

Cytological Evaluation of Ascitic Fluid in a Tertiary Care Centre, Gujarat, India

Dr. Devangi Gohel¹, Dr. Aditi Dholakia², Dr. Mayuri Bhalodi³

Second Year Resident Doctor, GMERS Medical College Gotri, Vadodara)

Corresponding Author Email: [gohel.devangi123\[at\]gmail.com](mailto:gohel.devangi123[at]gmail.com)

Associate Professor (HG), GMERS Medical College Gotri, Vadodara)

Second Year Resident Doctor, GMERS Medical College Gotri, Vadodara)

Abstract: ***Background:** Ascites is defined as pathological fluid accumulation within the abdominal cavity. Cytological examination aids in detecting underlying etiologies including infections, liver diseases, and malignancies. In situations when tissue biopsy is not available for histologic diagnosis, ascitic fluid cytology can assist in making the diagnosis. This study aims to reinforce the clinical relevance of cytological evaluation in diagnosis of benign as well as malignant conditions and also staging of later. **Methods:** It is a retrospective observational study of total cases of ascitic fluid cytology were collected from the patients admitted in a tertiary care hospital GMERS medical college and hospital Gotri which is situated in vadodara over a period of 2 years **Results:** Total 58 cases were analyzed. Out of which four cases of them had malignancy-related ascites, while one of them had suspicious for malignancy one had atypia and 50 had Non-malignant ascites and two had nondiagnostic. **Conclusion:** Cytological analysis is effective for diagnosing and prognosticating both benign and malignant ascitic fluid conditions. It is especially beneficial in identifying malignancies without resorting to invasive methods, in certain cases. Routine use in tertiary centers can streamline patient management and improve outcomes.*

Keywords: Ascitic fluid cytology, malignant ascites, diagnostic evaluation, tertiary care study, liver cirrhosis

1. Introduction

Ascitic fluid cytology is a pivotal diagnostic tool in the evaluation of patients with ascites, particularly in distinguishing benign from malignant etiologies. Ascites, the pathological accumulation of fluid within the peritoneal cavity, can arise from a wide range of conditions including liver cirrhosis, tuberculosis, nephrotic syndrome, and peritoneal carcinomatosis.^[1] Among these, malignancy-associated ascites represents a significant clinical concern, especially in cases where the primary tumor remains undiagnosed.

Cytological examination of ascitic fluid offers a minimally invasive method for the detection of malignant cells and can play a crucial role in guiding further diagnostic and therapeutic decisions.^[2] While traditional biochemical analysis and imaging studies contribute valuable information, cytology often provides definitive evidence of malignancy, particularly when coupled with ancillary techniques such as immunocytochemistry and cell block preparation.^[3]

Despite its clinical utility, ascitic fluid cytology faces several limitations, including low sensitivity in certain malignancies, sampling errors, and difficulties in distinguishing reactive mesothelial cells from malignant cells. However, advancements in cytological techniques and increasing awareness of morphological criteria have significantly improved diagnostic accuracy.

This study aims to evaluate the cytomorphological features of ascitic fluid in various pathological conditions, with an emphasis on the identification and characterization of malignant cells. By correlating cytological findings with clinical and histopathological data, this research seeks to enhance the diagnostic yield of ascitic fluid cytology and

reinforce its role in the early detection of intra-abdominal malignancies.^[4]

Aim and Objective

To analyze cytological features of ascitic fluid in various pathological conditions. To determine the frequency of benign vs. malignant effusions. To assess the diagnostic utility of cytology in staging malignancies.

2. Materials and Methods

A total of 58 cases of ascitic fluid sample received was centrifuged at 2000 rpm for 10 minutes.

Smears were prepared from the sediment and stained using Papanicolaou (PAP), Hematoxylin & Eosin (H&E), May-Grünwald-Giemsa (MGG) and examined under microscope. After confirming final diagnosis each data was analysed. Cytomorphological features were assessed and correlated with clinical and radiological data.

Inclusion Criteria

Ascitic fluid samples received for cytological analysis

Exclusion Criteria

Sample which not received in universal sterile container were excluded.

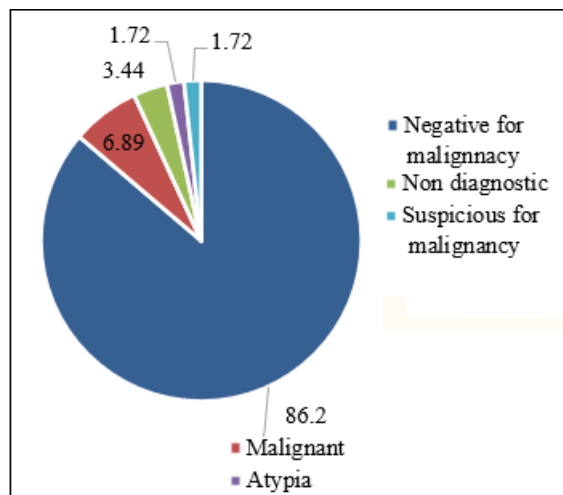


Figure 1: Pattern of ascitic fluid cytological findings

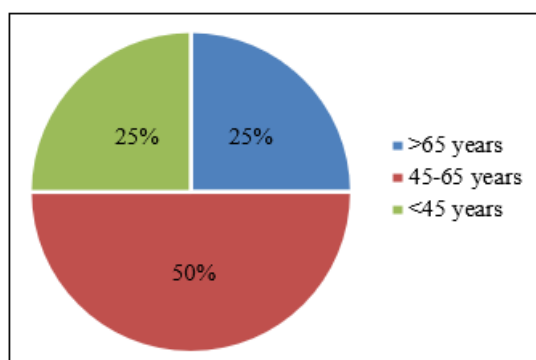


Figure 2: Age distribution of patients with ascitic fluid positive for malignant cells

Ethical Consideration

Informed consent was not required for the study and identity of the patient was not disclosed in this study. The present study was carried out in the Cytopathology laboratory, Department of Pathology, GMERS medical college and Hospital, Gotri, Vadodara a tertiary care center. Institutional human ethics committee (IHEC) approval taken before starting the study. All the information collected and was done during the period of June 2023 to May 2025

3. Result

A total of 58 cases were included in the study. Out of these, 37 cases (63.7%) were female, 21 cases (36.2%) were male resulting in a Female-to-male ratio of 1.7:1 with the highest number of cases 50 (86.2%) cases were observed cytological diagnosis category II Negative for malignancy, 4 (6.8%) were category V Malignant, 2 (3.4%) were category II Nondiagnostic, 1 (1.7%) was category III Atypia and 1 (1.7%) was category IV Suspicious for malignancy.

Serial no.	Age	Gender	Chief complains / Provisional Clinical Diagnosis	Radiological Findings	Gross fluid findings	Microscopy	Cytology diagnosis (TIS Category)
Case 1	51	F	Pedal edema, abdominal distension, breathlessness x10 days	Hepatomegaly	Not mentioned	Predominantly neutrophils	TIS Category II- Negative for malignancy
Case 2	25	F	Abdominal pain, amenorrhea, constipation	CECT abdomen – P/O ovarian neoplasm	5 ml yellowish slightly hazy	Scattered mesothelial cells	TIS Category II- Negative for malignancy
Case 3	60	F	K/C/O Liver parenchymal disease	–	4 ml yellowish clear	Benign mesothelial cells	TIS Category II- Negative for malignancy
Case 4	44	M	Chronic liver disease	–	2 ml reddish yellow clear	Few lymphocytes, neutrophils	TIS Category II- Negative for malignancy
Case 5	52	F	Ascitic fluid on CT scan	–	3 ml yellowish clear	Small lymphocytes	TIS Category II- Negative for malignancy
Case 6	40	F	Abdominal pain, distention	–	50 ml yellowish turbid pus-like	Dead neutrophils, histiocytes	TIS Category II- Negative for malignancy
Case 7	30	M	MDR-TB, ALD, severe anemia, PLHA	–	10 ml yellowish clear	Mainly lymphocytes, histiocytes	TIS Category II- Negative for malignancy
Case 8	21	F	Fever, cough, dizziness, weakness	–	20 ml yellowish clear	Inflammatory cells	TIS Category II- Negative for malignancy
Case 9	40	F	Chronic pancreatitis with ascites	–	30 ml yellowish turbid	Scattered lymphocytes	TIS Category II- Negative for malignancy
Case 10	38	M	Alcoholic liver disease, AKI	–	5 ml yellowish clear	Scattered lymphocytes	TIS Category II- Negative for malignancy
Case 11	35	M	Chronic liver disease	–	2 ml reddish	Hemorrhagic effusion	TIS Category II- Negative for malignancy
Case 12	63	F	Abdominal distention, pain, oliguria	–	2 ml yellowish	Mesothelial cells, macrophages	Negative for malignancy

Case 13	45	M	Necrotizing pancreatitis	CT: Peripancreatic fluid	2 ml brownish hazy	Acellular	TIS Category I- Non-diagnostic
Case 14	50	F	Liver parenchymal disease	–	1.5 ml reddish turbid	Mesothelial cells	TIS Category II- Negative for malignancy
Case 15	45	F	Ascites, hepatomegaly, anemia	CECT: Nodular liver lesion	1 ml yellowish clear	Reactive mesothelial cells	TIS Category III- Atypia - Most probably Benign
Case 16	25	F	Post LSCS, septic shock, gross ascites	–	2 ml yellowish turbid	Neutrophils, macrophages	TIS Category II- Negative for malignancy : Acute suppurative effusion
Case 17	56	M	Jaundice, hepatomegaly	–	20 ml yellowish clear	Neutrophilic infiltrates	TIS Category II- Negative for malignancy
Case 18	21	F	Suspected abdominal TB	–	1.5 ml yellowish turbid	Lymphocytes, mesothelial	TIS Category II- Negative for malignancy
Case 19	60	F	Cirrhosis of liver	–	5 ml dark yellow hazy	Lymphocytes, histiocytes	TIS Category II- Negative for malignancy
Case 20	70	F	Abdominal pain	CT: Lesion in left iliac fossa	5 ml reddish	Mesothelial cells, macrophages	TIS category II - Negative for malignancy
Case 21	65	M	Adenocarcinoma of liver	–	2 ml reddish turbid	Lymphocytes, macrophages	TIS Category II- Negative for malignancy
Case 22	65	M	Large bowel obstruction	CECT: Mass over transverse colon	5 ml reddish turbid	Mesothelial, lymphocytes	TIS Category II- Negative for malignancy
Case 23	30	F	Ascitic fluid, pedal edema	–	5 ml yellowish clear	Acellular (proteinaceous)	TIS Category II- Non-diagnostic
Case 24	45	F	Ascites, weakness, edema	–	10 ml	Lymphocytes, mesothelial	TIS Category II- Negative for malignancy
Case 25	50	F	Chronic alcoholic	CT: 75x77x70 mm mass (neoplastic)	10 ml	Neutrophils, mesothelial	TIS Category II- Negative for malignancy
Case 26	40	M	Chronic alcoholic	–	10 ml	Lymphocytes, neutrophils	TIS Category II- Negative for malignancy
Case 27	50	M	Liver abscess	CT: Caudate lobe abscess	10 ml	Neutrophils, mesothelial	TIS Category II- Negative for malignancy
Case 28	23	M	Abdominal pain	–	1 ml brownish	Lymphocytes, neutrophils	TIS Category II- Negative for malignancy
Case 29	72	M	Ascites, edema	CT: Gallbladder calculus, pleural effusion	10 ml pale yellow	Lymphocytes, mesothelial	TIS Category II- Negative for malignancy
Case 30	51	M	Chronic alcoholic	–	2 ml reddish orange	Mesothelial cells	TIS Category II-Negative for malignancy
Case 31	30	F	Burst abdomen (post LSCS)	USG: Portal hypertension	1 ml reddish turbid	Neutrophils, lymphocytes	TIS Category II-Negative for malignancy
Case 32	48	F	Acalculous cholecystitis, ascites	–	1 ml yellowish clear	Lymphocytes, mesothelial	TIS Category II-Negative for malignancy
Case 33	54	M	Hollow viscus perforation	–	5 ml yellowish turbid	Neutrophils, debris	TIS Category I- Non-diagnostic : Inconclusive
Case 34	55	F	Peritoneal carcinomatosis	CT: Suggestive findings	10 ml creamish turbid	Mesothelial, lymphocytes	TIS Category II-Negative for malignancy
Case 35	60	F	Jaundice, melena	–	3 ml yellowish clear	Atypical, reactive mesothelial	TIS Category III -Atypia
Case 36	45	F	Abdominal distension	–	3 ml yellowish clear	Mesothelial, macrophages	TIS Category II- Negative for malignancy
Case 37	65	F	SOB, edema, distension	–	4 ml yellowish clear	Lymphocytes, neutrophils	TIS Category II- Negative for malignancy
Case 38	62	F	Abdominal distension, pain	–	2 ml reddish yellow clear	Atypical cells, pleomorphic	TIS Category V- Malignant
Case 39	60	F	Abdominal distension	–	5 ml whitish turbid	Lymphocytes, mesothelial	TIS Category II-Negative for malignancy
Case 40	21	F	Suspected abdominal TB	–	1.5 ml yellowish turbid	Lymphocytes, mesothelial	TIS Category II-Negative for malignancy
Case 41	66	F	Gross ascites, weight loss	CA Pancreas	50 ml yellow clear	Atypical clusters	TIS Category IV- Suspicious for malignancy
Case 42	28	M	Alcoholic, hepatomegaly	USG: Gross ascites	3 ml yellowish turbid	Lymphocytes, macrophages	TIS Category II-Negative for malignancy
Case 43	37	M	Tuberculosis (CBNAAT+)	–	20 ml pale yellow	Lymphocytes, mesothelial	TIS Category II-Negative for malignancy

Case 44	60	M	Alcoholic liver disease	USG: Moderate ascites	5 ml pale yellow	Mesothelial, lymphocytes	TIS Category II-Negative for malignancy
Case 45	42	F	CA Colon	CT: Transverse colon narrowing	1.5 ml yellow turbid	Signet ring cells	TIS Category V - Malignant
Case 46	53	F	CA Ovary with peritoneal mets	CT: External iliac lesion	10 ml yellowish clear	Atypical epithelial cells	TIS Category V-Malignant
Case 47	55	F	CA Ovary (high grade)	CECT: Cystic lesion in adnexa	0.8 ml reddish clear	Reactive mesothelial	TIS Category II-Negative for malignancy
Case 48	45	F	Abdominal distension and jaundice with bilateral pedal edema	nan	1 ml yellowish clear	only blood and pink protenecious material	TIS category I - Non diagnostic
Case 49	35	M	Extra-pulmonary TB (ALD + AKT)	–	2 ml yellowish clear	Lymphocytes, mesothelial	TIS Category II-Negative for malignancy
Case 50	25	M	Pleural effusion, ascites	–	1 ml whitish clear	Degenerated cells, lymphocytes	TIS Category II-Negative for malignancy
Case 51	60	F	CLD, GI bleed	–	0.8 ml reddish clear	Mesothelial, lymphocytes	TIS Category II-Negative for malignancy
Case 52	57	F	Abdominal distension, jaundice	–	–	Lymphocytes, neutrophils	TIS Category II-Negative for malignancy
Case 53	55	M	Hamartomatous polyp	–	1.5 ml yellowish clear	Neutrophils, mesothelial	TIS Category II-Negative for malignancy
Case 54	24	F	Abdominal pain	–	2 ml yellow clear	Lymphocytes, macrophages	TIS Category II-Negative for malignancy
Case 55	70	M	Carcinoma stomach	UGI: 5x5 cm lump	0.5 ml yellowish turbid	Epithelial, lymphocytes	TIS Category II- Negative for malignancy
Case 56	72	F	Grossly distended abdomen? CA ovary	USG - Ovarian cyst measuring 5x3 cm	10 ml Yellowish and turbid	Many atypical cells, signet ringcells and binucleated and multinucleated cells	TIS Category V - Positive for malignancy: metastatic epithelial malignancy
Case 57	66	F	Bilateral Pyoslapphynx?	–	10 ml Yellowish clear	predominantly lymphocytes, neutrophils	TIS Category II- Negative for malignancy: Lymphocytosis
Case 58	52	F	Ascitis	–	3 ml ywllowish clear	Plenty of small lymphocytes and few neutrophills	TIS Category II - Negative for malignancy: Reactive effusion is suggested

Images



Figur1: Benign effusion (H and E stain)

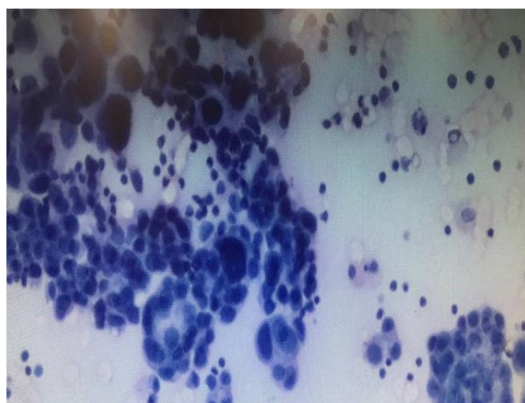


Figure 2: Malignant effusion (H and E stain)

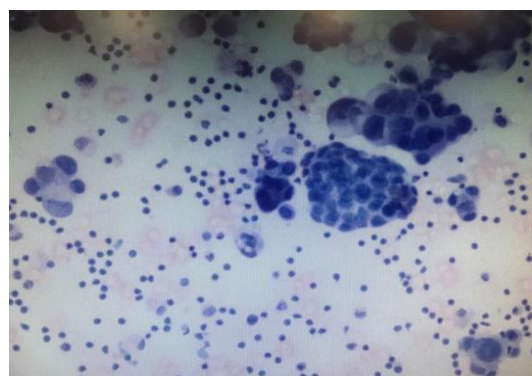


Figure 3: Malignant effusion (H and E stain)

4. Discussion

The cytological examination of ascitic fluid is an important diagnostic modality; which aims at pointing out the etiology of effusion. The technique is simple, safe, cost effective and reproducible even in resource limited settings. The malignant cells in the ascetic fluids were almost always indicative of metastatic tumors primary malignancies of the mesothelial cell lining are uncommon. A positive effusion for malignant cells is an important prognostic indicator in cancer patients.^[5] In our study, the majority of ascitic fluid samples were associated with benign causes such as liver cirrhosis and tuberculosis.^[6] These cases typically showed a predominance of reactive mesothelial cells, lymphocytes, and occasional

macrophages. Reactive mesothelial proliferation, while commonly observed, presented a diagnostic challenge due to its occasional morphological overlap with malignancy. However, careful evaluation of cellular architecture, absence of significant nuclear atypia, and lack of three-dimensional clusters helped distinguish benign from malignant processes. Malignant ascites accounted for a significant proportion of cases, with ovarian carcinoma, gastric carcinoma, and metastatic adenocarcinoma being the most frequent primary sources. Cytologically, these cases were characterized by increased cellularity, cell clustering, nuclear pleomorphism, prominent nucleoli, and occasional mitotic figures. The presence of three-dimensional cell clusters.^[7]

In this study a total of 58 cases were included with the highest number of cases 50 (86.2%) cases were observed cytological diagnosis category II Negative for malignancy, 4 (6.8%) were category V Malignant, 2 (3.4%) were category II Nondiagnostic, 1 (1.7 %) was category III Atypia and 1 (1.7%) was category IV Suspicious for malignancy.

5. Conclusion

In ascitic fluid cytological examination most ascitic effusions are benign in nature, commonly associated with non-neoplastic conditions, cytological examination plays a crucial role in the early detection and diagnosis of malignant effusions.^[8] Ascitic fluid cytology remains a simple, rapid, and reliable diagnostic tool that aids in differentiating benign from malignant effusions, especially when combined with cell block preparation and relevant clinical correlation.^{[9],[10]}

References

- [1] Manaswini R (2023) Ascitic Fluid Cytology- Rewarding Tool in the Discovery of Unknown. *Ann Clin Cytol Pathol* 9(1): 1146.
- [2] Goyal S, Shah N, Shah F.R, Shah J.M. Cytology- A useful diagnostic tool in ascites, 2 years study. *Trop J Path Micro* 2019;5(2): 94-99.doi:10.17511/ jopm. 2019.i2.08.
- [3] Cytomorphological Examination of Ascitic Fluid-A Prospective Study in a Tertiary Care Hospital.Maria Alexander et al., *Sch J App Med Sci*, Nov., 2019; 7(11): 3724-3727.
- [4] The Sensitivity of Cytology in the Differential Diagnosis of Ascites among Adult Nigerians in a Tertiary Health Institution. Ekpe EEL et al., *Sch. J. App. Med. Sci.*, 2015; 3(2F):969-972.
- [5] Determination of the optimal volume of ascitic fluid for the precise diagnosis of malignant ascites.Saudi J. et.al *Gastroenterol.* 2019 Sep 26;25(5):327–332. doi: 10.4103/sjg.SJG_547_18
- [6] Evaluation of tumor markers for the differential diagnosis of benign and malignant ascites.Liu F, et al. *Annals of Hepatology.* 2014; 13 (3): 357-363.
- [7] Cytologic examination of ascitic fluid in a patient with pleural-based mass: A unique presentation of a rare tumor Priyadarshini Dehuri. et. al. *Cytojournal.* 2018 Oct 15; 15: 26. doi: 10.4103/cytojournal.cytojournal_7_18.
- [8] Ascitic fluid cytology and its implications in the clinical approach. Dr. S P Tathe.et.al. *Journal of Medical Science and clinical Research.*

- [9] V AV, R KD. Cytomorphological study of peritoneal fluid in suspected cases of malignancy [Internet]. *IP Arch Cytol Histopathol Res.* 2021 [cited 2025 Oct 14];6(3):206-213.

- [10] Analysis of Ascitic Fluid Cytology by Cell Block in the Evaluation & Grading of Malignancy with Ki 67 Marker Study in a Tertiary Care Centre.G Jeyanthi, K Sumathi, K Rani, & Byravi S. (2023).