Ultrasound in Pulmonology

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Over the past 7 decades, ultrasound has evolved into a versatile tool in medicine. Over half a century ago, Dussik [1] published one of the first overview articles about this imaging modality. In the following years, its technique and equipment improved, and thus the application of ultrasound firstly flourished in the mid-60s. Meanwhile, it has established itself as a standard imaging technique for diagnostic purposes but also in the guidance for therapeutic interventions such as punctures or drainages for various indications. The success of the technique is due to the technical improvements and the rapid developments in the digital age. Initially, only waves were visible (M-mode images), which are nowadays colored (fig. 1), and sometimes three-dimensional images are visualized on large screens, impressing the examiner as well as the patient. Using online pre- and post-processing, even smallest vessels are detectable, and perfusions and abnormalities can be assessed. The latest developments in the field, harmonic imaging, elastography and contrast enhancement, will further enhance its acceptance and application.

Based on the development progress and miniaturization of the items involved, smaller devices are available for routine use, and mobile ultrasound systems can be used at the bedside.

And what about transthoracic ultrasound? For many years, the lung was a neglected field in sonography. The routine use of ultrasound for pulmonary indications came with a relative delay since the lung is surrounded by

Fig. 1. Doppler examination of pneumonia with a lovely artifact.

ribs, which lead to absorption of the ultrasound waves, and is filled with air, which also contributes massively to artifacts.

However, due to continuous improvements in science as well technology, transthoracic ultrasound has now established as a standard imaging tool in pulmonary medicine, too [2].

For both diagnostic and therapeutic indications, ultrasound is presently an accepted technology: it is available 24 h a day, always repeatable and noninvasive [3]. In patients with pleural effusion, for example, diagnosis and therapeutic puncture without this kind of imaging guidance is no longer conceivable today [4].

Nevertheless, there are still a few limitations. One of them, its effectiveness, is clearly dependent on the skills and experience of the examiner. Therefore, continuous training and education of people performing ultrasonography is essential, keeping up with developments regarding novel technical approaches as well as different indications and possible complications.

In the following issues of *Respiration*, the thematic review series focuses on hot topics on ultrasound in pulmonary medicine. In four articles, which are written by experts in the field of pulmonary ultrasound and include the latest references, the authors will give an update on the indications for ultrasound.

Dr. Gompelmann will present the role of endobronchial and endoscopic ultrasound in pulmonary medicine, describing potential applications in malignant and non-malignant diseases involving the mediastinum. Dr. Kreuter, the guest editor, and Dr. Mathis, one of the pio-

neers in the technique, will focus on the need of ultrasound in emergency rooms and acute care settings. In the next issue, pneumonia and diffuse parenchymal lung diseases as well as the role of thoracic ultrasound will be discussed by Dr. Copetti and Dr. Reissig. Last but not least, Dr. Stigt and Dr. Groen will give an update on the principal indications for thoracic ultrasound: pleural effusion and ultrasound-guided chest biopsies.

This series updates and reviews the state of the art of ultrasound in pulmonary medicine.

Enjoy reading.

References

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- 4 Reissig A, Kroegel C: Sonographic diagnosis and follow-up of pneumonia: a prospective study. *Respiration* 2007;74:537–547.