Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2015; 3(8A):2790-2793 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2015.v03i08.012

Research Article

Pleural Effusion: A Two Year Prospective Study in Western India

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Abstract: Collection of fluid in pleural cavity has varied etiological factors. It constitutes one of the major causes of morbidity in India as well in other parts of world. Because of the various etiologies that can cause pleural effusion, it often present a diagnostic problem, even after extensive investigations. The initial step is the distinction between transudates and exudates as this gives an indication of pathophysiological mechanisms, differential diagnosis and the need for further investigation. The present study was carried out in the Dept. of TB And Chest, P.D.U. Medical College, Rajkot from July 2013 to June 2015. All patients underwent detailed clinical examination and routine laboratory examination, A plain chest X ray PA view. Additional films and ultrasound, CT scan was done whenever indicated. Pleural fluid analysis was done for protein, sugar, total cell count, differential cell count, Gram's stain, ZN stain, Culture and sensitivity and ADA. Diagnosis was made on clinical examination, radiological examination and analysis of laboratory data. Tuberculosis is the most common cause (66%) of pleural effusion followed by malignancy (18%) and parapneumonic Effusion (10%). Smoking habit was present in 33.33% of patients of tuberculosis effusion and 88.89% of malignant effusion. 50% of the patients had moderate pleural effusion and 30% had mild while 20% had large pleural effusion. In this study an attempt has made to arrive at the etiological diagnosis by analysis of history, clinical presentation, and biochemical, radiological, cytological, and bacteriological methods.
Keywords: Pleural effusion, Tuberculosis, Parapneumonic Effusion, Malignant Effusion

INTRODUCTION

Collection of an abnormal quality of fluid in the pleural cavity is called pleural effusion. Collection of fluid in pleural cavity has a varied etiological factors. It is a common respiratory condition known since the time of Hippocrates (641 – 539 B.C). It constitutes one of the major causes of morbidity in India as well in other parts of world. Because of the various etiologies that can cause pleural effusion, it often present a diagnostic problem, even after extensive investigations. The initial step is the distinction between transudates and exudates as this gives an indication of pathophysiological mechanisms, differential diagnosis and the need for further investigation. There are number of criteria to differentiate exudates from transudates but none has 100% sensitivity and specificity [1].

Tuberculosis is still the most common and important cause of exudative pleural effusion in our country. Tuberculosis is one of the most encient diseases known to affect humanity. This has been proved by the finding of tuberculosis spinal disease in Egyptian mummies.

In India tuberculosis known to exist from the time immemorial and has been mentioned in the Vedas and Ayurvedas. Tuberculosis remains a major cause of morbidity and mortality in India. Every year approximately 18 lakh people develop TB and about 4 lakh die from it. TB kills more adults in India than any other infectious disease.

The diagnosis of tuberculous pleural effusion is usually done by clinical, radiological, histological, and laboratory findings. Several new techniques like rapid culture (Bactac), gas chromatography, nucleic acid probes, polymerase chain reaction and adenosine deaminase (ADA) are useful for diagnosis of tuberculosis. Pleural effusion is second most common extrapulmonary tuberculosis next to tuberculosis lymphadenitis. About 20 % cases of extrapulmonary tuberculosis presented with pleural effusion.

NORMAL COMPOSITION OF PLEURAL FLUID

Volume	: 0.1-0.2mi/kg
Cells/mm3	:1000-5000
% mesothelial cells	: 3-70 %
% monocyte	:30-75 %

% lymphocyte	:2-30 %
% granulocytes	:10%
Proteins	:1-2 g/dl
% albumin	:50-70 %
Glucose	:same as plasma level
LDH	:<50 % PLASMA LEVEL
Ph	:> plasma Ph

Excess fluid accumulation in pleural space occurs due to either the six mechanisms. 1) An increase in the hydrostatic pressure in the microvascular circulation, 2) A decrease in the oncotic pressure in the microvascular circulation, 3) A decrease in pressure in pleural space, 4) Increased permeability of microvascular circulation, 5) Impaired lymphatic drainage from pleural space and 6) Movement of fluid from peritoneal space [3].

The effects of accumulation of fluid in the pleural space depend on the cause and the amount of the fluid. Small effusions are often asymptomatic, even very large effusion, if they accumulate slowly, may cause little or no discomfort to the patient. The most commonly associated symptoms are pleuritic chest pain, progressive dyspnea and cough. Other symptoms occurring with pleural effusion are associated with more closely with the underlying disease process[4].

Management of pleural effusion is:

- Treatment of underlying cause
  AKT- for tuberculous effusion.
  Antibiotic – for parapneumonic effusion.
  Diuretics – for transudative effusion
- Therapeutic aspiration of pleural effusion
- Procedures like pleurodesis and pleuroperitoneal shunt are also useful.
- Supportive therapy.
- Deep breathing exercise to prevent pleural effusion.

MATERIALS AND METHODS

The present study was carried out in the Dept. of TB And Chest, P.D.U. Medical College, Rajkot from July 2013 to June 2015. In this study total 50 patients of adult age and either sex were taken, admitted in TB and Chest Disease ward, Medical Ward, Surgical ward or OPD.

Inclusion criteria

Adult patients with pleural effusion as determined by clinical and or radiological means, thorecocentesis on whom yield a minimum amount of fluid enough to carry out routine test were included in the study.

Exclusion criteria

Patients with pleural effusion with non aspirable fluid quantity decided clinically or radiologically, were excluded.

All patients underwent detailed clinical examination and routine laboratory examination like blood test for hemoglobin, total WBC count, differential WBC Count, Erythrocyte Sedimentation Rate, Random Blood Sugar, RFTs, S. Proteins, Urine Examination, Sputum Examination and Tuberculin Test will be carried out in all patients.

A plain chest X ray PA view taken prior to thorecocentesis and another was taken after thorecocentesis to rule out complications. Additional films and ultrasound, CT scan was done whenever indicated. Pleural fluid analysis was done for protein, sugar, total cell count, differential cell count, Gram's stain, ZN stain, Culture and sensitivity and ADA.

Diagnosis was made on clinical examination, radiological examination and analysis of laboratory data.

RESULTS

Table No.1 shows that maximum number of cases of pleural effusion were tuberculous (66%) followed by malignant (18%) and parapneumonic effusion (10%).

Table No.2 shows that pleural effusion was more common in males (74%) as compared to females (26%).

For assessing socio economic status of patient's family, modified Prasad's classification for socio economical class is used according to latest AICP (All India Consumer Price Index) for the year 2001. Table No.3 shows that pleural effusion is more common in patients of lower socio economical class and it constitutes of 88% of total patients.

Table no. 4 shows that 51.52% patients with tuberculous effusion had total cell count between 251-1000 while 45.46% patients had total cell count between 0-250. Among parapneumonic effusion, all (100%) patients had total count between 1001-5000. Majority of tuberculous effusion (96.97%) and malignant effusion (77.78%) had predominant lymphocytes while all patients with parapneumonic effusion had predominant polymorphs.

Sputum for AFB with ZN stain was done in all pleural effusion. It was positive in 1(3.03%) patient out of 33 patients of tuberculous pleural effusion. In other group it was negative in all cases.

Pleural fluid cytology for malignant cells was done in all pleural effusion patients. It was positive in 9 patients out of 9 patients of malignant pleural effusion.

Pleural fluid for Gram's stain and ZN stain was done in all pleural effusion patients, but not positive in any case.

Pleural fluid culture and sensitivity was done in all pleural effusion patients, but not positive in any case.

Table 1: Etiological Diagnosis of Pleural Effusion

Group Code	Diagnosis	No. of cases	Percentage (%)
A	Tuberculous pleural effusion	33	66
B	Non Tuberculous pleural effusion	17	34
	a)Malignancy	9	18
	b)Parapneumonic	5	10
	c)Congestive cardiac failure	1	2
	d)Hypoproteinemia	2	4
	Total	50	100

Table-2: Sex Distribution in Pleural Effusion

Diagnosis	No. of cases			
	Male	(%)	Female	(%)
Tuberculous	23	69.7	10	30.3
Malignant	8	88.9	1	11.1
Paraneumonic	3	60	2	40
Congestive cardiac failure	1	100	0	0
Hypoproteinemia	2	100	0	0
Total (50)	37	74	13	26

Table-3: Socio Economical Class of Patients of Pleural Effusion

Cases of pleural effusion	Socio economical class of patients		
	Lower	Middle	Upper
Tuberculous	29	4	0
Malignant	8	1	0
Paraneumonic	4	1	0
Congestive cardiac failure	1	0	0
Hypoproteinemia	2	0	0
Total	44	6	0

Table-4: Cellular Analysis of Pleural fluid

Diagnosis	Total count/mm^3			Predominant cell type	
	0-250	251-1000	1001-5000	Lymphocyte	Polymorph
Tuberculous(33)	15	17	1	32	1
Malignant(9)	8	1	0	7	2
Parapneumonic (5)	0	0	5	0	5
Congestive cardiac failure (1)	1	0	0	1	0
Hypoproteinemia (2)	2	0	0	2	0
Total	26	19	5	42	8
Percentage	52	38	10	84	16

DISCUSSION

Etiological diagnosis of Pleural effusion is compared with various other studies as under [4-5]:

In the present study incidence of tuberculous pleural effusion was 66% which was comparable to study of Thiruvengadam (1962), A. Dambal (1998) and P.

Majethiya (68%) which were done in India while in other studies incidence of tuberculous Pleural effusion was low, which can be explained by the fact that TB is more prevalent in India.

Incidence of Malignant Pleural effusion was 18% which was comparable with the studies of Thiruvengadam (1962), Valdes (1996), A.Dambal (1998) and P.Majethiya.

Thus pleural effusion in India needs to be studied deeply and differently because of more prevalence of tuberculosis in India.

50 cases of pleural effusion were studied by clinical, radiological and laboratory methods [4, 5].

Table-5: Comparison of etiological diagnosis

Diagnosis	Thiruvengadam (1962)	Hirsch (1979)	Valdes (1996)	A. Dambal (1998)	S.Kava (2000)	J.E. Haffner (2002)	J.E. Haffner (2003)	P.Majethiya (2006)	Present study (2015)
Tuberculosis	64	17.67	25	65.5	80	20.4	-	68	66
Malignancy	21	35	22.9	18.2	4	30.3	32.4	18	18
Parapneumonic	1	12.67	11.7	1.8	4	12.8	13.9	8	10
CCF	4	1.66	17.9	1.8	8	18.7	18.8	4	2
Hypoproteinemia	-	-	-	-	2	1.7	1.6	2	4
Others	10	33	22.5	12.7	2	16.1	33.3	-	-

In this study 74% of patients were male and 26% were females. 94% of pleural effusions were exudative and 6% were transudative. Tuberculosis is the most common cause (66%) of pleural effusion followed by malignancy (18%) and parapneumonic Effusion (10%). In tuberculosis most of (75.8%) the patients were between 21-40 years of age group. Smoking habit was present in 33.33% of patients of tuberculosis effusion and 88.89% of malignant effusion. Chest pain was present in 80% of patients while fever, breathlessness and cough were present respectively 72%, 62% and 66% of patients. Right sided pleural effusion was present in 54% of patients while left sided effusion in 42% and 4% of the patients had bilateral pleural effusion. Majority of the tuberculous (60.60%) patients had right sided pleural effusion. 50% of the patients had moderate pleural effusion and 30% had mild while 20% had large pleural effusion. Majority of the tuberculous (63.3%) patients presented with moderate effusion while in malignant effusion 55.6% had large effusion. 68% of patients had turbid appearance of pleural fluid, 16% had clear appearance and 16% had hemorrhagic appearance. Turbidity was present in 84.85% patients of tuberculous effusion. 93.34% patients of tuberculous effusion had pleural fluid protein more than 3gm%. 96.97% of the tuberculous and 77.78% of malignant effusion patients had lymphocyte predominance in pleural fluid while 100% of parapneumonic pleural fluid had PMN predominance. Tuberculin test was positive in 76.47% patients of tuberculous pleural effusion. 100% of the malignant pleural effusion patients had pleural fluid cytology for malignant cells positive.

CONCLUSION

Most Common cause of pleural effusion was tuberculosis followed by malignancy and parapneumonic. Tuberculous effusion was more common in younger age group (below 40 years) while malignant effusion was more common in older age group (above 60 years). Right sided pleural effusion was more common in tuberculous, malignant and parapneumonic effusion while bilateral pleural effusion was more common in patients with CCF and Hypoproteinemia. Majority of the patients with malignant pleural effusion had large effusion, while tuberculous pleural effusion had a moderate effusion. Majority of the patients with tuberculous pleural had yellowish and turbid fluid, while malignant pleural effusion had hemorrhagic fluid. Pleural fluid cytology positive for malignant cells was present in significant number of patients with hemorrhagic effusion.

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