



DIAGNOSTIC UTILITY OF INDIAN ACADEMY OF CYTOLOGIST GUIDELINES FOR REPORTING SEROUS FLUID -AN EXPERIENCE IN TERTIARY CARE CENTER

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ABSTRACT

Background: Cytological study of body fluids is an inexpensive, rapid, simple, cost-effective and relatively patient compliant investigation. The major body fluids are Peritoneal, Pleural and Pericardial fluids. **Aims and Objectives:** The present study is done to evaluate the morphological spectrum of various body fluids and classify the lesions using "Indian Academy of Cytologists (IAC) guidelines which categories lesions into five categories **Materials and Method:** The present retrospective study was conducted in the Department of Pathology, Government General Hospital, Suryapet, Telangana with total cases of 217 for period of three and half years extending from January, 2021 to June, 2024. Centrifuged sedimented smears were studied for inflammatory cells, reactive mesothelial cells and malignant cells and cases were divided into five diagnostic categories based on "Indian Academy of Cytologists (IAC) guidelines **Results:** The sample size in the present study is 217 cases. Maximum number of cases were in the range of 31-50 years cases with Male to female ratio of 2.6:1. The commonest fluid was pleural fluid accounting for 71.8% with most of the cases belonging to category 2: No malignant cells detected/ Benign Changes seen (inflammatory category) 196(90.3%) and Category 5, Malignant cells seen accounting for 1.8% **Conclusion:** Cytological evaluation of body fluids is a definite aid to the treating physician. It is a simple and safe investigation. The gross inspection and cytological evaluation using IAC guidelines helps attain uniformity across all laboratories. Furthermore, studies such as biochemical and microbiological analysis, tumour markers can be done on fluid, which can help in accurate diagnosis and alleviate patient's morbidity and mortality

KEYWORDS : Serous Fluid Cytology, IAC, Malignancy.

INTRODUCTION

Cytological study of body fluids is an inexpensive, rapid, simple, cost-effective and relatively patient compliant investigation. The major body fluids are Peritoneal, Pleural and Pericardial fluids. Normally, all the body cavities are lined by single layer of epithelium and have minimal free fluid in them, for lubrication and protection of underlying viscera.

The dynamics of fluid accumulation is governed by Starling's law and effusion results when there is imbalance between fluid formation and removal. Body fluid cytology serves both as a diagnostic as well as a therapeutic intervention. It serves as definitive guide in disease progression with monitoring of treatment with good accuracy.

The overall cytological evaluation in the light of clinical, radiological and physical examination is an aid to the primary provisional diagnosis.

There are already established international reporting terminology systems available for cervical, urinary tract, thyroid, salivary gland, pancreatic-biliary, and pulmonary cytology. In the year, 2020, the Indian Academy of Cytologists (IAC) published guidelines for reporting of serous effusion fluid samples with the vision of attaining uniformity across all laboratories, ensuring good cytopathology practice and implementing a standard reporting format with same recommendations in similar context.

The present study is done to evaluate the morphological spectrum of various body fluids and classify the lesions using "Indian Academy of Cytologists (IAC) guidelines which categories lesions into five categories

MATERIAL AND METHODS

The present retrospective study was conducted in the Department of Pathology, Government General Hospital, Suryapet, Telangana with total cases of 217 for period of three and half years extending from January, 2021 to June, 2024. Relevant clinical details and history was noted and correlated accordingly.

The fluids (pleural fluid, peritoneal fluid, and cerebrospinal fluid) received was centrifuged at 3000 revolutions per minute for five minutes. The supernatant was discarded. The remaining sediment was transferred with the help of pipette onto three glass slides and spread evenly. Two slides were immediately fixed in 95% alcohol and stained with Hematoxylin & Eosin Stain and Papanicolaou stain. The other slide was air dried and stained with Leishman stain. For the cell count, Improved Neubauer counting chamber was used.

Centrifuged sedimented smears were studied for inflammatory cells, (cell type whether predominant cells are neutrophils or lymphocytes), reactive mesothelial cells and malignant cells. If malignant cells were found morphological criteria like cellularity, pattern of arrangement of malignant cells with nuclear and cytological features were considered. Based on morphology of cells and correlation with the clinical data, cases were divided into five diagnostic categories based on "Indian Academy of Cytologists (IAC) guidelines:

Category 1 Unsatisfactory for evaluation

Category 2A No malignant cells detected

2B Benign Changes seen (Reactive mesothelial cells, Inflammatory cells, Specific infections)

Category 3 Atypical cells, not otherwise specified (NOS)

Category 4 Atypical cells, suspicious for malignancy

Category 5 Malignant cells seen

RESULTS

The sample size in the present study is 217 cases. The range of age group varied between newborns to 78 years of age. Maximum number of cases was in the range of 31-50 years, followed by 61-70 years.

Males constituted 142 cases and females comprised of 75 cases with Male to female ratio of 2.6:1. (Fig:1) The commonest fluid was pleural fluid accounting for 71.8% (156 cases) followed by peritoneal fluid 18.9% (41 cases), and CSF 9.2% (20 cases) (Fig:2)

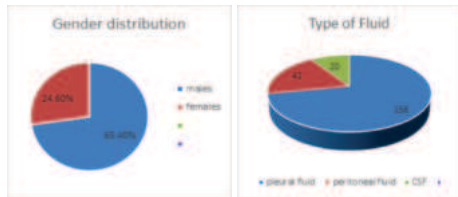


Fig:1

Fig:2

14 out of 217 cases were categorized as unsatisfactory for evaluation- category 1 accounting for 6.4 % with 8 cases of pleural fluid, 6 cases of peritoneal fluid.

196 out of 217 cases were categorized as Category 2- No malignant cells detected/benign cellular changes accounting for 90.3 % with 142 cases of pleural fluid, 34 cases of peritoneal fluid and 20 cases of CSF.

1 out of 217 cases were categorized as Category 3 Atypical cells, not otherwise specified (NOS) accounting for 0.4 % with 1 case of pleural fluid 2 out of 217 cases were categorized as Category 4- Atypical cells, suspicious for malignancy accounting for 0.9 % with 2 cases of pleural fluid.

4 out of 217 cases were categorized as Category 5, Malignant cells seen accounting for 1.8 % with 3 cases of pleural fluid, 1 case of peritoneal fluid. comparison of various fluids and ROM (table 1 and table 2)

Table 1: A Comparison of Cases, their Percentage, and Categorization into types of Effusion

	Category	Total	Pleural fluid	Peritoneal fluid	CSF	Total
1	Unsatisfactory	14 (6.4 %)	8	6	-	14
2	No malignant cells detected/ benign cellular changes	196 (90.3%)	142	34	20	196
3	Atypical cells, nos	1 (0.4%)	1	-	-	1
4	Suspicious for malignancy	2 (0.9%)	2	-	-	2
5	Malignancy	4 (1.8 %)	3	1	-	4
		217	156	41	20	

Table 2 : Comparison of ROM with Other Studies

IAC Category	ROM, present study	ROM, kundu et al	ROM, farhani et al
1. Unsatisfactory	Was not followed up	20%	17.4%
2. No malignant cells detected/benign cellular changes	1.53%	16%	20.7%
3. Atypical cells, NOS	could not be ascertained	50%	65.9%
4. Suspicious for malignancy	100%	94%	81.8%
5. Malignancy	100%	100%	98.9%

Out of 156 cases of pleural fluid, 142 were non neoplastic inflammatory effusions category -2,. The non-neoplastic

transudates were 63 , non-neoplastic exudates were 73 and granulomatous effusion was seen in 3 cases one of which 1 was associated with microfilarial infection. 3 were neoplastic and 2 were suspicious for malignancy. One case of category IV turned out to be malignant effusion. Of these 03 cases of malignancy 2 cases had primaries in lung and 1 had unknown primary (table 3).

Table : 3 Pleural Fluid Cytology and its Categorization

Pleural fluid cytology-category	Number of cases = 156
Category-1	8
Category-2	142
Category-3	1
Category-4	2
Category-5	3

Out of 41 cases of peritoneal fluid, 34 were non neoplastic, Of the 34 cases, 29 were non neoplastic transudates and 5 were non neoplastic exudates. 1 was neoplastic (adenocarcinoma). Ovary was found to be the primary (Table : 4).

Table : 4, Peritoneal Fluid Cytology and its Categorization

Peritoneal Fluid Cytology-Category	Number of cases = 41
Category-1	6
Category-2	34
Category-3	nil
Category-4	nil
Category-5	1

Total of 20 cases of CSF, all cases were categorized as category 2 with one case of hemorrhagic and 19 cases of normal cytology findings.

Cytology Images

Category 1: Unsatisfactory for Evaluation

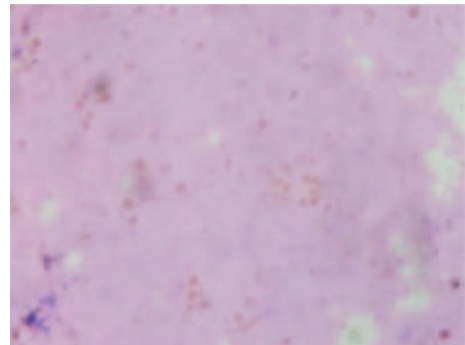


Fig 3 H&E Stained Smear of Pleural Fluid (10x) Degenerated Cells and RBCS

Category 2: No malignant cells detected/benign cellular changes

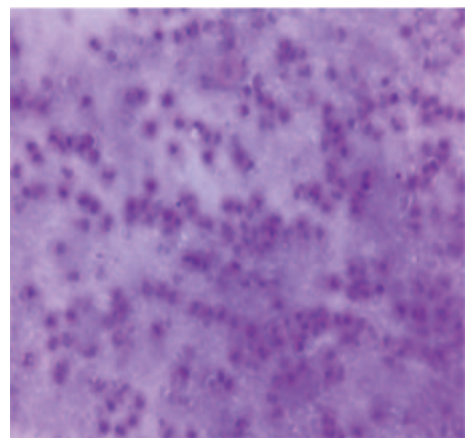


Fig 4:Exudative Effusion

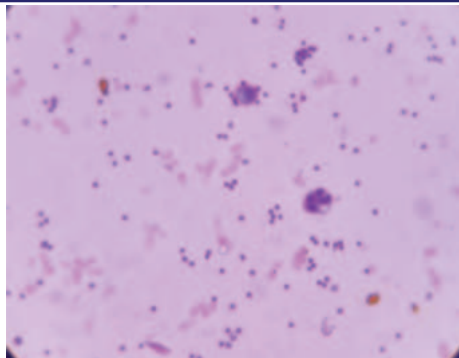


Fig 5: Lymphocytic Effusion

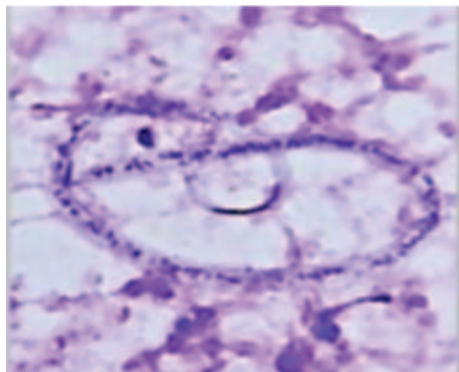


Fig 6: H&E Stained Smear of Pleural Fluid(40x) Microfilaria

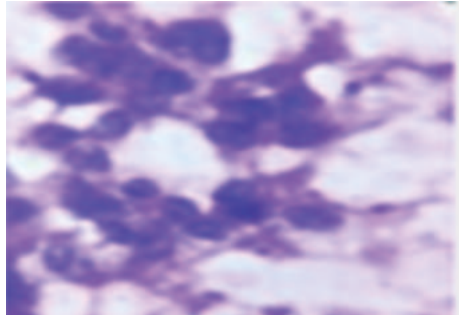


Fig 7: H&E Stained Smear of Pleural Fluid with Granulomatous Inflammation (Epithelioid Cells, Binucleate Cells)

Category 3 : Atypical cells, NOS

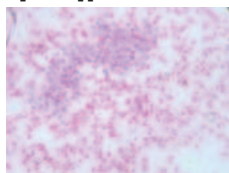


Fig:8

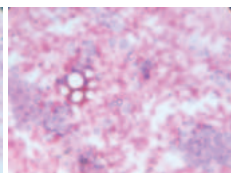


Fig:9

H&E Stained Smear of Pleural Fluid (10x&40x) Atypical Cells. Cell Clusters with Nuclear Overlapping and Mild Pleomorphism

Category 4 : Atypical cells, suspicious for malignancy

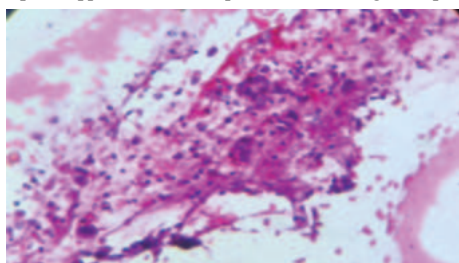


Fig 10: H&E Stained Smear of Pleural Fluid (10x) Atypical

Cells. Cell Clusters with Nuclear Pleomorphism, Hyperchromatic Nuclei and Irregular Nuclei

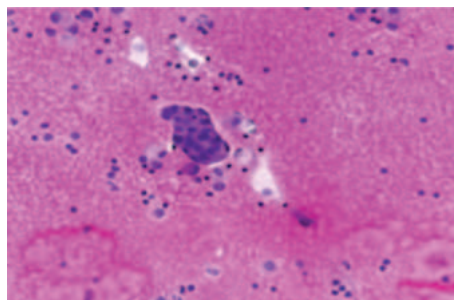


Fig 11: H&E Stained Smear of Ascitic Fluid (10x) Atypical Cells. Cell Clusters with Nuclear Pleomorphism, Hyperchromatic Nuclei and Irregular Nuclei

Category 5: Malignant Cells Seen.

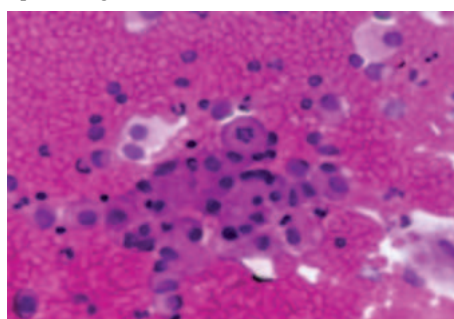


Fig 12: H&E Stained Smear of Ascitic Fluid (10x) Atypical Cell Clusters and Attempted Acinar Pattern with Nuclear Pleomorphism, Hyperchromatic Nuclei and Irregular Nuclei, Increased N:C Ratio. Mitotic Activity Seen

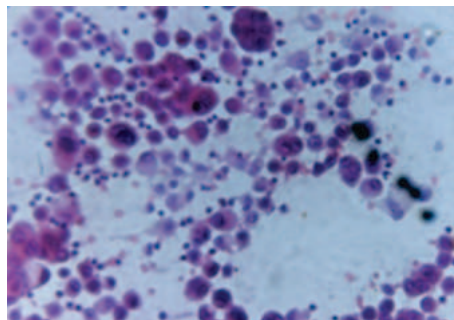


Fig 13: H&E Stained Smear of Pleural Fluid (40x) Atypical Cell Clusters and Cell Balls with Nuclear Pleomorphism, Hyperchromatic Nuclei and Irregular Nuclei, Increased N:C Ratio.

DISCUSSION

Effusion cytology dates back to 19th century. Lucke and Klebs in 1867 were the first investigators who recognized atypical cells in ascitic fluid. Quincke in 1882 has been credited for describing malignant cells in pleural effusion. CSF examination also began in 1891 in Germany following the introduction of lumbar puncture. Since then effusion cytology has gained tremendous importance in the medical literature.¹

The advantages of fluid aspiration lie in the fact that it is relatively simple, economical, quick easy, safe and patient compliant procedure. Thus the number of samples received in pathology lab is increasing. The diagnostic use of the effusion cytology traces its importance to the fact that the cell population present is representative of large surface area.²

Body fluids are classified into transudates, modified transudates and exudates. Transudates are caused by

hypoalbuminemia, leakage of fluid from efferent intestinal lymphatics. Causes of modified transudates are increased vascular permeability and increased intra hepatic hydrostatic pressure. Effusion cytology and radiographic examination are used to evaluate patients with transudates. The exudates are usually inflammatory, neoplastic and chylous effusion. Culture is used to identify sepsis, organism of cause and to monitor the therapy. Chylous exudates have variable number of neutrophils, macrophages and lymphocytes. Recent studies have shown that approximately 90% of tuberculous pleural effusion are lymphocyte predominant and 10% are neutrophil predominant.³

Neoplastic exudates have plenty of malignant cells. Cytological examination of the fluid, in conjunction with the clinical history and various investigations can identify the etiology of malignant effusion and can be ascertained if effusion is of primary or secondary malignancy.

In our study pleural fluid was the commonest fluid, 156/217 (71.8%) with similar findings in mahima et al.⁴ Out of 156 cases of pleural fluid, 142 were non neoplastic inflammatory effusions category -2, . The non-neoplastic exudates were 93, non-neoplastic transudates were 43, and granulomatous effusion was seen in 3 cases one of which 1 was associated with microfilarial infection. 3 were neoplastic and 2 were suspicious for malignancy. Kumavat PV et al⁵ and Kushwaha et al⁶ reported similar findings in their study.

The most common cause of ascitis is cirrhosis seen in 82.9% of patients and only 2.4% of cases presented with malignancy. It is advisable to repeat the cytology if there is history of cancer, physical findings not suggestive of liver disease and very high lymphocyte count to rule out malignancy. 29 cases were of non neoplastic lymphocytic predominant and 5 cases were non neoplastic exudative effusion and cell count <300 cells/cmm. Kumavat PV et al⁵ in their study also showed similar findings.

In our study, males showed higher predominance with 142 (65.4%) cases being slightly more than female 75 (35.6%) cases.

In our study 4 cases showed malignant effusions. Malignancy in peritoneal fluid was seen in 01 cases and pleural fluid showed malignant cells in 03 cases. Adenocarcinoma was the commonest type of malignancy in our study in concordance with other studies. Jha R et al in their study found that adenocarcinoma as most common malignancy.⁷ Lung was the most common primary site encountered in our study.

Bloody fluid is the most common variable and highly suspicious of malignancy. In our study, haemorrhagic aspirates were noted in cases with malignant effusions. Smears positive for malignant cells were showing high cellularity and arrangement of cells in acinar pattern. Individual cells showed round to oval cells, with high nucleocytoplasmic ratio, pleomorphic nuclei, prominent nucleoli and scant eosinophilic cytoplasm.

CONCLUSION

Cytological evaluation of body fluids is a definite aid to the treating physician. It is a simple and safe investigation which helps in understanding the pathophysiology of types of effusion in the human body and helps for further treatment of the patients in a cost-effective manner. The gross inspection and cytological evaluation using IAC guidelines helps attain uniformity across all laboratories. Furthermore, studies such as biochemical and microbiological analysis, tumour markers can be done on fluid, which can help in accurate diagnosis and alleviate patient's morbidity and mortality

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