# Value of Chest Ultrasound in Pleural Effusion

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## ABSTRACT

Pleural ultrasound is complementary to other imaging techniques. It has many advantages: it is dynamic, non-irradiating, inexpensive, easy to implement. This is a prospective analytical study by the same operator grouping 63 cases who benefited from thoracic ultrasound in the context of a pleural disease.

71.9% men and 28.1% women, with an average age of 40.58 years. The main respiratory symptom in our series was dyspnea (87.5%), 75.0% of patients had chest pain, 15.6% had a history of neoplastic disease, 53.1% had an atypical radiograph whose ultrasound guidance allowed to locate pleural effusion with a single puncture attempt, regarding the location of the effusion; a predominance right 57,8%, 40.6% left and 1.6% of effusions were bilateral. Regarding the ultrasound aspect of effusions: 90.6% effusion was anechogenic, 37.5% effusion were cloistered, 6.3% effusion was echogenic, the risk of complications specially pneumothorax, hemopneumothorax and hemorrhage was null. The thoracic ultrasound is still fast, harmless and with low cost for detection, monitoring and identification of pleural diseases, reducing the risk of thoracocentesis.

**Key-words**: Pleural Ultrasound -Thoracic Ultrasound - Pleural Effusion - Ultrasound-Guided Thoracentesis - Pleural Disease – Dyspnea - Chest Pain - Anechoic Effusion - Echogenic Effusion - Pneumothorax – Hemopneumothorax.

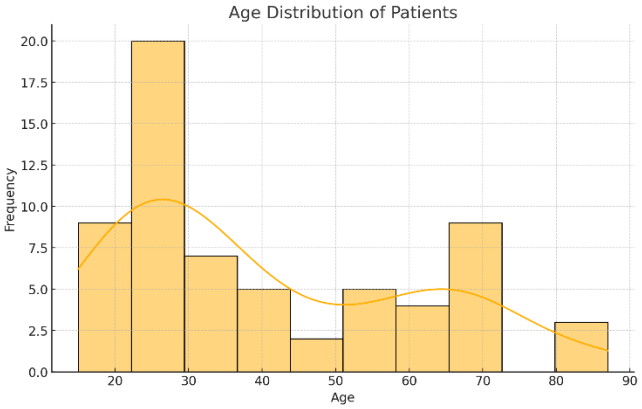
## INTRODUCTION

Pleural diseases are frequent in clinical practice, often presenting with varied etiologies. Among the diagnostic tools, Thoracic ultrasound has become an important imaging modality besides chest radiography and computed tomography in the evaluation of pleural effusions and other related pathologies (1) (2). One of the primary advantages of pleural ultrasound is its ability to provide real-time, Bedside availability and ease of use, dynamic imaging without exposing the patient to radiation, making it particularly suitable for repeated evaluations.(3) Furthermore, ultrasound-guided pleural interventions have been shown to reduce complications, such as iatrogenic pneumothorax, when compared with blind procedures(4).These advantages are particularly beneficial in settings where resources may be limited or when immediate decisions regarding patient management are required (5).

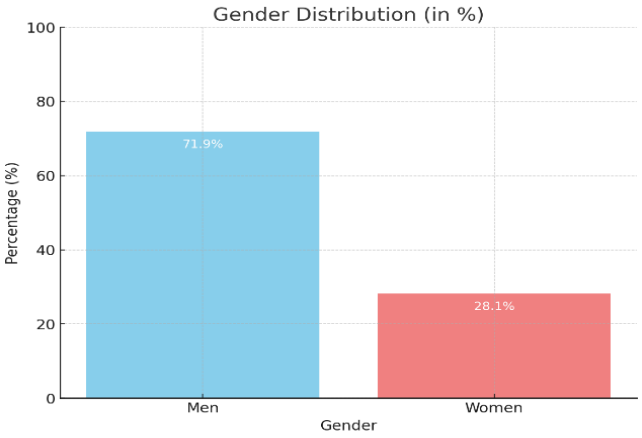
The present prospective analytical study of 63 cases aims to demonstrate the diagnostic and interventional utility of pleural ultrasound in patients with suspected pleural diseases. By detailing the outcomes of ultrasound examinations—focusing on its diagnostic accuracy, safety, and ease of use— this study aims to further establish thoracic ultrasound as a fundamental component in the workup and management of pleural pathologies.

## RESULTS

Most patients are aged between **25 and 57 years**. The mean age is **40.6 years**, with a minimum of **15 years** and a maximum of **87 years**.




**Age distribution of patients**

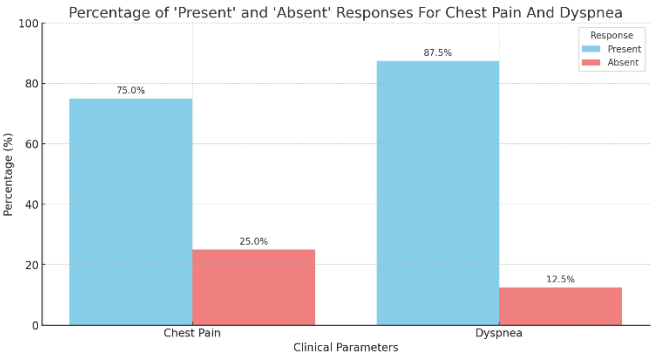



Gender distribution

For the gender distribution, the majority of patients were men (71.9%).

Clinical symptoms:

Chest Pain is Present in 75.0% of cases and Absent in 25.0%. Dyspnea Is Present in 87.5% of cases and Absent in 12.5%




For the radiological Findings:

57.8% of cases have a Right-Sided pleural effusion and about 40.6% of cases in the left side, The remaining cases have a bilateral pleural effusion

90.6% of cases have Anechoic Effusion which indicate a simple fluid collection that are typically transudative or uncomplicated exudates. Echogenic Effusion is Present in 9.4% of cases. 37.5% of patients have a Loculated Pleural Effusions (figure 1).

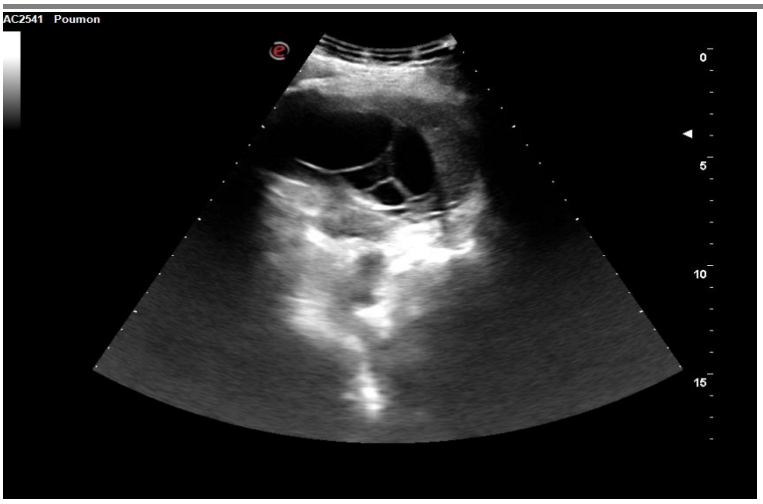



Figure 1: Loculated Pleural Effusions

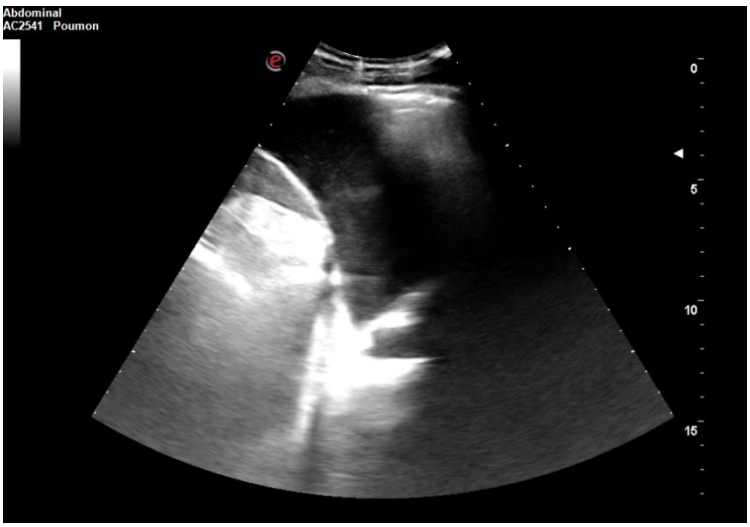



Figure 2 : anechoic pleural effusion

The results suggest that most patients are in the middle age group, with a predominance of right-sided effusions. Dyspnea and thoracic pain are the most frequent symptoms. The correlation analysis does not reveal any significant relationship between age and the number of puncture attempts, suggesting that age does not influence procedural success.

The p-value (0.48) is greater than the commonly used significance level of 0.05, indicating that **there is no significant association** between the number of thoracocentesis attempts and the presence of atypical radiographic findings. Thus, the number of puncture attempts does not appear to be influenced by whether the patient had an atypical radiograph.

## DISCUSSION

The results of this study are consistent with many similar studies which draw attention to the advantages of ultrasounds, especially their non-ionizing nature, real-time imaging, and affordability(6,7). The high proportion of male patients (71.9%) The average age was around 40–50 years in several studies,(8) the predominant symptoms of dyspnea and chest pain in our study are consistent with others epidemiological data on pleural effusions (8).

Our study also shows that ultrasound guidance facilitated successful identification of pleural effusions, even in cases of atypical radiographs (53.1%), It helps with precise puncture and the correct placement of needle in the correct space in addition it allows a single puncture attempt. These founding results align with previous research

which show that ultrasound guidance significantly improves the rate of thoracentesis while reducing complications such as pneumothorax and hemorrhage (9,10).

Concerning the laterality of effusions, the results showed clearly the presence of a predominance of right-sided effusions (57.8%), followed by left-sided effusions (40.6%) and bilateral effusions (1.6%). This distribution aligns with others studies in literature indicating that right-sided effusions are more common in various pleural effusion etiologies, including malignancy and infectious processes (11).

The ultrasound description of pleural effusions in our study showed that 90.6% were anechoic, 37.5% were septated, and 6.3% were echogenic. These findings are comparable to existing literature describing that anechoic effusions are typically transudates or uncomplicated exudates, whereas echogenic or complex septated effusions are more frequently associated with infections or malignancies (12,13). The absence of complications in our study supports previous evidence that ultrasound-guided pleural procedures are safer than blind techniques. (14)

## CONCLUSION

Our study reinforces the established role of pleural ultrasound as a reliable, safe, and efficient tool in the diagnosis and management of pleural diseases. Its ability to guide thoracentesis with high accuracy and minimal risk of complications underscores its importance in clinical practice. Future studies with larger sample sizes and direct comparisons with other imaging modalities will further elucidate its advantages and potential limitations.

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