F., Ansari., Maimoona Mustafa. Efficacy of Polymerase chain reaction over Ziehl-Neelsen staining in the diagnosis of Mycobacterium tuberculosis. *Int J Pharm Bio Sci*, 2(4):B 272-278, (2011).
11. Udasimath S., Arakeri SU., Karigowdar MH. Diagnostic utility of the cell block method versus the conventional smear study in pleural fluid cytology. *J Cytol*, 29(1):11-15, (2012).
12. Murphy M., Alan BP. Determination of primary site by examination of cancer cells in body fluids. *Am J Clin Pathol*, 58(5):479-488, (1972).
13. Gaur DS., Chauhan N., Kusum A et al. Pleural fluid analysis-role in diagnosing pleural malignancy. *Jcytol*, 24(4):183-88, (1972).
14. Lopez and Cardoz PL. A Critical evaluation of 3000 cytologic analysis of pleural fluid and peritoneal fluid. *Acta Cytol*, 40(5):455-460, (1996)