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A RETROSPECTIVE ANALYSIS OF SEROUS EFFUSION SPECIMENS BASED ON THE NEWLY PROPOSED INTERNATIONAL SYSTEM FOR REPORTING SEROUS FLUID CYTOPATHOLOGY: A ONE-YEAR STUDY IN A TERTIARY CARE CENTRE IN NORTH-EAST INDIA

Pathology

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ABSTRACT

Introduction: International system for reporting serous fluid cytopathology (ISRSFC) has published guidelines for reporting effusion cytology and calculating the risks of malignancy (ROMs) for each category. It is a time saving, inexpensive and minimally invasive procedure for evaluation of etiology of serous effusions. **Aims :** To classify the results of serous fluid according to ISRSFC and to analyse the frequency of individual category and assess the ROM for each category. **Methodology:** A retrospective analytical study on all cases of serous effusions received in the last one year in the cytology section, Department of Pathology, AMCH was done and reported using newly proposed five tiered ISRSFC guidelines. Histopathological follow up information was obtained to assess the ROM for each diagnostic category. **Results:** Out of 108 cases, 66 cases (61.1%) were peritoneal, 40 cases (37%) were pleural and 2 cases (1.9%) were pericardial fluid. According to ISRSFC 12 cases (11.1%) were category 1 (nondiagnostic) , 60 cases (55.6%) category 2 (negative for malignancy), 7 cases (6.4%) category 3 (atypia of undetermined significance) , 9 cases (8.4%) category 4 (suspicious for malignancy) and 20 cases (18.5%) were category 5 (malignant). ROM was (16.6%) for nondiagnostic, (20%) for negative for malignant, (57.1%) for atypical category, (88.8%) for suspicious for malignancy and (100%) for malignant category. **Conclusion:** Categorizing serous effusion cytology samples as per the ISRSFC diagnostic categories reduces reporting variability. The ISRSFC will increase standardization and reproducibility in reporting, leading to improved clinical decision making.

KEYWORDS

Serous fluid, ISRSFC, Risk of Malignancy.

INTRODUCTION

Serous effusions refer to the pathological accumulation of fluid within the serous cavities—namely, the pleural, peritoneal, and pericardial spaces—which can occur due to various inflammatory, infectious, benign, or malignant conditions [1]. Cytological examination of these fluids is a simple, cost-effective, and minimally invasive diagnostic tool. Neoplasms are responsible for approximately 10–25% of pleural, pericardial, and peritoneal effusions [2]. The International System for Reporting Serous Fluid Cytopathology (TIS) outlines specific diagnostic criteria for each category, aiming to improve interobserver agreement, assign well-defined risks of malignancy (ROM), and enhance clinical decision-making [3]. The primary objective of serous effusion cytology is to determine the presence of malignant cells—a task of significant importance, as their detection usually indicates an advanced or terminal stage of malignancy and is often linked to poor patient survival [3].

The International System For Reporting Serous Fluid Cytopathology was .proposed by the International Academy of Cytology and American society of cytopathology.

The Five categories Of ISRSFC -

1. Non diagnostic (ND)
2. Negative for Malignancy (NFM)
3. Atypia of Undetermined Significance (AUS)
4. Suspicious For Malignancy (SFM)
5. Malignant

Aim:

To classify the results of serous fluid according to international system for reporting serous fluid cytopathology categories.

To analyse the frequency of individual category and assess the risk of malignancy (ROM) for each category

MATERIALS AND METHODS:

A retrospective study is done for all the cases of serous effusions sent to Cytopathology Department of AMCH during the period from January 2024 to December 2024.

108 cases were included in the study and reported using the newly proposed five tiered ISRSFC guidelines.

Histopathological correlation was done to assess the risk of malignancy for each diagnostic category.

Based on the adequacy of the volume, samples are accepted . Samples were centrifuged and two conventional smears of the samples were prepared – one ethanol fixed for Papanicolaou stain and the other air dried for GIEMSA staining

RESULTS:

Table 1: Distribution Of Cases According To Type Of Body Fluid-

Type of Fluid	No of cases	Percentage
Peritoneal	66	61.1%
Pleural	40	37%
Pericardial	02	1.9%

Out of 108 cases , 66 cases (61.1%) were of peritoneal, 40 cases (37%) were of pleural effusion and 2 cases(1.9%) were of pericardial fluid.

Table 2: Reclassifying the cases according to ISRSFC system-

DIAGNOSTIC CATEGORIES	TOTAL CASES (%)
Non Diagnostic	12(11.1%)
Negative For Malignancy	60(55.6%)
Atypia of Undetermined Significance	07(6.4%)
Suspiciousof Malignancy	09(8.3%)
Malignant	20(18.5%)

Table 3: Correlation of Cytological Diagnosis with Histopathology and Risk of Malignancy (ROM)

Diagnostic Categories	Cytology cases	Malignant (Histological Correlation)	Risk of Malignancy (ROM)
Non Diagnostic	12	2	16.6%
Negative For Malignancy	60	12	20%
Atypia Of Undetermined Significance	7	4	57.1%
Suspicious Of Malignancy	9	8	88.8%
Malignant	20	20	100%

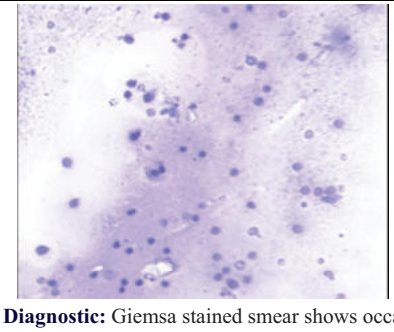

Fig.1 Non Diagnostic: Giemsa stained smear shows occasional cells in a proteinaceous background , not sufficient for categorization

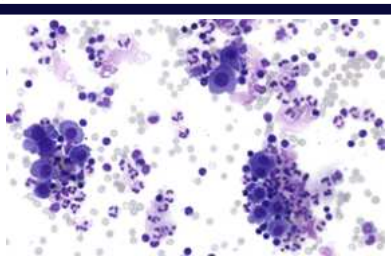

Fig.2 Negative For Malignancy: Giemsa stained smear shows highly cellular smear containing abundant mesothelial cells arranged singly or in cohesive clusters and inflammatory cells mostly neutrophils and a few lymphocytes. Individual cells show reactive changes .

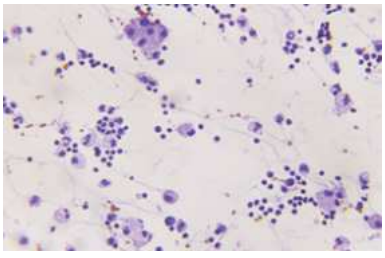

Fig 3 Negative For Malignancy: Giemsa-stained smear is moderately cellular, demonstrating numerous mesothelial cells, present both individually and in cohesive clusters. The smear also contains a mixed inflammatory infiltrate, predominantly neutrophils with occasional lymphocytes. The mesothelial cells display reactive features, such as mild nuclear enlargement and prominent nucleoli. No malignant cells are seen

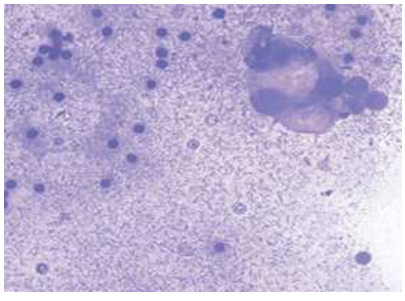

Fig 4 Atypia Of Undetermined Significance: Giemsa stained smear shows degenerated cells and occasional clusters of atypical cells , reactive atypia of mesothelial cells (benign reactive category) , that did not favor malignancy

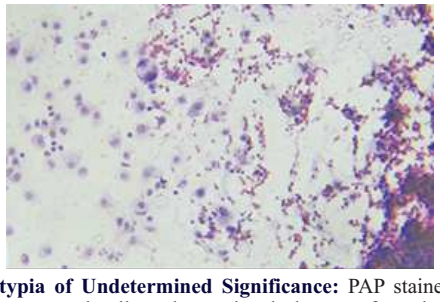

Fig 5 Atypia of Undetermined Significance: PAP stained smear shows degenerated cells and occasional clusters of atypical cells , reactive atypia of mesothelial cells (benign reactive category) , that did not favor malignancy

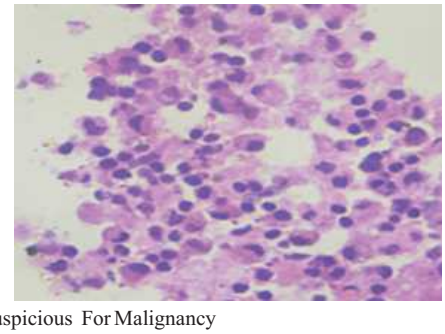

Fig 6 Suspicious For Malignancy

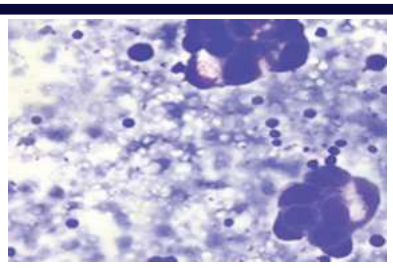

Fig. 7 Suspicious For Malignancy

Fig 6 & 7 Suspicious For Malignancy: Giemsa stained smear showing aggregates of atypical cells with low nucleocytoplasmic ratio, vesicular chromatin and prominent nucleoli

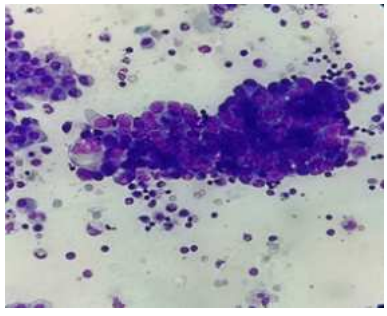

Fig. 8 Malignant: Giemsa stained smear shows high cellularity comprising of neoplastic cells arranged in 3D clusters and a few dispersed singly. Individual cells are highly pleomorphic with high n:c ratio , irregular nuclear membrane, coarse chromatin and prominent nucleoli. Few cells have vacuolated cytoplasm in a background of lymphocytes and mesothelial cells

DISCUSSION:

In the present study, the majority of cases (55.2%) were classified under Category II – Negative for Malignancy, based on the International System for Reporting Serous Fluid Cytopathology (ISRSFC). This aligns with findings from previous studies by Ahuja et al. [4] (76.4%), Sachan et al. [1] (76%), and Jha et al. [5] (74.2%), indicating that non-malignant effusions are frequently encountered in routine cytological evaluation. This highlights the effectiveness of cytology in screening serous effusions and in excluding malignancy when appropriate cytomorphologic criteria are met.

In our cohort, the highest Risk of Malignancy (ROM) was observed in Category IV (Suspicious for Malignancy) at 88.2%, and Category V (Malignant) at 100%, consistent with studies by Jha et al. [5], Rajeswaran et al. [6], and Ahuja et al. [4]. These data validate the stratification proposed by the ISRSFC and support its utility in risk-based categorization. The high ROM in Categories IV and V confirms their strong predictive value and justifies prompt clinical follow-up or intervention when such diagnoses are rendered.

When only Categories IV (Suspicious for Malignancy) and V (Malignant) were considered positive for malignancy, the diagnostic performance was as follows: sensitivity of 60.86%, specificity of 98.38%, positive predictive value (PPV) of 96.55%, and negative predictive value (NPV) of 77.21%. These metrics are comparable to those reported by Pinto et al. [3] and Sachan et al. [1], underscoring the reliability of cytology for identifying malignant effusions. The high specificity and PPV reinforce the diagnostic accuracy of positive cytologic findings, while the moderate sensitivity and NPV reflect potential limitations in detecting malignancy in morphologically ambiguous or paucicellular samples.

Overall, our findings support the ISRSFC as a robust framework for standardizing serous fluid cytology reporting. It provides clear diagnostic categories with associated ROMs, facilitating improved communication between cytopathologists and clinicians and promoting informed clinical decision-making.

CONCLUSION

Serous effusion cytology has a high specificity and positive predictive value and a modest sensitivity and negative predictive value, supporting its role in confirming the diagnosis of malignancy. Categorizing serous effusion cytology samples as per the ISRSFC

diagnostic categories reduces reporting variability. The ISRSFC will increase standardization and reproducibility in reporting, leading to improved clinical decision making.

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