Arch Bronconeumol. 2012;48(8):265–266

ARCHIVOS DE BRONCONEUMOLOGIA

www.archbronconeumol.org

Editorial

Pleural Ultrasound Applications☆

Aplicaciones de la ecografía pleural

M. Victoria Villena Garrido

Servicio de Neumología, Hospital Universitario 12 de Octubre, Madrid, Spain

The study of the pleural cavity with imaging methods made important advances some years ago with the development of computed tomography (CT), the important improvements made in its resolution capacity[1,2] and more recently the advent of positron emission tomography, which can be especially useful in the staging and prognosis of pleural mesothelioma or for detecting pleural metastases.[3,4] The evaluation of the pleural cavity with ultrasound has been part of the clinical assessment of these patients for more than 40 years as a complementary method to other radiological techniques available. In the last 10 years, however, ultrasound has presented a substantial change in its clinical use. It has gone from its almost exclusive use by specialists in radiology to being widely used by different clinical specialists, such as cardiologists, digestive tract specialists, orthopedic surgeons and pulmonologists[5] or gynecologists, where its iconographic information has become better integrated into the clinical decision-making process,[6] without significantly reducing the thoracic ultrasound activity in radiology units.[7] In addition, in thoracic studies, there has been a considerable increase in the number of publications related with the recommended characteristics of ultrasound devices or transducers and with the characterization of the pleural space, including the presence of pleural masses or septa, or with the possible usefulness of this technique in the diagnosis of other pleural pathologies, such as pneumothorax.[8–11]

In order to study the pleural cavity, it is recommended to use a small-sized vector or convex ultrasound probe, with frequencies between 3.5 and 5 MHz; meanwhile, for the exploration of the chest wall, high-frequency linear probes are used. The information provided by the pleural ultrasound is complementary to other imaging methods; it can be superior to them for the resolution of some clinical problems (such as detecting the existence of septa and their location), and inferior in other instances. Nevertheless, ultrasound has 2 characteristics that definitively set it apart from the other methods: the lack of radiation of the patient and its portability. These characteristics mean that it can be used in different places without having to move the patient—such as in intensive care units, the OR, post-op reanimation, patient hospital rooms or in the ER[12–14]—and it may be repeatedly used as many times as necessary in order to evaluate the disease. It is, in addition, a less expensive technique than the other methods mentioned.

The main indications for ultrasound for studying pleural pathologies include:

- To detect the existence of pleural effusion. Ultrasound is able to detect up to 5 ml of pleural liquid, and its sensitivity increases when there are accumulations of more than 30 ml. Chest radiography usually requires an accumulation of at least 150 ml in order for it to be detected, and even greater quantities when done in supine decubitus. The ability of the ultrasound for distinguishing between pleural effusion and pleural thickening is high and comparable or superior to CT.
- To locate the existence of pleural masses or thickening.
- To guide thoracocentesis, transparietal pleural biopsy or the entry of the thoracoscope towards the best possible region with a greater quantity of pleural liquid or pleural masses, avoiding areas with walls, as it is most advisable.[15–17]
- To define the characteristics of the pleural liquid. The pleural effusion may present with established ultrasound characteristics, such as an anechoic, homogeneously echogenic and complex septated or non-septated patterns.[8]
- To direct the etiology of the pleural effusion. Although ultrasound is not able to establish a diagnosis, on most occasions the transudates have an anechoic pattern. Characteristics suggestive of malignant pleural effusion have also been described, such as pleural thickening of more than 1 cm, nodularity of the diaphragmatic pleura and thickening of the visceral pleura[18] or the existence of detritus whirlpools floating in the pleural liquid.
- To differentiate subpulmonary effusion from phrenic paralysis or ascites in the radiological elevation of the hemidiaphragm.
- To diagnose pneumothorax. Its efficacy is similar to chest radiography, although it is not able to quantify size. Its main application could center around severe patients whose radiographies should be done in decubitus, those with subcutaneous emphysema (which makes for difficult radiological interpretation), or in situations with a greater difficulty for doing thoracic radiography.[14]

All the characteristics and potentialities of ultrasound for studying the pleura make it an essential technique for optimizing the evaluation and treatment of patients with pleural effusion. The

☆ Please cite this article as: Villena Garrido MV. Aplicaciones de la ecografía pleural. Arch Bronconeumol. 2012;48:265-6.

E-mail address: vvillena@separ.es

need for immediate results and the need to repeat the technique in many patients make it essential for the technique to be learnt by all pulmonologists involved in the evaluation of this type of patients. Other specialties have been equipped with ultrasound devices and pulmonology should be no different, especially considering that even the most inexpensive devices are sufficient for studying pleural pathologies. In times like these of economic crisis, being flexible and sharing equipment with other specialists, or even recycling older ultrasound models, are just 2 possibilities for those departments that do not have the option of obtaining new equipment.

Conflict of Interest

The author declares having no conflict of interest.

References

1. Bittner RC, Teichgraeber UK. Imaging techniques in the diagnosis of pleural diseases. Eur Respir Mon. 2002;22:76–109.
2. Ayres J, Gleeson F. Imaging of the pleura. Semin Respir Crit Care Med. 2010;31:674–88.
3. Mavi A, Basu S, Cermik TF, Urhan M, Bathaii M, Thiruvenkatasamy D, et al. Potential of dual time point FDG-PET imaging in differentiating malignant from benign pleural disease. Mol Imaging Biol. 2009;11:369–78.
4. Flores RM, Akhurst T, Gonen M, Zakowski M, Dycoco J, Larson SM, et al. Positron emission tomography predicts survival in malignant pleural mesothelioma. J Thorac Cardiovasc Surg. 2006;132:763–8.
5. Hidalgo Ramírez M, Cases Viedma E, Sachis Aldás JL. Utilidad de la ecografía torácica en una unidad de técnicas respiratorias. Arch Bronconeumol. 2003;39:253–5.
6. Rahman NM, Singanayagam A, Davies HE, Wrightson JM, Mishra EK, Lee YCG, et al. Diagnostic accuracy, safety and utilization or respiratory physician-delivered thoracic ultrasound. Thorax. 2010;65:449–53.
7. Diacon AH, Theron J, Bolliger CT. Transthoracic ultrasound for the pulmonologist. Curr Opin Pulm Med. 2005;11:307–12.
8. Chira R, Chura A, Mircea PA. Thoracic wall ultrasonography—normal and pathological findings. Med Ultrason. 2011;13:228–33.
9. Sartori S, Tombesi P. Emerging roles for transthoracic ultrasonography in pleuropulmonary pathology. World J Radiol. 2010;2:83–90.
10. Reuss J. Sonography of the pleura. Ultraschall Med. 2010;31:8–25.
11. Tayal VS, Nicks BA, Norton HJ. Emergency ultrasound evaluation of symptomatic nontraumatic pleural effusion. Am J Emerg Med. 2006;24:782–6.
12. Beaulieu Y, Marik PE. Bedside ultrasonography in the ICU. Chest. 2005;128:881–95.
13. Ueda K, Ahmed W, Ross AF. Intraoperative pneumothorax identified with transthoracic ultrasound. Anesthesiology. 2011;115:653–5.
14. Lichtenstein D, Hulot JS, Rabiller A, Tostivint I, Mezière G. Feasibility and safety of ultrasound-aided thoracentesis in mechanically ventilated patients. Intensive Care Med. 1999;25:955–8.
15. Sartori S, Tombesi P, Tassinari D, Ceccotti P, Nielsen I, Trevisani L, et al. Sonographically guided small-bore chest tubes and sonographic monitoring for rapid sclerotheraphy of recurrent malignant pleural effusions. J Ultrasound Med. 2004;23:1171–6.
16. Medford ARL. The utility of thoracic ultrasound before local anesthetic video-assisted thoracoscopy in patients with suspected pleural malignancy. J Clin Ultrasound. 2010;38:222–5.
17. Qureshi NR, Rahman NM, Gleeson FV. Thoracic ultrasound in the diagnosis of malignant pleural effusion. Thorax. 2009;64:139–43.
18. Chian CF, Su WL, Soh LH, Yan HC, Perng WC, Wu CP. Echogenic swirling pattern as a predictor of malignant pleural effusions in patients with malignancies. Chest. 2004;126:129–43.