Ultrasound findings in patients with COVID-19 pneumonia in early and late stages: Two case-reports

Laurent Zieleskiewicz, Gary Duclos, Ophélie Dransart-Raye, Nicolas Nowobilski, Belaïd Bouhemad

HAL Id: hal-03156077

https://hal.inrae.fr/hal-03156077

Submitted on 17 Oct 2022

Ultrasound findings in patients with COVID-19 pneumonia
in early and late stages:
Two case-reports

Authors:
Laurent Zieleskiewicz[1,2], Gary Duclos[1], Ophélie Dransart-Rayé3, Nicolas Nowobilski[3], Belaid Bouhemad[3,4]

Affiliations:
[1] Consultant, Department of Anaesthesia and Intensive Care Medicine, University Hospital of Marseille, Aix-Marseille University, Marseille, France.
[2] PhD student, C2VN Inra Inserm, Faculty of medicine, Aix- Marseille University, Marseille, France
[3] Department of Anaesthesiology and Intensive Care, University Hospital of Dijon, Dijon, France.
[4] Lipness Team, INSERM Research Centre LNC-UMR1231 and LabEx LipSTIC, Université Bourgogne Franche-Comté, Dijon, France

Corresponding author: Pr Bélaid BOUHEMAD, Department of Anaesthesiology and Intensive Care, Unity of Cardiovascular Anaesthesiology and Intensive Care, CHU de Dijon, BP 77908, 21709 Dijon Cedex, France**.**
E-mail: belaid_bouhemad@hotmail.com

Morphology assessment of COVID-19 pneumonia may be crucial for its diagnosis and management. Chest computed tomography (CT) scan has a high diagnosis accuracy and may be associated with patient clinical condition [1]. However, during a pandemic the safe use of CT is questionable. Given its characteristics, CT scan cannot be considered as a screening tool (too wide target population) or a monitoring tool (intra-hospital transfer, radiation, availability).

Lung ultrasound (LUS) has been validated for the diagnosis and the management of acute respiratory failure, pneumonia [2], even during viral pandemic [3]. LUS has a high diagnosis accuracy for interstitial syndrome and alveolar consolidations, which are the most common radiological signs of COVID-19 pneumonia [4]. Moreover, preliminary reports are in favour of a predominant involvement of the pulmonary periphery, which could reinforce LUS interest in the actual pandemic.

Here two cases of confirmed COVID-19 patients are described at early and late stages of the disease. We compared the CT scan and ultrasound features performed at the same time.

In a 70-year-old woman, at admission, CT scan showed the typical pattern of COVID-19 with peripheral ground-glass opacities that were bilateral and multilobar (Fig 1A and 1B). Ground-glass opacities appear as coalescent B-line areas and are associated with irregularities of pleural line (white arrows, Fig 1A, 1B and Fig 1C). This pattern alternates with normal area. Nodular or mass-like ground-glass opacities can also reach the periphery and be depicted as small consolidations in subpleural areas (red arrows, Fig 1A, 1B and Fig 1D, 1E) or consolidation (yellow arrows, Fig 1A, 1B and Fig 1E).

A 65-year-old male, after 25 days of mechanical ventilation for acute respiratory distress syndrome, developed on the CT scan fibrosis (Fig 2A, 2B) consisting on subpleural fibrosis, honeycombing, traction bronchiectasis with anterior distribution and thickened interlobular septal [5]. These abnormalities using LUS were reported as irregularities of pleural line associated with coalescent B-lines (red arrows Fig 2A and Fig 2C, 2D) or multifocal subpleural consolidation (red arrows, Fig 2C,D). Thickened interlobular septal seen as regularly spaced B-lines (yellow arrows Fig 2E) combined with thickened pleural line allows the visualisation of secondary pulmonary lobules (white arrow; Fig 2E). Thickened interlobular septal and small subpleural consolidations evidenced the major fissure (red arrows Fig 2B and 2E).

These two suggestive cases underline the potential of LUS for COVID-19 pneumonia assessment at different stages of the disease. Even if all LUS signs are not specific, presence of these various patterns in a clinical context is very suggestive of viral pneumonia. When the clinical context is evocative, LUS may therefore help physicians to identify COVID-19 patients. After a proper validation of LUS against chest CT scan, one can believe that LUS could serve as a diagnostic and a triage tool detecting at risk patients, thus allowing a better allocation of ICU resources as previously described in another context [6]. Finally, it seems important to underline that LUS should also be associated with multi-organ point-of-care ultrasound. In particular, COVID-19 infection is associated with myocarditis and an elevated incidence of thromboembolic events. Multi-organ point-of-care ultrasound could therefore be of high interest for the screening of these complications at the bedside with a minimum exposition of healthcare providers.

References

[1]   Zhao W, Zhong Z, Xie X, Yu Q, Liu J. Relation Between Chest CT Findings and Clinical Conditions of Coronavirus Disease (COVID-19) Pneumonia: A Multicenter Study. AJR Am J Roentgenol 2020;214(5):1072-7.

[2]   Mojoli F, Bouhemad B, Mongodi S, Lichtenstein D. Lung Ultrasound for Critically Ill Patients. Am J Respir Crit Care Med 2019;199(6):701-14.

[3]   Testa A, Soldati G, Copetti R, Giannuzzi R, Portale G, Gentiloni-Silveri N. Early recognition of the 2009 pandemic influenza A (H1N1) pneumonia by chest ultrasound. Crit Care 2012;16(1):R30.

[4]   Wu J, Wu X, Zeng W, Guo D, Fang Z, Chen L, et al. Chest CT Findings in Patients With Coronavirus Disease 2019 and Its Relationship With Clinical Features. Invest Radiol 2020;55(5):257-61.

[5]   Desai SR, Wells AU, Rubens MB, Evans TW, Hansell DM. Acute respiratory distress syndrome: CT abnormalities at long-term follow-up. Radiology 1999;210(1):29-35.

[6]   Markarian T, Zieleskiewicz L, Perrin G, Claret PG, Loundou A, Michelet P, et al. A lung ultrasound score for early triage of elderly patients with acute dyspnea. CJEM 2019;21(3):399-405.