

Diagnostic Evaluation of Serous Body Fluids Based on Cytomorphological Characteristics¹Dr. Minakshi S. Ninale, Assistant Professor, Department of Pathology, SSIMS & RC Medical College, Davanagere²Dr. Sangita Margam, Addl Professor, Dept. of Pathology, GSMC & KEM Medical College, Mumbai³Dr Santhosh K Gouroji, Associate Professor, Department of Anaesthesiology, JJM Medical College, Davanagere**Corresponding Author:** Dr. Minakshi S. Ninale, Assistant Professor, Department of Pathology, SSIMS & RC Medical College, Davanagere.**How to citation this article:** Dr. Minakshi S. Ninale, Dr. Sangita Margam, Dr Santhosh K Gouroji, “Diagnostic Evaluation of Serous Body Fluids Based on Cytomorphological Characteristics”, IJMACR– August – 2026, Volume – 9, Issue –4, P. No. 1050 – 1061.**Open Access Article:** © 2026 Dr. Minakshi S. Ninale, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution license (<http://creativecommons.org/licenses/by/4.0>). Which allows others to remix, tweak, and build upon the work non- commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.**Type of Publication:** Original Research Article**Conflicts of Interest:** Nil**Abstract**

Introduction: Cytological study plays significant role in the diagnostic modality of body fluids, in identifying atypical cells in effusions, to know the advancement of the disease process in the body. The cell block technique study for fluids has an architectural pattern, a useful method, mainly in correct diagnosis of malignancy and hence patient management and prognosis, we conducted this study, to know the incidence, etiopathogenesis of non-neoplastic and neoplastic effusions along with to assess the utility of cell block in diagnosis of neoplastic fluids.

Materials and Methods: A prospective study was carried out over a period of 18 months. In our study, total of 280 cases of pleural, pericardial and peritoneal effusions which were received in department of cytology of pathology from March 2016 to Sept 2017 and assessed by Routine gross examination, Smear

preparation by Cyto-centrifugation and Cell block technique. Immuno histochemistry and Chemical analysis were performed wherever necessary.

Results: Out of total 280 effusions, 150 (53.57%) were peritoneal, 125 (44.64%) were pleural and 5 (1.78%) were pericardial fluids, 166 were transudates and 114 were exudates. Maximum number of cases of serous effusion were seen in females, 162/280 cases i.e. (57.85%) and males in 118 cases (42.14%), Male: female ratio being 0.72:1. On gross examination, the commonest appearance was yellow in 133 cases (47.5%). Out of 280 samples received, 245(87.5%) were of non-neoplastic causes, while neoplastic effusion was seen in 35 (12.5%) cases. Cell block prepared in neoplastic effusions yielded high cellularity in 65% cases compared to 45.71% in conventional smears, moderate yield in 10% compared to 37.14% in conventional smear and

low yield significantly reduced to 25% from 45.71% in conventional smear.

Conclusion: Conventional smear method can yield good result in all types of effusion, when combined approach to morphology with Papanicolaou (PAP) and May-Grunwald Giemsa (MGG) used. Cell block preparation is a simple and inexpensive method in obtaining better cellularity, cellular architecture and cellular morphological details. Thus, when cell block technique and conventional smear method used in combination, definitely there is increased rate of correct diagnosis in case of malignant effusions.

Keywords: Cytomorphology, Cyto-Centrifugation, Cell Block, Immunohistochemistry.

Introduction

Cytological study of body fluids dates back to a long way in the history of pathology for being an inexpensive, simple procedure combined with imbibing significant knowledge in the diagnostic modality of body fluids.

The main serosal body cavity fluids comprise of pleural, peritoneal, and pericardial fluid. The fluid cavities are lined by single layered epithelium. Normally these cavities contain very minimal fluid that is required for lubrication and protecting the underlying viscera. Accumulation of fluid in serous cavity in excess amount is referred as effusion.¹

Cytological examination of the fluids along with physical examination helps the pathologist to identify specific etiologic agent, to follow the natural process of disease and to monitor the response to therapy.

The study of fluid cytology has paramount importance in identifying atypical cells in effusions which in turn helps to know the advancement of the disease process in the body. Any innovations in standard processing methods

of these fluids to yield better results are also of practical importance.

The cell block technique study for fluids has an architectural pattern; it is a useful method, mainly in correct diagnosis of malignancy and hence patient management and prognosis. Diagnosis of Malignant cells in effusions help in staging procedures and resulting therapeutic decisions.²

Detection of malignant cells in serous effusions is possible in nearly 40-60% of patients. Because of scarcity of tumor cells in malignant effusions along with morphologic similarities to reactive mesothelial cells, in approximate 40% of effusion cytological examination fails to detect malignant cells.³ So, cell block study along with conventional smear cytology improves sensitivity of diagnosis.

Keeping all this in mind, we conducted this study, to know the incidence, etiopathogenesis of non-neoplastic and neoplastic effusions along with to assess the utility of cell block in diagnosis of neoplastic fluids.

Materials and Methods

A prospective study was carried out over a period of 18 months. All consecutive samples of pleural, peritoneal and pericardial cavities of any age group were included in our study. All other body fluids were excluded from this study. A total of 280 cases were received in department of cytology of pathology from March 2016 to Sept 2017 and processed routinely. For all the cases detailed clinical information with regards to age, sex, history, provisional diagnosis, biochemical findings, obtained from medical records, wherever possible.

A. Gross Examination: Macroscopic examination of fluids was done by naked eye examination for physical characteristics. 1. Quantity- equal distribution of fluid is important for both conventional smear and cell block

method for equal distribution of cells. For cytopsin method 0.5ml of fluid was measured by pipette. In case of thick fluid, we diluted it to avoid thick smear. 2. Color- it was examined in natural light. In malignancy, fluids were usually hemorrhagic. 3. Appearance- from the appearance of fluids we can classify them into transudates (clear) and exudates (turbid), examined by naked eye. 4. Clot- fluids checked for clot/coagulum, if present mentioned in paper. Before processing fluid, we dissolved clot by shaking the container to avoid hypocellular smears.

B. Chemical Analysis of Serous Fluids: 1. Protein estimation by colorimetric method using Trichloroacetic acid (TCA) at 470nm filter. Protein was calculated by formula- colorimetric reading x factor x 20 mg/dl. Fluids with protein <3gm/dl were labelled as transudative type and >3gm/dl as exudative type.

2. Examination of smear processed by Cyto-centrifugation Around 0.5ml of sample was taken from container and placed in 2 Cytocentrifuge filters each for centrifugation. Both were centrifuged at 2000 rpm for 5 min. Cell smear formed on one slide was fixed by 95% ethanol and stained with Papanicolaou stain (PAP), second smear formed on another slide, kept it dry and stained with Giemsa stain (MGG). Cytology by microscopic examination showed cellularity and type of cell population.

C. Additional Tests

1. Cell block technique: - It was used in neoplastic effusion. - We used Plasma-Thromboplastin method by Bansode Shubhada et al.⁵ Plasma and thromboplastin reagent are used to prepare cell block. The stability was checked periodically by adding two drops of thromboplastin to two drops of plasma, which formed clot in about 30 seconds. 5ml fluid from container

transferred into centrifuge tube and labeled with the specimen identifier. Centrifuge tube spinned for 5 minutes at 2000rpm. Centrifuge tube removed and supernatant discarded. Mixed 2-3 drops of plasma with sediment. Added 2-3 drops of thromboplastin reagent and mixed by tapping. To this mixture, 10% buffered formalin was added. Clot formed was kept for fixation for 30 minutes in formalin. This clot was wrapped in filter paper and processed in histokinette as part of routine paraffin section histopathology Hematoxylin and eosin staining was done. Special staining and immunohistochemistry was done whenever required.

2. Immunocytochemistry- we used cell block for immunocytochemistry wherever possible

Results

Out of 280 serous fluids received, peritoneal fluid was the commonest effusion accounting for 53.57%, followed by pleural fluid 125 cases (44.64%), while 5 cases were of pericardial fluid effusion shown in (Table 1).

Table 1: Distribution of cases as per type of fluid

Sn.	Type of fluid	No of cases	Percentage
1	Peritoneal	150	53.57
2	Pleural	125	44.64
3	Pericardial	5	1.78
	Total	280	100

Maximum number of cases of serous effusion were seen in females, 162/280 cases (57.85%) and males in 118 cases (42.14%). Male: female ratio being 0.72:1. The age range in our study was 01-89 years. The maximum number of cases i.e. 62 cases out of 280 cases belonged to age group 41-50 years. Youngest patient in our study was 1-year old female who presented with pleural effusion while Oldest was 82-year-old male with ascites.

On gross examination, the commonest appearance was yellow in 133 cases (47.5%), in pleural and peritoneal fluid, with 59 (47.2%) cases and 73(48.66%) cases respectively.

In pericardial fluid, commonest appearance was hemorrhagic in 3 cases (60%).

Out of total 280 samples, 166 were transudates and 114 were exudates. The transudates were more commonly seen in peritoneal fluid, 109 cases (38.79%). While exudative fluid was maximum with pleural effusion (69 cases) comprising 24.64%. Out of 5 pericardial fluids, 4 were exudative.

In our study, out of 280 samples received, 245(87.5%) were of non-neoplastic causes, while neoplastic effusion was seen in 35 (12.5%) cases (Table 2). Maximum non-neoplastic cases were of peritoneal effusion in 136 (55.51%) cases, while maximum neoplastic cases were of pleural effusion in 18 cases (51.42%). Out of total 5 pericardial fluids, 3 were of neoplastic and 2 were of non-neoplastic etiology.

Table 2: Distribution of non-neoplastic cases in peritoneal and pleural fluid as per etiology

Sn.	Causes	No of cases	
		Peritoneal Fluid	Pleural Fluid
1	Liver cirrhosis	39	4
2	Tuberculosis	14	53
3	Idiopathic	10	16
4	Pancreatitis	8	3
5	Anemia	6	1
6	Hepatic abscess	4	2
7	Hyper eosinophilic syndrome	1	-
8	Retroviral disease	1	1
9	Pneumonia	-	13

10	Renal failure	1	2
11	Congestive cardiac failure	-	2
12	Empyema	-	1

Out of 107 cases of non-neoplastic pleural effusion, commonest cause was tuberculosis in 53 cases (49.53%), followed by idiopathic in 16 cases (14.95%) and pneumonia in 13(12.14%) cases.

Out of 136 cases of non- neoplastic peritoneal effusion, commonest cause was liver cirrhosis in 39 cases (28. 67%).Tuberculosis was seen in 14 cases of non-neoplastic peritoneal effusion, out of total 14, 9 cases were of abdominal tuberculosis and 5 were known case of pulmonary tuberculosis. Out of 10 idiopathic cases, 1 was chylous effusion and in remaining 9 cases cause was not found. Eight cases of non-neoplastic peritoneal effusion were because of pancreatitis, while Anemia caused ascites in 6 cases. A part from cirrhosis, there were 4 cases of hepatic abscess causing peritoneal effusion.

One case was of hyper eosinophilic syndrome, renal failure and retroviral disease each. Cytologically, Lymphocyte rich peritoneal effusion was commonly seen in liver cirrhosis, 31/39 cases; tuberculous peritoneal effusion in 13 cases. Polymorphs were seen in pancreatitis (5 cases) and hepatic abscess in 4 cases.

In pleural effusion, cytomorphologically, Lymphocytic predominance was most commonly associated with tuberculosis, in 49 cases followed by idiopathic in 12 cases. The polymorphs predominance was seen in 12/13 cases of pneumonia, pancreatitis & Amoebic liver abscess (2 cases) and empyema (1 case).

In neoplastic cases, most common appearance seen was hemorrhagic in 16 cases out of total 35 neoplastic cases, followed by yellow in 11 cases.

Table 3: Distribution of malignant effusion according to type

Sn.	Type of malignancy	No of cases	Percentage
1	Adenocarcinoma	28	80
2	Unknown primary	2	5.71
3	Lymphoma	2	5.71
4	Dysgerminoma	2	5.71
5	Suspicious of malignancy	1	2.85
	Total	35	100

The commonest malignant cell type in effusions was adenocarcinoma in 28 cases(80%) out of total 35 cases, shown in (Table no-3).

There were 2 cases of unknown primary; morphology was consistent with adenocarcinoma in 1 case and other showed metastasis of epithelial malignancy.

Two malignant effusions were of lymphoma. There was 1 case of dysgerminoma, which had peritoneal as well as pericardial effusion.

One case was suspicious for malignancy on both conventional smear and cell block method.

Table 4: Distribution of malignant pleural and peritoneal cases according to type

Sn.	Type of Malignancy	Pleural fluid		Peritoneal fluid	
		No of cases	Percentage	No of cases	Percentage
1	Adenocarcinoma	14	77.77	12	85.71
2	Unknown primary	2	11.11	-	-
3	Lymphoma	1	5.55	1	7.14
4	Suspicious of malignancy	1	5.55	-	--
5	Dysgerminoma	-	-	1	7.14
	Total	18	100	14	100

In both malignant pleural and pericardial effusion, commonest malignant cell type seen was adenocarcinoma in 14 cases and 12 cases respectively, shown in (Table no-4).

Commonest cause for adenocarcinoma in pleural effusion was lung followed by breast whereas in peritoneal, it was ovary followed by colon.

Out of 3 malignant pericardial effusions, 2 were because of adenocarcinoma, which were of metastasis from lung carcinoma and colon carcinoma, each.

While there was 1 case of malignant pericardial effusion because of dysgerminoma.

Discussion

Cytological evaluation of serous effusions is a frequently performed procedure for knowing underlying etiology, can be neoplastic or non-neoplastic. Also, it helps in both primary diagnosis as well as staging of neoplasm.

In our study, we received total 280 serous body fluids in our Department of Pathology, over a period of 18 months from March 2016 to September 2017. Out of these, 150 were peritoneal, 125 were pleural and 5 were pericardial fluid (Table 5).

Table 5: Comparison of distribution of fluid type with other studies

Sn.	Type of fluid	Sherwani Ret al ¹¹ % (2005)	Thaper M et al ¹⁵ % (2009)	Bhanvadia V M et al ¹⁶ % (2014)	Joshi A et al ⁷ % (2014)	Preeti Ret al ¹⁷ % (2015)	Our study %
1	Peritoneal	129 (62.31)	92 (48.42)	69 (46)	(53.3)	485(53.76)	150(53.57)
2	Pleural	75 (36.23)	88 (46.32)	79 (53)	(44.7)	400 (44.34)	125(44.64)
3	Pericardial	3 (1.44)	10 (5.26)	2 (1)	(2.0)	17(1.88)	5(1.78)
	Total	207	190	150	-	902	280

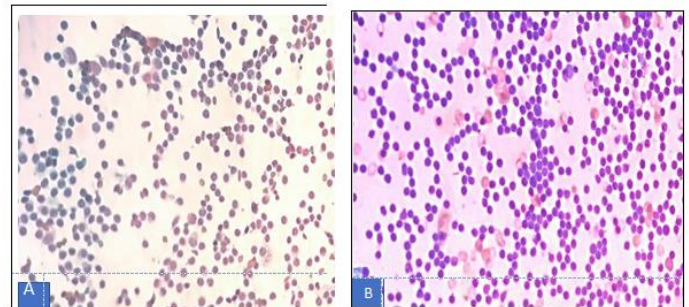
In our study, peritoneal fluid outnumbered followed by pleural and pericardial fluid. Similar findings were seen by Thaper M et al¹⁵, Preeti R et al¹⁷, Sherwani R et al¹¹ and Joshi A et al⁷

The discrepancy with finding of Bhanvadia V M et al¹⁶ study with our study was seen. It may be because of selection of samples. Out of 280 samples studied, 162 were of females (57.85%) and 118 of males (42.14%). Similar findings were noted by Nathani et al¹ on cavity effusions that had female preponderance in serous effusions.

Our study had maximum number of cases in the age group of 41-50 years age i.e. 62 cases (22.14%), followed by the age group 61-70 years. These findings were similar to those in the study of Grandhi et al¹², Joshi et al⁷, Bhanvadia et al¹⁶ and Hathila R et al⁶ who also had maximum number of samples in the similar age group i.e. 41-50 years.

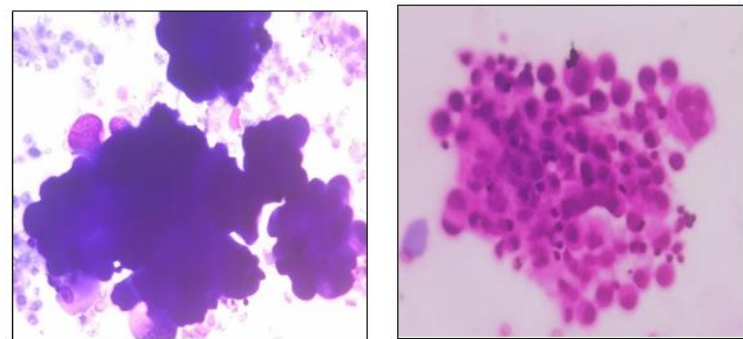
Liver cirrhosis was the most common non-neoplastic cause for peritoneal effusion in our study accounting for 39 cases (28.67%), which was similar finding in Mehmood G et al²¹, Malabu U et al²⁰ and P V Kumavat et al¹⁸. Most common cause of pleural effusion in the study by Kushwaha R et al¹⁹ and P VKumavat et al¹⁸ was tuberculosis which is comparable with our study, which cytologically showed predominantly lymphocytes shown in (fig. 1).

Fig.1: PAP (A) and Giemsa (B) stained smear showing lymphocytes in tuberculous pleural effusion (400X Power).



Out of 280, 25 effusions (peritoneal- 23, pleural-2) were related to benign lesions of Female genital tract, which cytologically showed reactive mesothelial cells in (fig. 2)

Fig. 2: Giemsa stained smears showing reactive mesothelial cells (Balls and clusters) in case of benign neoplasms of ovary in peritoneal effusion (400X Power)



There were total 19 cases of known malignancies and 17 cases of operated for malignancies, in which fluids were sent for malignant cell cytology, but none of them showed atypical cells on cytology so included in non-neoplastic category.

Smears of malignant effusions were moderately to highly cellular, scanner view showed two cell populations. Malignant cells showed features of anaplasia like large cell size, raised nuclear cytoplasmic ratio, prominent nucleoli, irregular nuclear membrane etc. cells displayed various patterns of arrangement such as sheets, clusters, glandular pattern in adenocarcinoma and discrete pattern in lymphoma.

Cell in adenocarcinoma were large, forming aggregates, sheets and clusters. Large cytoplasmic vacuoles and signet ring cells with mucin were also seen. Cells of lymphoma were small to moderate sized, discrete, with hyperchromatic nuclei, inconspicuous nucleoli and thin rim of basophilic cytoplasm.

Out of 280 cases, 35 showed malignant cells on cytology, 18 cases were pleural effusions, 14 were peritoneal effusions and 3 were pericardial effusions.

As stated in literature, most of the malignant fluids have grossly hemorrhagic appearance, 16 out of 35 cases in our study were hemorrhagic accounting for 45.71%.

Out of total 35 malignant effusions, 27 cases (77.14%) were because of metastatic adenocarcinoma in this study. This finding was consistent with many other studies like P V Kumavat et al¹⁸, Bista P et al³, Shulbha V S et al¹⁹, Geethu G Net al². Most common cause of malignant effusion was metastatic adenocarcinoma. This was expected since the majority of human cancers are adenocarcinoma. So, the serous fluids harbor adenocarcinoma more than other malignancy.

In our study, 2 cases (5.71%) were categorized as unknown primary as primary was not known in these cases. Luse and Reagen⁸ in their study found the overall rate of unknown primary as 15%. The cause for this can be attributed to lack of clinical history with loss of follow up of patients.

There were 2 malignant effusion cases each of metastasis from lymphoma and metastasis from dysgerminoma of ovary.

There was 1 case which was reported as suspicious of malignancy in our study.

The most common primary site of metastasizing adenocarcinoma in pleural effusion was lung in 9 cases out of total 14, followed by 4 cases from metastasis of breast carcinoma. 1 case of adenocarcinoma metastasizing to pleural cavity was gall bladder carcinoma.

Most common cause of malignant pleural effusion was lung carcinoma in males and breast carcinoma in females. In our study 8 cases of lung adenocarcinoma were males and one case were female. These findings are consistent with Dey S et al²¹, Khan et al¹⁰, Preeti R C et al¹⁷.

In females, most common malignancy metastasizing to pleural cavity was breast carcinoma, this finding was consistent with Dey S et al²¹, Khan et al¹⁰, Preeti R C et al¹⁷.

Out of 4 cases of breast carcinoma metastasizing to pleural cavity, on histopathological correlation, 3 cases were reported as infiltrating duct carcinoma and one was as lobular carcinoma, she was 48-year-old, k/c/o bilateral Invasive lobular carcinoma had pleural effusion and on cytology showed scattered large cells with high nuclear cytoplasmic ratio, vesicular nuclei and thickened nuclear membrane. (fig. 3)

Fig. 3: Giemsa stained smear shows, scant cellularity, few isolated cells showing high N/C ratio in pleural fluid in a K/C/O B/L lobular breast carcinoma, b/g shows lymphocytes (100X Power)

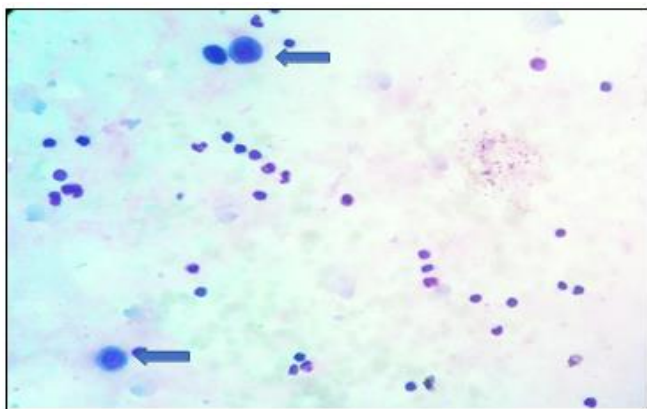
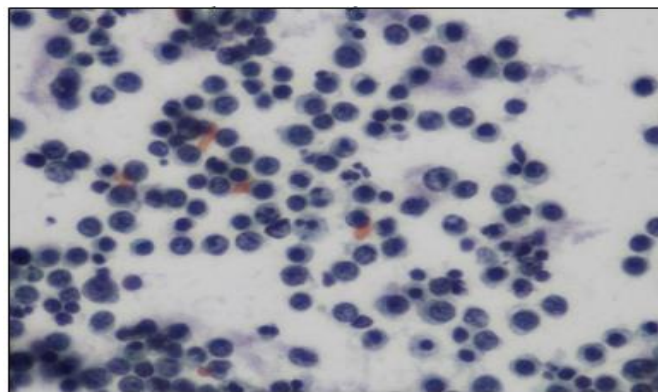


Fig. 4: Pap stained smear showing high cellularity, discrete large neoplastic lymphocytes having high N/C ratio, Scant cytoplasm and irregular nuclear membrane (400X Power)

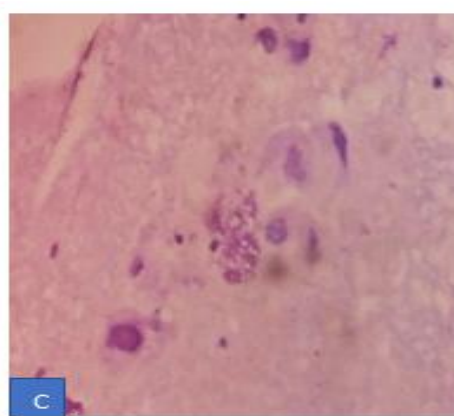
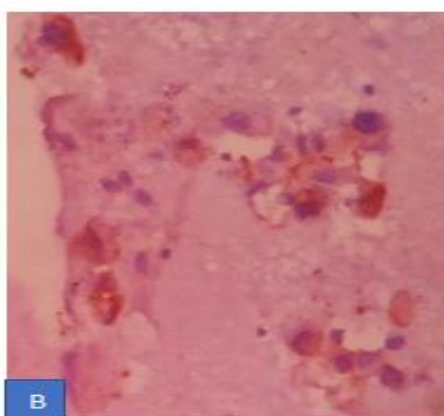
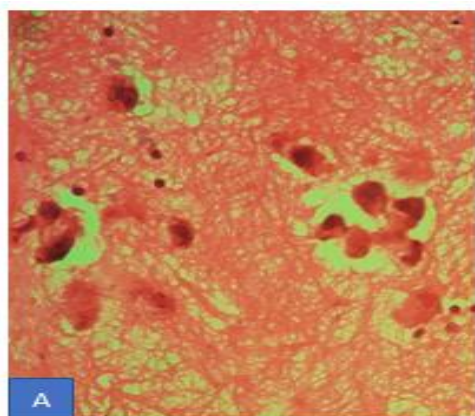


One case was 33-year-old female who was known case of gastritis and presented with right sided pleural effusion and breathlessness, cytologically reported as suspicious of malignancy on both conventional smear and cell block. We performed immunocytochemistry to confirm the malignancy, it showed marker CK7 positive and marker CK20 negative, confirming it as malignant effusion, most likely primary from ovary (fig. 5). Thus, after Immunocytochemistry, we were able to find primary in 1 case and to confirm malignancy in 1 case.

In 2 cases of malignant pleural effusion, primary could not find. Cytologically one was showing features of adenocarcinoma and in another case, morphology was not type able so reported as positive for epithelial malignancy. As the fluids were of less quantity, we were neither able to prepare cell block nor could perform immunocytochemistry to know the site of origin. Patient lost to follow up, hence labelled as malignant effusion of unknown primary.

Metastasis of lymphoreticular malignancy was seen in 1 case of pleural cavity. Patient was 65-year-old female, known case of diffuse large B cell lymphoma, cytologically smears were cellular showing discrete neoplastic lymphoid cells. (fig. 4)

Fig. 5: H and E sectioned slide (A) of cell block showing scant cellularity, cells with nuclear atypia, immunocytochemistry showing CK7 positive (B) and CK20 negative (C) [400X Power].



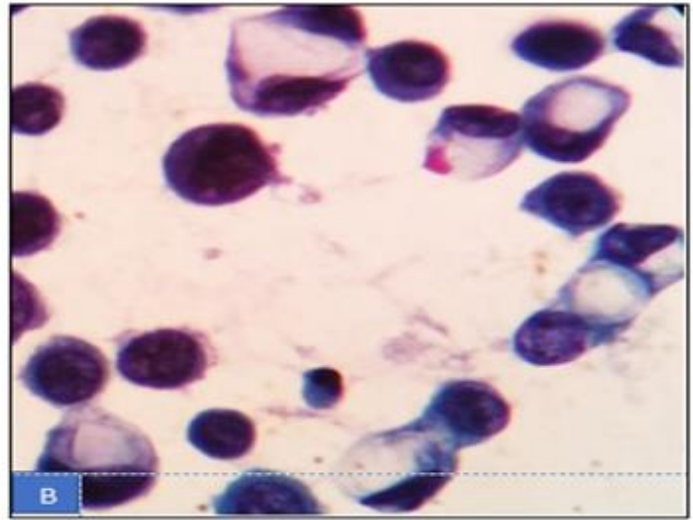
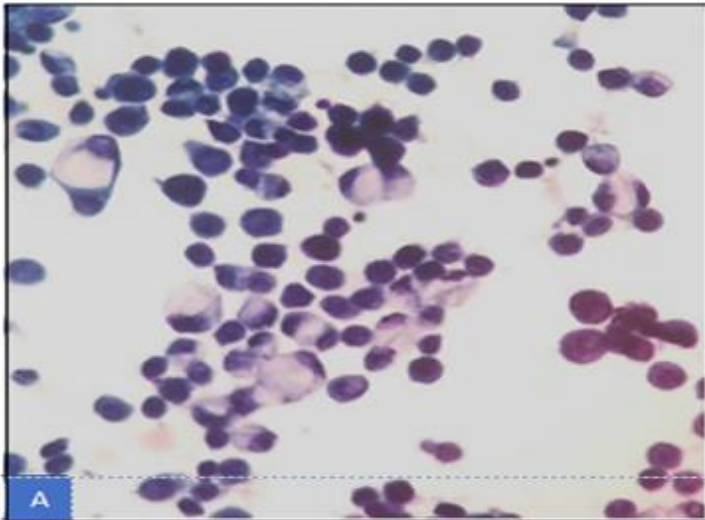
In our study, we found that most common metastasizing malignancy as adenocarcinoma in peritoneal effusion. 12

cases (85.71%) out of total 14 cases. Other metastasizing malignancies were lymphoma and dysgerminoma in 1

case (7.14%) each. These findings were similar to other studies like Dey S et al, P V Kumavat et al, Monte SA et al and Sears Hajdu et al.

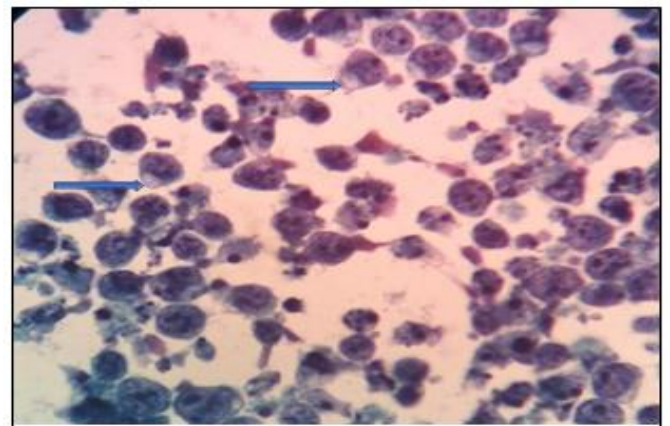
Out of 12 adenocarcinoma cases, 6 were from ovary, 5 cases were from GIT and 1 was from bladder carcinoma, which showed signet ring cells on cytology. In a case report by Cimino-Mathews A et al²⁶, reported their first

Fig. 6: Pap stained smear -Signet ring cells in metastasizing adenocarcinoma in peritoneal fluid in a k/c/o urinary bladder malignancy (A- 400X power, B-1000X power).



A 50-year-old male patient, known case of high grade B cell lymphoma, Burkitt's lymphoma, had peritoneal effusion. Cytologically, smears were highly cellular, showing discrete population of large cells showing cytoplasmic vacuolations (fig. 7), hence diagnosis given as positive for lymphoma.

Fig.7: Pap stained smear- highly cellular, showing discrete neoplastic large lymphocytes with cytoplasmic vacuolations s/o Burkitt's lymphoma (400X Power).



Out of total 5 pericardial effusions, 3 were malignant. All three were hemorrhagic on gross and were exudative effusions as their proteins were >3gm/dl. Out of these 3 cases, 2 (66.66%) were female patients and one was male patient. Out of three, 2 cases (66.66%) were

because of metastasis from adenocarcinoma 1 case each from carcinoma of lung and carcinoma of colon.

Ema A. D et al¹⁴ in their study also stated that malignant pericardial effusions were found to be more common in females (74.2% of all malignant effusions), and also the lung carcinoma is as the most common malignancy that is metastatic to pericardium in both males (75.0%) and females (52.3%), with adenocarcinoma being the most common histologic type encountered (72.2%). There was a 19-year-old female, a diagnosed case of Dysgerminoma, presented with peritoneal and pericardial effusion. Cytology of both the fluids showed clusters of cells showing nuclear atypia. The large nuclei usually show prominent nucleoli.

Our patient succumbed to disease. Postmortem showed ovarian mass which on histologically showed morphology of dysgerminoma. There were no pericardial deposits or cardiac metastatic nodules on post mortem. Dysgerminomas of ovary can produce ascites. Dysgerminoma can metastasize to peritoneal fluid frequently but it's rare finding in pericardial fluid.

There was only one case in our study which was reported as suspicious for malignancy on both conventional and cell block methods. It was a known case of gastritis, 33-year-old female with moderate pleural effusion. On conventional smear and on cell block, both showed many clusters of reactive mesothelial cells with few cell clusters arranged in glandular pattern having high N:C ratio and hyperchromatic nuclei. In such cases, it is difficult to make differentiation between reactive mesothelial cells and adenocarcinoma cells on cytology. Reactive mesothelial cells in form of cell balls can easily mimic adenocarcinoma. The tell-tale sign which gives insight into the benign nature is the intercellular window with hair-like bridges connecting the neighboring cells.

So, the different antibodies serve as reliable markers in differential diagnosis of reactive mesothelial cells and adenocarcinoma³.

The suspicious case, on cell block, we performed immunocytochemistry, it came out as positive for malignancy.

Cell block was made in 20 cases out of 35 malignant effusions. In those 20/35 cases where we prepared cell block, both the techniques i.e. conventional smear and cell block, showed metastatic malignancy in 19 cases and one was suspicious for malignancy.

On conventional smear, out of 35 cases 16 cases showed low/scant cellularity. 13 cases showed moderate cellularity and 8 smears were highly cellular.

Out of 20 cell blocks, 13 smears were highly cellular, 2 showed moderate cellularity and 5 cases showed low cellularity.

Cellularity of the smears and block for detecting malignancy was graded according to the presence of tumor cells in the smears and cell block. Low (<10% tumor cells), moderate (10-50% tumor cells) and high (>50% tumor cells)²¹ (Table 7).

Table 7: Comparison of cellularity of conventional smear method and cellblock method

Cellularity	Conventional smear (n=35)	Cell block (n=20)
Low/ scant	16	5
Moderate	13	2
High	8	13

Cell block yielded high cellularity in 65% cases compared to 45.71% in conventional smears, moderate yield in 10% compared to 37.14% in conventional smear and low yield significantly reduced to 25% from 45.71% in conventional smear. This finding was also consistent with many other studies like Shulbha V S et¹⁹ Ramappa

K et al.²⁷ Morphology was superior in cell block preparations which provided better architectural details in the form of better delineation of cell balls, papillae, three dimensional clusters, excellent nuclear and cytoplasmic details and individual cell characteristics. These findings of our study were consistent with other studies also like Bista P et al³, Thaper M et al¹⁵, Khan N et al¹⁰, Dey S N et al.²¹

Conclusion

Effusion cytology is a simple and safe diagnostic procedure, an asset to both the pathologist and clinicians to study the patho physiology of types of effusion, also helps for further treatment of patients in a cost-effective manner.

Conventional smear method can yield good result in all types of effusion, when combined approach to morphology with Papanicolaou (PAP) and May-Grunwald-Giemsa (MGG) used. Cell block preparation is a simple and inexpensive method in obtaining better cellularity, cellular architecture and cellular morphological details.

Combined approach of cell block in conjunction with conventional smear method should be used in suspicious for malignancy cases. Positive results, identification of primary site in malignant effusions and further typing will have an influence on patient management. Thus, when cell block technique and conventional smear method used in combination, definitely there is increased rate of correct diagnosis in case of malignant effusions.

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