Commentary

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# Lung ultrasound in children with pneumonia

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Chest radiography is the primary imaging modality utilized for the evaluation of pneumonia in children. When cross sectional imaging is needed, CT and increasingly MRI are the preferred modalities. Ultrasound has received increasing attention in recent years as a tool to evaluate the lungs given its lack of ionizing radiation, portability, and ease of use (1). Advances in ultrasound imaging technology including higher resolution transducers and harmonic-imaging have made high quality sonography of the chest more feasible. Children tend to have better sonographic windows than adults, and factors including unossified costal cartilage, less subcutaneous fat, and the ability to use the thymus as a sonographic window make chest ultrasound an attractive consideration in children.

Chest ultrasound is most commonly utilized to evaluate an opacity that is first seen on chest radiographs, and has a long-established role in the evaluation of the completely opacified hemithorax, pleural effusion, diaphragmatic motion, and chest wall lesions (2). Though radiographs are most commonly the first imaging test performed in the evaluation of suspected pneumonia, ultrasound may be performed before chest X-ray in some critical and emergency settings. When pneumonia is peripherally located, and not covered by aerated lung, consolidation can frequently be visualized. Unlike in normal lung, where sound waves are immediately reflected back to the transducer by the aerated lung, consolidated lung will transmit sound waves through fluid-filled alveoli causing an appearance similar to the liver, leading to the term *hepatization* (2). Branching echogenic air will often be seen within the bronchi, leading to sonographic air-bronchograms. Investigations in adults have shown that ultrasound without chest radiography can be fairly sensitive and specific for the diagnosis of pneumonia (3). Ultrasound may even be equivalent to CT in the detection of several complications of pneumonia including loculated pleural effusion, lung necrosis, and lung abscess (4). Though the results of these studies are encouraging, ultrasound of the central portions of the lungs is subject to acoustic shadowing from overlying aerated lung, which is a major technical limitation. This limited ability to assess central portions of the lung make it unlikely that ultrasound will ever completely replace chest X-ray as the prima-

ry imaging test for evaluating pneumonia, however ultrasound can play an important role.

In the current issue of *Acta Medica Academica* Lovrenski et al. (5) take an interesting approach to the role of lung ultrasound in pneumonia by comparing it with lung auscultation. They found that in children with suspected pneumonia, lung ultrasound was positive in more cases than chest auscultation. The authors also found that in those cases with normal auscultatory findings and abnormal ultrasound findings, the ultrasound findings tended to be smaller. This suggests that if one is suspicious for pneumonia but auscultation is negative, ultrasound could be considered as a method that will detect findings of pneumonia more often than chest auscultation alone.

This study is limited because other modalities, such as chest radiographs or CT, were not incorporated into the analysis. Though ultrasound is being utilized with increased frequency and several studies have demonstrated its utility in the diagnosis of pneumonia, most practitioners still consider chest X-ray to be the standard first-line imaging test for the evaluation of suspected pneumonia and CT to be the gold standard. It is difficult to know how many cases in this study were true-positives and if any cases may have been false-positives due to another entity such as atelectasis. It is also unknown how many cases were false negatives, if for instance breath sounds were normal and a centrally-located consolidation was obscured by overlying aerated lung on ultrasound. Though ultrasound does have the benefit of utilizing no ionizing radiation, chest radiographs use a very low amount of ionizing radiation, ranging from 0.01-0.02 mSv for a standard PA chest radiograph, and most consider them relatively safe. As the authors point out, chest CT utilizes a larger amount of radiation and it would not be appropriate to perform CT in the entire patient population.

Pneumonia is a common disease in children, and ultrasound can play a role in its diagnosis as a non-invasive imaging test which does not utilize ionizing radiation. As Lovrenski et al. (5) found, ultrasound may detect findings of pneumonia in a larger number of patients than auscultation alone, and may play a role in detecting small abnormalities that are too small to cause abnormal breath sounds.

**Conflict of interest:** The author declares that he has no conflict of interest.

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