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Original Research Article

Clinicocytological Study of Peritoneal Fluids at National Capital Region Institute of Medical Sciences, Meerut

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Abstract

Background & Methods: The aim of the study was to study clinicocytological analysis of peritoneal fluids. All the samples of peritoneal fluid collected at the cytology lab, NCRIMS, during the above-mentioned period of one year was analyzed (Hospital based study depending on the duration of sampling followed by data collection).

Results: TIS System for classifying serous fluids; AUS = Atypical cytological changes of uncertain significance; MAL = Malignancy; NFM = Negative for malignant cytology; SFM = Suspicious for malignant cytology. For TIS classification distribution, maximum patients were NFM (350, 96.2%) while only 8 cases (2.2%) MAL and 3 cases (0.8%) each for AUS and SFM were recorded.

Conclusion: According to the TIS classification distribution, in this study maximum patients were NFM (350 cases) while only 8 cases MAL and 3 cases each for AUS and SFM were recorded. Implication of the TIS system can help in improving diagnostic accuracy, uniformity and reproducibility in cytological analysis of peritoneal fluids.

Keywords: Cytology, Peritoneal Fluids, Effusion, Malignant Effusion.

Study Design: Cross-sectional study.

1. INTRODUCTION

From ancient times, the collection of fluid in the abdomen or peritoneum was well-documented. With the first time, Celsus is accredited to mention in 20 BC that the procedure of “paracentesis” revealed to aspirate the fluid from the cavity of peritoneum in which a “bronze tube along with a flanged collar” used for draining the fluid.(1) In 1827, it was reported that one of the renowned patients who received large quantity of paracentesis was known as “Ludwig van Beethoven”.(2)

The name ascites comes from the ‘Greek foundation “askos” meaning “bag or sac”.(3) Ascites refers to the collection of enormous fluid in the peritoneum, that typically becomes clinically measurable when minimum quantity of 500mL has found to be accumulated in the peritoneum.(3)

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Ascites appears when there is an inequity of factors that favor the emergence of fluid from vascular cavity and/or when there is fluid exudation due to infections or malignant establishment on the peritoneum. Mild ascites may not generate any symptoms. Moderate ascites may just construct an induction of abdominal girth followed by weight gain. Enormous amounts of fluid may create abdominal discomfort. [4]
The examination of ascitic fluid provides with an appreciated sign regarding the etiologic diagnosis for ascites especially in patients where to depict the cause clinically is not effortless.[5] The primary causative factor of ascites is hepatic cirrhosis.[6] It was noted that the patient who develops ascites due to the cirrhosis of liver have projected 12 months death rate of about 20% in comparison with a 1-year mortality rate of about 7% in patient with cirrhosis and without the progression of ascites.[7] Therefore, it is suggested to take sample of the ascitic fluid in the cases with commencement of ascites.[8]

The disorder, ascites is classified into two types such as exudative and transudative according to the fundamental pathological process, such a distinction allows suitable examinations are to be initiated, enabling proper management of the patient. [8] Exudative ascites is inflammatory origin based on the pathologic fluid due to microbial infection. It results from a vigorous collection of fluid in the cavities of the body, related to damage of the capillary walls, and common causes such as with or without disrupted viscus for an abscess of intra-abdominal origin, bacterial peritonitis, abdominal-tuberculosis, bile peritonitis, pancreatitis, trauma, secondary peritoneal carcinomatosis, leukemias, lymphomas, primary mesotheliomas, and primary hepatic tumors are found.[4] Transudative ascites is non-inflammatory origin of the pathological fluid. It occurred due to percolation of blood serum around physically intact vascular wall. Common causes such as cirrhosis, constrictive pericarditis, hepatic vein obstacle 'Budd-Chiari syndrome', congestive cardiac failure, portal vein obstacle, nephrotic disorder, diseases associated with excessive loss of proteins through the gastrointestinal tract (PLE), myxedema, and malnutrition are found.[9]

2. MATERIAL AND METHODS

All the patients presenting to the hospital with ascites, not falling in exclusion criteria were evaluated. First of all, name, age, sex and duration of disease were noted after taking an written informed consent. Fluid or routine analysis and cytology investigations were done in respect of physical examination and microscopic examination. The smears were prepared from sediments and stained by Giemsa stain and with AFB Stain and Papanicolaou stain whenever required and the differential counts and cytological findings were noted. All peritoneal fluids were classified according to the TIS system for classifying fluids into the five category:

All peritoneal fluid samples were performed with clinical examinations, all efforts were put to process the fluids as expeditiously as possible, most of the samples were put to processing with immediate effect rather in small number, where their might be delayed, the specimens were refrigerated around <4°Celcius. Samples were categorized into

1. Non-diagnostic,
2. Negative for malignant cytology (Benign),
3. Atypia of undetermined significance
4. Suspicious for a malignancy,
5. Positive for malignancy.

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- All findings were tabulated, analyzed and recorded.
- Adequate care was taken to exclude bias from the investigator.

Inclusion Criteria

1. The peritoneal fluids collected at cytology lab, provided the patient given an informed consent for taking part in the study.
2. The patients presenting with ascites were considered. All the cases were clinically diagnosed. Patients of nephrotic syndrome, severe anaemia, hypoproteinaemia, spontaneous bacterial peritonitis, tuberculous ascites, and malignancy were also be included in this study.

Exclusion Criteria

1. Samples of patients who refused for active participation in the study with a written informed consent.
2. Samples with volume less than 5.0 ml.
3. Samples with time lag more than 24 hours.
4. Unlabelled samples.

3. RESULT

Table 1: Age-Group Distribution among Patients

Age Group (Years)	Frequency	Percent
1-10	2	0.5
11-20	3	0.8
21-30	23	6.3
31-40	87	23.9
41-50	140	38.5
51-60	70	19.2
61-70	31	8.5
71-80	8	2.2
Total	**364**	**100.0**

For age group distribution, maximum patients were of age between of 41-50 years (140, 38.5%) then 31-40 years (87, 23.9%), 51-60 years (70, 19.2%) and 61-70 years (31, 8.5%) while minimum patients were age group of 1-10 years (2, 0.5%). The mean age was 46.51 ± 12.32 years.

Table 2: Clinical Diagnosis Distribution among Patients

Clinical Diagnosis	Frequency	Percent
Acute kidney injury with sepsis	6	1.6
Alcoholic liver disease	1	0.3
Alcoholic liver disease with peritonitis	4	1.1
Appendicular perforation with pelvic abscess	2	0.5
Blunt trauma with peritonitis	6	1.6
Chronic cholecystitis with mild ascitis with peritonitis	10	2.5
Chronic kidney disease	9	2.5
Chronic liver disease	24	6.6

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Chronic liver disease with peritonitis	8	2.2
Chronic pancreatitis	6	1.6
Chronic renal failure with peritonitis	2	0.5
Chylous ascites	3	0.8
Cirrhosis	100	27.5
Cirrhosis with gross ascites with peritonitis	29	8.0
Cirrhosis with tuberculosis	9	2.5
Congestive cardiac failure	34	9.3
Congestive cardiac failure with tuberculosis	7	1.9
Intestinal obstruction	3	0.8
Intestinal obstruction with peritonitis	11	3.0
Malignant mesothelial cell carcinoma	2	0.5
Metastatic adenocarcinoma	4	1.1
Metastatic mucin secreting adenocarcinoma	2	0.5
Obstructive jaundice	4	1.1
Ovarian tumor/Cyst	5	1.4
Pelvic mass (Ovarian tumor/Cyst) with peritonitis	2	0.5
Portal hypertension	17	4.7
Post colectomy for CA colon	1	0.3
Post haemmohoidectomy with peritonitis	7	1.9
Post mastectomy for CA breast	1	0.3
Post OP liver abscess	1	0.3
Severe anemia	17	4.7
Suspicious for small round blue cell tumor	1	0.3
Subacute bowel obstruction	1	0.3
Suspicious for adenocarcinoma	1	0.3
Abdominal tuberculosis	25	6.9
Total	**364**	**100.0**

For clinical diagnosis distribution, maximum patients were diagnosed cirrhosis (100, 27.5%) followed by congestive cardiac failure (34, 9.3%), cirrhosis with gross ascites with peritonitis (29, 8.0%), abdominal tuberculosis (25, 6.9%), chronic liver disease (24, 6.6%) as well as portal hypertension and severe anemia (17, 4.7%) while 1 case for each category viz. alcoholic liver disease, post colectomy for CA colon, post mastectomy for CA breast, post OP liver abscess, suspicious for small round blue cell tumour, subacute bowel obstruction and suspicious for adenocarcinoma (0.3%) was recorded.

Table 3: Category Distribution among Patients

Category	Frequency	Percent
Atypical	5	1.4
Benign	264	72.5
Benign with SBP	87	23.9
Malignant	8	2.2
Total	**364**	**100.0**

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For category of cell distribution, maximum patients were benign (264, 72.5%) followed by benign with SBP (87, 23.9%) while only 8 cases (2.2%) malignant and 5 cases (1.4%) for atypical were recorded.

Table 4: TIS Classification Distribution among Patients

TIS Classification	Frequency	Percent
AUS	3	0.8
MAL	8	2.2
NFM	350	96.2
SFM	3	0.8
Total	**364**	**100.0**

TIS System for classifying serous fluids; AUS = Atypical cytological changes of uncertain significance; MAL = Malignancy; NFM = Negative for malignant cytology; SFM = Suspicious for malignant cytology. For TIS classification distribution, maximum patients were NFM (350, 96.2%) while only 8 cases (2.2%) MAL and 3 cases (0.8%) for AUS and SFM were recorded.

Table 5: Gross Appearance Distribution among Patients

Gross Appearance	Frequency	Percent
Brownish/Turbid	1	0.3
Dark yellow/Clear	5	1.4
Dark yellow/Turbid	34	9.3
Haemmorhagic/Reddish	27	7.4
Pale yellow/ Clear	217	59.6
Pale yellow/Reddish	22	6.0
Pale yellow/Turbid	53	14.6
PUS like/Turbid	2	0.5
Reddish/Clear	1	0.3
Reddish/Turbid	2	0.5
Total	**364**	**100.0**

For gross appearance distribution, maximum specimens of patients were observed pale yellow/clear (217, 59.6%) followed by pale yellow/turbid (53, 14.6%), dark yellow/turbid (34, 9.3%), hemmorhagic/reddish (27, 7.4%), pale yellow/reddish (22, 6.0%) while only 5 cases (1.4%) dark yellow/clear, 2 cases (0.5%) and 1 case (0.3%) for each category viz. brownish/turbid, pale yellow/clear, pale yellow/ turbid and reddish/clear were recorded.

Fig 1: Cytosmear Showing Moderate Cellularity with Predominantly Polymorphs with Few Lymphocytes. No Atypical Cells Seen. (40x Magnification) (Giemsa Stain

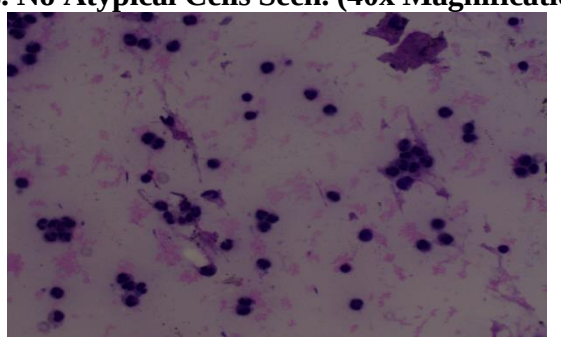

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Fig 2: Cytosmears Reveal Moderate Cellularity, Primarily Consisting of Mononuclear Cells Namely, Lymphocytes and Reactive Mesothelial Cells with Few Polymorphs in a Fluidy Background. Mesothelial Cells Have Prominent Nucleoli, Binucleation and Vacuolated Cytoplasm. No Evidence of Malignancy Seen. (20x Magnification)(Giemsa Stain)

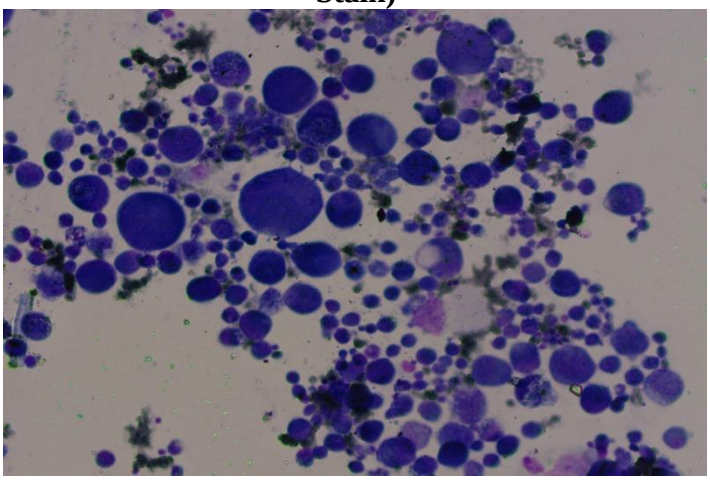

Fig 3: Benign Effusion Showing Tubercle Bacilli. Zn Stain for AFB. Multiple Pink Rod-Shaped Tubercle Bacilli

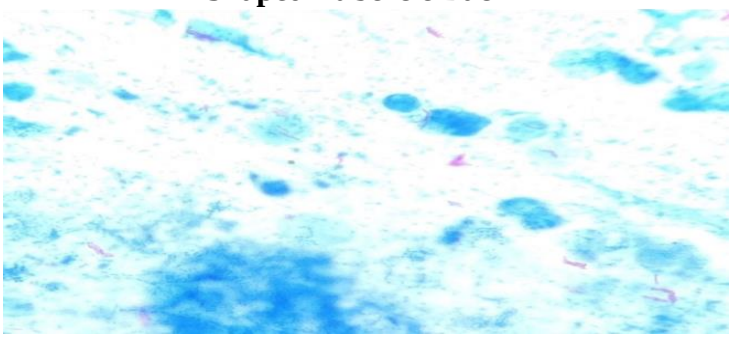

Fig 4: Smears are Cellular Showing 3D Balls and 3D Clusters of Atypical Cells Having Naked Nuclear Anisokaryosis and Signet Ring Cells also Present. (Metastatic Adenocarcinoma) (20x Magnification)(Giemsa Stain)

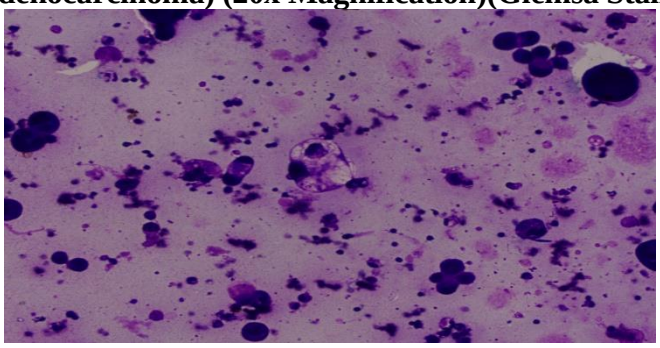

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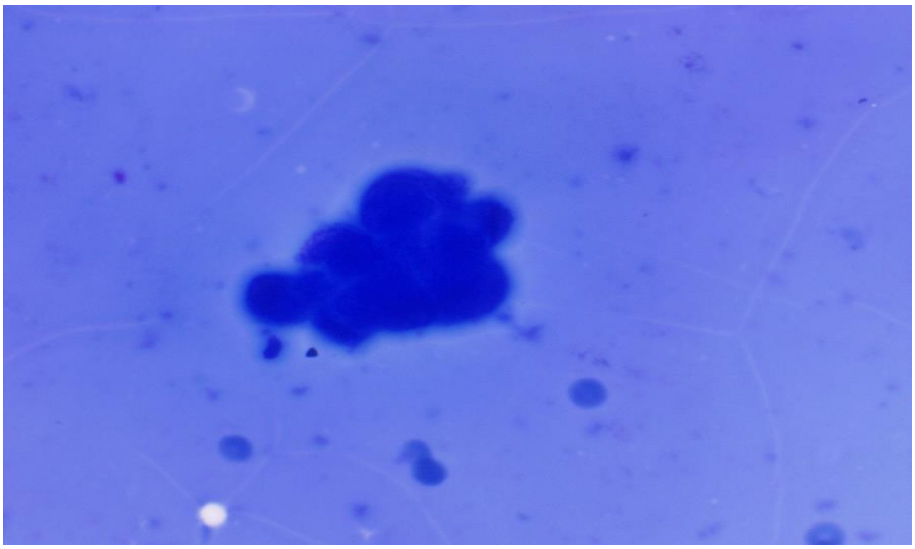
Fig 5: Smears show cells lying in 3D clusters as well as singly. The mesothelial cells have increased nucleocytoplasmic ratio, vacuolated cytoplasm. The individual cells have prominent nucleoli and exhibit pleomorphism in the background containing hemorrhage. (60x magnification)(Giemsa stain).



4. DISCUSSION

For age group distribution, in this study maximum patients were from the age between of 41-50 years (140, 38.5%) then 31-40 years (87, 23.9%), 51-60 years (70, 19.2%) and 61-70 years (31, 8.5%) while minimum patients were age group of 1-10 years (2, 0.5%). The mean age was 46.51 ± 12.32 years[10]. The association between TIS classification and age groups of patients was not statistically significant (P=0.333).

For clinical diagnosis distribution, maximum patients were diagnosed cirrhosis (100, 27.5%) followed by congestive cardiac failure (34, 9.3%), cirrhosis with gross ascites with peritonitis (29, 8.0%), Tuberculosis (25, 6.9%), chronic liver disease (24, 6.6%) as well as portal hypertension and severe anemia (17, 4.7%) while 1 case for each category viz. alcoholic liver disease, post colectomy for CA colon, post mastectomy for CA breast, post OP liver abscess,suspicious for small round blue cell tumor, subacute bowel obstruction and suspicious for adenocarcinoma (0.3%) was recorded[11]. The association between TIS classification and clinical diagnosis of patients was statistically significant (P<0.001).

On cytological diagnosis, 8 cases (2.2%) were recorded to be malignant (MAL), 3 cases (0.8%) for AUS and 3 cases of suspicious for malignant cytology (SFM), while 350 cases (96.2%) were found to be negative for malignancy (NFM) [12].

For cell count distribution, maximum patients were observed the cell counts (mm^3) of <=100 (134, 36.8%) followed by 201-500 (82, 22.5%), 1001-5000 (59, 16.2%), 101-200 (33, 9.1%) and 501-1000 (29, 8.0%) while minimum patients were observed 5001-10000 (2, 0.5%). The association between TIS classification and cell count of patients were observed to be of statistical significance (P<0.001) [13].

In (2014), a research done by Shikha, reported that about 86.2% observed WBC count less than 100 cells/mm^3 along with lymphocyte predominant while SBP observed WBC count less than 500 cells/mm^3 along with PMN predominant.[14]

For predominant cell type distribution, in this study maximum patients were observed the lymphocyte (256, 70.3%) followed by neutrophil (87, 23.9%) and mesothelial cell (15, 4.1%)

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while minimum patients were observed atypical mononuclear cell (6, 1.6%). The association between TIS classification and cellular arrangement of patients was statistically significant (P<0.001).

5. CONCLUSION

The maximum number of patients were from the age group of fourth decade of life, while minimum patients were age group of 1-10 years. The mean age was 46.51 ± 12.32 years. The maximum patients were diagnosed with cirrhosis (100 cases) followed by congestive cardiac failure (34 cases), cirrhosis with gross ascites with peritonitis (29 cases), Tuberculosis (25 cases), chronic liver disease (24 cases) as well as portal hypertension and severe anemia (17 cases) while 1 case for each category viz. alcoholic liver disease, post colectomy for CA colon, post mastectomy for CA breast, post OP liver abscess ,suspicious for small round blue cell tumor, subacute bowel obstruction and suspicious for adenocarcinoma was recorded. According to the TIS classification distribution, in this study maximum patients were NFM (350 cases) while only 8 cases MAL and 3 cases for AUS and SFM were recorded. Implication of the TIS system can help in improving diagnostic accuracy, uniformity and reproducibility in cytological analysis of peritoneal fluids.

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