

## Editorial

# The Utility of Ultrasonography in Diseases of the Pleura<sup>☆</sup>



## Utilidad de la ultrasonografía en la enfermedad pleural

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In recent years, different medical specialties have been including ultrasonography (US) in their portfolio of services to improve both the yield of the various medical procedures and patient safety. One of the applications most widely taken up has been chest US, and more specifically, chest US for the management of pleural diseases, including both pneumothorax and pleural effusion (PE).<sup>1</sup> The growing importance of US was demonstrated in a recent study, where the procedure significantly modified the management of 52 (65%) patients by resolving erroneous radiological findings, ruling out pleural disease, and detecting PE not visualized on standard radiography.<sup>2</sup> These benefits, along with the growing need to optimize diagnostic and therapeutic procedures in pleural disease, have led to the creation of specialized pleura units which have demonstrated their aptitude for developing and providing training in these techniques, including US, and their suitability as a framework for training specialists and conducting quality clinical research.<sup>3</sup>

The aim of this editorial is not to focus on particulars such as the basic concepts, the necessary equipment, or chest US techniques that have been addressed in various review articles,<sup>4,5</sup> but rather to emphasize the main advantages and current indications.

US has several advantages over conventional radiography and chest computed tomography: it is safe (it uses no ionizing radiation and can be repeated as often as necessary), transportable (the procedure can be conducted in any part of the hospital), inexpensive, gives real-time high quality images, and requires a relatively short learning curve.<sup>6</sup> The current role of US in pleural disease consists of identifying both PE (site, depth, loculation, and septa) and nodules and pleural thickening, and to serve as a guide for diagnostic procedures such as thoracentesis, percutaneous pleural biopsy, pleuroscopy, and chest tubes. US has some obvious advantages in these areas.

1. Identification of PE. US can identify volumes of pleural fluid (PF) as small as 5 ml, although sensitivity improves for volumes of

30 ml and more. In a meta-analysis that included 1554 patients, its sensitivity and specificity for detecting PF were 94% and 98%, respectively, which is far superior to radiography (51% and 91%, respectively).<sup>6</sup> It can also differentiate PF patterns according to echogenicity, and calculate PE volume.<sup>7</sup> Finally, it can distinguish between subpulmonary effusion, abdominal fluid, and phrenic nerve palsy.

2. US can help define the characteristics of the PF, and as such, orient and determine PE etiology. Infectious PE tend to be hyperechogenic, and loculations and septa can be observed in complicated cases.<sup>8</sup> In these cases, complicated PE can also be evacuated promptly, thus improving morbidity and mortality. If pleural or diaphragmatic nodules or thickening greater than 1 cm are observed, PE is very probably of malignant origin,<sup>9</sup> particularly if it is massive. In certain clinical situations, Kerley B lines can be seen on US, making this procedure highly sensitive and specific for diagnosing a PE of cardiac origin.<sup>10</sup> Finally, US has also demonstrated its usefulness in the diagnosis of trapped lung.<sup>11</sup>
3. Utility in the diagnosis of pneumothorax. A systematic review of 21 studies and 1048 patients found that the yield of US for the diagnosis of pneumothorax was much more sensitive than chest X-ray (90.9% [95% CI 86.5–93.9] vs 50.2% [95% CI 43.5–57], respectively), and similarly specific (98.2% [95% CI 97–99] vs 99.4% [95% CI 98.3–99.8], respectively).<sup>12</sup>
4. Identification of puncture site. US helps to select the ideal puncture site, i.e., the site where the PF has a depth of at least 10 mm, where lung is not interposed during maximum inspiration, and where the risk of puncturing other structures is minimal or non-existent.
5. Increased diagnostic yield of pleural procedures. Many publications have shown that US increases the diagnostic yield of thoracentesis and percutaneous pleural biopsy. In a recent study, US-guided pleural biopsy yield was higher than from blind procedures for the diagnosis of tuberculous PE (88.9% vs 77.8%), malignant PEs (89.7% vs 31%), and in all PEs (90% vs 48%).<sup>13</sup>
6. Lower complication rate. US is the examination that has most helped reduce the incidence of pneumothorax. One example is the now classic systematic review of 24 studies including 6605 thoracentesis procedures. The authors showed that US was

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associated with a lower risk of pneumothorax (odds ratio 0.3; 95% CI 0.2–0.7).<sup>14</sup>

In view of the contribution of US to the diagnosis of PE and to reducing complications arising from techniques used to explore PE, this imaging test should be obligatory in the routine practice of all pulmonologists and should be performed before any pleural procedure is undertaken. However, according to the White Paper of the Spanish Society of Pulmonology, only 65% of respiratory medicine departments are equipped to perform chest US.<sup>15</sup> Pleural US should be an integral feature in centers delivering expert, highly specialized care, such as that provided in dedicated pleura units. This would result in significant benefits, such as reduced hospital stays and shorter times to reach definitive diagnoses, improved patient safety, better training of new specialists in the management of pleural diseases, and expanded clinical research.

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