CRITICAL CARE

LETTER

Has lung ultrasound an impact on the management of patients with acute dyspnea in the emergency department?

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Lung ultrasound (LUS) has emerged as a rapid, immediately available, non-invasive bedside tool for detection of several pulmonary and/or pleural diseases [1,2]. However, no data are available for its impact on patient management in the emergency department.

We studied 50 adult patients (25 women, median age 80.5 years, interquartile range 12.3 years) presenting with acute undifferentiated dyspnea to the emergency department of 'Edoardo Agnelli' Hospital (Pinerolo, Turin), and evaluated the LUS diagnostic impact by comparing the main diagnosis (cardiac, respiratory, or combined dyspnea), the most likely pathophysiologic dysfunction, and the etiological diagnosis, as indicated by the emergency physician caring for the patient, before and after LUS. Reference diagnosis was established by two expert emergency physicians, blinded to LUS results, who independently reviewed the entire medical record. Moreover, we asked the emergency physician how LUS findings changed patient management.

We used a previously described eight-region scanning protocol [3] and assessed five major syndromes (see Figure 1) [1]. Diffuse interstitial syndrome (IS) was the most common finding (58%), followed by pleural effusion (52%), focal IS (18%), alveolar consolidation (14%), and pneumothorax (8%). Twenty-seven patients had two or more LUS pathological findings (for example, 17 patients showed pleural effusion and IS), while in six patients LUS detected no alterations.

The agreement between clinical assessment and reference diagnoses was fair (Cohen's kappa coefficient = 0.25, 0.32, and 0.26 for main, pathophysiologic, and etiological diagnosis, respectively; P <0.01), while agreement was excellent between LUS-implemented and reference diagnoses (kappa coefficient = 0.94, 0.84, and 0.81, respectively; P <0.01). Overall, LUS changed the main clinical diagnosis in 44% of cases. The agreement for the different main diagnosis is reported in Figure 2.

Therapeutic management was changed, because of LUS findings, in 58% of patients. LUS led to prescribing a new drug in 19 cases, and to holding a drug previously considered for treatment in 10 cases; moreover, LUS results led to a new procedure (for example, thoracentesis) being performed in six cases, and to a change of the disposition plan in five cases.

Our study is the first to address the issue of how LUS affects patient management in real-world practice. We found a high diagnostic and therapeutic impact, mainly related to the sequential approach used integrating clinical assessment and LUS, that paired the detection of IS, a very sensitive but poorly specific ultrasound sign [1], with the pretest probability of clinical assessment. These data need to be confirmed in larger cohort and multicenter studies.

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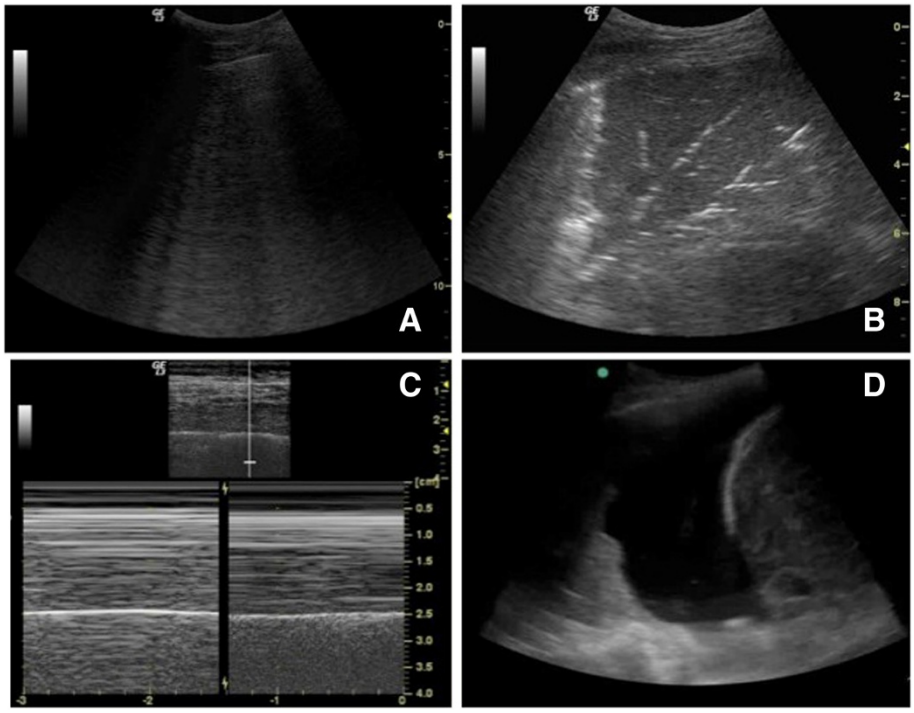

Figure 1 Lung ultrasound major syndromes. (A) Diffuse B-lines representing interstitial syndrome. **(B)** Alveolar consolidation. **(C)** M-mode findings of a pneumothorax (stratosphere sign or bar code sign; left), and a normal lung (seashore sign). **(D)** Pleural effusion.

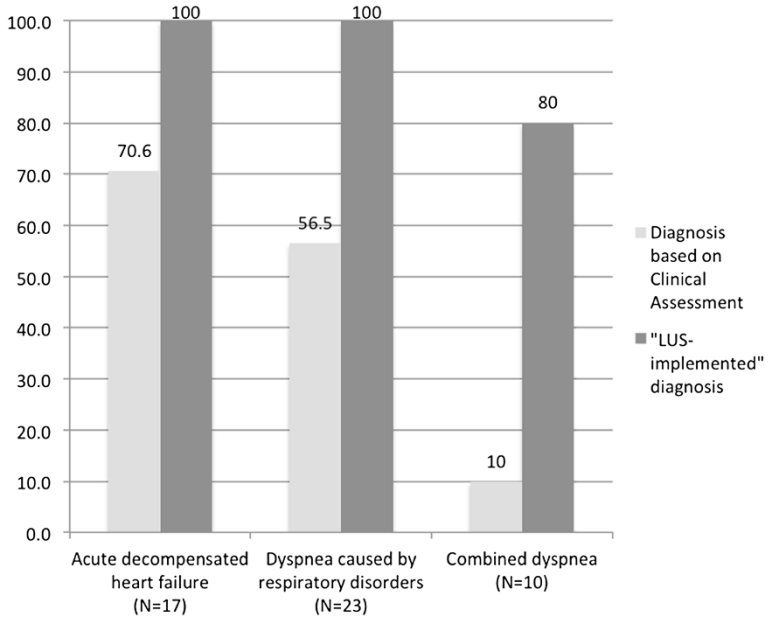

Figure 2 Agreement for the main diagnosis between clinical assessment or lung ultrasound (LUS)-implemented assessment, and reference diagnosis.

Abbreviations
IS: Interstitial syndrome; LUS: Lung ultrasound.

Competing interests
The authors declare that they have no competing interests.

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