ORIGINAL ARTICLE

Fluid volume as a predictor of pneumothorax after ultrasound-guided thoracocentesis

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ABSTRACT

Background and Objective: Pneumothorax, the accumulation of air between pleural layers, may occur spontaneously, post-traumatically, or iatrogenically after thoracocentesis. Although ultrasound guidance reduces its incidence, complications remain, particularly with large fluid volumes. Evidence on the link between aspirated volume and pneumothorax risk is conflicting. This study investigated the frequency of pneumothorax after ultrasound-guided thoracocentesis and its association with fluid volumes ≤1,000 ml and >1,000 ml in patients with pleural effusion.

Methods: A cross-sectional study was conducted at Memon Medical Institute Hospital, Karachi, from February to August 2024. A total of 266 patients, aged 20-60 years, with pleural effusion undergoing ultrasound-guided thoracocentesis were included and divided into Group A (≤1,000 ml) and Group B (>1,000 ml), with Group B subdivided into B1 (1,000-1,500 ml) and B2 (>1,500 ml). Data were analyzed using SPSS, and the association between fluid volume and pneumothorax was assessed using a chi-square test ($p < 0.05$).

Results: The mean age of the patients was 49.55 ± 7.63 years. Pneumothorax occurred in 8.6% of patients, with 4.5% in Group A and 12.7% in Group B. Subgroup B1 and B2 had 6.9% and 19.6% cases. Males had a higher frequency (82.35%) than females (52.94%). Fluid aspiration ranged from 550 to 950 ml in Group A (mean 778.3 ± 160.8 ml) and 1,250-2,000 ml in Group B (mean 1,669.4 ± 253.9 ml). A significant association was found between fluid volume and pneumothorax ($p < 0.05$).

Conclusion: Pneumothorax after ultrasound-guided thoracocentesis was significantly associated with larger aspirated fluid volumes, particularly >1,500 ml. Caution is advised when removing high volumes to minimize the risk.

Keywords: Pneumothorax, thoracentesis, interventional ultrasonography, pleural effusion.

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