

LETTER

Dynamic assessment of lung injury by ultrasound in a case with H7N9 influenza

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Abstract

H7N9 influenza is a new emerging infection and has high mortality. Both chest radiography and computed tomography (CT) had some limitations in assessing such patients. We performed daily lung ultrasound in a patient with H7N9 influenza. Lung ultrasound and lung ultrasound score showed high consistency with CT and the progression of pneumonia. Ultrasound can be adjunct to chest radiography and CT in caring for patients with H7N9 influenza.

In March 2013, cases infected with a novel reassortant avian-origin influenza A (H7N9) virus emerged in China and had high mortality [1]. That month, a patient with H7N9 influenza was admitted to our hospital, and daily lung ultrasound was performed.

A 54-year-old woman, who ran a convenience store beside a poultry market, complained of cough and high fever for 4 days. Her temperature was 38.6°C, and she had a heart rate of 113 beats per minute and a respiratory rate of 26 breaths per minute. Her white blood cell count was $2.7 \times 10^9/L$, and neutrophil, lymphocyte, and monocyte levels were 72.4%, 22%, and 5.2%, respectively. Her partial pressure of oxygen in arterial blood was 72 mm Hg, and her fraction of inspiratory oxygen (FiO_2) was 40%. Computed tomography (CT) showed left pneumonia. Avian-origin influenza A (H7N9) virus was confirmed from the pharyngeal swabs by real-time reverse transcriptase-polymerase chain reaction. Treatment with oseltamivir (150-mg capsule taken by mouth twice a day) was initiated, and she was admitted to an isolated room in the infectious diseases department. Her temperature dropped to normal 4 days later. H7N9 virus was found negative on days 5 and 6. Oseltamivir and isolation were

stopped [2]. The patient was discharged 10 days after admission. Daily lung ultrasound (TITAN; SonoSite Inc., Bothell, WA, USA) with C60 Convex probe (2 to 5 MHz) was performed, and the lung ultrasound score (LUS) [3] was recorded, and both effectively reflected the progression of pneumonia (Figure 1).

The onset of H7N9 influenza in this case was manifested by hyperpyrexia and flu-like symptoms and progressed to lobar pneumonia 4 days later. Chest radiograph is the routine tool for assessment of pneumonia, but its sensitivity and accuracy were not so good [4]. CT is regarded as the gold standard, but its application is limited in cases with this new emerging virus since strict protection should be followed to avoid person-to-person transmission. Ultrasound has many advantages, including convenience, rapidness, non-invasiveness, availability for repeated examination, and absence of radiation. Lung ultrasound has proven useful in critical illness. It showed high accuracy in diagnosing community-acquired pneumonia [5]. Daily lung ultrasound was performed in this case. The right lung presented an A line with few isolated B lines, whereas the left lung presented multiple abutting B lines and consolidation. When the patient improved, both B lines and the area of consolidation were decreased and the LUS was synchronously increased. The result of ultrasound showed high consistency with CT and the progression of pneumonia. This case highlights that ultrasound can be an adjunct to chest radiography and CT in caring for patients with H7N9 influenza.

Abbreviations

CT, computed tomography; LUS, lung ultrasound score.

Competing interests

The authors declare that they have no competing interests.

Acknowledgments

Written informed consent was obtained from the patient for publication of this letter and accompanying images.

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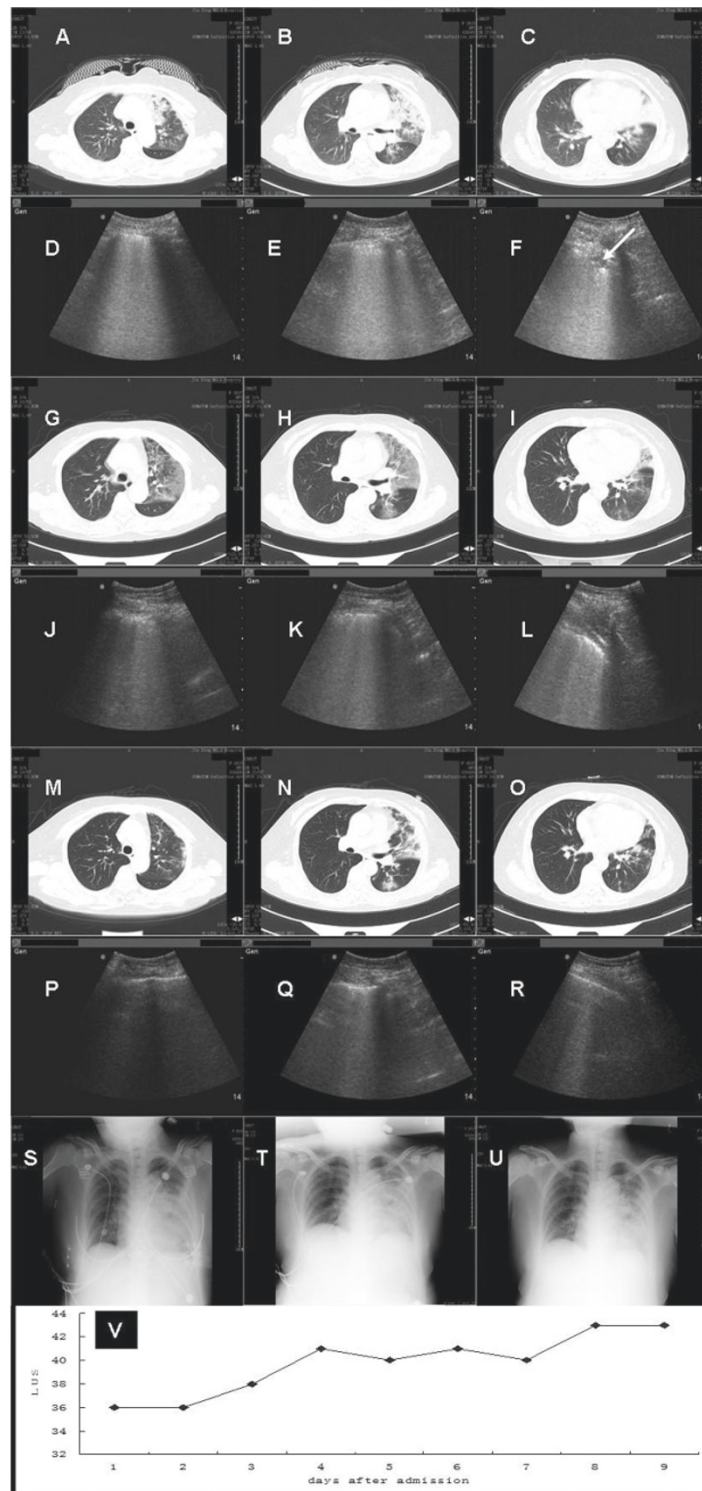


Figure 1. Dynamic changes of chest computed tomography (CT), radiography, and lung ultrasound in a patient with H7N9 influenza. (A-C) CT showed pneumonia in the left upper lung, with partial consolidation on admission. (D-F) Lung ultrasound corresponding to CT in (A-C) showed multiple abutting B2 lines, and some regions presented a tissue pattern (arrow). (G-I) CT on day 6 after admission showed that the pneumonia was partially absorbed. (J-L) Lung ultrasound corresponding to CT in (G-I) showed that the number of B lines was obviously decreased, and the consolidation disappeared. (M-O) CT on day 9 after admission showed that the size of the lesion was obviously reduced. (P-R) Lung ultrasound corresponding to CT in (M-O) indicated that only the A line and few B lines were visible. (S-U) Chest radiography on days 1, 3, and 6 after admission showed no obvious change of the pneumonia. (V) Dynamic changes of lung ultrasound score (LUS) (total of 48 for normal lung).

Published: 18 June 2013

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doi:10.1186/cc12751

Cite this article as: Shen P, *et al.*: Dynamic assessment of lung injury by ultrasound in a case with H7N9 influenza. *Critical Care* 2013, **17**:438.

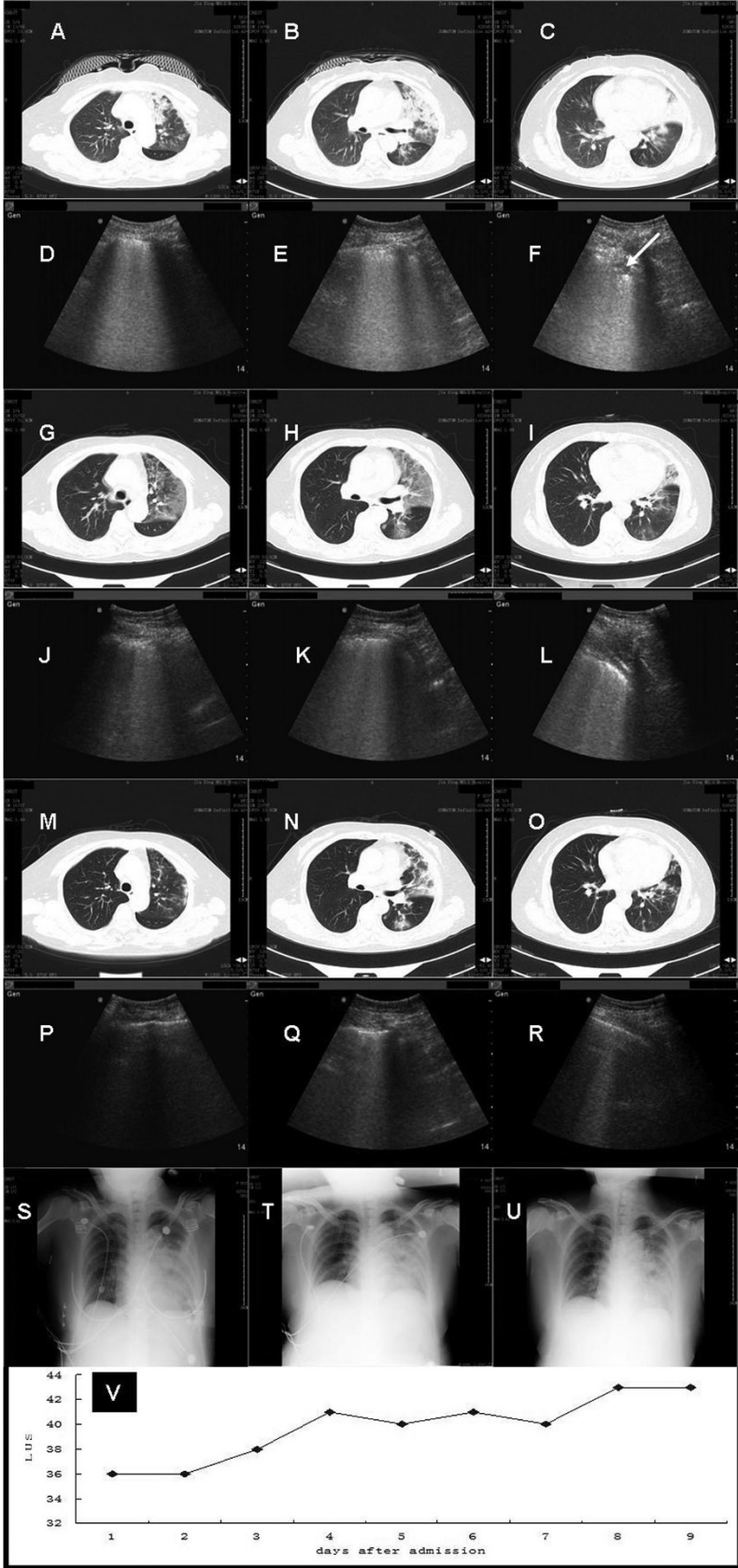


Figure 1