

ORIGINAL ARTICLE

Rate of Pneumothorax in Patients Undergoing Large Volume Thoracentesis

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ABSTRACT

Objective: To determine the frequency of pneumothorax in patients undergoing large volume thoracentesis.**Study Design:** Prospective study**Place and Duration of Study:****Methodology:** One hundred and twenty patients of both genders were presented in this study. Patients were aged between 18 to 75 years of age. Patients details demographics age, sex and body mass index were recorded after taking informed written consent. Ultrasound was performed among all patients to diagnosed pleural effusion >1000 ml. Patients were underwent for thoracentesis in large volume. Outcomes were prevalence of pneumothorax and amount of fluid aspirated were assessed.**Results:** Seventy (58.3%) patients were males and 50 (41.7%) were female patients. Mean age of the patients was 36.9±13.65 years with mean BMI 25.7±6.26 kg/m². Frequency of pneumothorax was 22 (18.3%) and was increases with a number of multiple attempts by passing needle. Among 22 cases, 4 (18.2%) patients had pneumothorax by passing single needle for fluid aspirated.**Conclusion:** Frequency of pneumothorax was high in patients with thoracentesis. In these instances, the risk of pneumothorax was mostly determined by the quantity of pleural fluid that was removed.**Keywords:** Pneumothorax, Thoracentesis, Pleural fluid

INTRODUCTION

For diagnostic and therapeutic purposes, thoracentesis is a popular operation. Experts believe it to be a low-risk and typically safe procedure. Pneumothorax during thoracentesis is associated with increased morbidity, mortality, and length of stay^{4,5}. Around 50 percent of patients with pneumothorax are forced to have chest tubes placed into their lungs, which adds to their length of stay and costs. Prior studies have shown that thoracentesis-related pneumothorax is a common complication. Pneumothorax was observed to occur in 0.61 percent of the 9,230 thoracentesis procedures studied⁸.

A decrease in thoracentesis-related pneumothorax has been attributed to ultrasound, which allows operators to analyse pleural effusion features and locate the most accessible location of pleural fluid. Pneumothorax associated with thoracentesis has been reported to occur in 4–30% of cases without ultrasound and in 1.3%–6.7% of cases with ultrasound¹⁰⁻¹². Pneumothorax is less common in patients who use US, according to further research¹³⁻¹⁵. It has not been established that real-time guidance for pneumothorax-related thoracentesis is superior to pre-procedural ultrasound.

The risk factors for pneumothorax-related thoracentesis have been studied. Underweight patients were shown to be more likely to suffer from pneumothorax¹⁶. Pneumothorax rates have been found to be higher in patients who have undergone many needle passes. Drainage volumes greater than 1,500 mL have been shown in the past to increase the risk of pneumothorax compared to drainage volumes less than 1,500 mL. The frequency of thoracentesis-related pneumothorax has also been shown to be associated with the level of operator expertise. Previous research found that experienced operators had a pneumothorax rate of 3.9%, whereas less-experienced operators had a rate of 8.5%.¹⁷

In patients who underwent large volume thoracentesis, the frequency of pneumothorax was assessed in order to establish a cut-off threshold for pneumothorax prevention. For future clinical guidelines, researchers hope to develop a safe volume of drainage that can be used as an example.

MATERIAL AND METHODS

This prospective study was conducted at Services Hospital and comprised of 120 patients. Following the receipt of informed written

consent, the patient's demographic information was recorded. Patients with chronic lung disease and those who did not provide written consent were barred from participating. Those that participated were between the ages of 18 and 75. After receiving informed written consent, the patient's demographic information, including age, gender, and body mass index, was recorded. In all patients with pleural effusion greater than 1000 mL, ultrasound was performed to confirm the diagnosis. A substantial number of patients were subjected to thoracentesis procedures. The prevalence of pneumothorax and the amount of fluid aspirated were the primary outcomes measured. The SPSS 24.0 version was used to examine the entire set of data.

RESULTS

Seventy (58.3%) patients were males and 50 (41.7%) were female patients. Mean age of the patient's were 36.9±13.65 years with mean BMI 25.7±6.26 kg/m². Most of the patients 45 (37.5%) were from age group 31-40 years followed by 37 (30.8%) among age group 41-50 (Table 1).

Table 1: Baseline details demographics of enrolled cases

Variables	No.	%
Mean age	36.9±13.65	
Mean BMI (kg/m ²)	25.7±6.26	
Gender		
Male	70	58.3
Female	50	41.7
Age group (years)		
18-30	25	20.8
31-40	45	37.5
41-50	37	30.8
>50	13	10.8

Frequency of pneumothorax was 22 (18.3%) and was increases with a number of multiple attempts by passing needle (Table 2)

Table 2: Prevalence of pneumothorax among all cases (n=120)

Pneumothorax	No.	%
Yes	22	18.3
No	98	81.7

Among 22 cases, 4 (18.2%) patients had pneumothorax by passing single needle for fluid aspirated and the rest were due to multiple attempts (Table 3)

Table 3: Association of pneumothorax with different attempts of needle (n=22)

No. of Attempts	No.	%
Single	4	18.2
Multiple	18	81.8

DISCUSSION

Pleural effusion is a symptom of a number of different disorders, both regional and systemic, including pneumonia, tuberculosis, and heart failure. Thoracentesis is a procedure that can be used to diagnose and treat a range of medical disorders. Iatrogenic pneumothoraxes associated with thoracentesis are associated with increased morbidity, mortality, and length of hospitalization. Chemotherapy and chest tube implantation are required in up to 50% of patients.¹⁸

Patients with a mean age of 36.9+13.65 years were included in this prospective study, which included 120 participants. The majority of the patients (58.3 percent) were males between the ages of 31 and 40 years old. These findings were comparable to those of prior research, in which the majority of patients were men between the ages of 30 and 40 years old.^{19,20} The current study found that the frequency of pneumothorax was 22 (18.3 percent), and that the frequency increased with the number of numerous attempts by passing the needle during the trial. Some investigations found that the frequency of pneumothorax was lower than that seen in our study. A survey of 255 people by Colt et al²¹ revealed that pneumothorax 12 occurred in 5.4 percent of those who took part. Jones et al discovered pneumothorax in 24 out of 941 thoracentesis procedures (2.5 percent). Raptopoulos et al¹⁵ discovered three cases of pneumothorax out of 188 ultrasound-guided thoracentesis procedures, resulting in a 3-percent incidence rate.

In accordance with Gordon et al²², the overall pneumothorax rate was 6 percent, with pneumothorax rates ranging from 0 percent to 19.2 percent in other studies. It is possible that the greater rate of incidence is due to the restricted usage of ultrasonography guiding during thoracentesis at our facility. Similar to our findings, Patel et al²³ discovered a pneumothorax rate ranging from 4.0 to 30.3 percent, which matches to the range of our data. In this study, there were two groups: one that received ultrasound guidance and another that did not. This could explain the vast range of outcomes, which ranged from extremely low to highly high in this study. We did not employ ultrasound to evaluate the pleural tape in our experiment.

Pneumothorax was found in four patients (18.2 percent) in the current study, four of whom were caused by a single needle being used to aspirate fluid, while the remainder were caused by multiple efforts.²⁴ Pneumothorax is more likely to occur if the number of passes is increased. In a study published in 2013, Lichtenstein et al²⁵ found that the rate of pneumothorax was greater in surgical procedures involving two or more passes than in procedures requiring only one pass. An increase in the number of passes equal to or greater than 2 is associated with an increased risk of pneumothorax. An investigation into the relationship between pleural fluid drainage volume and the development of pneumothorax revealed that it was significantly related. To reduce the risk of pneumothorax, the British Thoracic Society (BTS) recommends that thoracentesis be stopped after 1,500 mL of fluid has been sucked. This finding is in accordance with BTS recommendations.²⁶

CONCLUSION

Some of the effects of thoracentesis include pneumothorax, re-expansion of pulmonary edema, and bleeding, among others. Pneumothoraxes that are larger or more severe may require

aspiration or treatment with a chest tube, which may result in an extended hospital stay for the patient. As a result of our investigation, we discovered that pneumothorax was prevalent among individuals undergoing thoracentesis. In these circumstances, the amount of pleural fluid that was evacuated was the most important factor in determining the risk of pneumothorax.

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