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" *Clinical Presentations and Complications among Patients with Undiagnosed Exudative Pleural Effusion* "

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ABSTRACT:

Background: Pleural effusion is a common clinical finding with diverse causes, including congestive heart failure, parapneumonic effusion, and tuberculosis. When etiology remains unknown, it poses significant diagnostic and management challenges.

Aim: To describe clinical presentations and complications in patients with undiagnosed exudative pleural effusion.

Patients & Methods: This prospective, single-center interventional study included 100 adults (>18 years) with undiagnosed exudative pleural effusion presenting to Suez Canal University Teaching Hospital, Cardio-thoracic Department, Clinic, and Emergency Unit between July 2022 and December 2023. Exclusion criteria were bleeding diathesis, severe COPD, unstable cardiovascular disease, trapped lung, and inoperable transudative effusion. Collected data included demographics, medical history, and clinical evaluation.

Results: Dyspnea was the most common symptom (95.0%), followed by cough (47.0%), chest pain (44.0%), weight loss (42.0%), and fever (40.0%). Adverse events were rare: subcutaneous emphysema occurred in 2.0% of patients, fever in 3.0%, and pleural space infection in 1.0%.

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Conclusion: Dyspnea is the predominant presentation of undiagnosed exudative pleural effusion, with other symptoms including cough, chest pain, weight loss, and fever. Complications are infrequent, with a low incidence of subcutaneous emphysema, fever, and infection, suggesting a generally safe clinical course in this patient group.

Key words: Dyspnea, Complications, Clinical Presentations, Undiagnosed Exudative Pleural Effusion

Introduction

Among all pleural disorders, pleural effusion is the most prevalent, affecting 1.5 million individuals annually in the US. Pleural effusions can be a symptom of many different diseases, such as those that primarily affect the lung, such as pneumonia or asbestos exposure; diseases that are primarily systemic, such as lupus or rheumatoid arthritis; or the pleural manifestation of diseases that primarily affect other organs, such as pancreatitis or congestive heart failure; or diseases that are local to the pleura, such as mesothelioma & pleural infections [(1)].

Depending on the impairment of thoracic excursion, a patient with pleural effusion may appear with exertional dyspnea or be asymptomatic. Sharp, intense, localized crescendo/decrescendo pain when breathing or coughing is a symptom of pleurisy, an active pleural inflammation. Pain may lessen as the effusion grows, giving the impression that things are getting better. Another defining feature of cancerous conditions like mesothelioma is persistent discomfort. A cough, fever, & systemic symptoms may also be reported by the patient, depending on the origin of the effusion [(2)].

The underlying condition has a significant influence on the pleural effusion's presenting symptoms [(3)].

Many people don't have any symptoms that are exclusively related to the effusion. If such symptoms are present, they indicate a disruption of gas exchange, a limitation of pulmonary mechanics, or an inflammatory reaction of the pleura [(4)].

Pleuritic pain, which is mediated by the parietal pleura (the visceral pleura lacks nociceptors & nociceptive nerve fibers), is the most prevalent sign of a pleural inflammatory response [(5)].

Aim

This study aimed to describe clinical presentations & complications in patients with undiagnosed exudative pleural effusion.

Patients & Methods

This is a prospective, single-center interventional study. The sample aim was met by collecting data from one hundred (100) patients with undiscovered exudative pleural effusions at Suez Canal University Teaching Hospital, Cardio-thoracic Department, Cardio-thoracic Clinic, & Emergency Unit within a designated time period

(July 2022–December 2023). obtaining analytical & histological data & following up with those patients after thoracoscopy. Patients who attended Suez Canal University Teaching Hospital between July 2022 & December 2023 & whose exact diagnosis was not possible using traditional diagnostic methods were known to have exudative pleural effusion.

People over the age of 18 with undetected pleural effusion & exudative pleural effusion were included in the research. Patients who had transudative pleural effusion for any reason (cardiac, hepatic, renal, etc.), were deemed unsuitable for surgery (high coagulation profile, advanced uncontrolled chronic illnesses, advanced cancer cases), had trapped lung syndrome, unstable cardiovascular diseases, severe chronic obstructive pulmonary disease, bleeding diathesis, etc., were excluded from the study. A thorough history, clinical examination, & chest examination were performed on each patient.

Statistical analysis of the data

The data was collected & processed using SPSS version 27.0. Quantitative data was shown as means ±SD, whereas qualitative data was displayed as numbers & percentages. Statistical significance was defined as a P value of less than 0.05. Patients who met the admission criteria were transferred from Suez Canal University Hospital's emergency room or cardio-thoracic clinic to the cardio-thoracic surgery department.

Results

Of the participants, sixteen percent had diabetes mellitus & twenty-four percent had hypertension. Dyspnea was the most prevalent symptom, reported by 95.0% of the patients, followed by fever (49.0%), cough (47.0%), chest pain (44.0%), & weight loss (42.0%).

Table 1: The clinical data of patients in this study

Variables	**All patients (n = 100)**	
Symptoms		
Dyspnea n (%)	95	95.0%
Fever n (%)	49	49.0%
Cough n (%)	47	47.0%
Chest pain n (%)	43	43.0%
Loss of weight n (%)	42	42.0%
Signs		
Heart rate Mean ± SD.	76.64 ± 25.69 77.50 (51.00 - 98.00)	

Median (IQR)	
Respiratory Rate Mean ± SD. Median (IQR)	20.98 ± 5.10 21.00 (17.00 - 25.00)
SBP Mean ± SD. Median (IQR)	92.79 ± 7.41 94.00 (76.50 - 109.00)
DBP Mean ± SD. Median (IQR)	72.68 ± 10.43 72.50 (63.00 - 81.00)

IQR: **Inter quartile range** , SD: **Standard deviation**.

Table (1): With 95.0% of the patients reporting it, dyspnea was the most common symptom, followed by fever (40.0%), cough (47.0%), chest discomfort (44.0%), & weight loss (42.0%). The mean heart rate for the clinical symptoms was 76.64 beats per minute, with a median of 77.50 & a standard deviation of 25.69. The median respiratory rate was 21.00, the standard deviation was 5.10, & the mean was 20.98 breaths per minute. The mean systolic blood pressure was 92.79 mmHg, with a median of 94.00 mmHg & a standard deviation of 7.41. The median diastolic blood pressure was 72.50 mmHg, the mean was 72.68 mmHg, & the standard deviation was 10.43.

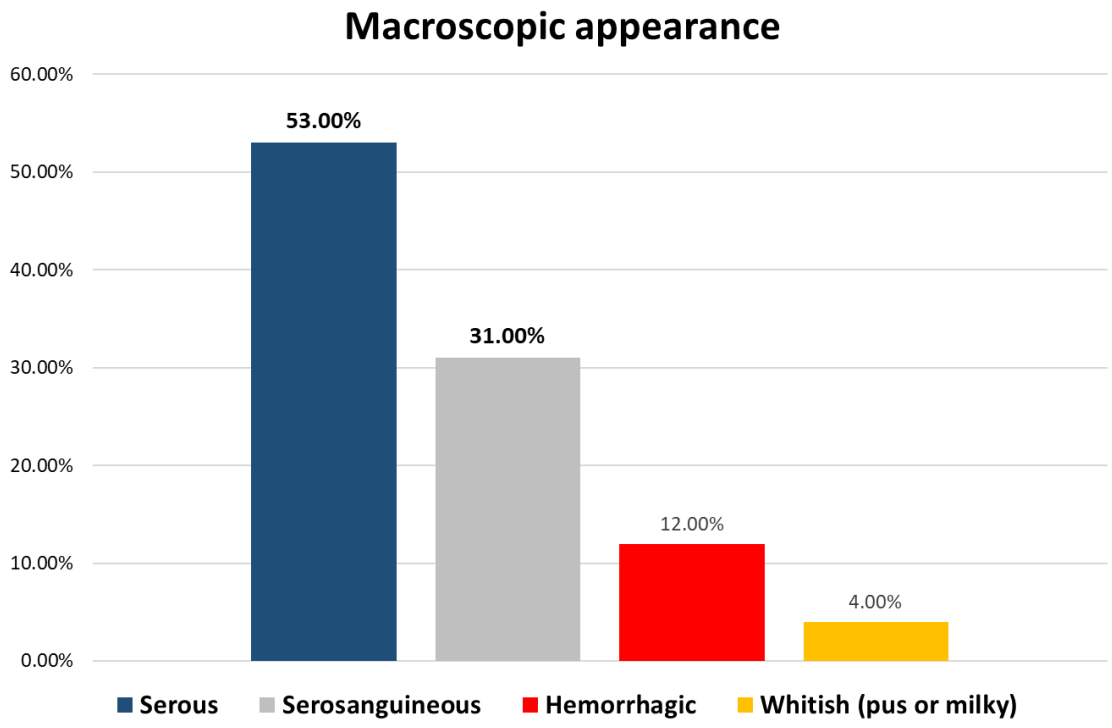

Figure 1: Macroscopic appearance of patients in this study

Table 2: Complications of patients in this study

Variables	All patients (n = 100)	
Subcutaneous emphysema	2	2.0%
Fever	3	3.0%
Air leak	1	1.0%

Regarding complications, only a few patients experiencing adverse events. Subcutaneous emphysema was observed in 2.0% of patients. Fever was reported in 3.0% of cases, 8 the chest cavity, was encountered in 1.0% of patients (Table 2), (Figure 2).

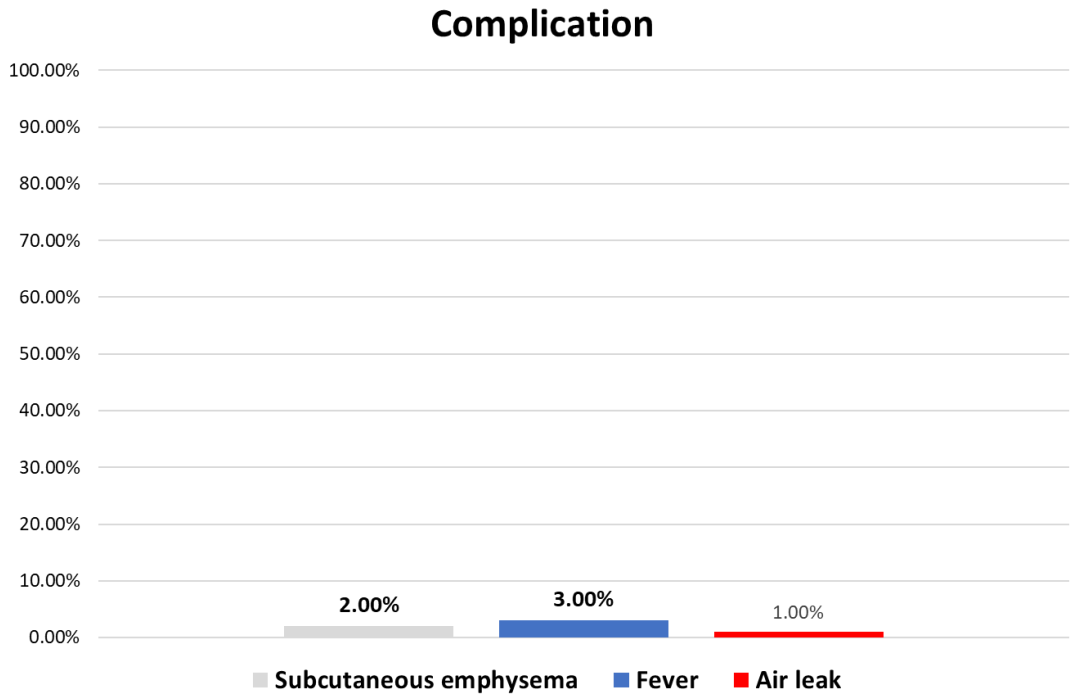

Figure 2: Complications of patients in this study

Discussion

For pulmonologists & thoracic surgeons, the diagnosis of pleural effusion is crucial due to its diverse clinical presentation & several etiologies, which may range from a simple inflammatory response to more dangerous conditions including cancer & TB [6].

Although there are many causes of pleural effusions, congestive heart failure, cancer, pneumonia, & pulmonary embolism are the most frequent ones [7]. Apart from mesothelioma, pleural metastatic carcinomas of the lung, breast, & lymph nodes are frequent causes of malignant pleural effusion [8]. In contrast, TB is the most

frequent cause of benign pleural effusion. According to reports, an effusion is expected to occur in 16.7% of MPE patients throughout their illness [9], 15% upon presentation, 50% during lung cancer & 90% during malignant pleural mesothelioma [10].

Unknown pleural effusion is still a common issue with significant ramifications. The cause of a pleural effusion may not be identified even after a patient has had a thorough diagnostic assessment. Both blind pleural biopsy & pleural fluid experiments have drawbacks. Only 60–80% of individuals with metastatic pleural involvement & 20% of patients with mesothelioma may be diagnosed with cytological investigation [11].

Because pleural metastases often occur at inaccessible places, a second closed pleural biopsy may only boost the diagnostic yield in malignancy by around 10% [12].

According to Kotb et al.[13], 13% of patients had heart issues, while 23% had diabetes & hypertension.

In this study, 95.0% of patients reporting it, dyspnea was the most common symptom in our research. Fever (40.0%), cough (47.0%), chest discomfort (44.0%), & weight loss (42.0%) were the next most common symptoms. With 55.0% on the right side, 36.0% on the left, & 9.0% bilaterally involved, the radiological evaluation using chest X-rays shows the distribution of pleural effusion. 39.0% of the effusions were categorized as mild, 43.0% as moderate, & 18.0% as huge, according to the macroscopic examination, which showed a wide range of effusion sizes. Serous (53.0%), serosanguineous (31.0%), hemorrhagic (12.0%), & white (pus or milky) (4.0%) were among the variations in macroscopic appearance.

This is consistent with the Abdelmotaleb [14] research, whereby 54 patients (51.43%) reported dyspnea as their most prevalent complaint. The most frequent radiographic abnormalities were pleural thickening in 42 patients (40%) & right free pleural effusion in 45 individuals (42.86%).

This is consistent with the findings of the Kotb et al. [13] research, which indicated that dyspnea was the most prevalent symptom (81%). 69% of patients had a right-side pleural effusion, & 71% of patients had a large pleural effusion. In 39.5% of cases, the pleural effusion was hemorrhagic; in 21%, it was straw in color. All of the patients had pleural effusion, according to the CT results, & the majority of them (65%) exhibited pleural thickening.

Additionally, it is consistent with Dadaş et al.[15], who showed that dyspnea accounted for 66.5% of all complaints. 49 patients (54.4%) had pleural thickness less than 5 mm, while 41 patients (45.6%) had pleural thickness more than 5 mm. 17 patients (18.8%) had mediastinal lymph nodes, while 17 patients (18.8%) had pleural nodules. Furthermore, Salim & Torky [16] showed that 38 patients (42.2%) had mild & mild to moderate pleural effusions, whereas 52 patients (57.8%) had severe to major pleural effusions.

Additionally, the majority of patients (60%) presented with PE, followed by pleural effusion & thickening in 40% of cases & pleural-based nodules or masses in 20% of cases, according to Brun et al.[17]. Therefore, the most frequent result on computed tomography of patients was pleural effusion, which was followed by pleural thickening or pleural nodules.

According to Karki et al. [18], coughing was the most common symptom among all 82 patients. Only one male patient had bilateral pleural effusion, whereas 64.6% of patients had left-sided pleural effusion. Just twelve individuals had enormous effusions, eight of whom had malignant effusions, one of whom had TB, & three of whom had no diagnosis. There was yellow-colored fluid in 60 individuals (50 of whom had tubercular etiology) & hemorrhagic effusion in 22 patients (15 of whom had malignant etiology).

According to the Hassanein et al. [19] research, 34 patients (56.7%) had a right-sided pleural effusion on their chest X-ray, 25 patients (41.6%) had a left-sided pleural effusion, & one patient (1.7%) had a bilateral pleural effusion. Eleven patients (18.3%) had pleural collection that was characterized as modest for pleural effusion on the chest x-ray. Of the patients, 31 (51.7%) had moderate effusion. In 18 (30%), a large/massive pleural effusion was found.

Therefore, we could conclude from both trials that the right side had a higher prevalence of exudative pleural effusion. This is often connected to the underlying causes of exudative effusions, which might affect both sides or preferentially impact the right, such as infection, cancer, or congestive heart failure .

Similar to this, dyspnea was the most prevalent symptom among the patients in Yousef et al. [21] research of patients with undetected pleural effusion (100%). Chest discomfort (91.7%), cough (72.2%), expectoration (30.6%), weight loss (13.9%), & fever (5.6%) were the next most frequent symptoms.

The results of Prabhu & Narasimhan [22] also supported this, as they found that dyspnea was the primary complaint of the pleural effusion patients they studied. In the study by Sobh et al. (2020), dyspnea was the most common symptom, followed by pleuritic chest pain. In terms of patient complaints, Almashtouly et al. [23] discovered that 15 patients (37.5%) had chest discomfort & 33 patients (57.3%) experienced dyspnea.

According to earlier research, dyspnea, coughing, & pleuritic chest discomfort are typical signs of pleural effusion [24]. A local pleural process is indicated when pleuritic chest discomfort is present in pleural effusion instances. Regarding the afflicted side, 51 patients had a right pleural effusion & 23 patients had a left pleural effusion in the research by Özkaya et al.[25].

Conclusion

The most common symptom, as reported by the patients was dyspnea followed by fever, cough, chest discomfort, & weight loss. Only a small number of individuals in the research group had adverse events, indicating a low incidence of problems. Two percent of patients had subcutaneous emphysema, which shows that there is air under the skin. In 3.0% of instances, fever was noted, indicating an inflammatory reaction.

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