ORIGINAL ARTICLE

FREQUENCY OF VARIOUS DISEASES IN PATIENTS PRESENTING WITH PLEURAL EFFUSION

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ABSTRACT

Background: Pleural effusion is a common diagnostic problem. Successful treatment of these cases depends upon establishing the exact etiology. The objective of this study was to determine the frequency of clinical features and frequency of various diseases in patients presenting with pleural effusion.

Material & Methods: It was a cross sectional study carried out at the Department of Medicine, Civil Hospital Karachi, from to July 2011 to March 2012. Inclusion criteria were all patients above 15 years of age with clinical and radiological evidence of pleural effusion. Patients with history of chest injury or surgical procedures involving pleural cavity were excluded. The demographic variables were gender, age in years and age group. The research variables were breathlessness, fever, cough, chest pain, dependent edema, weight loss, haemoptysis and confusion and cause of pleural effusion. There were four age groups as: 16-30 years, 31-45 years, 46-60 years and more than 60 years. Nominal data was analyzed for frequency and (%) and the numeric data was analyzes by mean, SD and range. Results: Tuberculosis was the most common cause 40(53.33%) of exudative pleural effusions, followed by parapneumonic/empyema 13(17.33%) and malignant effusions 9(12%). Congestive cardiac failure 9(36%) and liver cirrhosis 6(24%) were the commonest causes of transudative pleural effusions. Nephrotic syndrome 4(16%), renal failure 3(12%), systemic lupus erythmatosus 1(1.33%) were other causes of pleural effusion in this study. Conclusion: Due to high incidence of infectious causes, especially tuberculosis, pleural fluid examination should be a routine evaluation in each case of pleural effusion.

KEY WORDS: Pulmonary tuberculosis, Malignant pleural effusion, Pleural empyema, Pleural neoplasms, Congestive cardiac failure.

This article may be cited as: Rehan M, Alam MT, Aurangzeb M, Imran K, Farrukh SZ, Masroor M, et al. Frequency of various diseases in patients presentting with pleural effusion. Gomal J Med Sci 2013; 11 : 78-83.

INTRODUCTION

Pleural effusion is the abnormal accumulation of fluid in the pleural space.[1] It is a common diagnostic problem.[2] Successful treatment of these cases depends on determination of its exact etiology. The gross appearance of the pleural fluid provides useful information. A reddish appearance narrows the differential diagnosis. Pleural effusion can be small to massive in amount. Massive effusions are mostly secondary to malignancy, followed by complicated parapneumonic or empyema and tuberculosis.[3] Compared with nonmalignant pleural effusions, patients with large or massive malignant pleural effusions are more likely to have pleural fluids with higher RBC counts and lower adenosine deaminase (ADA) activity.[4] Lymphocytic exudative pleural effusion is caused by tuberculosis, malignancy, rheumatoid pleurisy, fungal pleurisy, sarcoidosis and even parasitic diseases such as echinococcus granulossis.[4] The presence of polymorphonuclear leukocytes, high LDH activity (>200 U/L) and protein level (>3 g/dl) in a pleural effusion indicate acute inflammation. The common causes are bacterial pneumonia, lung abscess, and bronchiactasis. An effusion is usually called empyema, when large numbers of neutrophils form thick, turbid exudates.[5,6]

Diagnostic workup of pleural effusion includes detailed clinical examination, chest x-ray, pleural fluid analysis and pleural biopsy: the latter is the investigation of choice with a diagnostic yield of 50-75%.[7] Pleural fluid analysis must be used in conjunction with the clinical presentation in determining the cause of a pleural effusion. Pleural fluid dysynchrony can indicate whether an exudative effusion is primarily due to a lymphatic abnormality with elevated protein or to inflammation (increased LDH). Traditional transudates like congestive cardiac failure

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rarely cause pleural fluid dysynchrony except following intense diuresis.[8]

The objective of this study was to determine the frequency of clinical features and frequency of various diseases in patients presenting with pleural effusion.

MATERIAL AND METHODS

It was a cross sectional study carried out at the Department of Medicine, Civil Hospital Karachi, from to July 2011 to March 2012. A sample of 100 patients with pleural effusion was selected by conveinience sampling from the medical units of the hospital.

Inclusion criteria were all patients above 15 years of age with clinical and radiological evidence of pleural effusion. Patients with history of chest injury or surgical procedures involving pleural cavity were excluded.

All these patients were admitted. Detailed present and past history was taken. Detailed clinical examination was carried out especially in respect to pulmonary, cardiac, hepatic and renal systems. All relevant investigations were performed to reach the diagnosis and treatment planning especially in respect to pulmonary, cardiac, hepatic and renal systems. X-ray chest, urinalysis, total and differential leukocyte counts, liver function tests, renal function tests and ECG were performed for all patients. Other tests were carried out according to the differential and provisional diagnosis. All patients underwent diagnostic thoracentesis and pleural fluid was sent for biochemical and microscopic analysis. Pleural biopsy was performed in selected/suspected cases.

The demographic variables were gender, age in years and age group. The research variables were breathlessness, fever, cough, chest pain, dependent edema, weight loss, haemoptysis and confusion (based on symptoms), pulse rate, temperature, respiratory rate, systolic blood pressure, diastolic blood pressure and body mass index (general signs) and cause of the pleural effusion. There were four age groups as: 16-30 years, 31-45 years, 46-60 years and more than 60 years. Nominal data was analyzed for frequency (number) and relative frequency (%) and the numeric data was analyzes by mean, SD and range.

RESULTS

Out of 100 patients of pleural effusions 65 (65%) were male and 35 (35%) female with male to female ratio of 1.86 to 1. There mean age was 44.82 ± 17.71 (15-60) years. 26 (26%) patients were of age group 16-30 years, 29 (29%) patients were of 31-45, 25 (25%) patients were of 46-60 and 20 (20%) patients were of age group of more than 60 years. Past history in 100 cases showed tuberculosis in 14, nephrotic syndrome in 2, ischaemic heart disease in 9, autoimmune disease in 6 and chronic liver disease in 1 case.

Table 1 shows the frequency (number) and relative frequency (%) of symptoms with breathlessness on the top.

Table 2 shows descriptive statistics of the general signs of the diseases.

On analysis seventy five percent patients were exudative and twenty five were transudative pleural effusion. In patients with exudative effusion, 70% were lymphocyte and 30% were neutrophil predominant. The frequency of various diseases in patients presenting with pleural effusion are presented in Table 3.

Pulmonary tuberculosis topped the list of exudative effusions while congestive cardiac failure topped the list of transudative pleural effusions. Malignancy accounted for 12 % of exudative pleural effusions in which lung cancer accounted for 33% of malignant effusion and lymphoma accounted for 22% and remaining were metastatic carcinomas.

Out of 100 patients, 58% pleural effusion oc-

Table 1: Frequency and Relative Frequency of Symptoms of 100 Patients with Pleural Effusion.

S.No.	Variable	No.	Percentage	S.No.	Variable	No.	Percentage
1	Breathlessness	82	82%	5	Dependent Edema	27	27%
2	Fever	80	80%	6	Weight Loss	22	22%
3	Cough	77	77%	7	Haemoptysis	18	18%
4	Chest pain	57	57%	8	Confusion	08	08%

Table :2. Descriptive Statistics of General Signs of 100 Patients with Pleural Effusion.

S.No.	Variable	Mean±SD	Range	S.No.	Variable	Mean±SD	Range
1	Pulse (per min)	95.31±8.59	60-110	5	SBP (mmHg)	118.10±26.5	80-210
2	Temperature(F°)	99.52±1.65	90-103	6	DBP(mmHg)	74.43± 15.2	40-110
3	Respiratory Rate (per min)	23.04±4.04	16-32	7	BMI (m^2)	18.70±2.69	12.6-27.2

SBP=Systolic Blood Pressure, DBP=Diastolic Blood Pressure, BMI=Body Mass Index

Table 3: Frequency of various diseases in 100 patients presenting with Pleural Effusion.

Exudative Effusions (n=75)				Trasudative Effusions (n=25)			
S.No.	Variables/Diseases	No.	Percentage	S.No.	Variables/Diseases	No.	Percentage
1	Tuberculosis	40	53.3%	1	Congestive Cardiac Failure	9	36%
2	Para pneumonic	13	17.3%	2	Chronic Liver Disease	6	24%
3	Malignancies	9	12.0%	3	Chronic Renal Failure	5	20%
4	Empyema	7	9.3%	4	Nephrotic Syndrome	3	12%
5	Liver Abscess	3	4.0%	5	Cushing Syndrome	1	4%
6	Chronic Renal Failure	2	2.6%	6	Hypothyroidism	1	4%
7	Systemic Lupus Erythematosis	1	1.3%				
	Total	75	100%		Total	25	100%

curred only on the right side, 30% only on the left side and 12% on both sides. Out of nine effusions due to congestive cardiac failure, 6 were on the right side and 3 were on the left side.

Regarding laboratory characteristic, mean serum LDH of the patients was 469.03± 285.41 while mean pleural fluid LDH was 915.28 ± 134.5.

DISCUSSION

The etiology of pleural effusion varies depending upon the population and the region being studied. This study was carried out in a populous city (18 million), with a high prevalence of tuberculosis. The estimation for Pakistan were 261,000 new cases, putting the estimated incidence of 181 cases per 100,000 population[11] and in some areas of the country, prevalence figures observed were as high as 554/100,000 cases.[12] In this study, tuberculosis was the most common cause of pleural effusion found in 40 out of 75 cases of exudative effusions (53.3%) followed by parapneumonic effusion/ empyema in 13 out of 75 cases (17.35) and malignant effusion in 9 cases (12%). All of these effusions were exudative. Congestive cardiac failure (CCF) was the most common cause i.e nine out of 25 cases (36%) of transudative effusion followed by chronic liver cirrhosis in 6 out of 25 (24%) cases. Male to female ratio was 1.86:1. This male to female difference may be due to delayed consultation by female patients[13] and gender inequality in utilization of health care facilities especially patients from rural areas. Approximately one million women die from tuberculosis and it is the leading single infectious cause of female death worldwide.[14] Sixty percent patients were illiterate. It may be due to low literacy rate in Pakistan. National literacy rate of Pakistan is 54%. In which 66.25% adult males and 41.75% adult females are literate in Pakistan.

Breathlessness was the most common symptom found in 82% patients. It is also the most common symptom described in literature.[15] The other symptoms included cough, chest pain and fever. Eighty percent patients had history of fever that reflects a high proportion of infectious causes (tuberculosis, parapneumonic, liver abscess).

The most common cause of pleural effusion in our study was tuberculosis. CCF was the most common cause of the pleural effusion in literature.[16,17] This is same as reported by Mattison et al.[18] The predominance of tuberculosis in this study may be because tuberculosis is very common in

Pakistan and it is also the commonest cause [9] of exudative effusion in Pakistan. Upto 53% cases of lymphocytic exudative effusion are tuberculous in nature.[2] Although tuberculosis is less common in developed countries, 25% cases of pleural effusion were found to be tuberculous in nature in Spain.[19,20]

Parapneumonic effusion was the second most common cause of pleural effusion. Streptococci and Staph aureus are the commonest organisms that cause parapneumonic effusion while recent studies[21] show that Pseudomonas is becoming a common pathogen. A local study showed that among pleural biopsies that were cultured, 92% had growth of microorganisms and 32% isolates were Pseudomonas, 20% were E.coli, 10% were Staph Aureus and 8% were S.pneumoniae.[22] In our study, culture was positive in 44% cases of parapneumonic effusion that is similar to other studies[23] in which less than 50% cultures were positive. Low yield of culture of pleural effusion has also been found by some international investigators.[16] This low yield may be due to prior administration of antibiotics.[23]

Malignancy was the third most common cause of exudative effusion and it comprised of 12% of all cases of pleural effusion. Carcinoma of bronchus was the most common cause of malignant effusion in males while pelvic malignancies were most common cause in females. Malignant cells were seen in pleural effusion in 6 patients and pleural biopsy showed malignant infiltration of parietal pleura in rest of 3 cases. Nineteen to 25% cases of exudative effusion[24,25] are reported to be due to malignancies and most cases are due to CA bronchus and carcinoma of breast. This low percentage of malignant effusions may be due to high prevalence of tuberculosis in our country. Virtually all cancers can metastasize to pleura but lung cancer is the most common cancer to involve the pleura because of its proximity to pleural surface.[26] Breast cancer and ovarian tumours also frequently metastasize to pleura. No case of breast carcinoma was found in this study while two patients had pelvic tumours. This may be because surgeons and specialized centres manage most cases of breast carcinoma.

Among the transudates, CCF was the most common cause. While CCF is the commonest cause of pleural effusion in the literature,[20] the low number of cases of CCF in this study may be because most cases of CCF are managed in cardiology departments. This has also been described by Light RW in literature.[27] Liver cirrhosis was the second most common cause of transudative effusion. It may be because of high incidence of viral hepatitis. 3 (50%) out of 6 patients were HBsAg postive while remaining were anti HCV postive. Although the incidence of hepatitis C infection is increasing, hepatitis B infection is still the commonest cause of liver cirrhosis in this area. Pakistan is facing a nationwide epidemic of hepatitis B and C infection mainly because of injection overuse and routine reuse of syringes by health care providers. [28,29]

Seven cases of pleural effusion resulted from renal failure. Five cases were transudative while two cases were found exudative. These two cases of exudative effusion fulfilled LDH criteria of exudative effusion. It is said that if an effusion fulfills only LDH criteria for diagnosis of exudative pleural effusion, then either parapneumonic or malignant effusion should be considered[30] but no evidence of bacterial infection and malignancy was found in these patients. Although uremia is a rare cause[31] of pleural effusion, incidence and prevalence of renal failure is increasing in Pakistan and 15-20% of persons 40 years of age or older have reduced glomerular filtration rate.[32] Uremia usually leads to exudative effusion while peritoneal dialysis can result in transudative effusion. Transudative effusions in patients with uremia in this study may be due to volume overload. Three (3%) patients had pleural effusion secondary to nephrotic syndrome. Pleural effusion in patients with nephrotic syndrome is probably due to hypoproteinemia. Other diseases constituted a small number of cases of pleural effusion including cushing syndrome, hypothyroidism, SLE and liver abscess.

Pleural effusion analysis was helpful in categorizing the effusions into exudates and transudes. Definitive diagnosis of malignancy was possible in six (66%) out of 9 patients with malignant effusion in whom malignant cells could be demonstrated in the effusion. Various studies[33] have shown that malignant cells can be demonstrated in 62 to 90% cases of malignant effusion. AFB stain was not positive in any case of tuberculous effusion. Akhtar S and Memon AM[6] found that AFB was negative in all tuberculous pleural effusions. It is because there are few bacilli in the effusion and tuberculous pleuritis is due to hypersensitivity to tuberculo-protein rather than actual infection and is well documented in the literature.[34] Thoracentesis is said to be a safe procedure with minimum complications, four (4%) patients had iatrogenic pneumothorax in this study. This complication can be prevented with better technique.

Pleural biopsy was helpful in the diagnosis of tuberculous and malignant effusions. Pleural biopsy showed malignant infiltration of pleura in three cases and in ten cases it showed chronic granulomatous inflammation due to tuberculosis. Although pleural biopsy showed excellent results, Parakash et al studied that thoracoscopy or open pleural biopsy is the

procedure of choice if the pleural fluid cytology is negative for malignant cells.[35] Pneumothorax did not occur in any patient. Pneumothorax large enough to require a chest tube occurs in about one percent of pleural biopsies.[36]

Pleural effusion in patients with collagen vascular diseases such as SLE, scleroderma and rheumatoid arthritis is exudative in nature.

Overall these results are identical to other studies with variations which are also reflected in other local studies such as high proportion of tuberculous pleural effusion.

CONCLUSION

Breathlessness and fever are the commonest symptoms and tuberculosis is the comments cause of pleural effusion in our set up. Due to high incidence of infectious causes, especially tuberculosis, pleural fluid examination should be a routine evaluation in each case of pleural effusion.

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CONFLICT OF INTEREST
Authors declare no conflict of interest
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.