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Original Research Article

PREVELANCE OF MALIGNANCY IN SEROUS EFFUSIONS: AN OBSERVATIONAL STUDY

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ABSTRACT

Background: Cytologic examination of serous fluids is a minimally invasive and inexpensive procedure for diagnosing, staging and prognosis of malignancy. Further, evaluation of serous fluid specimens can determine the primary site of origin. The newly proposed International System for Reporting Serous Fluid Cytopathology (ISRSFC) aims to standardize reporting. The aim is to determine the prevalence of malignant changes in serous effusions and to classify the serous fluids cytologically into five categories using international system for reporting serous fluid cytology.

Materials and Methods: This is a hospital based cross sectional study done over a period of 17 months between Aug 2022 and Dec 2023 in the department of pathology, in a tertiary care hospital, Chitradurga. The patients presenting with pleural, peritoneal and pericardial effusions were aspirated and samples were sent for cytological evaluation. The samples were stained wit H and E stain and were classified based on The International System for Reporting Serous Fluid Cytopathology (TIS)into 5 categories.

Results: Total of 310 patients were included in the study, out of which 148 were females. Of all the samples 176(56.8%) were ascitic fluid and 134(43.2%) were pleural fluid samples. On cytological evaluation of all samples, 223(71.95%) were negative for malignancy, 32(10.3%) were AUS, 18(5.8%) were SFM and 37(11.95%) were malignant. Malignancy was dected more in ascitic fluid (13.6%) as compared to pleural fluid (9.7%). Malignancy was detected more in males than females.

Conclusion: The proportion of malignant serous effusion is detected majority in male specially in ascitic fluid with prevalence being 11.95%. The International system for reporting serous fluid cytology will increase standardization and reproducibility in reporting.

Keywords: Serous effusion; Malignancy; The International System for Reporting Serous Fluid Cytopathology; Atypia of Undetermined Significance; Suspicious for Malignancy.

INTRODUCTION

Serous effusions are the fluids accumulated in body cavities like pleural, pericardial and peritoneal cavities. Varieties of conditions ranging from inflammatory to neoplastic are responsible for these effusions. Approach to an effusion depends upon whether an effusion is transudate or exudate. Because serous effusions are sometimes the first clinical manifestations of a malignancy, cytology has the potential not only to detect a malignancy but also to establish its primary site/cell lineage and to determine the stage of disease. Serous effusion cytology is a common clinical examination method to distinguish benign and malignant serous effusions due to its advantages of being minimally invasive, easily available, and cost-effective.[1] Cytological evaluation of serous effusions is performed to detect the presence or absence of malignancy The identification of cells as either malignant or benign reactive mesothelial cells in serous effusions is diagnostic problem. Because of its cytological nature and its exfoliation into a liquid, the cellular anarchy of mesothelial elements tend to overshadow

the classic diagnostic criteria of cytological malignancy.[2] Malignancies give rise to effusions by hematogenous spread or direct invasion.[3] Malignant tumours cause effusion by direct involvement of serous membranes by tumour invasion or by secondary inflammatory reaction.[4] Detection of the malignant cell in these effusions helps in staging and planning the line of management. The sensitivity and specificity of cytopathological analysis of serous fluid in detecting malignancy ranges from 50% - 80% and 89% to 98% respectively.[5] The purpose of this study was to establish the usefulness of clinicopathological evaluation of serous body effusions as a diagnostic method in malignant effusions.

Objectives

- To determine the prevalence of malignant changes in serous effusions.
- To classify the serous fluids cytologically into five categories using international system for reporting serous fluid cytology

MATERIALS AND METHODS

This is a hospital based cross sectional study done over a period of 17 months between Aug 2022 and Dec 2023 in the department of pathology, in a tertiary care hospital, Chitradurga. The study population include all the patients presenting with pleural, peritoneal and pericardial effusions and aspirated samples sent to central laboratory, department of pathology for cytological examination. Serous effusions of patients with known malignancy and on treatment were excluded from the study. Sample size was calculated usng the formula 4pq/d2, with prevelance of 11% and absolute precision of 5% and the sample size was 157.

All the samples will be centrifuged at a speed of 2000 rpm for 5 minutes. Smears were prepared from sediment, immediately fixed in 95% ethanol and stained with H and E. After staining with H and E, slides were visualized under light microscope (LABOMED Lx500). They were classified based on The International System for Reporting Serous Fluid Cytopathology (TIS) into 5 categories namely Non-Diagnostic (ND), Negative for Malignancy (NFM), Atypia of Undetermined Significance (AUS), Suspicious for Malignancy (SFM), Malignant (MAL).[6]

Statistical analysis: All the data collected will be compiled and entered into a Microsoft Excel worksheet and analyzed using SPSS 20.0, Jamovi 2.5.6, and MedCalc, Descriptive statistics for qualitative variables were presented in frequency distribution with percentage, and quantitative variables were presented in Mean with standard deviation or Median with interquartile. The tables were represented in suitable diagrammatic and graphics.

RESULTS

Total of 310 patients were included in the study, out of which 148 were females. Majority of cases belong to the age groups of 41-50 years and 51-60 years. Out of 310 samples 176(56.8%) were ascitic fluid and 134(43.2%) were pleural fluid samples. Of all the samples 223(71.95%) were negative for malignancy, 32(10.3%) were AUS, 18(5.8%) were SFM and 37(11.95%) were malignant [Table 1]. Of all the malignancies, majority belongs to the age group of 51-60 years (19.7%).

Table 1: H & E findings in the study sample

H & E findings	No. of Samples	%
Negative for Malignancy	223	71.95
AUS	32	10.3
SFM	18	5.8
Malignancy	37	11.95
Total	310	100.0

Out of 146 females, 71.9% were negative for malignancy, 13% were AUS, 4.8% were SFM, and 10.3% were malignant. Out of 164 males, 72% were negative for malignancy, 7.9% were AUS, 6.7% were SFM, and 13.4% were malignant [Table 2].

Table 2: H & E findings across sex in the study sample

Sex	H & E n (%)			
	Negative for Malignancy	AUS	SFM	Malignancy
Female (146)	105 (71.9)	19 (13)	7 (4.8)	15 (10.3)
Male (164)	118 (72)	13 (7.9)	11 (6.7)	22 (13.4)

Among ascitic fluid, 70.5% (124) were Negative for Malignancy, 10.2% (18) were AUS, 5.7% (10) were SFM, and 13.6% (24) were Malignancy. Among pleural fluid samples, 73.9% (99) were Negative for Malignancy, 10.4% (14) were AUS, 6% (8) were SFM, and 9.7% (13) were Malignancy. [Table 3]

Table 3: H & E findings across types of fluid in the study sample

Type of fluid	H & E n (%)			
	Negative for Malignancy	AUS	SFM	Malignancy
Ascitic fluid	124 (70.5)	18 (10.2)	10 (5.7)	24 (13.6)
Pleural fluid	99 (73.9)	14 (10.4)	8 (6)	13 (9.7)
Total	223 (71.95)	32 (10.3)	18 (5.8)	37 (11.95)

DISCUSSION

Serous effusions may occur due to variety of etiologies including nonmalignant and malignant effusions. In majority of cases cellular response is nonspecific and produces variety of cell which includes mesothelial cells, macrophages, erythrocytes, neutrophils, lymphocytes and other leucocytes. The major role of cytopathology is to detect malignant cells in these effusions.[7,8]

This is a cross sectional study conducted in department of pathology, in a tertiary care hospital, Chitradurga between 2022 August and 2023 December. Present study includes 310 patients with effusion which is largest among the studies compared. Out of 310 patients, 146 were females and 164 were males with male female ratio of 0.8:1 which is comparable studies conducted by Junwal A et al[9] and Karki S et al,[10] But M:F ratio of 4.33:1, which is more in study conducted by Palathingal D M R et al,[11] Mean age of the study population is 43.1+/-19.3 which is comparable with the studies conducted by Junwal A et al,[9] and Karki S et al.[10] [Table 4]

Table 4: Comparison of baseline characteristics with other studies

	Junwal A et al,[9]	Karki S et al,[10]	Gill M et al,[12]	Sujathan K et al,[13]	Palathingal D M R et al,[11]	Present study
n	97	174	100	100	80	310
Mean age(years)	43.02+/-15.96	48.3	-	-		43.1+/-19.3
Age range(years)	12-85	1-95	-	-	21-88	-
F:M	1.06:1	1.5:1	-	-	4.33:1	0.8:1
Type of study	Cross sectional study	Cross sectional study	Prospective study	Cross sectional study	Prospective study	Cross sectional study
Place of study	Gandhi medical college, Bhopal, Madhya pradesh	TUTH, Katmandu Nepal	Pandith B D Sharma PGI, Rothak India	Regional cancer institute, Tiruvanthapuram, Kerala	Govt Medical college, Trissur, Kerala	Tertiary care hospital, Chitradurga

This study includes 310 patients, out of which 134 were pleural effusion and 176 were peritoneal fluid. Study conducted by Junwal A et al,[8] includes 39 pleural, 55 ascitic fluid and 3 pericardial effusion. Study conducted by Karki S et al,[3] had 71 pleural and 103 ascitic fluids. [Table 5]

Table 5: Distribution of effusions in different studies

	Junwal A et al,[9] (97)	Karki S et al,[10] (174)	Gill M et al,[12] (100)	Palathingal D M R et al,[11] (80)	Present study(310)
Pleural fluid	39	71	50	32	134
Ascitic fluid	55	103	47	48	176
Pericardial	3	-	3	-	-

On H and E staining: out of 310 cases 223 were negative for malignant, 32 were Atypia of undetermined significance. 18 were suspicious of malignant and 37 were malignant. Similarly study conducted by Karki S et al,[3] had 132 benign, 10 atypical and 32 malignant effusions. Study conducted by Gill M et al,[7] had 57 benign, 15 atypical and 28 malignant effusions. Sujathan K et al,[10] had 37 benign, 8 atypical and 55 malignant effusions. Palathingal D M R et al,[11] had 69 benign and 11 malignant effusions.[Table 6]

Table 6: Distribution of effusions based on H and E stain in different studies

	Karki S et al,[10]	Gill M et al,[12]	Sujathan K et al,[13]	Palathingal D M R et al,[11]	Present study
NFM(Benign)	132	57	37	69	223
AUS	10	15	8	-	32
SFM					18
Malignant	32	28	55	11	37

CONCLUSION

The proportion of malignant serous effusion is detected majority in male specially in ascitic fluid with prevalence being 11.95%. The International system for reporting serous fluid cytology will increase standardization and reproducibility in reporting, leading to improved clinical decision-making and better communication between pathologist and clinicians.

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