A study of cytological evaluation of pleural effusion

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Abstract

Effusions are extremely common and constitute a significant proportion of all cytologic specimens being examined in any laboratory of a general hospital.[1] Fluid analysis plays an important role in clinical medicine. The major purpose of examination is for the presence of malignant cells and also to identify the effusion is of inflammatory, non specific and or neoplastic origin.

Objectives:

1. To study the age and sex wise incidence of pleural effusions.
2. To study the incidence of non- neoplastic and neoplastic effusions.
3. To study the gross and microscopic features of effusions.

Materials and Methods: Two years prospective study was done on 360 specimens of pleural effusions and were analysed. Centrifuged smears were stained and studied with clinical correlation.

Results: Out of 360, 342(95%) were non neoplastic and 18(5%) were neoplastic effusions. Commonest malignancy was Adenocarcinoma.

Conclusion: Non-neoplastic lesions were common in the study. Exudates were common in infections Tuberculosis), Pneumonia and Malignancy.

Keywords: Pleural effusion, Exudate, Malignancy.

Introduction

Pleural effusion is a common clinical condition, can be detected by clinical examination and also needs radiological examination when it is mild.[1-3] The other radiological investigations like ultrasound and computerized tomography scan of chest are important to arrive the diagnosis. Effusions are of pulmonary etiology and also occur in other conditions involving cardiac, liver, renal, endocrine diseases, malignancies and connective tissue disorders.[4,5] Clinical presentation may be asymptomatic or with severe dyspnoea and chest pain. The cytological evaluation of the pleural fluid is very essential confirmation to know the etiological factor of the condition. The most common cause of pleural effusion is of infective and tuberculosis. The first step of analysis is to differentiate transudate and exudate, which indicates the underlying pathological process. The important goal of the analysis is to detect the malignant cells, to rule out and to confirm the infective etiology.

Materials and Methods

A prospective study of 360 cases was carried out for a period of two years i.e., from January 2015 to January 2017 at Santhiram Medical College and Hospital, Nandyal, Kurnool. The relevant clinical data was collected from the available hospital records.

Physical examination of the fluids regarding the colour, volume and odour were noted. Smears obtained from the fluids without centrifugation to produce uniform suspension of cells. The sample was centrifuged for five minutes at 2000rpm. Smears were made from the drop of the sediment after discarding the supernatant fluid. Smears were fixed in 95% alcohol and stained with Hematoxylin and Eosin (H&E) and Papanicolaou stain (Pap), with the remaining sediment, cell blocks were made and sections reviewed after H&E staining.

Results

Cytological analysis of 360 cases were done. The age range was 01-70yrs. Out of 360 cases 130 (36.1%) cases were in the age of 30-40yrs (Table 1). Among 360 cases 250 (69.4%) cases were in males and 110 (30.5%) cases were in females.

Out of 360 cases, 280 (77.7%) effusions were non-neoplastic exudates, 62 (17.2%) were non- neoplastic transudates and 18 (5%) were neoplastic exudates indicating that exudates were common. Tuberculosis 70 cases (19.4 %) were common among non- neoplastic exudates and 12 cases (3.3%) of ransudates of congestive cardiac failure. Among 18 cases of malignant effusions 12 (66.6%) were adenocarcinoma. Lung was primary in 10 cases (55.5%) and 2 cases (11.1%) of unknown primary of adenocarcinoma. 4 cases (22.2%) were squamous cell carcinoma and 2 cases (11.1%) were Lymphomas (Table 2).

Table 1: Showing age wise analysis of effusions

Age range	Frequency
01-10 yrs	05
10-20 yrs	36
20-30 yrs	24
30-40 yrs	130
40-50 yrs	48

50-60 yrs	64
>60 yrs	53
Total	360

Table 2: Showing the clinical presentations of bilateral effusion and unilateral effusion

Bilateral Effusion Transudate	Number (n)	Unilateral Effusion Exudate	Number (n)
CHF	12	Malignancy	
Alcoholic Cirrhosis	30	Primary	06
Idiopathic	10	Secondary	10
Hypoproteinemia	110	Lymphoma	02
		Infection	
		TB	70
		Empyema	
		Effusion with infiltrate	
		Auto immune disorder (RA)	01
		Trauma	02
		Hemothorax	07
Total	262	Total	98

Out of 360 cases, the major symptom was cough in 172 cases (47.7%) and chest pain in 150 cases (41.6%). Past history of smoking was noted in 300 (83.3%) cases and treated for tuberculosis in 160 (44.4%) cases (Table 3).

Table 3: Showing the clinical symptoms of the patients

Symptom Wise Distribution of Cases	No.	%
Cough	172	47.7%
Chest pain	150	41.6%
Dyspnoea	250	69.4%
Expectoration	302	83.8%
Weight loss	70	19.4%
Night sweats	70	19.4%
Anorexia	70	19.4%

Among 360 cases, hemorrhagic effusion noted in 170 cases (47.2%) and straw colored in 186 cases (51.6%) and predominantly noted on right side.

Cytological examination of the smears reveal predominantly lymphocytes and macrophages in chronic inflammatory lesions. The next common lesion was acute suppurative inflammation with predominant nutrophils. In Tuberculous effuisons granulomas with lymphocytes and epithelioid cells were noted. Reactive effusions with reactive mesothelial cells in effusions of non specific etiology 5 cases (1.3%). (Table 4)

Table 4: Type of effusions

Type of lesions	Number of Lesions
Non Specific	197
Acute Suppurative Inflammation	70
Tuberculous Effusion	70
Malignant Effusion	18
Reactive Effusion	05
Total	360

Table 5: Showing Age wise analysis of effusions

Age Range	Frequency
01-10 yrs	05
10-20 yrs	36
20-30 yrs	24
30-40 yrs	130
40-50 yrs	48
50-60 yrs	64
>60 yrs	53
Total	360

Discussion

Effusion fluid analysis is a simple and easy method of diagnosing various clinical conditions like tuberculosis and in staging of malignancies[6,7] (Archana josh et al 2014).

The cytological examination of effusion is a diagnostic method and aims at pointing out the etiology of the effusions. The transudates and exudates also provides the possible underlying etiology of the effusion. The cell population present in the fluid provides the type of etiological factor.

In the present study out of 360 cases of pleural effusion, 280 (77.7%) effusions were non- neoplastic exudates, 62 (17.2%) were non- neoplastic transudates. In the study of Prashant et al, the non- neoplastic lesions were common.[8] The present study correlated with Prashant et al 2015. Non neoplastic lesions were most common compared to neoplastic lesions. Most

common non neoplastic lesion is chronic inflammation. These lesions had predominantly lymphocytes in 90% of cases and 10% of cases with lymphocyets and histiocytes. Similar findings noted by Priavadhana Rajan Prasad et al 2016.[9] The chronic inflammatory exudates are commonly caused by infection of the organs involved by serosal membranes or occasionally by tumors of these organs.[9] (Priavardhana et al 2016). Three consecutive analysis of the samples of chronic inflammation samples needed to exclude a suspicion of malignancy Thapar et al 2009.[10] kushwaha et al 2008.[11] Priavadhana et al 2016[9] documented that the common causes of non neoplastic exudative pleural effusion were Tuberculosis and Pneumonia.

Table 5:

Sears D Hajdu et al[12] 1987	CardozoL[13] 1996	Monte SA[14] 1987	Thapar M et al[10] 2009	Foot NC et al[15] 1955	Prashanth et al[8] 2015	Present study 2016
41%	32%	21.8%	63.6%	30.1%	41.3%	%

Tuberculous effusion revealed predominantly lymphocytes 62 cases (17.2%), 6 cases predominantly with neutrophils and 2 cases (0.5%) with mesothelial cells. The second common cause of non neoplastic exudative effusion with predominant neutrophils noted in 60 cases (16.6%), 6 cases (1.6%) with lymphocytes and 4 cases (1.1%) with mesothelial cells. Kushwaha et al 2008 [11] and PV Kumvat et al 2013[3] documented similar findings in Tuberculosis and Pneumonia. In the present study 5 cases (1.3%) showed Reactive mesothelial cells, and Mimikers of malignancy. Careful study is needed to rule out underlying malignancy[16] (Koss LG 2006).

Out of 360, 62 were transudates (17.2%) Light et al 1973[17] and PV Kumavat[3] reported that congestive cardiac failure and cirrhosis were common causes of transudates. Cytological analysis showed predominantly lymphocytes. Among 360 cases of effusions, 42 (11.6%) were sent for the detection of malignant cells, of these 18 (42.8%) were positive for malignant cells. Our study correlated with Kushwaha et al 2008[11] and PV Kumavat et al 2013.[3] Priavardhan Rajan Prasad et al 2016[9] reported 41.3% of malignancy in pleural effusions. The present study correlated with above authors.

Sear D, Hajdu (1987)[12] and Light et al (1973)[17] reported that the adenocarcinoma was the commonest malignancy (66% and 58.1%). The present study (55.5%) correlated with the above authors study. DiBonito et al (1993) reported (53.85%) of adenocarcinoma lung with pleural effusion.[18] Kumavat et al 2013 reported 61.11%.[3] The present study (55.5%) correlated with Kumavat et al study.

In the present study 04 cases (22.2%) of Squamous cell carcinoma of lung noted in middle aged male. The smears were moderately cellular with sheets of neoplastic squamous cells and occasional multinucleate giant cells. Kumavat et al reported one case of squamous cell carcinoma, (5.5%) hence deferred from Kumavat et al.

Kumavat et al documented 3 cases (10%) of Non Hodgkin Lymphoma in middle aged male. The smears were highly cellular and showed neoplastic lymphoid cells. Our study 2 cases (11.1%) correlated with Kumavat et al (2013).[3]

Conclusion

Cytological analysis of pleural fluid plays an important role in the diagnosis of various lesions. Differentiation of transudate and exudates of the fluid gives an indication of the pathophysiology of the lesion. The most important goal is to detect malignant cells in the effusion, The analysis also reveals the inflammatory and infective lesions. Non neoplastic (95%) effusions were common in the present study and among the neoplastic lesions adenocarcinoma was the commonest malignancy.

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