

Is the Finding of an Absent “Sinusoid Sign” on Lung Ultrasound Meaningful?

To the Editor:

The absent “sinusoid sign” ultrasound finding described in *Ultrasound Reflections*, if validated, provides a valuable noninvasive method to predict patients with a trapped lung (1). At this time, the gold standard for the diagnosis is the use of pleural manometry concurrent with a thoracentesis (2); thus, patients with a trapped lung are subjected to the both the risks inherent to the thoracentesis itself; namely, discomfort, pneumothorax, and hemorrhage, and the risks of pleural drainage in the setting of a trapped lung; namely, pneumothorax *ex vacuo* and reexpansion pulmonary edema (3, 4). A noninvasive diagnostic modality that avoids these risks would be valuable.

Shortly after publication, this *Ultrasound Reflections* article was disseminated to the fellows within my fellowship program. Despite the simple description of image acquisition and the theoretical benefits, after reading the article and cross-referencing the citations, I became concerned that publication of the article may provide a false sense of confidence in the significance of this ultrasound finding both to my immediate peers in the fellowship program and to peers throughout the specialty. Several significant limitations to Wong and colleagues description of this novel ultrasound finding provide caution before this finding’s implementation in routine clinical care and merit discussion. First, Wong and colleagues cite a single source, a non-peer reviewed ATS conference abstract, to support the significance of this ultrasound sign (5). The absence of a peer-reviewed publication, either the one cited in the *Ultrasound Reflections* article or another study attempting to replicate the abstract’s finding, warrants caution. Second, inspection of the abstract reveals several methodological concerns in the reporting of a new diagnostic test. Specifically, the study was small ($n = 10$), and only 4 cases were each used to derive the mean “sinusoidal sign” delta values on motion mode for both the normal mobile and expandable lung and trapped lung. Furthermore, no measure of variability around the mean value such as standard deviation was reported, which is especially important considering an absolute difference of only 9 mm (0.08 vs. 0.98 cm) distinguishing the absence and presence of the “sinusoid sign,” corresponding to a trapped lung and expandable lung, respectively. This small absolute difference is further complicated by the presence of a third condition, an entrapped lung, derived from only 2 patients, with an intermediate “sinusoid sign” delta value of 0.53 cm, which itself has an unreported measure of variability around the mean. Implicit in these small differences is that technical expertise is required to obtain these precise measurements. Importantly, a study of this size also precludes meaningful hypothesis statistical

testing from being completed to identify significant between-group differences. In addition, the mean values obtained were not prospectively compared with the gold standard, pleural manometry, as part of a validation cohort to evaluate diagnostic test characteristics such as the sensitivity and specificity of an absent “sinusoid sign.” It is conceptually possible that effusion size is a confounding variable in the relationship between the sinusoidal sign and pleural motion with tidal breathing, such that larger effusions, like trapped lungs, would limit pleural motion, thereby limiting the diagnostic performance of the “sinusoid sign.” Finally, a literature search revealed that although the measurements of anatomical characteristics via ultrasound has previously been used to predict the presence of a nonexpandable lung, the procedure is more complicated than the one suggested by Wong and colleagues (6).

We commend Wong and colleagues for the description of the absent “sinusoid sign” in the *Ultrasound Reflections* case report. With publication, absence of the “sinusoid sign” can be prospectively tested for validation. Until then, however, caution is warranted in the significance of this ultrasound finding in influencing medical decision making.

Author disclosures are available with the text of this letter at www.atsjournals.org.

Derrick D. Herman, M.D.*
Avraham Z. Cooper, M.D.
Vincent Esguerra, M.D.
The Ohio State University Wexner Medical Center
Columbus, Ohio

ORCID ID: 0000-0002-4209-8128 (D.D.H.).

*Corresponding author (e-mail: Derrick.Herman@osumc.edu).

References

- 1 Wong A, Patail H, Ahmad S. The absent sinusoid sign. *Ann Am Thorac Soc* 2019;16:506–508.
- 2 Light RW, Jenkinson SG, Minh VD, George RB. Observations on pleural fluid pressures as fluid is withdrawn during thoracentesis. *Am Rev Respir Dis* 1980;121:799–804.
- 3 Ault MJ, Rosen BT, Scher J, Feinglass J, Barsuk JH. Thoracentesis outcomes: a 12-year experience. *Thorax* 2015;70:127–132.
- 4 Huggins JT, Maldonado F, Chopra A, Rahman N, Light R. Unexpandable lung from pleural disease. *Respirology* 2018;23:160–167.
- 5 Flora B, Ahmad S. Ultrasound as a noninvasive tool to diagnose trapped lung [abstract]. *Am J Respir Crit Care Med* 2017;195:A6518.
- 6 Salamonsen MR, Lo AKC, Ng ACT, Bashirzadeh F, Wang WYS, Fielding DIK. Novel use of pleural ultrasound can identify malignant entrapped lung prior to effusion drainage. *Chest* 2014; 146:1286–1293.

Copyright © 2019 by the American Thoracic Society

This article is open access and distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives License 4.0 (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). For commercial usage and reprints, please contact Diane Gern (dgern@thoracic.org).