CHEST

Editor's Note: Authors are invited to respond to Correspondence that cites their previously published work. Those responses appear after the related letter. In cases where there is no response, the author of the original article declined to respond or did not reply to our invitation.

Lung Ultrasonography in Diagnosis of Transient Tachypnea of the Newborn

Limitations and Pitfalls

To the Editor:

Liu et al[1] investigated the possible use of thoracic ultrasonography (TUS) to diagnose transient tachypnea of the newborn in a large sample of infants. In such patients, the use of TUS, a safe radiation-free repeatable technique that is easy to perform, would be extremely appealing; it can also be used in emergency settings with portable devices. However, Liu et al's[1] study raises relevant concerns.

First, because of the anatomical constraints of the thoracic cage, TUS at its best explores about 70% of the pleural surface. Even in amenable zones, TUS visualizes only the lesions adherent to the pleural surface. Moreover, TUS may provide similar patterns in many diseases reducing lung aeration in the subpleural surface and does not distinguish among different causes of consolidation, for instance between pneumonia and atelectasis, which may coexist.[2] In addition, even children with normal lungs often display subsegmental lung focal areas of atelectasis beyond terminal bronchioles (Fig 1).

The picture is further compounded by artifacts, predominantly B lines. The latter are generated behind the pleural line by the elevated difference of acoustic impedance between either soft tissue or fluid and gas. B lines may be detected in several pleuropulmonary diseases; their number has low specificity[3] and does not allow discrimination between different conditions. In summary, no feature of TUS can be considered at all disease specific. In addition, the authors particularly emphasized the results concerning "linear/arborescent bronchograms." However, to our knowledge, no study or meta-analysis hitherto has demonstrated that they really match the anatomy of the bronchial tree or the CT finding of an air bronchogram, this TUS sign being detectable even in lung neoplasms.[4] The authors also stressed the sign of the "double lung point," which is a TUS sign of pneumothorax. The same term has been used previously to describe a TUS sign of transient tachypnea of the newborn subsequently renamed "double transition point."[5] Finally, the authors did not provide information on several settings parameters (time gain compensation, tissue harmonics, and electronic focus), which may affect the ultrasonographic pattern.

Considering all the mentioned technical concerns, we believe that many statements included in the paper of Liu et al should be more prudent. In particular, the authors did not specify that the utility of TUS may be invaluable only after a clinical and radiological diagnosis have been made. The negative ethical and medicolegal implications of skipping these steps, particularly when addressing a therapeutic choice, are quite evident.

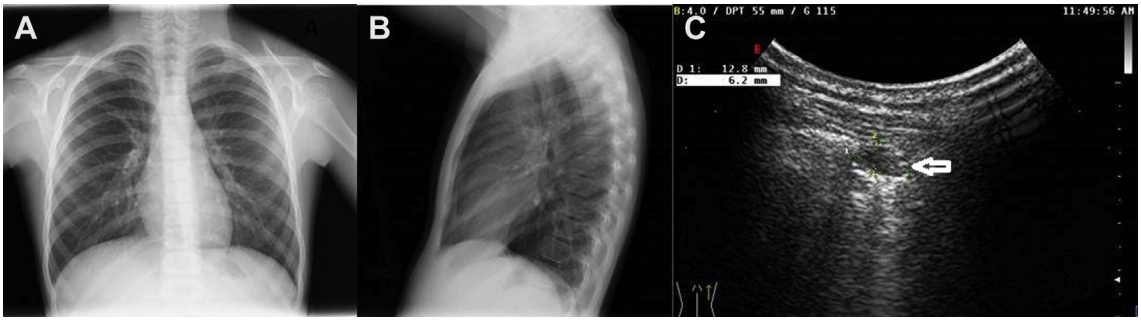

Figure 1 – *A and B, Chest radiograph in a child (posterior-anterior, latero-lateral views) are normal. C, Transthoracic ultrasonogram: right posterior basal subpleural small hypoechoic focal area of atelectasis (arrow).*

Marco Sperandeo, MD
San Giovanni Rotondo (FG), Italy
Gaetano Rea, MD
Alfredo Santantonio, MD
Naples, Italy
Vincenzo Carnevale, MD
San Giovanni Rotondo (FG), Italy

AFFILIATIONS: From the Unit of Interventional Ultrasound of Internal Medicine (Dr Sperandeo), and the Department of Internal Medicine (Dr Carnevale), IRCCS Hospital Casa Sollievo della Sofferenza; the Department of Radiology (Dr Rea) and Division of Neonatology (Dr Santantonio), Monaldi Hospital.

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CORRESPONDENCE TO: Marco Sperandeo, MD, IRCCS Hospital Casa Sollievo della Sofferenza, Unit of Interventional Ultrasound of Internal Medicine, Viale Cappuccini 1, 71013, San Giovanni Rotondo (FG), Italy; e-mail: sperandeom@libero.it

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Response

To the Editor:

I appreciate Dr Sperandeo et al for their attention and insightful comments in response to the recent publication by my colleagues and me on the use of lung ultrasonography (LUS) to diagnose transient tachypnea of the newborn (TTN).[1] Sperandeo et al's professional knowledge of LUS, their publications, and comments on our publication have expanded my understanding in this field.

To a certain extent, my colleagues and I agree with the comments by Sperandeo et al, particularly in the context of the great developmental potential of LUS for diagnosing lung diseases more accurately. However, we hold some different viewpoints about LUS.

First, because subpleural lung tissues are located at the termini of the bronchial tubes and blood supply, they are more likely to suffer from a variety of lung diseases.

Second, neither normal chest radiography nor clinical manifestations can exclude the existence of lung disease, whereas LUS is more accurate and reliable for diagnosing lung diseases. When diagnosing neonatal pulmonary atelectasis (NPA), the sensitivity of chest radiography was only 75%, whereas the sensitivity of LUS was 100%.[2] Atelectasis that was detected on chest CT scanning, after failing to be detected by chest radiography, was termed "occult lung atelectasis"; in contrast, all such occult lung atelectasis was detected by LUS.[2] The failure to detect atelectasis by chest radiography may be due to the following factors:

1. The area of atelectasis might be too small to produce clinical symptoms.
2. The position of the infant and direction of the radiation beam might hinder the detection of atelectasis in some areas, such as deep areas in the lungs or the posterior lungs.
3. The radiation beam might not be sufficiently strong to detect tiny areas of atelectasis.
4. Spontaneous breathing or mechanical ventilation might result in chest radiographic images obtained during expiration. In contrast, LUS can detect small areas of atelectasis in almost any part of the lungs, regardless of the position of the patient. This greater sensitivity is also one of the reasons that some experienced experts have recently suggested replacing chest radiography with LUS in the neonatal ward.[3]
5. My colleagues and I have reservations about the example provided by Sperandeo et al, in which the pictures are presented as correct. This assertion is based on the hypothesis that chest radiography is the "gold standard," but the "standard" itself remains controversial, as is the case for comparisons of brain CT scanning and MRI. In some cases, the brain is functionally normal, yet MRI reveals anatomical injuries, whereas the CT scan reveals no abnormal findings. Under this condition, the brain cannot be considered normal, because MRI is more accurate and preferable than CT in diagnosing brain conditions.

Third, it is true that there are no specific lung signs for any lung diseases. Therefore, it is necessary to comprehensively analyze the ultrasonic findings in the diagnosis of lung diseases when using LUS. Some distinct and relatively specific ultrasonographic characteristics have been explored in differentiating lung diseases such as neonatal pneumonia and NPA. For