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Audit

Clinical profile of patients with pleural effusion admitted to KMCTH

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Abstract

Background: pleural effusion is the common findings in patients presenting with cardiopulmonary symptoms but specific studies are lacking in Nepal.

Objective: The main objective of this study is to find out the various causes of pleural effusion, their mode of clinical presentation and laboratory analysis of blood and pleural fluid to aid diagnosis of patients with pleural effusion.

Materials and methods: Retrospective data from July 2009 to July 2007 from all the cases diagnosed with pleural effusion were taken. Altogether 100 cases diagnosed with pleural effusion by chest X-ray (Posterior- Anterior and Lateral view) and Ultrasonogram of the chest were studied. The following parameters were analysed: Patients demographic profile, causes, location (Unilateral, Bilateral), Blood haemoglobin and count, sputum profile, Monteux test, chest X-ray and USG findings and pleural fluid analysis[Biochemical, Haematological, Microbiological(culture and stain) and cytological]. This study was analysed by using SPSS 16.

Results: The mean age of the patient was 44.89 ± 21.59 and must patients with pleural effusion belong to age group 21-30. Most common cause of pleural effusion was found to be tubercular effusion followed by parapneumonic effusion. Right sided effusion was seen in most cases of tubercular parapneumonic and malignant effusion whereas bilateral effusion was seen in 87.5% of the patient (7 out of 8) having congestive heart failure and all cases of renal disease (4 out of 4). Shortness of breath (83%), cough (67%) and fever (66%) are the most common mode of clinical presentation.

Conclusion: Our study concluded that the most common cause of unilateral pleural effusion is tuberculosis followed by parapneumonic effusion and most cases of those belong to younger age group (21 -30yrs) and most common cause of bilateral pleural effusion is congestive cardiac failure.

Key words: Pleural effusion, Tuberculosis, pneumonia, malignancy, protein, ADA

Pleural effusion is a common finding among patients presenting with cardiopulmonary symptoms. A systemic approach to the investigations is needed because of the extensive differential diagnosis. Pleural effusions can be transudative or exudative[1, 2]. In cases with transudative pleural effusion the diagnosis is usually made without much difficulties but exudative pleural effusion requires careful differential diagnosis that includes parapneumonic effusion, tuberculosis, and metastatic cancers which are found to be the cases in large number of patients[3-5].

Pleural effusion occurs when there is disequilibrium between the quantity of fluid entering and leaving the pleural space. Mechanisms by which the rate of fluid formation exceeds the rate of fluid absorption include increased pulmonary capillary pressure or permeability of the endothelial barrier, decreased intrapleural pressure or plasma oncotic pressure, obstructed lymphatic flow, diaphragmatic defects, and thoracic duct rupture[6].

Tuberculosis is the most common cause of exudative pleural effusion in many areas of the world[7,8]. But in the developed world like United States, the leading etiologies of pleural effusion in adults who undergo thoracentesis are CHF, pneumonia, malignancy, pulmonary embolus, viral disease, coronary artery bypass surgery, and cirrhosis with ascites[9].

The incidence of parapneumonic effusion among individuals with pneumonia ranges from 20% to 57%,[10-13] and the incidence of pleural effusions in decompensated congestive heart failure (CHF) may be as high as 87%[14].

Lung cancer is the most common metastatic tumours to the pleura in men and breast cancer in women.[15] Together, both malignancies account for approximately 50–65% of all malignant effusions. Lymphoma, a tumour of the genitourinary tract and gastrointestinal tract, account for a further 25% of malignant effusions[16-18]. Pleural

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effusions from an unknown primary are responsible for 7–15% of all malignant pleural effusions[19-21].

Even with this high risk of getting pleural effusion in so many different diseases, specific researches are lacking in studying these clinical spectrum in our country. This study gives the brief overview of clinical presentations and laboratory findings of all those patients admitted to Kathmandu Medical College Teaching Hospital (KMCTH) during the period of last 2 years which we hope will represent the clinical scenario in Nepal.

Materials and methods

This is a retrospective where data from all the cases diagnosed with pleural effusion in the medicine department of KMCTH from July 2007 to July 2009 were included. Data was taken from medical record section. Altogether 100 cases diagnosed with pleural effusion by chest x-ray (postero-anterior, anterio-posterior and lateral view), and ultrasonogram were taken. Patients with diagnosis other than tubercular effusion, parapneumonic effusion, malignant effusion, congestive heart failure, due to liver disease and due to renal disease were mentioned as others. Patients demographics were enlisted alphabetically to avoid inclusion of same patient more than once. Any patients with confusion were deleted from the study. Results of this study was analysed by using SPSS software version 16.

Result

All the cases with the diagnosis of pleural effusion admitted to medicine department of Kathmandu medical college teaching hospital, from July 2007 to July 2009 were included in the study.

The demographic profile of the patients studied is depicted in Table 1. Out of the total 100 cases, 48 were male and 52 female. Thus male to female ratio was 1:1.08. No obvious difference is observed between male and female in the study. 58 patients were from Kathmandu valley and others 42 were from outside Kathmandu valley. The age group was from above 14 years. The maximum number of patients with pleural effusion belonged to the age group 21-30 years and majority of cases of right sided pleural effusion were included in this age group. Among the various causes of pleural effusion the most common cause was tubercular type (32%) followed by parapneumonic effusion (30%). The third most common cause was due to malignancy (18%) as shown in Table 2. Figure 1 shows the various age groups and the clinical diagnosis as shown in the diagram tubercular pleural effusion is common in the age group 21 – 30yrs.

Table 3 shows the various symptoms of the patients having pleural effusion. The most common mode of presentation of tubercular effusion and parapneumonic effusion was fever and shortness of breath where as in case of renal disease and liver disease common mode of presentation was generalized oedema. Fifty one patients (51%) had right sided pleural effusion the most common cause of which was parapneumonic effusion followed by tubercular effusion. Thirty one patients (31%) had left sided pleural effusion only most common cause of which was tubercular effusion followed by parapneumonic effusion. And eighteen patients (18%) had bilateral pleural effusion most common cause of which was congestive cardiac failure. Shortness of breath was present in 83%, cough in 67%, fever in 66%, chest pain in 40%, oedema in 22%, and haemoptysis in 16% and weight loss in 13%. Out of 100 cases Monteux test was done for 72 patients among them only 17 patients (23.6%) were positive and 55 patients were negative.

Out of 32 cases of tubercular pleural effusion 16 cases were found to be Monteux test positive.

In sputum cytology out of 18 cases of malignant effusion 7 cases shows malignant cells positive cytology. In sputum gram stain out of 89 cases of pleural effusion 24 cases shows gram stain positive. In sputum AFB staining 13 out of 89 cases were AFB stain positive, out of total positive cases 12 were tubercular effusion. Out of 88 cases of sputum culture only 10 are positive.

Figures 1, 2, 3 show the haematological, cytological and biochemical characteristic of the pleural fluids. Total count and differential count were done for 100 patients out of whom 61 had lymphocytes >50% and only 39 patients had predominant polymorphonuclear cells. Patients with CCF, malignant effusion, renal disease had low pleural fluid TC whereas patients with parapneumonic and tubercular effusion had raised pleural fluid total count.

PF protein level was determined in 100 patients. Mean protein level was <3 gm/dl in patients with CCF and renal disease whereas > 3 gm/dl was observed in patients with tubercular, malignant, parapneumonic effusion.

LDH level was determined in 75 patients, mean level of LDH was: tubercular effusion (1359.38 U/L), parapneumonic effusion (1375.92 U/L) whereas in renal disease and liver disease the values were less than 200 U/L.

ADA level in pleural fluid was analyzed in 76 patients, only patient with tubercular pleural effusion show raised level of ADA (>60U/L). Mean value of ADA for tubercular effusion was 181.37 U/L.

Table 1: Demographic profile of the patients

(1)Sex	Total Number
Male	48
Female	52
(2)Address	
Outside Kathmandu Valley	42
Kathmandu Valley	58

Table 2: Diagnosis and number of cases

S.N.	Diagnosis	Total Number	Percent (%)
1	Tubercular Effusion	32	32
2	Parapneumonic Effusion	30	30
3	Malignant Effusion	18	18
4	Congestive Heart Failure	8	8
5	Renal Disease	4	4
6	Liver Disease	3	3
7	Others	5	5
	Total	**100**	**100**

Table 3: Diagnosis and chief clinical mode of presentation

S.N.	Diagnosis	Shortness of breath (%)	Fever (%)	Weight loss (%)	Oedema (%)	Haemoptysis (%)	Cough (%)	Chest pain (%)
1	Tubercular effusion	75	87.5	28.12	9.3	34.37	78.12	34.37
2	Parapneumonic effusion	86.66	90	0	10	6.6	70	66.66
3	Malignant effusion	94.94	33.33	22.22	16.66	66.66	66.66	38.88
4	Congestive cardiac failure	87.5	12.5	0	62.5	0	57	0
5	Renal disease	75	25	0	100	0	25	0
6	Liver disease	66.66	66.66	0	100	0	0	0
7	Others	80	20	0	20	0	80	40

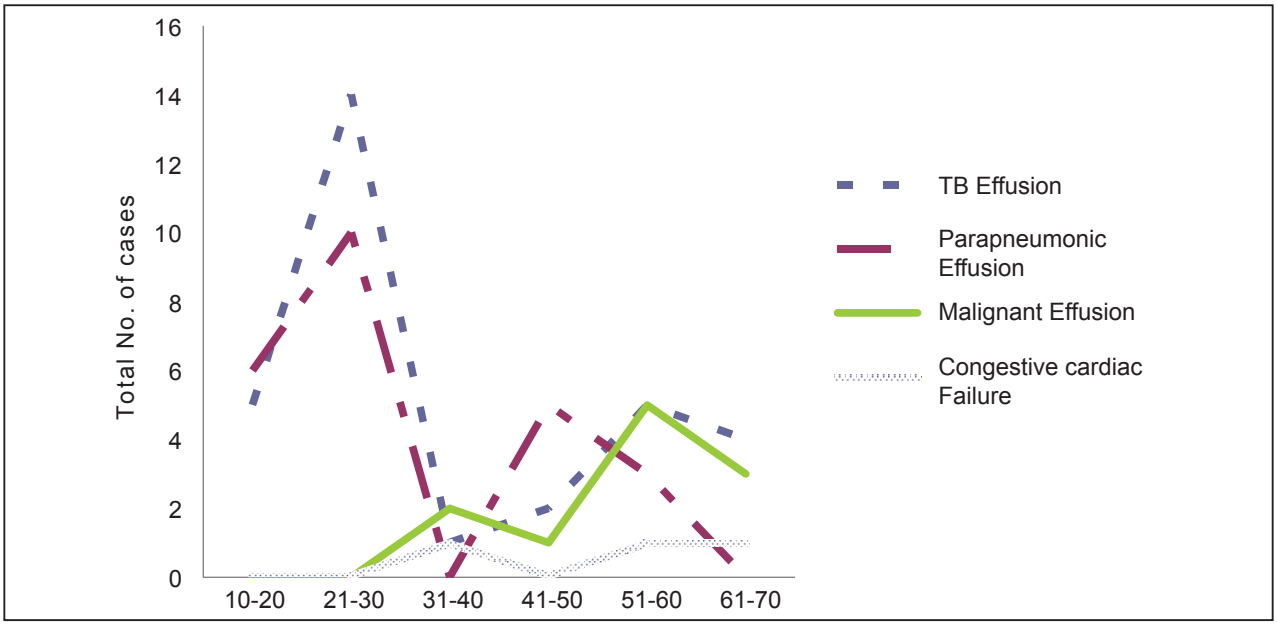

Fig 1: Age group and diagnosis

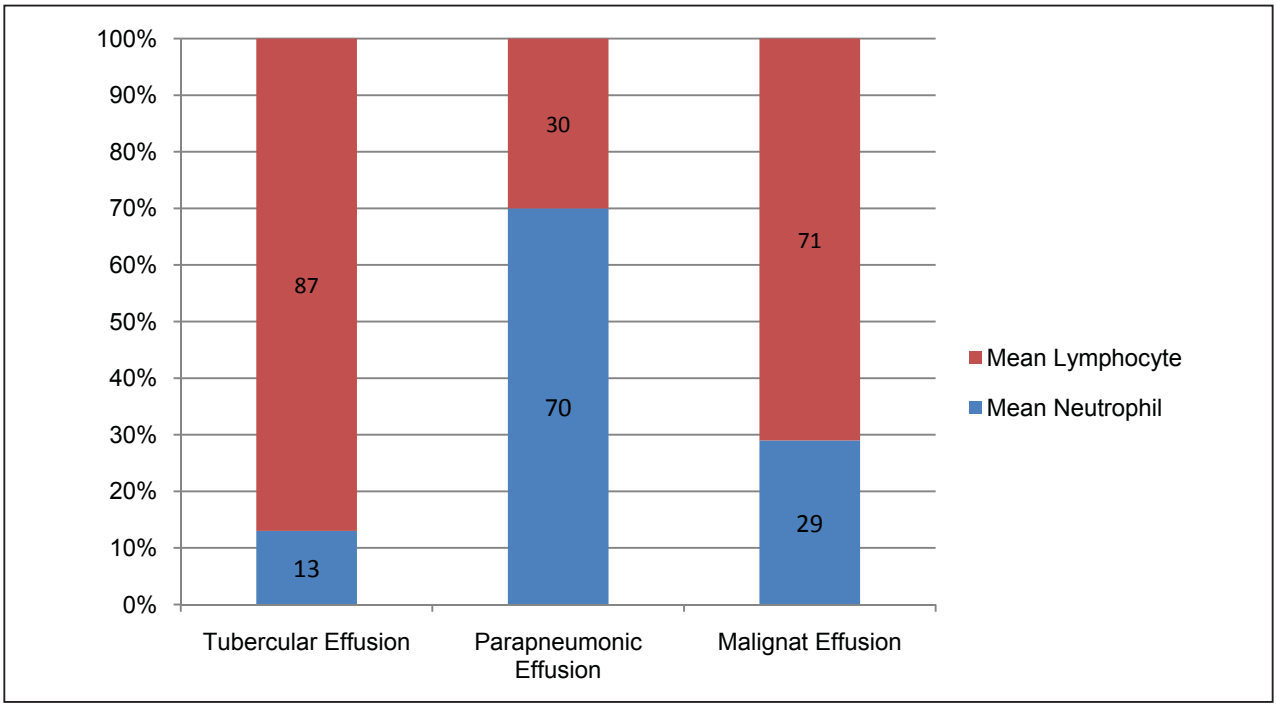

Fig 2: Diagnosis and mean lymphocyte and neutrophil count

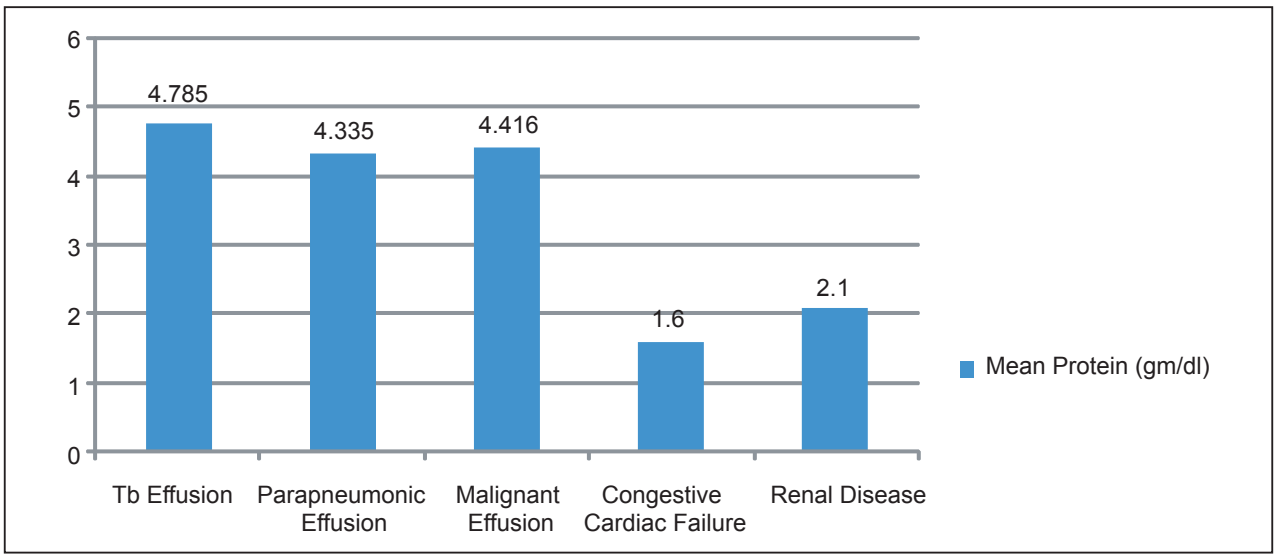

Fig 3: Diagnosis and mean protein level

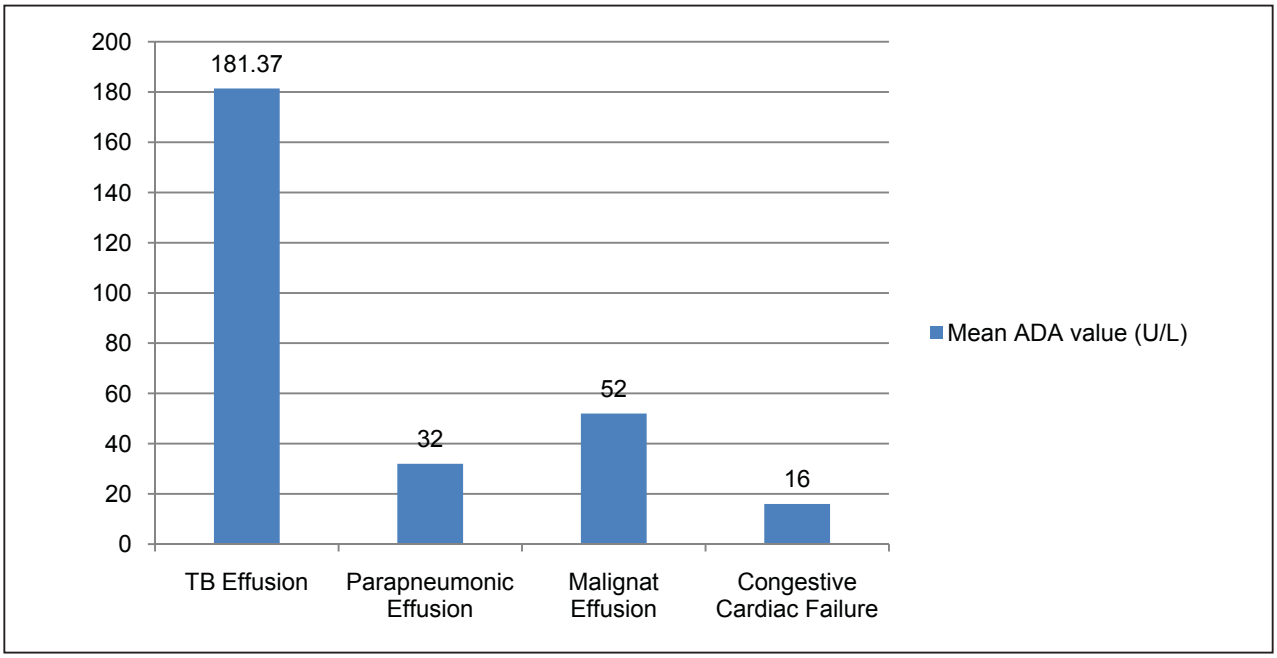

Fig 4: Diagnosis and mean ADA level

Discussion

Our study concludes that the tubercular effusion is the commonest cause of unilateral pleural effusion followed by parapneumonic effusion and congestive heart failure is the commonest cause of bilateral pleural effusion.

In developed countries as shown in study by Storey and coworkers[22] at mayo clinic in a series of 133 patients reported that malignancy accounted for nearly 50 percent of patients with pleural effusion and that nearly one third of the patients with malignancy and effusion had lymphoma. In contrast, less than 15 percent of the patients had the patients had heart failure.

Shortness of breath, fever and cough are the commonest mode of clinical presentation. Sputum profile (culture, Gram's stain, AFB stain and cytology) is not of much help in the work up of patient with pleural effusion. Pleural fluid analysis is the definite mode of separating transudative from exudative pleural analysis.

A systemic approach to the classification of pleural effusion is needed because of extensive differential diagnosis. Diagnostic exploration is based on the analysis of clinical variables (gender, age and symptoms), imaging (chest x-ray, USG of chest) and laboratory analysis of blood and pleural fluid. Tubercular effusion is the common cause of exudative pleural effusion in many areas of the world[7,8] which is consistent with our study which shows that 32 patients were having tubercular effusion out of 100. Tubercular effusion and parapneumonic effusion predominates among individuals younger than those with malignant effusion and congestive cardiac failure, a fact confirmed by in this study (total 62 patients belong to TB Effusion and parapneumonic effusion which predominate among 21 – 30 age group).

A predominance of neutrophils in the pleural fluid (more than 50 percent of the cells) indicates that an acute process is affecting the pleura. In one series, 21 of 26 parapneumonic effusions (81 percent), 4 of 5 effusions secondary to pulmonary embolus (80 percent), and 4 of 5 effusions secondary to pancreatitis (80 percent) contained more than 50 percent neutrophils, but only 7 of 43 malignant effusions (16 percent) and none of 14 tuberculous effusions contained more than 50 percent neutrophils[23]. Our study also shows that in parapneumonic effusion mean total neutrophil is 70% which shows that parapneumonic effusion is an acute process affecting pleura where as predominance of mononuclear cells indicates a chronic process. A preponderance of small lymphocytes indicates that the patient most likely has cancer or tuberculous pleuritis, although such a preponderance is also seen in pleural effusions after coronary-artery bypass surgery[23,24,25]. The combined data from two series[5,11] show that 90 of 96 exudative pleural effusions consisting of more than 50 percent lymphocytes (94 percent) were due to cancer or tuberculosis. In these series, 90 of 116 tuberculous pleural effusions (78 percent) contained more than 50

percent lymphocytes.[23, 24] which is similar to that found in our study which showed that mean lymphocyte count was 87.61 and 70.74 percentage for tubercular effusion and malignant effusion respectively. Pleural fluid protein level is higher >3gm/dl among patients with exudative effusion like tubercular effusion and parapneumonic effusion where as it is low in transudative effusion like congestive cardiac failure, a fact confirmed by our study.

Several reports[26] have suggested that an elevated pleural fluid ADA level predicts tuberculous pleuritis with a sensitivity of 90 to 100% and a specificity of 89 to 100%.The reported cutoff value for ADA varies from 47 to 60 U/L[25]. In our lab Effusion is strongly suspected if pleural fluid ADA level is above 60 U/L. mean value of ADA in tuberculous effusion is found 181.37 U/L in our study. However ADA may be falsely positive in few conditions[27-30]. In our study also few cases of malignant pleural effusion had significant ADA level.

The level of lactate dehydrogenase in the pleural fluid correlates with the degree of pleural inflammation.[31]In our study, also raised level lo LDH was seen in inflammatory conditions like TB and Parapneumonic effusion and low in other conditions like congestive heart failure and liver disease.

As this is just the retrospective cross-sectional study, with small sample size, the findings should be interpreted with caution. However our study collaborates well with the other study and shows the various mode of clinical presentation, importance of sputum profile and pleural fluid analysis in patient presenting with pleural effusion. Further study would be required to determine the complete clinical profile patient presenting with pleural effusion in our setup.

Conclusion

Our study concluded that the most common cause of unilateral pleural effusion is tuberculosis followed by parapneumonic effusion and most cases of those belong to younger age group (21 -30yrs) and most common cause of bilateral pleural effusion is congestive cardiac failure.

Our study concluded that shortness of breath, cough, and fever are the three most common mode of clinical presentation in patient with pleural effusion. Sputum profile does not help much in the workup of patient with pleural effusion. Pleural fluid analysis is the diagnostic method to distinguish exudative from transudative pleural effusion. Lymphocyte rich exudative effusion occurs in case of Tubercular effusion and neutrophil rich effusion occurs in parapneumonic effusion. Pleural fluid protein rises in patient with tubercular and parapneumonic effusion whereas its level decreasing in patient with liver disease and renal disease. High ADA concentration is highly sensitive diagnostic test in Tubercular effusion.

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