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INDIAN ACADEMY OF CYTOLOGY (IAC) GRADING FOR REPORTING SEROUS EFFUSIONS IN A TERTIARY CARE HOSPITAL OF NORTH EAST INDIA: A THREE-YEAR CROSS-SECTIONAL STUDY.

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ABSTRACT **Aim:** The present study was carried out to categorise various serous effusions according to Indian academy of cytology (IAC) guidelines, determine the frequency of each type and calculate the risk of malignancy(ROM) for individual category. **Material and methods:** All cases of serous effusion fluids reported from June2020 till May 2023 were retrieved and reassigned as per the IAC category. **Results:** A total of 342effusion samples were received. Majority were pleural (189,55.26%), followed by peritoneal (126,36.84%) and pericardial (27,7.89%). There were 5(1.46%) cases in category I non diagnostic, 288(84.2%) cases in category II benign, 9 cases (2.63%) in category III (Atypical) and 20 cases each (5.84%) in category IV (Suspicious for malignancy) and category V(Malignant). The estimated risk of malignancy(ROM) was 0% for category I,4.4% for category II,50% for category III and IV and 100% for category V. **Conclusion:** The IAC diagnostic categorization aids in uniform reporting of serous effusions throughout all institutes, ensuring a standard reporting system like other systems.

KEYWORDS : Indian academy of cytology (IAC), Serous effusions, Category.

INTRODUCTION

Cytological evaluation forms the core component of initial work up of the serous cavity effusion fluids to find out the possible etiology (1). Depending upon the cytology report the clinician However, unlike established international reporting system in thyroid, cervical, urinary tract, salivary gland and pulmonary cytology there is lack of a globally accepted and widely used reporting terminology in serous effusions (2,3,4). The Indian Academy of cytologists (IAC) has recently published guidelines for collection, preparation, interpretation and reporting of serous effusions so that cytology reports can be reported in a standardized manner and a uniformity is brought in reporting. This system also like other international reporting system has its own clinical implications and directions for treating clinicians.

The present study was carried out to assess the application of new IAC system in categorization of serous effusion and also assessing the risk of malignancy with histological and immunohistochemical correlation of cases.

MATERIAL AND METHODS:

All cases of serous effusion fluids received in the cytology section of department of Laboratory Medicine from June 2020 -May 2023 were retrieved. Relevant clinical details were obtained from test requisition forms. Clinical, radiological and histopathological follow up reports were obtained from medical records department. All cases were categorized as per IAC guidelines for interpretation and reporting of serous effusion samples.

Samples were processed by centrifugation and sediment smears prepared, one of which was stained by May Grunwald Giemsa (MGG) and second smear was stained by Rapid pap stain. Remaining sample was stored in the refrigerator at 2–8-degree celcius for 24 hours. Routinely cytomorphological evaluation was done by light microscopy and based on the interpretation, each case was categorized into any of the 5 recommended diagnostic IAC categories

RESULTS

Table 1: Age-wise distribution of cases

Age group(years)	Number(n=342)	Percentage (%)
11-20	11	3.21
21-30	18	5.26
31-40	46	13.45
41-50	80	23.4
51-60	97	28.36
61-70	75	21.93
71-80	16	5.7

A total of 342 serous effusion cytology samples were studied of which 175 were male (51.1%) and 167 were female (48.9%). The age ranged from 11-80 years with maximum number of cases were found in 51-60 years of age group (28.36%).

Table 2: IAC category-wise distribution of cases in various types of serous fluid

Category	Pleural	Pericardial	Peritoneal	Percentage
Category 1 Non-diagnostic	2	0	3	1.46%
Category 2 Benign	167	21	100	84.2%
Category 3 Atypical	4	1	4	2.63%
Category 4 Suspicious for malignancy	11	2	7	5.84%
Category 5 Malignant	5	3	12	5.84%

Total 342 cases are categorized according to IAC category. 84.2% cases are included in category 1 (benign) which is followed by category 5 (5.84%), category 4 (5.84%), category 3 (2.63%) and category 1 (1.46%). Most of the cases were from pleural fluid in category 2 and in peritoneal fluid cases were predominant in category 5.

Table 3: Estimated risk of malignancy in follow-up cases

Category	No of cases	Follow-up available	Malignant outcomes	Benign outcomes	Estimated risk of malignancy
Non-diagnostic	5	4	0	4	0%
Benign	288	68	3	65	4.4%
Atypical cells	9	8	4	4	50%
Suspicious for malignancy	20	12	6	6	50%
Malignant	20	16	16	0	100%

1) Category 1, Non-diagnostic: Out of 5 cases, histopathological and/ or clinical follow-up were available in 4 cases. The outcome of all 4 cases were benign in nature.
2) Category 2, Benign: Only 68 cases could be followed-up out of 288 cases. 3 cases which were assigned to be benign in previous reporting, they were come out as malignant. Rest 65 cases were found to benign in nature. They were further sub-categorized as reactive mesothelial proliferations, acute inflammation, chronic inflammation and specific infection i.e., tuberculosis.
3) Category 3, Atypical cells: Out of 9 cases, 1 case could not be traced. Pleural biopsy revealed 2 cases malignant and rest 2 cases were metastatic deposits.
4) Category 4, Suspicious for malignancy: Here, follow-up were

available in 12 out of 20 cases. Of these 12 cases, 6 were pleural effusions, with primary in breast (3 cases) and unknown primary (3 cases). Peritoneal effusions in 6/12 cases showed malignancy on follow-up. Associated malignancy was predominantly high grade ovarian serous carcinoma followed by gastric carcinoma.

5) Category 5, Malignant: A definite diagnosis of malignancy was made in 20 cases, 5 pleural, 3 pericardial and 12 peritoneal effusions. Follow-up was available in 16 cases. All of them were found to be malignant.

The estimated risk of malignancy was calculated based on available clinical records or histopathology. Risk of malignancy on follow-up was highest in category 5 (100%) and lowest in category 1 (0%).

Table 4: Primary site of malignancy in category 5 cases

Effusion category	Total no of cases	Type of malignancy (Number of cases)	No of cases in follow-up	Primary site of malignancy (Number of cases)
Pleural	5 out of 189	Metastatic carcinoma (2) Metastatic adenocarcinoma (3)	4	Breast (2) Lung (2)
Pericardial	3 out of 27	Metastatic carcinoma (2) Metastatic thyroid carcinoma (1)	3	Breast (1) Thyroid (2)
Peritoneal	12 out of 126	Metastatic adenocarcinoma (8) Metastatic carcinoma (2) Positive for malignancy (2)	9	Stomach (2) Colon (3) Ovary (4)

In pleural effusions, metastatic adenocarcinoma (3/5) was the most common. Breast and lung were the most common sites of involvement on follow-up cases. Pericardial effusions showed both metastatic carcinoma and metastatic thyroid carcinoma of which thyroid was the most common primary site of involvement. Similar to pleural effusions, peritoneal cavity effusions were also positive for metastatic adenocarcinoma with maximum number of cases (8/12). Ovary was the most common primary site of involvement on follow-up.

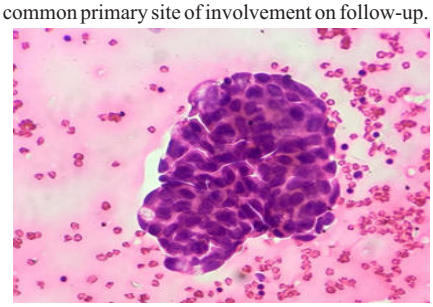

Fig 1: 3 dimensional malignant cell cluster, Pap 40 x

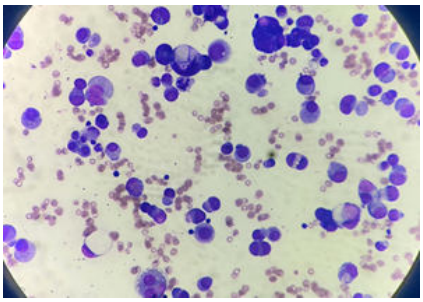

Fig 2: Reactive mesothelial proliferation in a case of Tuberculosis, MGG 40x

DISCUSSION

Now-a-days, a diagnostic consensus has been made in reporting the cytopathology of various systems, for example, Milan system for salivary lesions, the Bethesda system for thyroid and cervical cytopathogy and so on, so that there is enhancement of professional communication among pathologists and clinicians which leads to improved patient care and management (5). In recent times, cytological evaluation of various body cavity fluids is an important part of day-to-day practice.

In our study, diagnostic categorization of body cavity fluids was done according to the recommendations of IAC.

5 out of 342 effusion samples were found to be non-diagnostic (category 1) in our study. All of these samples were inadequate in quantity (<10 ml). Previous studies like Kundu R. et al., also mentioned that nondiagnostic category was because of less in volume of the samples which also showed contamination by bacteria, improper anticoagulation or had excess of anticoagulant leading to formation of crystals. We had advised all these cases a repeat cytological evaluation followed by proper instructions for sample collection and transportation (6).

In our study, majority (167/342, 84.2%%) of the effusions were placed in category 2. The causative factors for benign serous effusions are infectious diseases, cirrhosis, organ failure, autoimmune diseases, peritoneal dialysis, etc (7). Serous effusions in category 2 were further sub-categorized into reactive mesothelial proliferation, acute inflammation, chronic inflammation, lymphocyte rich effusion, and specific infections. This sub-categorization provides a better way to reach etiology in many occasions. In most of the benign effusion cases, reactive mesothelial proliferations were seen. Mesothelial proliferations were stimulated by a wide variety of stimuli; that may also cause marked morphological alterations in mesothelial cells and thus it may lead to difficulties in diagnosis (8). In India, tuberculosis is one of the most important causes of lymphocyte predominant pleural effusion.

We found one case each of aspergillosis which again represents spread of pulmonary disease into the pleural space. So, it is advisable to request special stains for identification of various organisms in effusion smears. The upper bound limit of ROM of category 2 was 4.4% which was based on malignant outcome in 3 out of 68 follow-up cases which were reported benign initially. Hence, we can modify a little bit of the recommendation for this category and can include a repeat cytology evaluation in those cases where there is a suspicion of malignancy on clinical/imaging findings.

It has been noticed that repeat cytological evaluation is very useful in other categories as well. In our study, 32(9.35%) repeat samples were received among all categories. It was done mostly in cases with a strong clinical suspicion for malignancy or when a second sample was requested for cell block and immunocytochemistry. A shift in category was seen in 12(3.5%) cases. Category 3 and category 4 have a high propensity to move into either benign and malignant category on repeat sampling and/or ancillary testing. Thus, these categories can be labelled as preliminary "holding category" (9).

Category 4 report should be viewed very cautiously by the pathologist as well as clinicians and should be taken as malignant until proved otherwise. In some cases, cytology report is suspicious for malignancy and biopsy report is negative for malignancy, then we can take help for IHC in such situations. A good clinico-radiological correlation is indicated in category 4 cases and a repeat biopsy is always indicated in case of strong clinical suspicion if initial biopsy is found to be benign (6).

We found 20 out of 342 cases in category 5 (5.9 %). Amongst these malignant effusions, peritoneal effusions constituted 60%, followed by pleural (25%) and pericardial (15%) effusions. Our results are not similar with the malignancy rates observed in effusions in other study wherein malignant pericardial effusions constituted 56.2% followed by peritoneal samples (33%) and pleural effusions (31.9%) (9). In our study, the most common cause of malignancies in pleural effusion were from lung and breast as observed in other studies (10,11).

CONCLUSION:

Reporting of serous effusions fluid samples according to IAC guidelines is feasible and convenient. It provides a standardization to come at a accurate final outcome. Thus, it helps in better clinical practice as well as patient care and management.

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Conflicts of interest: There are no conflicts of interest.

REFERENCES:

1. Gupta S, Sodhani P, Jain S. Cytomorphological profile of neoplastic effusions: An audit of 10 years with emphasis on uncommonly encountered malignancies. J Cancer Res Ther 2012;8:602-9.
2. Hanselaar AGJM. Additional techniques in serous effusions. Anal Cell Pathol 2002;24:1-4.
3. Nayar R, Wilbur DC. The Bethesda system for reporting cervical cytology: A historical perspective. Acta Cytol 2017;61:359-72.
4. Barkan GA, Wojcik EM, Nayar R, Savic-Prince S, Quek ML, Kurtycz DF, et al. The Paris system for reporting urinary cytology: The quest to develop a standardized terminology. Acta Cytol 2016;60:185-97.
5. Effusion guidelines committee of IAC guidelines drafting and finalization committee, Srinivasan R, Rekhi B, Rajwanshi A, Pathuthara S, Mathur S, et al. Indian academy of cytologists guidelines for collection, preparation, interpretation, and reporting of serous effusion fluid samples. J Cytol 2020;37:1–11.
6. Kundu R, Srinivasan R, Dey P, Gupta N, Gupta P, Rohilla M, Gupta S, Bal A, Rajwanshi A. Application of Indian Academy of Cytologists Guidelines for Reporting Serous Effusions: An Institutional Experience. J Cytol. 2021 Jan-Mar;38(1):1-7. doi: 10.4103/JOC.JOC_224_20. Epub 2021 Feb 17. PMID: 33935385; PMCID: PMC 8078616.
7. Mercer RM, Corcoran JP, Porcel JM, Rahman NM, Psallidas I. Interpreting pleural fluid results. Clin Med (Lond) 2019;19:213–7.
8. Davidson B. Malignant effusions: From diagnosis to biology. Diagn Cytopathol. 2004;31:246–54.
9. Lobo C, Costa J, Petronilho S, Monteiro P, Leça L, Schmitt F. Cytohistological correlation in serous effusions using the newly proposed international system for reporting serous fluid cytopathology: Experience of an oncological center. Diagn Cytopathol. 2020 doi:10.1002/dc.24440.
10. Froudarakis ME, Plojoux J, Kaspi E, Anevlavis S, Laroumagne S, Karpathiou G, et al. Positive pleural cytology is an indicator for visceral pleural invasion in metastatic pleural effusions. Clin Respir J. 2018;12:1011–6.
11. Awadallah SF, Bowling MR, Sharma N, Mohan A. Malignant pleural effusion and cancer of unknown primary site: A review of literature. Ann Transl Med. 2019;7:353.