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Research Article

CYTOLOGICAL EVALUATION OF BODY FLUIDS: A STUDY FROM A TERTIARY CARE HOSPITAL OF KACHCHH REGION, INDIA

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A R T I C L E I N F O

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A B S T R A C T

Introduction: Cytological evaluation of body fluids is a cost effective and simple procedure useful in arriving at a diagnosis regarding ethiopathogenesis of diseases. It has helped in staging of the disease process along with assessing the prognosis.
Aims & Objectives: The present study aims to evaluate the gamut of cytological findings one can come across in the various body effusions and to classify them into non – neoplastic and neoplastic etiologies.
Material and Methods: A total of 276 cases of aspirated fluids received in Department of Pathology, GAIMS, G.K General Hospital, Bhuj were studied over a period of one year. The body fluids included pleural, peritoneal, pericardial and synovial effusion. The body fluids were received in plain test tubes and were centrifuged. Routine stains like haematoxyllin and eosin (H&E) and Papanicolaou were done and special stains were done wherever required.
Results: Most common aspirated fluid was peritoneal fluid (47.8%) followed by pleural fluid (43.5%) with overall male to female ratio of 3:1. Maximum cases belonged to age group of 51-60 years. Non-neoplastic aetiology was predominantly present in 85% cases with neoplastic causes being present in 14.9% cases. Among malignant effusions, adenocarcinoma was the most common aetiology. Along with studying the different cytopathologies, we also evaluated the causes of unsatisfactory smears.
Conclusion: Exfoliative fluid cytology is rapid and cost effective method for diagnosis of the underlying disease process and serves in the evaluation for timely and accurate management of the patients. It also helps to distinguish the reactive causes from the neoplastic etiologies.

INTRODUCTION

The mere presence of fluid in any of the body cavities indicates a pathologic process. [1]Abnormal accumulation of fluid in any body cavity is known as effusion.[2] Under pathologic circumstances, two leaflets of serous membrane, may be separated from each other because of presence of air or fluids within body cavity.[1] The main serosal body cavity fluids comprises of peritoneal, pleural, cerebrospinal fluid and pericardial fluids.[3] The cytology of body fluids(effusions) has gained increased acceptance to such an extent that a positive diagnosis was often considered as a definitive diagnosis.[4] Aspiration of serous body fluids is simple and relatively non-invasive technique to achieve a diagnosis and hence aid in the timely management of patients. Therefore the cytological study of body effusions is complete diagnostic modality which aims at pointing out the aetiology of effusion as well as in certain cases a means of prognostication of disease process.[5]

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Aims & Objectives

1. The present study aims to evaluate the gamut of cytological findings one can come across in the various body effusions and to classify them into non –neoplastic and neoplastic etiologies.
2. To identify the causes of unsatisfactory smears

MATERIALS AND METHODS

The present study was undertaken for a period of one year in Department of Pathology, GAIMS, G.K. General hospital, Bhuj. The study was a retrospective study in which 276 cases were studied. A detailed clinical history of the patient like age, sex, and other relevant information was obtained from the clinical protocol of the hospital and had been documented .The fluid were received in plain test tubes and ethylene diamine tetra-acetic acid (EDTA) test tube for cell counts. Manually, cell count was performed with the help of improved Neubauer chamber, wherever required. The fluid was centrifuged for around 2000 revolutions per minute (rpm) for five minutes. The supernatant was sent for biochemistry analysis and the remaining sediment was transferred with the help of pipette onto two glass slides and spread evenly. Both slides were fixed

and Haematoxyllin and Eosin (H&E) and Papanicolaou staining were done. Special stains and cell block preparation done whenever necessary.

Inclusion criteria: - Peritoneal, pericardial, pleural and synovial fluids and of any age group included in study.
Exclusion criteria: - Cerebrospinal fluid.

RESULTS

1. The total 276 cases, 132(47.8 %) cases were peritoneal, 120(43.5%) were pleural, 18(6.5) were pericardial and 6 (2.2%) were synovial fluids (Table 1).
2. Maximum body fluids belong to age group of 51-60 years followed by 41-50 years.(Table 1)
3. There was a male predominance in the present study with male to female ratio is 3:1(Figure 1)
4. The distribution of age groups in relation to the various aetiologies of effusion is shown in (Table 2). The most common effusion was tubercular effusion (34.7%) followed by suppurative effusion (21.1%). Both were most common in age groups of 51-60 years (Table 2).
5. Unsatisfactory smears were also present comprising 10.5% of all the effusions (Table 2).
6. After excluding the unsatisfactory smears, a total of 85.1% of fluids were non neoplastic and only 14.9% were neoplastic (Table 3) of which adenocarcinoma type was the commonest.
7. Adenocarcinoma was present in equal frequency in both pleural and peritoneal fluids. (12 cases each) (Figure 2).
8. Amongst the peritoneal fluid most common aetiology was suppurative effusions (32%) and tubercular effusion (32 %) followed by adenocarcinoma (9%) (Figure3). Unsatisfactory smears due to scant cellularity and drying artefact was also present. (Table 4)
9. Amongst the pleural fluid, maximum cases were of tubercular effusion (45%), followed by mesothelial hyperplasia (20%) (Figure 4). Unsatisfactory smears due to scant cellularity and drying artefact was also present. (Table 4)
10. Amongst the pericardial fluid most of them were unsatisfactory due to haemorrhagic tap (Table 4) with one neoplastic finding of metastatic adenocarcinoma.
11. Amongst synovial fluid, most common aetiology was suppurative effusion (67 %) followed by lymphocytosis (33%) (Figure 5).

Table 1 Distribution of age groups in various effusions

	Fluid				Total
Age group (years)	**Pleural**	**Peritoneal**	**Pericardial**	**Synovial**	
0-10	0	0	0	0	0
11-20	0	0	0	0	0
21-30	6	6	0	0	12
31-40	12	24	0	0	36
41-50	36	30	6	0	72
51-60	30	72	6	4	112
61-70	36	0	6	2	44
Total (%)	120 (43.5%)	132 (47.8 %)	18 (6.5 %)	6 (2.2%)	276

DISCUSSION

Non neoplastic and neoplastic processes can affect the serous body cavities manifesting in various cyto-morphological changes in their cellular components.[5] Effusions are classified clinically as transudative or exudative. Exudates are further

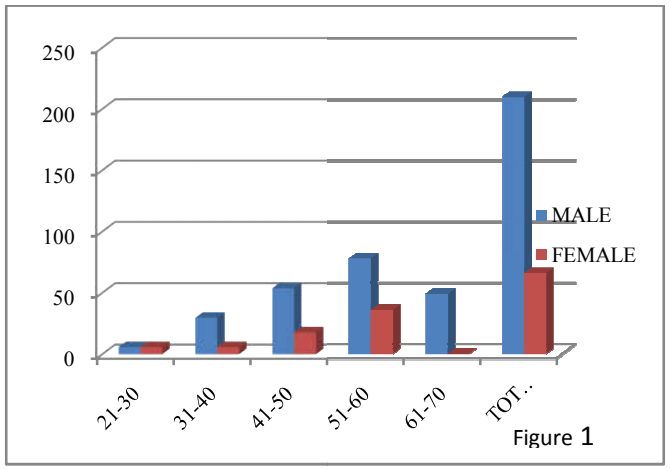

Figure 1 Gender distribution of patients

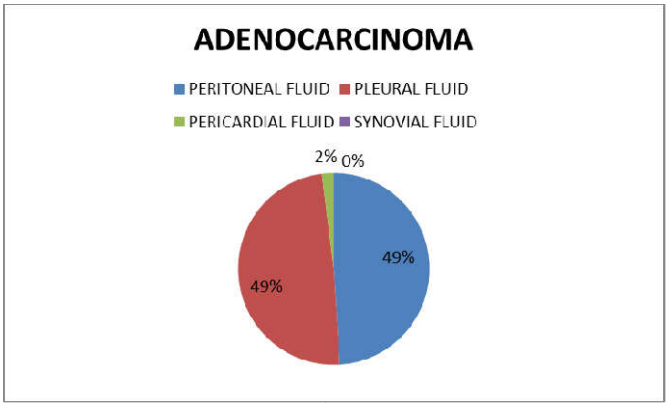

Figure 2 Distribution of adenocarcinoma in various fluids.

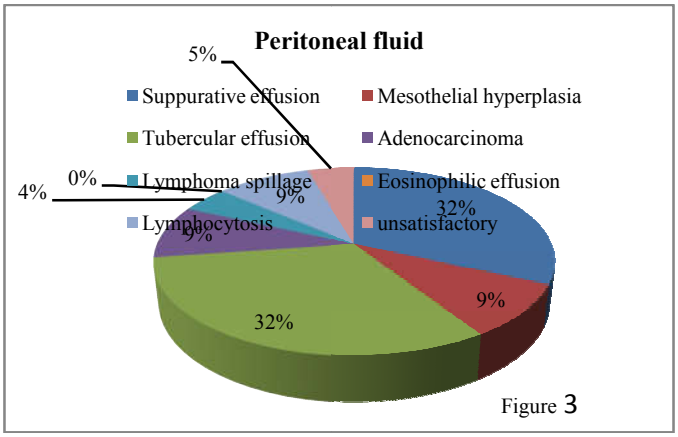

Figure 3 Distribution of various aetiologies of peritoneal fluid.

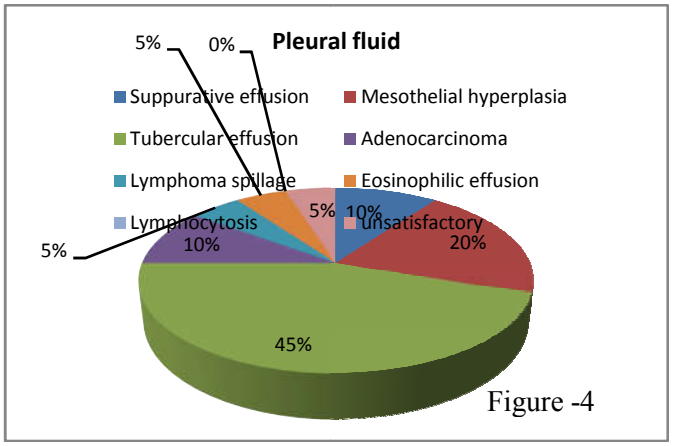

Figure 4 Distribution of various etiologies of pleural fluid.

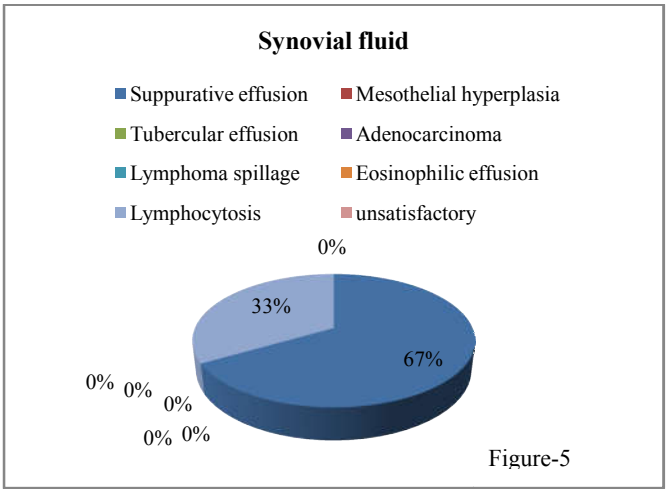

Figure 5 Distribution of various aetiologies of synovial fluid.

Table 2 Distribution of age groups in relation to the aetiologies of the effusion

Age group (years)	Type of effusions								
	SE	MH	TE	AC	LS	US	EE	LC	Total
0-10	0	0	0	0	0	0	0	0	0
11-20	0	0	0	0	0	0	0	0	0
21-30	0	0	12	0	0	0	0	0	12
31-40	6	0	24	0	6	0	0	0	36
41-50	12	18	24	0	0	0	6	6	66
51-60	40	12	30	13	0	17	0	6	118
61-70	0	6	6	12	6	12	0	2	44
Total (%)	58 (21.1%)	36 (13%)	96 (34.7%)	25 (9%)	12 (4.3%)	29 (10.5%)	6 (2.1%)	14 (5%)	276

sub-classified into: inflammatory or neoplastic.[6] The distinction between transudate and exudate is made by protein concentration measurements performed in the clinical laboratory. The cytological examination of body effusion is complete diagnostic modality which aims at pointing out the aetiology of effusions.[5] Even in almost every institute reactive effusions are more common than malignant effusions. Malignant effusions usually show diagnostic cells on cytological evaluation along with many benign effusions, showing characteristic diagnostic cytomorphological features.[7] In our study of 276 cases, maximum body fluids were peritoneal followed by pleural fluid. Similar findings were also present in the studies .[4,6] There was male predominance in the present study, which was similar to the findings in other studies .[4,5,6,8] The highest percentage of cases was present in the age group 51-60 years. These results were in concordance with what was reported by Samar A.EL Sheikh [9] and Dagli A.F *et al* [10]. In our study peritoneal fluid comprised maximum number of cases (47.8%) out of which 92% non-neoplastic and 8% neoplastic. Amongst non-neoplastic etiologies of the peritoneal fluid, tubercular effusion and suppurative effusion were the most common etiologies present in equal proportions. Tubercular effusions on microscopy were characterised by the presence of abundant lymphocytes (Figure 6). On microscopic examination of suppurative effusions, neutrophils were the predominant cell population indicating acute inflammation, along with scant mesothelial cellsseen in.(Figure 7). Findings of our study are different from other studies in which suppurativeeffusions were more common than tubercular effusion.[4,6,9,10] In the pleural fluids, the most common cytological diagnosis was tubercular effusion . It was characterised microscopically predominantly

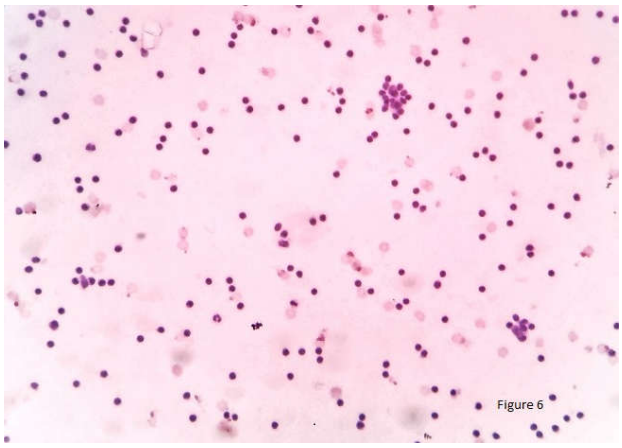

Figure 6 Smear showing abundant lymphocytes with occasional mesothelial cells in case of tubercular effusion (H&E, 100 x)

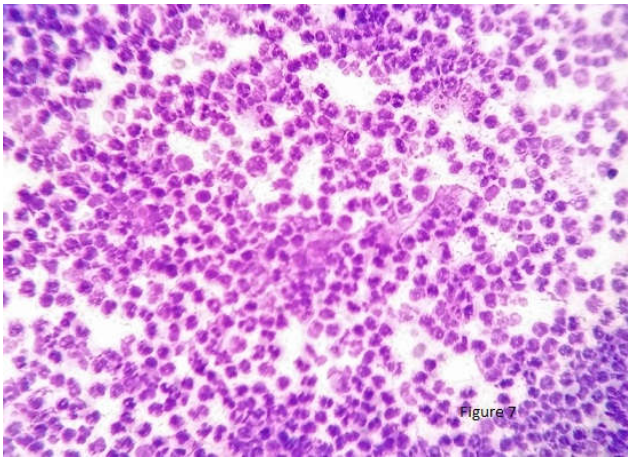

Figure 7 Smear showing abundant polymorphonuclear infiltrate with occasional macrophages in case of suppurative effusion (H&E, 400 x)

small lymphocytes with scant mesothelial cells.One case of acquired immunodeficiency syndrome (AIDS) positive patient with esoinophilic effusion (Figure 8) was also found in the present study.

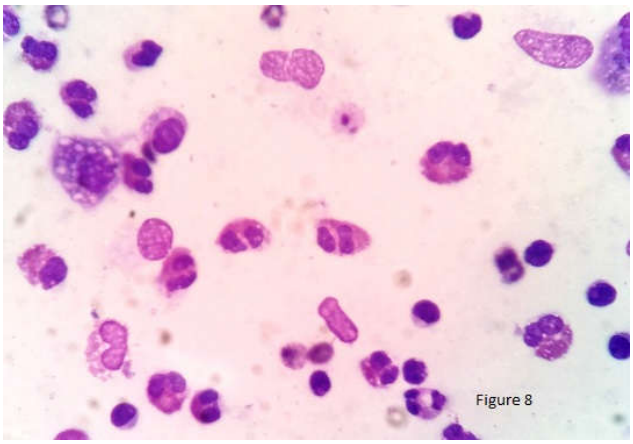

Figure 8 Smear showing many eosinophils with occasional macrophages in case of eosinophilic effusion (H&E, 1000 x)

Mesothelial hyperplasia and reactive changes were present in 13% cases. Microscopically mesothelial hyperplasia is characterized by spherical to oval cells with centrally located nuclei, cyanophilic to faintly amphophilic cytoplasm with two cytoplasmic zones. At times reactive mesothelial cells can mimic the signet ring type of neoplastic cell (Figure 9,10).

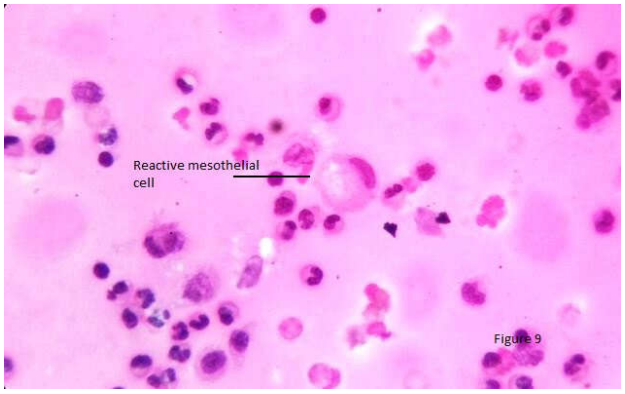

Figure 9 Smear having reactive mesothelial cell which may be confused with signet ring cell (H&E,400X)

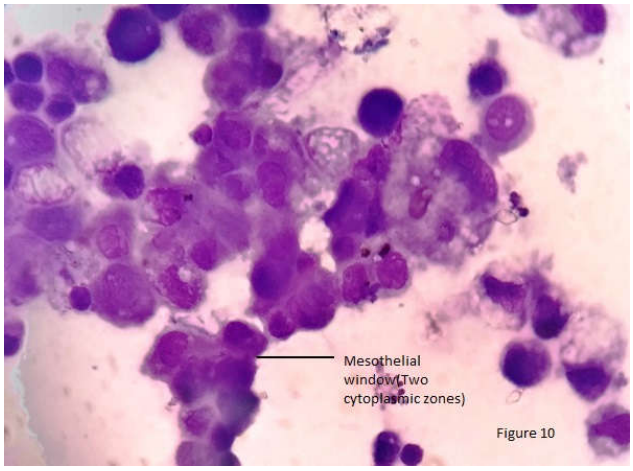

Figure 10 Smear showing many reactive mesothelial cell with window formation in case of reactive mesothelial hyperplasia (Pap, 400 x)

Majority of pericardial fluids were unsatisfactory with one case showing metastatic adenocarcinoma. Unsatisfactory effusions were also seen in pleural and peritoneal fluids. In our present study we found that the presence of haemorrhage was the most common cause of unsatisfactory smears followed by scant cellularity and drying artefact. (Table 4).

Table 3 Distribution of neoplastic and non-neoplastic effusion excluding unsatisfactory cases.

	Pleural	Peritoneal	Pericardial	Synovial	Total (%)
Non neoplastic	96	108	0	6	210 (85)
Neoplastic	18	18	1	0	37 (14.9)

Table 4 Causes of unsatisfactory smears

Causes	Pericardial	Pleural	Peritoneal
Hemorrhage	17		
Scant cellularity		3	5
Drying artifact		2	2

Table 5 Neoplastic etiology of fluids

Neoplastic aetiology	Number	(%)
Adenocarcinoma	25	67.5
Lymphoma spillage	12	32.5
Total	37	

There were 37 (14.9%) neoplastic effusions in our study, comprising of adenocarcinoma (67.5%) and lymphoma spillage (32.5 %) (Table 5). Most common aetiology of neoplastic effusions was adenocarcinoma, showing varying cytomorphological patterns. Most of the adenocarcinoma effusions were haemorrhagic similar to one other study.[5] Adenocarcinoma metastatic to serous cavities is the most common cause of neoplastic effusion.[11] On microscopy, smears were hyper-cellular with tumour cells showing acinar pattern along withcell cannibalism (Figure 11). At times glandular formations characterised by the presence of tubular formations with central luminarimmed by neoplastic cells can also be seen (Figure 12). At times spherical or oval cell clusters, or having columnar configuration can also be present.[12] Signet ring neoplasticcells were seen in four cases with abnormal nucleus displaced to the periphery by large mucin vacuole. Adenocarcinoma was present in equal frequency in peritoneal and pleural fluids (12 cases each) and one in pericardial fluid (Figure 2). We observed adenocarcinoma as the commonest malignancy which was in concordance with other studies.[4,13,14, 15]

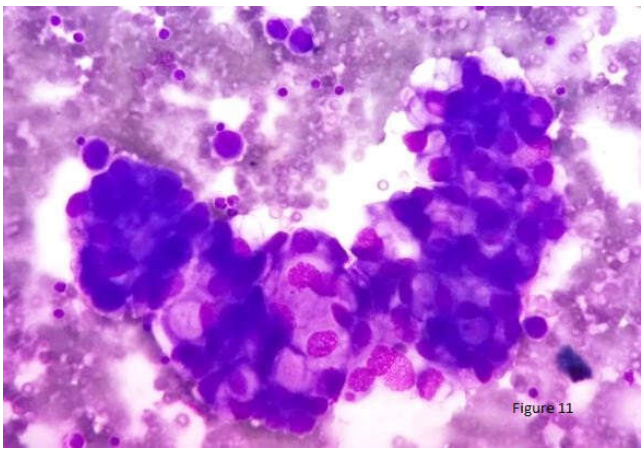

Figure 11 Smear showing neoplastic cells with cell cannibalism in adenocarcinoma . (Pap, 400x)

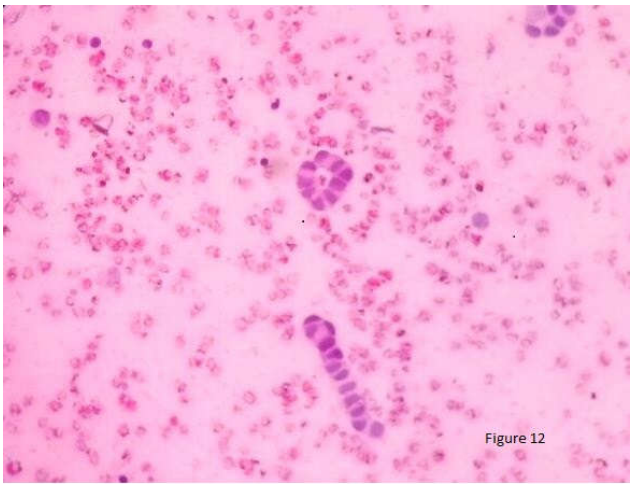

Figure 12 Smear showing neoplastic cells in trabecular pattern in adenocarcinoma (H&E, 400x)

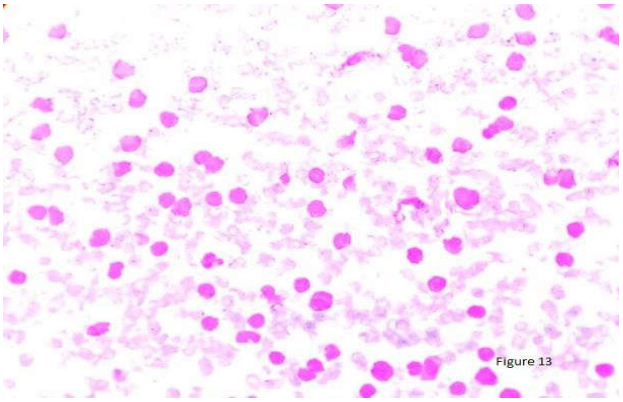

Figure 13 Smear shows predominance of small lymphocytes with round nuclei and scant cytoplasm in case of lymphoma.

In the present study lymphoma spillage was seen in (32.5%) cases. All the 11cases had the clinical diagnosis of chronic lymphocytic leukaemia (CLL). On microscopy, smear shows predominance of small lymphocytes with round nuclei with checkerboard pattern with scant to absent cytoplasm (Figure 13). In adults, lymphoma is the third most common cause of malignant pleural effusion after lung and breast carcinoma, leading to approximately 10% of all malignant pleural effusions.[16,17] In present study, one case was an AIDS positive patient, in which the large lymphoid like cells were present in the effusion confused with metastatic carcinoma cells .

CONCLUSION

To the best of our knowledge few studies have been done to discuss the cytomorphological spectrum of body effusions. Our study aimed to evaluate cytomorphological spectrum of body effusion along with identifying certain diagnostic pitfalls. Cytomorphological features of effusions are most of the times a tell- tale story of the underlying pathogenesis and aids in timely management of the patients.

References

1. Effusions in the Absence of Cancer.In:LeopoldG.Koss, Myron R Melamed.editors. Koss' Diagnostic Cytology And Its Histopathologic Bases, 5thedn.Philadelphia: Lippincott Williams & Wilkins; 2006.p.919-948.
2. Anita B, Ahuja JM. Evaluation of Coelomic Fluids and its Clinical Correlation with Cytologic Diagnosis. *J CytolHistol* 2016; 7:397-414.
3. Nguyen G.Essential of fluid cytology.2009:9-71.
4. Gupta R, Dewan D, Raina R, Gupta M. Exfoliative cytology of body fluids: a study from provincial hospital of Jammu region, India. *Int J Res Med Sci* 2016; 4:1016-9.
5. Kushwah R, Shashilaka P, Hiremath S, Basavaraj H G. Cells in pleural fluid & their value in differential diagnosis. *J Cytol* 2008; 25:138-143.
6. Shulbha VS, Dayananda B. Cytology of body fluids- an aid to primary diagnosis. *Indian Journal of PatholOncol* 2015; 2:81-3.
7. JhalaNC, JhalaDN, ChhiengDC. Reactive conditions. In: Shidham VB, Atkinson BF, editors. Cytopathologic Diagnosis of serous Fluids, 1stedn. Elsevier; 2007.p.79-89.
8. Joshi A, Mahajan N, Karmakar PJ. Diagnostic utility of various techniques used in body fluid cytology. *J Dent Med Sci*.2014; 13:13-8.
9. Samar A.EL-Sheikh.The diagnostic value of pleural fluid cytology in benign and malignant pleural effusions. *MedJ.Cairo Univ*.2012; 80:95-103.
10. Dagli A.F, Kucuk S, Sezer M, UcerO. Cytolopathologic Diagnosis in Pleural Effusion and Cyto-Histopathologic Correlation. *Turkish Journal of Pathology* 2011; 27:1-26.
11. Galindo LM. Effusion cytopathology. In: AtkinsonBF, Silverman JF, Editors. Atlas of Difficult Diagnosis in Cytopathology, 1 stedn. Philadelphia: WB Saunders; 1998.p.165-99.
12. Effusions in the Presence of Cancer. In: Leopold G.Koss, Myron R Melamed. Koss' Diagnostic Cytology And Its Histopathologic Bases, 5thedn. Philadelphia: Lippincott Williams & Wilkins; 2006.p.949-1022.
13. Pradhan SB, Pradhan B, Dalis S. Cytology of body fluids from different sites: an approach for early diagnosis of malignancy. *J Nepal Med assoc*.2006; 45:353-6.
14. Jha R, Shrestha HG, SayamiG, Pradhan SB. Study of effusion cytology in pateints with simultaneous malignancy and ascites. *KathmanduUni Med J.* 2006; 16:483-7.
15. Sears D, Hajdu S. The cytologic diagnosis of malignant neoplasms in pleural and peritoneal effusions. *Actacytocol* 1987; 31:85-97.
16. Travis WD. Armed Forces Institute of Pathology (US), Universities Associated for Research and Education in Pathology. Non- neoplastic disorders of the lower respiratory tract. Washington, DC: American Registry of Pathology: Armed Forces Institute of Pathology; 2002 xix, 939.
17. Valdes L, Alvarez D, ValleJM, *et al*. Theetiology of pleural effusions in an area with high incidence of tuberculosis. *Chest* 1996; 109:158-62.

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