



EVALUATING EFFICACY OF CYTOLOGICAL DIAGNOSIS OF SEROUS EFFUSIONS BY SMEAR CYTOLOGY AND CELLBLOCK TECHNIQUE

Dr. Kirti Priya

Senior Resident (Pathology Department) IGIMS, Patna.

Dr. Sujeet Kumar Bharti*

Senior resident (Gastrosurgery Department) IGIMS, Patna. *Corresponding Author

ABSTRACT

Introduction :- Cytological examination of serous effusions is of paramount importance not only for diagnosing cancer, but it may also reveal information regarding various inflammatory conditions, parasitic infestations, infection with bacteria, fungi or viruses, and some immunological diseases. Cellblock technique has many advantages over conventional smear cytology in improving the sensitivity of diagnosis. The main advantages of the cellblock technique are preserving tissue architecture and obtaining multiple sections from the same material for special stains and immunohistochemistry.

Objectives :- To study the body fluids, i.e., pleural, peritoneal, and pericardial, for the absence of local or systemic pathological situation. To evaluate the diagnostic efficacy of a combined approach of conventional smear study and cellblock technique in serous effusions.

Methods:- A total of 100 fluid samples from referral centers received in the Cytology section. After preparing two conventional smears for PAP and Giemsa stains, the residual sample was subjected to cellblock preparation. Nathan's Alcohol Formalin Substitute was added and fixed for an hour. After fixation, the specimen was centrifuged at 1500 rpm for 15min. The supernatant was decanted, and the sediment completely drained off by Xlinverting tube over Whatman filter paper. After discarding the supernatant fixative, the pellet formed was removed with a pointed spatula and placed on top of the lens paper inside the tissue cassette, and processed for paraffin embedding.

Results:- In the total of 100 samples were subjected for cytological evaluation. Pleural fluids were 47%, peritoneal fluids were 43%, and pericardial fluids were 10%. Maximum samples were in age group of 41-50 years. By Conventional smear cytology, benign, suspicious and malignant lesions were 76%, 14.5%, and 9.5%, respectively. By cellblock study, benign and malignant lesions were 75.5% and 24.5%, respectively.

Conclusion:- Morphological features were better appreciated by cellblock composition, which rises the sensitivity of cyst diagnosis hence serves as a useful adjunct to conventional smears.

KEYWORDS : Serous effusions, Conventional smear, Cellblock,

INTRODUCTION :-

Cytological inspection of serous effusions is of paramount importance not only for diagnosing cancer, but they may also disclose information regarding many inflammatory conditions, parasitic infestations, infection with bacteria, fungi, or some immunological conditions.^[1,2] This residual material can be evaluated in cellblock preparation which gives 5% additional diagnostic yield.^[2] The lower sensitivity is due to bland morphological features of cells, loss of cellular material, and changes due to different laboratory methods. The cellblock technique not only increases the positive results but also helped to demonstrate better architectural patterns, which can be of great help in making the correct diagnosis of primary site and categorization of tumors. As the morphological and architectural design is better appreciated in cellblock preparation, it serves as a useful adjunct method for comparison of routine, conventional smear cytology. Hence it plays a significant role in the correct diagnosis of malignancy, thereby patient management and prognosis. The main advantages of cellblock technique are the preservation of tissue architecture and the ability to obtain multiple sections from the same material for special stains and immunohistochemistry. So this study has been tackled to assess the diagnostic efficacy of cell block preparation by a combined approach of conventional smear cytology and cell block preparation in serous effusions.

OBJECTIVES :-

To study the body fluids, i.e., pleural, peritoneal, and pericardial, for the absence of local or systemic pathological situation. Evaluate the diagnostic efficacy of a combined approach of conventional smear study and cellblock technique in serous effusions.

HISTOLOGY:-

The cytomorphologic quality associated with all the serous

cavities is alike without any specific site specification.^[3] The mesothelium forms the parietal and visceral layer in all the cavities. It comprises a flat monolayer of mesothelial cells, which tend to undergo hypertrophy secondary to various stimuli, usually resulting in a somewhat cuboidal appearance. The lymphatic vessels open on to the surface lining of the serous cavities through stoma between the mesothelial cells, which provides continuity between the lymphatic system and serous cavities. The mesothelial cells are reported to be immunoreactive for immunomarkers of lymphatic endothelium, such as D2-40 and podoplanin.

MATERIALS & METHODS:-

Study Design-

The study was conducted in the Department of Pathology, Patna Medical College. The study was conducted from March 2015 to December 2017. The study was approved by Institutional Ethics Committee for Human Subjects Research in Patna Medical College. Serous effusions from the body cavities comprising of pleural, peritoneal, and pericardial were included. All fluids other than pleural, peritoneal, pericardial fluids were excluded, and all fresh samples of serous fluids received from October 2015 to September 2017 were included in the study.

The liquid was split into two equal volumes. The first volume of fluid was used for conventional smear cytology, where the fluid was centrifuged at 1500 rpm for 20 minutes and minimum two smears were prepared from that sediment. The first smear was immediately fixed in 90% alcohol and stained with Papanicolaou stain, and the other smear was air-dried and stained with May-Grunwald Giemsa or Giemsa stain. The second volume of fluid was used for cellblock study. To this equal volume of Nathan alcohol formalin substitute consisting of absolute alcohol and 10% formaldehyde in 9:1 proportion was added and fixed for an hour.

The supernatant was decanted, and the sediment was completely drained off by inverting the tube over Whatman filter paper number one. Tinted formalin was added to sediment and kept fixation for one day. Then after discarding the supernatant fixative, the pellet formed was removed with a pointed spatula and placed on top of the lens paper number one and was put inside the tissue cassette and processed for paraffin embedding. Multiple thin sections of 3 to 5-micron thickness from paraffin blocks were obtained & stained with Haematoxylin and Eosin stain, later studied under a microscope.

The cellular material in the cellblock section was examined to be mild when there were 10-200 nucleated cells per high power field, moderate when there were 200-1000 cells per high power field, marked when there were more than 1000 cells per high power fields & inconclusive when there was no cellularity was observed on cellblock preparation. The lack of cellularity may be due to technical errors such as inadequate sampling less than 5 ml of fluid was sent to the laboratory. The volume of obscuring background was said to be mild when less than 15% of the smear/section was obscured & diagnosis was easy, moderate when 15-50% of the smear/section was obscured & diagnosis was possible & large when more than 50% of the slide/section was obscured & diagnosis was greatly compromised. Statistical analysis was done using the Chi-square test to calculate statistical significance, diagnostic accuracy, sensitivity, and specificity of conventional smear cytology, cellblock preparation, and combined traditional cytology of smear and cellblock preparation.

RESULTS AND DISCUSSION:-

In the total of 100 samples were subjected for cytological evaluation. Pleural fluids were 47%, peritoneal fluids were 43%, and pericardial fluids were 10%. Maximum samples were in the age group of 41-50 years. By Conventional smear cytology benign, suspicious and malignant lesions were 76%, 14.5%, and 9.5%, respectively. By cellblock study, benign and malignant lesions were 75% and 25%, respectively. (Figure-1), In this study, 75 cases were male and 25 cases female. (Figure-2) Out of 100 samples, by conventional smear cytology mild cellularity was observed in (52.7%) samples, whereas by cellblock preparation, moderate cellularity was observed in (47.3%) samples. A highly significant association ($p < 0.001$) in cellularity was noted between CS & CB preparation of fluids.

Out of 27 cases of malignant effusions, for 13 patients (48%) primary was known & for 14 cases (52%) primary was unknown. Malignant effusions were predominantly seen in males, i.e., 21 cases (78%). The most common primary site was lung in 4 cases (15%). (Table-1)

Table-1:- Distribution Of Primary Sites For Metastatic Effusions

Sl No.	Primary Site	Male	Female	Total	Percentage
1	Ovary	00	2	2	7%
2	Breast	00	1	1	4%
3	Lung	4	0	4	15%
4	GIT	3	0	3	11%
5	Liver	3	0	3	11%
6	Unknown	11	3	14	52%
7	Total	21	6	27	100%

Table-2:- Comparison Of Additional Yield Of Malignancy By Cellblock Preparation In Various Studies

STUDY BY	PERCENTAGE
Dekker et al 1978	38%
Grandhi et al 65 2014	5%
Bhanvadia et al 66 2014	10%
Present study 2015	15.55%

DISTRIBUTION OF TYPE OF BODY FLUIDS

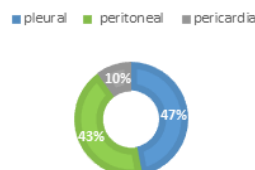


Figure-1

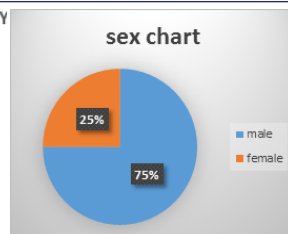


Figure-2

In this present study by a combined approach of conventional smear cytology and cell block preparation, diagnostic yield for malignancy was significantly increased by cellblock preparation. The present study identified additional 17 cases (15.55%) of malignant fluids by cellblock preparation compared to the conventional smear study. (Table-2) Similar findings were noted in studies by Dekker et al. Bhanvadia et al.,^[4] & Grandhi et al.^[5]

According to various studies, additional diagnostic yield for malignancy was noted if the conventional smear technique is supplemented by cellblock method. The present study also concludes that cellblock serves as a useful adjunct to Conventional traditional smears.

A significant disadvantage of the cellblock is more turnaround time as compared to conventional smears.

CONCLUSION:-

Cellblock preparation by using Nathan alcohol formalin substitute as fixative was simple, inexpensive and does not require any special training or instrument. The cellularity was abundant and sufficient for diagnosis in cellblock preparation, even when the conventional smear had minimal cellularity.

Morphological features were better identified by cellblock method when compared to conventional smear method.

The diagnostic efficacy of cellblock preparation of fluid is attributable to the fact that cell population present in sediment is representative of larger surface area than that obtained by needle biopsy. Combined study of conventional smear cytology and cellblock preparation were the most useful in establishing the diagnosis of serous effusions. Thus despite the fact that in majority of cases, the diagnosis can be made on the basis of either smear or cell block alone, the study concluded that using the combined technique on the same specimen leads to a more accurate diagnosis. So a combined approach of conventional smear cytology and cellblock preparation helps us to get an additional diagnostic yield for malignancy in serous effusions.

REFERENCES:-

- Dekker A, Bupp PA. Cytology of serous effusions. An investigation into the usefulness of cellblocks versus smears. *Am J Clin Pathol* 1978; 70(6): 855-860.
- Thapar M, Mishra RK, Sharma A, Goyal V. Critical analysis of cellblock versus smear examination in effusions. *J Cytol* 2009; 26(2):60-64.
- Shidham VB, Atkinson BF. Cytopathologic diagnosis of serous fluids. Elsevier, PA, Saunders, 2006; 1-55.
- Bhanvadia VM., Santwani PM, Vachhani JH. Analysis of diagnostic value of cytological smear method versus cellblock method in body fluid cytology: study of 150 cases. *Ethio J Health Sci* 2014; 24(2):125-131.
- Grandhi B, Shanthi V, Rao NM, Reddy CV, Mohan KVM. Diagnostic utility of cellblock as an adjunct to cytological smears. *Int J Med Res Health Sci* 2014;3(2):278-284.