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THE CYTOLOGICAL STUDY OF ASCITIC FLUID IN ADULTS: A PROSPECTIVE STUDY IN A TERTIARY CARE CENTRE.

Pathology

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ABSTRACT

Background: For cytopathologists, identifying cancerous cells in any bodily fluid is always a difficult task. When needed, a thorough clinical history, morphological analysis, and occasionally contemporary methods like cytochemistry and immunohistochemistry can be used. A common clinical finding with a variety of etiologies is ascites. The purpose of this study is to document pathological findings related to both exudative and transudative ascites. This is the deciding element for patient treatment and will assist the physician, surgeon, and oncologist in treating the patient. **Objectives:** To differentiate into inflammatory, non inflammatory and neoplastic causes of ascites and to assess the proportion of each. **Materials and Methods:** It is an observational, prospective study. 116 cases of ascitic fluid cytology were collected from the patients admitted in a tertiary care hospital which is situated in Ballari over a period of 12 months. Detailed examination – Physical, Biochemical and Microbiological (wherever indicated) was done along with cytology examination of ascitic fluid. **Result:** We studied 116 cases of ascitic fluid cytology. Most common causes were liver cirrhosis followed by acute bacterial infection, inflammatory, tuberculosis, severe anemia, congestive cardiac failure and malignancy. Among malignant effusion, Gastrointestinal adenocarcinoma was most common primary malignancy. **Conclusion:** Most of the time, cytology and detailed examinations of the fluid, including physical, biochemical, and microbiological analyses, can provide a definitive diagnosis of ascitic fluid effusion. Newer methods, such as cytochemistry and immunohistochemistry, could, nevertheless, are often needed for confirmation. To rule out malignant lesions, cytology is the first line of examination, in addition to other radiological investigations. It is also helpful in identifying non-neoplastic lesions such as spontaneous bacterial peritonitis, nephrotic syndrome, cirrhosis of the liver, TB, congestive heart failure, and anemia-hypoproteinemia. It helps doctors in patient management.

KEYWORDS

Ascitic fluid, Cytology, Malignant cells

INTRODUCTION

Our bodies have three serosal cavities. The peritoneum, pericardium, and pleura are these. These serous cavities are lined by inner visceral and outer parietal layer of epithelium.[1]

Normally they contain very little amount of lubricating fluid which is up to 50 - 75 ml in the peritoneum required for lubricating underlying viscera.[2] And pleural space contains only 10-20ml of fluid normally.[3]

Accumulation of fluid in this serous cavities is known as effusion which occurs when there is imbalance between fluid formation and removal.[4] The name "ascites" is defined as pathologic accumulation of fluid within the peritoneal cavity.[5]

Paracentesis is the procedure in which peritoneal cavity is perforated with a hollow needle to remove fluid or gas. Paracentesis with ascitic fluid analysis is the most rapid, simple, safe & costeffective method of determining the etiology of ascites.

Ascitic fluid effusion is classified into transudate and exudate. Transudate is watery and has low protein and very scanty cellularity, on the other end exudates is thick and has high protein as well as high cellularity.

Transudate effusion occurs due to either increased hydrostatic pressure or due to decrease oncotic pressure. Common causes of transudative effusion are cirrhosis, congestive heart failure, portal vein obstruction, Nephrotic syndrome, malnutrition, protein losing enteropathy.

Exudative effusion is mostly due to inflammatory origin. Common causes of Exudative effusion in ascites are tuberculosis, bacterial infection of GIT viscera, trauma, primary hepatic tumor, mesotheliomas etc.

The differentiation of the fluid into malignant or non-malignant fluid is the main aim for cytological examination and it has a deep impact on treating patients. Exfoliative cytology for fluid is highly specific though less sensitive to detect malignancy.[6]

Apart from helping in detecting the cancer, it also helps regarding systemic pathology and various inflammatory conditions of the peritoneal cavity. In cytology of non malignant effusion, we can see number of cells like mesothelial cells, neutrophils, eosinophils, lymphocytes, macrophages, plasma cells.

The diagnosis of tumor types, such as adenocarcinomas, squamous carcinomas, tumors with endocrine functions, malignant lymphomas or sarcomas in effusions, is of significant clinical value in case of malignant effusion because it helps clinician or surgeon to locate primary site for tumor and has deep impact on management of patients.

OBJECTIVES

1. To differentiate into inflammatory, non inflammatory and neoplastic causes.
2. To assess the proportion of neoplastic and non-neoplastic condition causing ascitic fluid effusion

MATERIALS AND METHODS

This study is conducted at the Department of Pathology, Cytology section, Ballari Medical College and research centre, Ballari. Clinical data of the cases were retrieved from the database of the hospital from September 2023 to August 2024. The data regarding demographic features, clinical features, radiological investigation, cytology, were collected, wherever they were available.

The received ascitic fluid samples were processed within 2h of collection. The specimens were centrifuged at 1500 rpm for 10 min; the supernatant was decanted and smears were prepared from the sediment pellet and fixed in alcohol and stained with Hematoxylin and Eosin.

Information regarding possible primary site was obtained based on history, physical Examination and radiological findings.

Statistical analysis was conducted using Microsoft Office Excel 2016. The cases in each category were reviewed for the presence of malignancy.

Study Site- Tertiary care hospital

Duration - 1 year

Study Design- Observational prospective study

Case Selection- The study was carried out on all samples clinically diagnosed as Ascites

Inclusion Criteria: All samples received in sterile container

Exclusion Criteria: Samples < 5 ml, not received in sterile container.

Sample size- 116

RESULTS:

A total of 116 cases of ascites were examined, among those we found 80 cases of male while 36 cases of female with male to female ratio was 2.22:1. Maximum number of cases 37 (32%) was found in the age group 31-40 followed by 31 cases (27%) in the age group 41-50 years. Out of all 116 cases, 81 cases (70%) were found to be transudate and 35 cases (30%) were exudate**.**

Table 1 : Distribution Of The Cases According To The Etiology

Sl no	Cases	Total cases	Percentage (%)
1	Non neoplastic- non inflammatory	43	38
2	Non neoplastic – Inflammatory (chronic non specific)	38	33
3	Non neoplastic – inflammatory (chronic specific - TB)	5	4
4	Acute bacterial peritonitis	26	22
5	Malignancies	4	3
	Total	116	100

Out of all 116 cases, 43 cases (38%) were found to be non neoplastic – non inflammatory which was majority due Liver cirrhosis, followed by Severe anemia and Congestive cardiac failure which was 38 cases (31%), 5 cases(4%), 4 cases (3%) respectively. Further 38 cases (33%) were found to be non neoplastic – non specific inflammatory, 26 cases (22%) were found to be of acute bacterial peritonitis, 5 cases (4 %) were found to be non neoplastic – specific inflammatory caused by Tuberculosis(TB) and 4 cases (3%) were found to be Malignant Effusion.

Out of these 4 cases of malignant effusion, 2 cases (50%) were of Adenocarcinoma of Gastrointestinal tract followed by 1 case (25%) of Serous Cystadenocarcinoma of Ovary, and 1 case of Non-Hodgkin Lymphoma (25%).

DISCUSSION

Diagnostic cytology is interpretation of cells from the human body that are exfoliated or removed from their native tissue. It is important to distinguish malignant ascites from non-malignant ascites since their management modalities are different.

The present study gives the accuracy of diagnosis on the basis of physical parameters with cytological features like cell count, cell type and any other atypical cells against a specific background. The advantages of cytology is that it is a relatively simple, rapid, inexpensive and less invasive tool having a high accuracy with low incidence of false positive diagnosis.

Cytodiagnosis of ascitic fluid represents the cell population from a much larger representative area than that obtained from needle biopsy. The cytological examination of ascitic fluid has an important role in diagnosing the cause of ascites like
1) Malignancy
2) Non specific chronic inflammatory conditions
3) Specific chronic inflammation due to Tuberculosis.
4) Acute purulent ascites
5) Transudative ascites

In this study, we found 80 cases of male while 36 cases of female with male to female ratio was 2.22:1 which is comparable to studies carried out by Khan & Mahmood et al.[7,8]

Table 2: Comparison Of Neoplastic And Nonneoplastic Ascites Compared With Other Studies.

Slno	Study	Non neoplastic (%)	Neoplastic (%)
1	Khan N et al [9]	81	19
2	Lobo et al [10]	67	33
3	Pergaris et al [11]	73.6	26.4
4	Sears D et al [12]	81	19
5	Goyal S et al [13]	66.66	33.33
6	Present study	97	3

Table 3: Comparison Of Primary Site Of Malignancy In Cases Of Malignant Effusion In Various Other Study.

Sr No	Study	Ovary %	GIT %	Lung %	Breast %	Others %	Unknown %
1	Sears D[12]	24	19	5	4	29	19
2	Lopez & Cardoz [14]	16	21	4	3	7	49
3	Khan N et al[9]	12	69	0	0	0	19
4	Present study	25	50	0	0	25	0

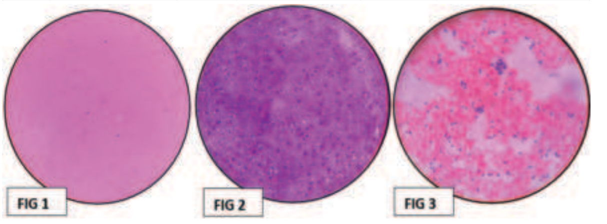

Fig 1 - Transudate Effusion With Low Cell Count (H&E, STAIN)
Fig 2 - Exudative Effusion With Majority Neutrophils Against Necrotic Background – A Case Of Bacterial Peritonitis. (H&E, STAIN)
Fig 3 - Hemorrhagic Effusion With Predominantly Lymphocytes And Reactive Mesothelial Cells (H&E, STAIN)

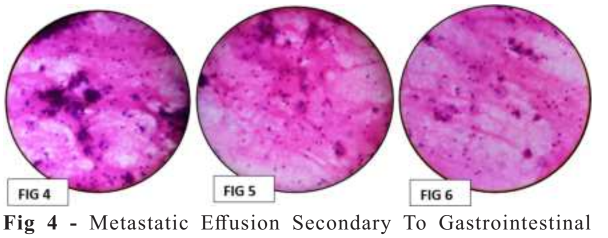

Fig 4 - Metastatic Effusion Secondary To Gastrointestinal Malignancy (ADENOCARCINOMA) (H&E, STAIN)
Fig 5 & 6 - Metastatic Effusion Secondary To Gastrointestinal Malignancy (ADENOCARCINOMA) SHOWING SIGNET RINGS (H&E, STAIN)

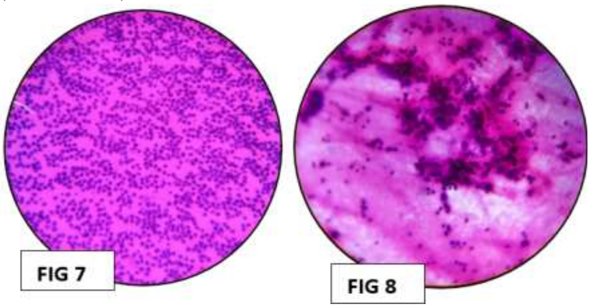

Fig 7 - Lymphomatous Effusion Secondary To Non-hodgkin Lymphoma. (H&E, STAIN)

Fig 8 - Metastatic Effusion Secondary To Ovarian Serous Cystadenocarcinoma(H&E, STAIN)

CONCLUSION

Overall, fluid cytology is very useful in classifying benign conditions, further it plays a very useful role in rapid diagnosis of malignant effusions. It is the first line investigation to rule out any malignancies.

However radiological, microbiological and biochemical examination should be considered for the definitive diagnoses, which will help the clinicians in management of patients.

Fluid cytology although not a substitute for conventional histopathology but act as complementary to it and is useful in categorizing benign conditions as well as in the diagnosis of malignant conditions.

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