ORIGINAL RESEARCH

Investigate the causes and clinical characteristics of pleural effusion

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ABSTRACT

Aim: Investigate the causes and clinical characteristics of pleural effusion. **Materials and Methods:** This was a cross-sectional hospital-based study conducted to investigate pleural effusion among patients meeting specific criteria. A total of 100 patients who met the inclusion and exclusion criteria during the study period were enrolled. Inclusion criteria comprised patients of both sexes who had undergone clinical and radiological evaluations for pleural effusion, confirmed by pleurocentesis, and provided informed consent. **Results:** In the present study, maximum incidence of pleural effusion was found in the age group 41-50 years (39%) followedby 51-60 years (30%). In the present study**,** it was observed that, male (73%) is predominance than female (27%). In the present study, out of 100 cases, 90 cases were exudates and 10 cases were transudates. The most common etiology of pleural effusion was tuberculosis (59%) and cardiac failure (10%). **Conclusion:** Every case of pleural effusion should be meticulously investigated in order to arrive a diagnosis and to proceed for specific therapy, specific treatment may be started earliest.

Keywords: Causes, Clinical, Pleural effusion

INTRODUCTION

Pleural effusion, characterized by an abnormal accumulation of fluid in the pleural space, represents a common clinical entity encountered in medical practice. It manifests across a spectrum of etiologies, reflecting diverse pathophysiological mechanisms that contribute to its development. Clinically, pleural effusion presents with a wide array of symptoms ranging from asymptomatic findings on routine imaging to respiratory distress and compromised lung function. The etiology of pleural effusion is multifactorial, encompassing various underlying conditions that disrupt the delicate balance of pleural fluid dynamics. Common etiologies include congestive heart failure, pneumonia, malignancy, and pulmonary embolism, each contributing distinctively to the pathogenesis of fluid accumulation within the pleural cavity.[1,2] Other less frequent causes include autoimmune diseases, connective tissue disorders, and iatrogenic factors such as postsurgical complications or drug-induced reactions.[3-5] Clinical presentation varies based on the underlying cause and the volume of fluid accumulated. Patients may present with dyspnea, pleuritic chest pain, cough, or systemic symptoms such as fever and weight loss, depending on the precipitating condition.[6] Diagnosis involves a systematic approach integrating clinical assessment, imaging studies (chest X-ray, ultrasound, CT scan), and biochemical analysis of pleural fluid obtained via thoracentesis. The classification of pleural effusion as transudative or exudative guides further diagnostic evaluation and therapeutic management[6-8]

MATERIALS AND METHODS

This was a cross-sectional hospital-based study conducted to investigate pleural effusion among patients meeting specific criteria. A total of 100 patients who met the inclusion and exclusion criteria during the study period were enrolled. Inclusion criteria comprised patients of both sexes who had undergone clinical and radiological evaluations for pleural effusion, confirmed by pleurocentesis, and provided informed consent. Exclusion criteria included hemodynamically unstable patients and those who had previously undergone pleurocentesis and were already on treatment.

METHODOLOGY

All patients underwent detailed interviews to gather comprehensive background information and were examined according to a predefined protocol. Diagnostic evaluations included chest X-rays, chest radiographs, pleural fluid analysis, and routine physical examinations. Each patient's pleural effusion

was initially classified as transudate or exudate based on clinical assessment. Biochemical analysis included pleural fluid cytology for malignant cell detection, microbiological tests (Gram staining, acid-fast bacilli [AFB] staining, and culture in selected cases), and biochemical tests such as adenosine deaminase (ADA) estimation. Pleural biopsy for histopathology and mycobacterial culture was performed in selected cases. Sputum examinations included AFB staining and, in selected cases, mycobacterial culture, as well as Gram stain and pyogenic culture. Fine-needle aspiration cytology (FNAC) or biopsy of lymph nodes or swellings was conducted as necessary. Serum and pleural fluid amylase and lipase levels were assessed in selected cases. Imaging studies such as CT scans and ultrasonography of the thorax or abdomen were performed when indicated. Additional diagnostic procedures, including image-guided FNAC, fiber optic bronchoscopy (FOB), and biopsy, were performed in cases where further etiological clarification was required. Light's criteria were employed to accurately differentiate between exudates and transudates. Pleural fluid was classified as an exudate if it met one or more of the following criteria: pleural fluid protein divided by serum protein >0.5, pleural fluid LDH divided by serum LDH >0.6, or pleural fluid LDH greater than two-thirds of the upper limit of normal serum LDH. All patients underwent comprehensive diagnostic evaluations to establish an etiological diagnosis systematically.

RESULT

Table 1: Incidence of Pleural Effusion according to age group

Age group	Number	Percentage
21-30	4	4
31-40	10	10
41-50	39	39
51-60	30	30
61-70	15	15
> 70	2	2

In the present study, maximum incidence of pleural effusion was found in the age group 41-50 years (39%) followedby 51-60 years (30%).

Table 2: Incidence of Pleural Effusion according to Sex

Sex	Number	Percentage
Male	73	73
Female	27	27

In the present study**,** it was observed that, male (73%) is predominance than female (27%)

Table 3: Distribution of cases according to etiology

Etiology	Number	Percentage
Exudative		
Tuberculosis	59	59
Malignancy	25	25
Pyogenic	6	6
Transudative		
Cardiac failure	10	10

In the present study, out of 100 cases, 90 cases were exudates and 10 cases were transudates. The most common etiology of pleural effusion was tuberculosis (59%) and cardiac failure (10%).

DISCUSSION

In the present study, the incidence of pleural effusion was maximum in the age group 41-50 years (39%). In another study reported that, majority of their cases (29.6%) below 20 years of age.[4] Pleural effusion was commonly seen in male (73%). Cases of pleural effusion have been studied earlier and their male outnumbered the female [4]. Similar observation also made by Sharma et al [5]. Most common cause pleural effusion was tuberculosis (59%), followed by malignancy (25%), pyogenic (6%),and. cardiac failure (10%). Bintcliffe et al. conducted study at Bristol (UK) of 327 patients with non-malignant effusions referred to a tertiary pleural service for further investigation over a 5-year period. Data demonstrates the distribution of possible aetiologies after effusions caused by malignancy or trauma have been excluded, such as pleural infection in 131 patients (40%), congestive cardiac failure in 81 patients (34.8%), idiopathic pleuritis/undiagnosed in 41 patients(12.5%), benign asbestosis pleural effusion in 27(8.3%) patients, liver cirrhosis in 13(4%) patients, renal failure in 10 patients(3.1%), pulmonary embolism in 6 (1.8%) patients, post CABG in 4(1.2%) patients [6]. In the present study, 78 (75%) cases are having non malignant pleural effusion, such as pleural infection in 68 patients (65%), congestive cardiac failure in 10 patients(10%). Bintcliffe et al. study reveals that, pleural infections and congestive cardiac failure constitutes 74.8% of causes of pleural effusion, whereas in the present study reveals that, pleural infections and congestive cardiac failure constitutes 75% . In present study, pleural infections constitute the major cause for pleural infection (65%), whereas, in Bintcliffe et al. study, pleural infections(40%) and congestive cardiac failure (34.8%) toghther constitutes major causes of pleural effusion [6]. In present study, pleural infections constitute major cause for pleuralinfection, because Tuberculosis is the commonest and more prevalent communicable disease in India. Walker et al stated, Pleural effusions secondary to a non malignant aetiology can represent significant morbidity and mortality. These non malignant pleural effusions (NMPE) are common, with congestive heart failure (CHF) representing the leading cause. Despite this, there is limited data on mortality risk and the factors which influence them [7].Walker et al studied on 782 patients, 356(46%) were diagnosed with a NMPE. These patients had a mean age of 68(SD17) with 69% of patients male. This is the largest prospectively collected series in patients with NMPE, demonstrating that those secondary to organ dysfunction have an extremely

high 1-year mortality. In addition, the presence of bilateral and transudative effusions are an indicator of increased mortality. In present study, the major causes of Non malignantpleural effusions are pleural infections which accounts for 65%, and congestive cardiac failure which accounts for 10%., In walker et al study, the majority of NMPE were exudative (73%), unilateral (88%) with pleural infection being the commonest aetiology (40.6 %) [7]. In Shimon Izhakian et al study, (73.7%) were diagnosed with exudative effusion, and 44 (18%) were diagnosed with transudative effusion, whereas in present study, exudates are 90% , and 10% cases were transudates [8]. In the present study, the major cause for exudative pleural effusion is tuberculosis 59% , whereas in Shimon Izhakian et al study, the major cause for exudative pleural effusion is malignant effusion 53.1% [8].Nick Maskell et al study is the first to establish the prevalence of more than one identifiable cause for a unilateral pleural effusion. Out of 130 study subjects, 38 (30%) had multiple causes for an effusion. The identification of multiple pathologies underlying an accumulation of fluid in the pleural space may be important in determining optimum treatment and improving patients' symptoms [9]. But, in present study all 100 cases had a single cause for their pleural effusion. Hence, present study did'ntestablish the prevalence of more than one identifiable cause for a unilateral pleural effusion.Yuanyuan Liu et al stated that, the differential diagnosis of tuberculous pleural effusion (TPE) and malignant pleural effusion(MPE) remains difficult despite the availability of numerous diagnostic tools [10]. In present study, 59% of patients are having tuberculous pleural effusion, whereas in YuanyuanLiu et al study, 68.4% of patients are having tuberculous pleural effusion [10]. In both studies, major cause of pleural effusion is Tuberculosis, and second most common cause is malignancy. Our study result is concordant with results observed by Jindal,[11] Valdés.[12]The definitive diagnosis of pleural malignancy depends upon histological proof obtained via pleural biopsy. SPB (standard pleural biopsy), US-CNB (ultrasound (US)-guided cutting- needle biopsy) and thoracoscopy are techniques commonly utilised for the acquisition of pleural tissue[13]. In study done by Jinlin Wang on 172 patients, reported that, Malignant pleural effusions are 90 (52.3%) patients while non-malignant pleural effusions are 82 (47.7%) patients. Whereas in present study, malignant pleural effusions are 25%, non malignant pleural effusions are of 75% [14].In Jinlin Wang et al study, malignancy is the major cause of pleural effusion, whereas in present study, pleural infections i.e; tuberculosis is the major cause of pleural effusion [14]. In Jinlin Wang et al study, Pleural tuberculosis is the second most common cause of pleural effusion, whereas in present study, malignancy is the second most common cause of pleural effusion [14].

CONCLUSION

Every case of pleural effusion should be meticulously investigated in order to arrive a diagnosis and to proceed for specific therapy, specific treatment may be started earliest.

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