Respiration 2015;89:175–176

DOI: 10.1159/000369037

The Resistible Rise of B-Line Lung Ultrasound ArtefactsGuglielmo M. Trovato^a, Marco Sperandeo^b^aDepartment of Medical and Pediatric Sciences, University of Catania, Catania, and ^bSezione di Ecografia Diagnostica e Interventistica, IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo, Italy

Dear Editor,

We read with interest the thematic review by Reissig and Copetti [1] on the diagnosis of community-acquired pneumonia (CAP) and interstitial lung diseases by lung ultrasound (LUS). Although we agree that LUS is a valuable tool in respiratory disease, particularly as a surgical guide [2–4], we feel we must take issue with some of the comments published.

First and foremost, the authors state that ‘in case of a clinical suspicion of pneumonia, a positive LUS excludes the need to perform chest radiography. Nevertheless, a negative chest radiograph does not rule out pneumonia.’ We strongly disagree with this statement, as the subpleural consolidation taken as evidence of pneumonia in LUS cannot be distinguished from that seen in other conditions, including cancer, and US diagnosis therefore needs to be further investigated to confirm the diagnosis. As stated by the authors, a negative chest X-ray is nowadays, as in the past, unable to rule out pneumonia [5]. Nevertheless, digital chest X-ray provides information sufficient for detecting most subpleural or central pneumonia densities, as well as most associated pulmonary, mediastinal and even cardiac co-morbidities. This is not the case with LUS, as the current lung imaging guidelines suggest [6].

Our greatest concern, however, regards the authors’ claim that ‘the most important ultrasound sign for interstitial lung disease is B-lines’ [1]. This appears to suggest that B-lines have gained widespread scientific acceptance as a marker of ‘diffuse parenchymal lung disease’, which, to our knowledge, is by no means the case. This brings us to the question of what exactly is ‘diffuse parenchymal lung disease’: is it a clinical syndrome defined by the existence of B-lines, i.e., ultrasound artefacts, alone?

Other questions we have regard the seemingly straightforward statement: ‘in interstitial pneumonia, an interstitial LUS pattern combined with spared areas is strongly suggestive for viral pneu-

monia and correlates with the findings on CT scans.’ This is not sufficiently supported, and, indeed, is seriously misleading. Such ‘correlations’ between LUS and CT findings are not in fact demonstrated in the articles reviewed: in one of the cited studies fewer than 10% of patients were investigated by CT, while the other study is a case report concerning measles in which no CT was performed. Based on such scanty evidence, do the authors really believe, as they appear to suggest, that LUS could be a substitute for CT? In this regard, others emphasize that ‘Lung consolidation is currently accepted as a non-specific term referring to a sub-pleural echopoor region or one with tissue-like echo-texture’ [7], and ‘It can be caused by a variety of disease states, including pneumonia, pulmonary embolism, lung tumours, atelectasis and pulmonary contusion’ [7]. Whether or not additional signs may aid in distinguishing the various causes is doubtful. Moreover, ‘pneumonic consolidation often appears less extensive on US than on chest radiograph’ [7].

Similarly, the inference that LUS may differentiate acute pulmonary oedema from acute respiratory distress syndrome with great accuracy is not adequately supported by evidence in the cited articles, as pointed out elsewhere [8, 9]. Furthermore, it appears to suggest that the authors champion LUS as indispensable for accurate diagnosis of acute pulmonary oedema, which is not, in fact, the case.

Likewise, the statement ‘the most important parenchymal criterion of CAP is the positive air bronchogram within an echopoor area’ [1] is extremely questionable, since the same identical pattern, the air bronchogram, is also detected in lung cancer, as we have previously shown [10]. We must also point out that Reissig and Copetti [1] misrepresent the one article of ours [10] included in the review; they write that Sperandeo et al. [10] report a positive air bronchogram in 220/314 (70%) pneumonia patients and a fluid bronchogram in 100/314 (31%). However, we merely described the visible pattern (‘hyper-echoic spots were shown in the inner-side’), which others define as air bronchogram, and which is, in any case, equally frequently present not only in lung cancer, but also in atelectasis and drowned lung [11]. In contrast, the radiological significance of the air bronchogram is very different and better supported in both chest X-ray and CT, where it is actually seen as an air ‘arborization’. In lung echography, on the other hand, only peripheral tiny strictures are seen [10].

On a final note, the authors [1] conclude by auspicating investigations on the role of colour Doppler sonography, spectral curve analysis, and contrast-enhanced ultrasound; we are surprised that they do not cite any of the pertinent articles already available in their review.

References

- 1 Reissig A, Copetti R: Lung ultrasound in community-acquired pneumonia and in interstitial lung diseases. *Respiration* 2014;87:179–189.
- 2 Trovato GM, Sperandeo M, Catalano D: Thoracic ultrasound guidance for access to pleural, peritoneal, and pericardial space. *Chest* 2013;144:1735–1736.
- 3 Trovato GM, Sperandeo M, Catalano D: Optimization of thoracic US guidance for lung nodule biopsy. *Radiology* 2014;270:308.
- 4 Stigt JA, Groen HJ: Percutaneous ultrasonography as imaging modality and sampling guide for pulmonologists. *Respiration* 2014;87:441–451.
- 5 Catalano D, Trovato G, Sperandeo M, Sacco MC: Lung ultrasound in pediatric pneumonia. The persistent need of chest X-rays. *Pediatr Pulmonol* 2014;49:617–618.
- 6 Havelock T, Teoh R, Laws D, Gleeson F; BTS Pleural Disease Guideline Group: Pleural procedures and thoracic ultrasound: British Thoracic Society Pleural Disease Guideline 2010. *Thorax* 2010;65(suppl 2):ii61–ii76.
- 7 Koegelenberg CF, von Groote-Bidlingmaier F, Bolliger CT: Transthoracic ultrasonography for the respiratory physician. *Respiration* 2012;84:337–350.
- 8 Trovato GM, Sperandeo M: Sounds, ultrasounds, and artifacts: which clinical role for lung imaging? *Am J Respir Crit Care Med* 2013;187:780–781.
- 9 Trovato GM, Rollo VC, Martines GF, Catalano D, Trovato FM, Sperandeo M: Thoracic ultrasound in the differential diagnosis of severe dyspnea: a reappraisal. *Int J Cardiol* 2013;167:1081–1083.
- 10 Sperandeo M, Carnevale V, Muscarella S, Sperandeo G, Varriale A, Filabozzi P, Piattelli ML, D'Alessandro V, Copetti M, Pellegrini F, Dimitri L, Vendemiale G: Clinical application of transthoracic ultrasonography in inpatients with pneumonia. *Eur J Clin Invest* 2011;41:1–7.
- 11 Koegelenberg CF, Bolliger CT, Irusen EM, Wright CA, Louw M, Schubert PT, Diacon AH: The diagnostic yield and safety of ultrasound-assisted transthoracic fine-needle aspiration of drowned lung. *Respiration* 2011;81:26–31.