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Diagnostic evaluation of patients presenting with pleural effusion to Mardan Medical Complex, Khyber Pakhtunkhwa

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A B S T R A C T

Background: Collection of abnormal amount of fluid in pleura space is referred to as pleural effusion. Etiology of pleural effusion is very wide, varying in different areas suggesting the role of environmental and geographical factors.

Objective: The aim of study was to look in to the different causes of pleural effusions in patients presenting to chest outpatient department in mardan medical complex.

Methodology: This Descriptive cross sectional study was conducted in Department of Pulmonology and Medicine (medical B unit) of Mardan Medical Complex (MMC) from January 2018 to December 2019. Data was collected by non-probability convenience sampling technique.202 patients were included in study. Diagnosis of effusion was confirmed by chest radiography and where needed with chest ultrasound. Pleura fluid was aspirated in all cases. Pleural fluid analysis was then followed by the relevant investigations like pleural fluid cytology, culture, pleural biopsy, computer tomoghraphy, echocardiography and connective tissue profile for diagnosis of underlying cause of pleural effusion.

Results: Out of 202 patients 145, (73 %) were male and 57 (26 %) were female. Mean age of patients was 44 .8 years with + 19.832 SD. Among patients with pleural effusion the most common cause was tuberculosis (65.3%), followed by Para pneumonic effusion/empyema (11.4%), malignancy both metastatic and primary accounted for (15%), heart failure also showed its presence in 5% of cases. Connective tissue disorder was found to be the cause in only one case (0.5%). In one case (0.5%) pleural effusion remained undiagnosed.

Conclusion: Tuberculous pleural effusion is the most common cause of pleural effusion. Less common causes include parapneumonic effusion, malignant effusion and cardiac failure.

Key words: Pleural Effusion; Tubercular Pleural Effusion; Pleural Biopsy

Introduction

When pleural fluid accumulates in abnormal quantity and quality within pleural space it is then known as pleural effusion.[1] Pleural effusion is caused by a long list of pulmonary and extra pulmonary diseases.[2] It may prove to be fatal if not diagnosed or treated timely. 1 to 1.5 million cases of pleural effusion are presented to physicians per annum in US while in UK the newly detected cases of pleural effusion is between 200,000 to 250,000.[3] Most of the cases are diagnosed by detailed history followed by clinical examination and relevant investigations.[4] Large number of diseases may also be responsible for persistent and undiagnosed pleural effusion.[5] Worldwide CCF is the main etiological factor for transudative effusion.[6,12] Among the long list of causative diseases for exudative effusion malignancy and pneumonia are common in the west while in indo-pak subcontinent they are replaced by TB, followed by malignancy and PPE(para pneumonic effusion).[6,7] Sometimes the diagnoses become challengeable to physicians as etiology remains unknown in 15% of the cases.[7] In this study it was attempted to conclude an etiological diagnosis by analyzing the history, detailed clinical examination and relevant cytological, bacteriological, histological, biochemical and radiological investigations.

Methodology

This was a descriptive study over a period of two years from Jan 2018 to Dec 2019 carried out in Department of pulmonology and Medicine (medical B unit) of MMC Mardan. Approval for the study was obtained from research and ethical committee of the hospital. Adult 202 patients of 13 and above by age from both gender were included in study. Pleural effusion was detected on both clinical and radiological examination and was confirmed by Chest ultrasound where needed. Informed written consent was taken from patient for enrolment in the study. This consent was not only for enrollment of study but was also for diagnostic interventions. Patients who were hemodynamically unstable or already diagnosed and were on treatment were excluded. Also patients with acute history of trauma or fire arm injury were not included. Detailed history was taken from all patients followed by detailed clinical examination. chest X-ray done in all cases was mostly PA view but lateral and decubitus were also done where needed. This was then followed by pleural fluid aspiration and its routine examination. Further work up was guided by the report of pleural fluid routine examination report. Cytological, microbiological and biochemical examination forms part of this routine examination. Pleural biopsy with Abrams needle was also done in all exudative effusions. CBC, LFTs, RFTs, and blood glucose was done in all cases. In relevant cases sputum Xpert MTB/RIF assay was done. Gram'sand Z.N staining for AFB and when necessary Xpert MTB/RIF assay was also carried out as directed along with routine fluid examination. Imaging of thorax and abdomen with CT and U/G were also done where needed. In few cases image guided (CT) FNAC, Fiber optic bronchoscopy (F.O.B) biopsy were also done. ECG, Echocardiogram was performed for diagnosis of cardiac problems.

Data Analysis

All information was documented on preform and was analyzed statistically. Statistical analysis was performed by using SPSS version 20.0. Frequencies / Percentages were calculated for qualitative variables, while Mean ± standard deviation were calculated for quantitative variables. Results were presented as tables.

Results

The present study consists patients visited the two departments at study site. Study cases includes 73.3% male and 26.7% female patients. Patient age varies between 13 and 90 years with mean age for male 45.75+19.513 SD and female 42.43+20.605 SD respectively (Table 1).

Most of the patients included in study were from Mardan district, this was then followed by the patients from neighboring districts evident from the Table 2.

Table 1. Gender and age wise distribution of patients

Gender	N	% of total sum	Minimum age	Maximum age	Mean age	Std. Deviation
Male	145	73.3%	13.00	90.00	45.7586	19.51398
Female	57	26.7%	15.00	85.00	42.4386	20.60515
Total	202	100.0%	13.00	90.00	44.8218	19.83283

Tuberculosis is the most common cause of pleural effusion in our study followed by parapneumonic effusion (PPE) and malignancy. Only ten patients (5%) presented with pleural effusion due to CCF.Although we did not

Table 2. District wise distribution of patients

District	Frequency	Percent
Mardan	137	67.8
Charsadda	33	16.3
Sawabi	14	6.9
Nowshehra	6	3.0
Malakand	4	2.0
Sawat	4	2.0
Buner	2	1.0
Bajaur Agency	1	.5
Pindi	1	.5
Total	202	100.0

included patients with acute chest trauma in this study, but 4 patients were diagnosed with hemothorax. Among these patients on further inquiry 3 patients revealed to have past history of some trauma to chest. The remaining one patients was diagnosed as pulmonary embolism on computed tomography pulmonary angiography. Undiagnosed cases and connective tissue disorders presented with single case each (Table 3).

Table 3. Underlying of cause of pleural effusion

Diagnoses	Frequency	Percent
Tuberculosis	132	65.3
Parapneumonic effusion/Empyema	23	11.4
Malignant pleural effusion (Metastatic)	16	7.9
Malignant pleural Mesothelioma	15	7.4
Congestive cardiac failure	10	5.0
Heamorrhagic/hemothorax	4	2.0
Conective tissue disorder	1	0.5
Un diagnosed Effusion	1	0.5
Total	202	100.0

Right sided effusion was found in 116 cases which makes 57.4% of the total and left sided effusion was present in 77 patients making 38.1% of the total patients, while bilateral effusion was detected in 9 cases making 4.5%. of the total (Table 4).

Table 4. Side versus Diagnosis of effusion

Diagnoses	Side of effudion			Total
	Right side effusion	Left side effusion	Bilatral Effusion	
Tuberculosis	75	53	4	132
Parapneumonic effusion/Pleural empyema	10	11	2	23
Malignant pleural effusion	12	4	0	16
Malignant pleural mesothelioma	12	3	0	15
Congestive cardiac failure	6	2	2	10

Heamorrhagic/hemothorax	1	3	0	4
Connective tissue disorder	0	1	0	1
Un diagnosed Effusion	0	0	1	1
Total	116	77	9	202

75 patients with TB presented with right sided effusion while 53 patients presented with left sided effusion and bilateral effusions were present in only 4 cases. Bilateral effusion was not detected in malignancy. Majority of the patients with CCF presented with right sided effusion though patients with left side and bilateral effusion were also found in CCF (Table 5).

Table 5. Age versus diagnosis of effusion

Diagnoses	No of cases	Mean Age
Tuberculosis	132	41.40
Parapneumonic effusion/Eempyema	23	48.34
Malignant pleural effusion (Metastatic)	16	60.68
Malingnant pleural Mesothelioma	15	55.40
Congestive cardiac failure	10	47.10
Heamorrhagic/hemothorax	4	34.25
Un diagnosed Effusion	1	34.00
Connective tissue disorder	1	18.00
Total	202	44.75

Tuberculosis found to be more common in younger age group with mean age of 41.4 while malignancy (metastatic) was common in old age with mean age of 60.68. Mean age for malignant pleural mesothelioma was 55.4 and for PPE was found to be 48.34. Single patient with connective tissue disorder was female and a teenager. (Table 6)

Table 6. Gender versus diagnosis of effusion

Diagnoses	Male	Female
Tuberculosis	95	37
Parapneumonic effusion / Empyema	17	6
Malignant pleural effusion	11	5
Malingnant pleural mesothelioma	9	6
Congestive cardiac failure	9	1
Heamorrhagic / hemothorax	3	1
Conective tissue disorder	0	1
Un diagnosed Effusion	1	0

Tubercular effusion was found to be more in males than females (47% males and 18.31% females). Likewise all other causes of pleural effusions were more in males than in females but pleural effusion due to connective tissue disorders was only found in females.

Discussion

In our study common cause for pleural effusion was pulmonary tuberculosis (65.3%), followed by parapneumonic effusion/empyema (11.4%), metastatic lung (7.9%) and malignant mesothelioma (7.4%). We found that transudative effusion was mainly due to CCF

and was found only in 5% of cases. Tubercular effusion was found in younger age group while malignant effusion was common in patients of age group 60 and above. Right sided effusion was found in 57.4% while left sided was found in 38.1%, while in 4.5% of cases it was bilateral.

CCF is the common cause of pleural effusion world wide[6] and in developing countries like Pakistan, India, Bangladesh, Malaysia tuberculosis leads the race.[7] Our results were similar to the observations made by Abbas et al in Pakistan[8] and in India.[9] Tuberculosis was also found to be common cause of pleural effusion by jindal[10] and valdes.[11] As this study was conducted in medical unit of teaching hospital where cases of CCF are mainly diverted to cardiology unit so this may be the reason that we were encountered with few cases of cardiac pleural effusion. This may also be the reason for less number of reported transudative effusion as have got referral to their respective units.

In our study pleural effusion due to all causes was more common in males (71.8%) than in females (28.2%) and male: female ratio was 2.5:1, similar ratio of gender was found to be present in tubercular effusion as well. Earlier studies also showed that pleural effusion was found more in males.[10] This was also finding by Sharma et al.[11] The slightly higher male ratio reported in our study as compared to other international studies may be due to difference in number of patients. Social, cultural norms and male dominant society may also contribute to this fact as female are less likely to get health facilities as compared to male.

In our study tubercular effusion was more common in younger age group with a mean age of 41 years. A study conducted in the past also highlighted that common age group was between 21 and 40 years.[12] A study also found that effusion was more common in patients under 20 years of age.[6] The cause of TB in this age group is most likely due to primary pleural infection at an early age rather than reactivation of previous lung parenchymal tuberculosis.

Patients with Tubercular effusion presented to us mainly with complaints of fever, cough and chest pain while those with malignant effusion also have got similar complaints but dysponea and weight loss was more pronounced in them. However, fever was an uncommon feature of malignant effusions. Berger and Megia also concluded that patients with Tubercular effusion presented with pleurtic chest, non productive cough and fever.[13] Cher now et al also found in their study that dyspnea and weight loss were the presenting symptoms in patients with malignant effusion.[14] Fever was more common in benign effusion (tubercular) as compared to malignant, it was also observed by an observer in the past.[15]

In our study right sided effusion (57%) was more common than left sided effusion (38%). A study done in the past also showed that right sided effusion was more common than left.[16]

Regarding physical appearance, cardiac effusion was clear, turbid effusion was found in PPE while tubercular and malignant effusions were straw color and hemorrhagic respectively however. Similar findings have been reported in work done by Light RW.[17] In Tubercular effusion lymphocyte count was more than 50%, this is what already explained by Light RW.[18] Polymorphs were found in excess in PPE and this again was in accordance to the finding of Light RW, Ball CW, et al.[18] Atypical cells were present in malignant effusion in 48% of cases which was again according to the findings of Light RW.[18,19] In developing countries like Pakistan simple pleural fluid analysis is the initial tool to guide further work up in reaching the final diagnosis.[6] Blind pleural biopsy coupled with immune histhochemical staining of biopsy material has revived this old procedure in establishing the diagnosis.[20] Complicated effusion and undiagnosed cases may need further workup like, computed tomography scans, bronchoscopy and thoacoscopic pleural biopsy under vision.

Conclusion

It was concluded that after many decades Tuberculosis still remains the common cause of pleural effusion in Pakistan. This is followed by Para Pneumonic effusion. In developing countries simple pleural fluid analysis and blind pleural biopsy coupled with immune histhochemical staining still remains the best tools in diagnosing pleural effusion though complicated and undiagnosed cases, may need further workup like CT scans, bronchoscopy and thoacoscopic pleural biopsy.

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