COMMENTARY

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Changes to practice may help avoid 'double trouble'

LARGE-VOLUME THORACENTESIS is defined as the drainage of more than 1 L of fluid. Inherent in this procedure is the removal of a large amount of fluid from a cavity with a rigid wall, which leads to changes in pleural pressure and to expansion of the lung. Two specific complications occur, pneumothorax and reexpansion pulmonary edema. The images submitted for the Clinical Picture article by Drs. Apter and Aronowitz in this issue of the *Journal* highlight these complications.

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Retrospective studies have found an association between the amount of fluid drained and the incidence of pneumothorax.[1,2] Although technical issues may account for it (eg, needle injury to the lung that leads to postprocedural pneumothorax), the available evidence suggests that it has more to do with the drainage of larger volumes than the lung can expand to fill.[3,4] That is, the patient's lung cannot expand,[5] so drainage creates a vacuum, and air enters the pleural space[3] through the lung parenchyma, or perhaps from around the drainage catheter.

In a series of patients who underwent therapeutic thoracentesis,[3] 23 (8.7%) of 265 patients had pneumothorax. Interestingly, some patients had only symptoms, some had only excessively negative pressures (< 25 cm H_2O), some had both, and some had neither. Thus, there does not seem to be a reliable sign or symptom of an unexpanding lung, but pleural manometry may help increase its detection.[6] This technique, however, is rarely used in clinical practice.

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Another consequence of therapeutic thoracentesis is reexpansion pulmonary edema. This rare condition occurs only after large-volume thoracentesis or evacuation of a moderate to large pneumothorax.[7] The pathophysiology behind this is controversial.[8] As with pneumothorax, a large case series did not find a correlation between volume removed or pleural pressures and reexpansion pulmonary edema.[7] Experimental data and analysis of case series[8–10] suggest that the duration of lung collapse and the speed of drainage and negative pressure applied contribute to the development of edema. Vacuum bottles are often used to speed drainage and to contain the large amount of fluid drained. These bottles have an initial negative pressure of about −723 mm Hg (personal communication with Baxter Healthcare Product information line), which may lead to rapid changes in lung volume and perhaps to higher negative pleural pressures.

Understanding physiologic changes in the lung and pleural space when draining large effusions may help avoid double trouble

Given the risks discussed above, we believe it is appropriate to avoid vacuum bottles and instead to use the syringe and one-way valve supplied in most thoracentesis kits. Further, pleural manometry to detect changes in pressure that suggest an unexpandable lung may lead to the appropriate early termination of a planned large-volume thoracentesis.[3] The complications reported by Drs. Apter and Aronowitz are relatively rare and, at this point, unpredictable; therefore, generating high-quality evidence for prediction or management will be difficult. In the meantime, understanding the physiologic changes in the lung and the pleural space when draining large effusions from the chest may help avoid double trouble. ■

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