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ORIGINAL RESEARCH

Pleural, peritoneal and pericardial fluids for the presence or absence of local or systemic pathological conditions: Pathological evaluation

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ABSTRACT
The accurate identification of cells as either malignant or benign reactive mesothelial cells is a diagnostic problem in conventional smear cytology. The lower sensitivity is due to bland morphological features of cells, loss of cellular material and changes due to different laboratory methods. Data regarding clinical, laboratory and radiological findings of all cases sent to laboratory were collected.Fresh serous fluid sample received were physically examined by noting color, appearance, presence of clot and mucin. Out of the 54 cases of pleural fluid, by conventional smear cytology 43 cases (80%) were benign (Inflammatory), five cases (9%) were suspicious for malignancy & six cases (11%) were positive for malignancy. By cellblock preparation, 41 cases (76%) were benign (inflammatory), 13 cases (24%) were positive for malignancy. In the present study of pleural fluid samples from 54 cases (Table 38), by conventional smear cytology benign effusions were noted in 43 cases (80%), malignant effusions in six (11%) cases & five cases (9%) were suspicious for malignancy. By cellblock preparation 41 cases (76%) were benign (inflammatory) & 13 cases (24%) were malignant.In the present study of peritoneal fluid samples from 51 cases (Table 40), by conventional smear cytology benign effusions were noted in 39 cases (76.5%), suspicious in 9 cases (17.6%) & malignancy in 3 cases (6%). By cellblock preparation 39 cases (76.5%) were benign, 12 cases (23.5%) were malignant.
Key words: Pleural, peritoneal and pericardial fluids

INTRODUCTION

Cytological examination of serous effusions is of paramount importance not only for diagnosing cancer but they may also reveal information regarding various inflammatory conditions, parasitic infestations, infection with bacteria, fungi or viruses and some immunological conditions [1, 2].

It has been seen in various studies that the cytological examination of effusions by means of conventional smears, however carefully prepared leaves behind a large residue that is not investigated but might contain valuable diagnostic material. This residual material can be evaluated in cellblock preparation which gives 5% additional diagnostic yield [2].

The accurate identification of cells as either malignant or benign reactive mesothelial cells is a diagnostic problem in conventional smear cytology. The lower sensitivity is due to bland morphological features of cells, loss of cellular material and changes due to different laboratory methods [2].

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 correct diagnosis of primary site and categorization of tumors. As morphological and architectural pattern are better appreciated in cellblock preparation it serves as useful adjunct method for comparison of routine conventional smear cytology. Hence it plays major role in correct diagnosis of malignancy there by patient management and prognosis [2, 3].

Cellblock technique has many advantages over conventional smear cytology in improving the sensitivity of diagnosis. The main advantages of

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cellblock technique are preservation of tissue architecture and ability to obtain multiple sections from the same material for special stains and immunohistochemistry [1, 4].

METHODOLOGY

STUDY DESIGN

The present study was prospective study conducted in Cytology section in Department of Pathology. The study was approved by Institutional Ethics Committee for Human Subjects Research in Medical College.

SOURCE OF DATA

Fresh samples of serous fluids (pleural, peritoneal, and pericardial) from various referral centers received in the cytology section, Department of Pathology were evaluated for the study.

INCLUSION CRITERIA

Serous effusions from the body cavities comprising of pleural, peritoneal and pericardial were included.

EXCLUSION CRITERIA

All fluids other than pleural, peritoneal, pericardial fluids were excluded.

METHOD OF COLLECTION OF DATA

Data regarding clinical, laboratory and radiological findings of all cases sent to laboratory were collected.Fresh serous fluid sample received were physically examined by noting color, appearance, presence of clot and mucin.

The fluid was divided into two equal volumes. The first volume of fluid was used for conventional smear cytology where the fluid was centrifuged at 1500 rpm for 15 minutes and minimum two smears were prepared from that sediment. One of the smear was immediately fixed in 95% alcohol and stained with Papanicolaou stain. The other smear was air dried and stained with May-GrunwaldGiemsa or Giemsa stain.

The second volume of fluid was used for cellblock study. To this equal volume of Nathan Alcohol Formalin solution (Nathan alcohol formalin substitute consisting of absolute alcohol and 10% formaldehyde in 9:1 proportion) was added and fixed for 1 hour. The mixture was agitated for uniform fixation of the material. After fixation, the specimen was centrifuged at 1500 rpm for 15 minutes. The supernatant was decanted and the sediment completely drained off by inverting tube over Whatman filter paper number one. Tinted formalin was added to sediment and kept fixation for 24 hours. 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 4 to 5 micron thickness from paraffin blocks were obtained & stained with Haematoxylin and Eosin stain later studied under microscope.

Cytopathological diagnosis was derived separately by studying cellular details (cellularity, cellular arrangement, cytoplasmic and nuclear details) in conventional smear, cellblock section and combined study of conventional smear & cellblock section.

RESULTS

Out of 110 fluid samples, by conventional smear cytology benign features were observed in 84 (76%) samples, sixteen cases were suspicious for malignancy and ten were positive for malignancy. By cellblock preparation benign features were observed in 83 (75%) samples & malignancy in 27 (25%) samples. A highly significant association ($p<0.001$) in distribution of fluid was noted in CS & CB preparation.

Table 1: Distribution of Fluid Analysis

Feature	CS Cytology		CB Preparation	
	No.	%	No.	%
Benign (inflammatory)	84	76	83	75
Suspicious	16	15	00	00
Malignancy	10	9	27	25
Total	**110**	**100**	**110**	**100**

($\chi2=10.3$; $p<0.001$ HS)

Out of the 54 cases of pleural fluid, by conventional smear cytology 43 cases (80%) were benign (Inflammatory), five cases (9%) were suspicious for malignancy & six cases (11%) were positive for malignancy. By cellblock preparation, 41 cases (76%) were benign (inflammatory), 13 cases (24%) were positive for malignancy. A highly significant association ($p<0.001$) in distribution of pleural fluid was noted between CS & CB preparation.

Table 2: Distribution of Pleural Fluid Analysis

Feature	CS Cytology		CB Preparation	
	No.	%	No.	%
Benign (inflammatory)	43	80	41	76
Suspicious	05	9	00	00
Malignancy	06	11	13	24
Total	**54**	**100**	**54**	**100**

($\chi2=7.63$; $p=0.022$ HS)

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Out of 51 cases of peritoneal fluids, by conventional smear cytology 39 cases (76.5%) were benign (inflammatory), nine cases (17.5%) were suspicious for malignancy. By cellblock preparation 39 (76.5%) were benign (inflammatory), 12 cases (23.5%) were positive for malignancy. A highly significant association (p<0.001) in distribution of peritoneal fluid was noted in CS & CB preparation.

Table 3: Distribution of Peritoneal Fluid Analysis

Feature	CS Cytology		CB Preparation	
	No.	%	No.	%
Benign(Inflammatory)	39	76.5	39	76.5
Suspicious	09	17.5	00	00
Malignancy	03	6	12	23.5
Total	**51**	**100**	**51**	**100**

($\chi 2$=14.4; p<0.001 HS)

Out of 5 cases of pericardial fluids, by conventional smear cytology two cases (40%) each were benign & suspicious for malignancy and one case (20%) was positive for malignancy. By cellblock preparation, three cases (60%) were benign (inflammatory) & two cases (40%) were positive for malignancy. No significant association (p=0.282) in distribution of pericardial was noted between CS & CB preparation.

Table 4: Distribution of Pericardial Fluid Analysis

Feature	CS Cytology		CB Preparation	
	No.	%	No.	%
Benign	02	40	03	60
Suspicious	02	40	00	00
Malignancy	01	20	02	40
Total.	**05**	**100**	**05**	**100**

($\chi 2$=2.53; p=0.282 NS)

DISCUSSION

Table 5: Comparison of Pleural Fluid Analysis in Various Studies

Feature	Bhanvadia*et al.* [66] 2014		Grandhi*et al* [65] 2014		Present study 2014	
	CS	CB	CS	CB	CS	CB
Benign (Inflammatory)	61(77%)	61(77%)	127(91%)	127(91%)	43(80%)	41(76%)
Suspicious	08(10%)	00(00%)	5(4%)	00(00%)	05(09%)	00(00%)
Malignancy	10(13%)	18(23%)	7(5%)	12(9%)	06(11%)	13(24%)
Total.	79(100%)	79(100%)	139(100%)	139(100%)	54(100%)	54(100%)

In the present study of pleural fluid samples from 54 cases (Table 38), by conventional smear cytology benign effusions were noted in 43 cases (80%), malignant effusions in six (11%) cases & five cases (9%) were suspicious for malignancy. By cellblock preparation 41 cases (76%) were benign (inflammatory) & 13 cases (24%) were malignant. Thus by cellblock preparation additional seven (13%) cases were diagnosed as malignant. Similar findings were noted in studies by Bhanvadia*et al.*, [5] &Grandhi*et al.*, [6]

Table 6: Comparison of Peritoneal Fluid Analysis in Various Studies

Feature	Bhanvadia*et al.* [5] 2014		Grandhi*et al.* [6] 2014		Present study 2014	
	CS	CB	CS	CB	CS	CB
Benign (Inflammatory)	53 (77%)	53 (77%)	69 (82%)	69 (82%)	39 (76.5%)	39 (76.5%)
Suspicious	08 (11.5%)	00 (00%)	7 (8%)	00 (00%)	09 (17.5%)	00 (00%)
Malignancy	08 (11.5%)	16 (23%)	8 (10%)	15 (20%)	03 (6%)	12 (23.5%)
Total	69 (100%)	69 (100%)	84 (100%)	84 (100%)	51 (100%)	51 (100%)

In the present study of peritoneal fluid samples from 51 cases (Table 40), by conventional smear cytology benign effusions were noted in 39 cases (76.5%), suspicious in 9 cases (17.6%) & malignancy in 3 cases (6%). By cellblock preparation 39 cases (76.5%) were benign, 12 cases (23.5%) were malignant. Overall by cellblock preparation additional 9 cases (17.5%) were diagnosed as malignant. Similar findings were noted in studies by Bhanvadia*et al.*, [5]&Grandhi*et al.* [6].

In the present studyof 5 cases of pericardial fluid samples, by conventional smear cytology two cases (40%) were benign & 2 were suspicious for malignancy and one case (20%) was positive for malignancy. By cellblock method three cases (60%) were benign (inflammatory) & two cases (40%) were positive for malignancy. While in studies by Thapar*et al.*,[2]Bhanvadia*et al.*,[5] &Grandhi*et al.*, [6] total numbers of pericardial samples were 8 (6.66%), 2 (0.88%), 2 (1%) cases. All these were benign effusions.

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CONCLUSION

- Out of the 54 cases of pleural fluid, by conventional smear cytology 43 cases (80%) were benign (Inflammatory), five cases (9%) were suspicious for malignancy & six cases (11%) were positive for malignancy. By cellblock preparation, 41 cases (76%) were benign (inflammatory), 13 cases (24%) were positive for malignancy.
- In the present study of pleural fluid samples from 54 cases (Table 38), by conventional smear cytology benign effusions were noted in 43 cases (80%), malignant effusions in six (11%) cases & five cases (9%) were suspicious for malignancy. By cellblock preparation 41 cases (76%) were benign (inflammatory) & 13 cases (24%) were malignant.
- In the present study of peritoneal fluid samples from 51 cases (Table 40), by conventional smear cytology benign effusions were noted in 39 cases (76.5%), suspicious in 9 cases (17.6%) & malignancy in 3 cases (6%). By cellblock preparation 39 cases (76.5%) were benign, 12 cases (23.5%) were malignant.

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