

# Negative-pressure pulmonary oedema following choking on a rice ball

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## DESCRIPTION

A 74-year-old woman was brought to the emergency department by ambulance due to choking. Thirty minutes prior to presentation, the patient choked on a rice ball at lunch, and repeated banging on her back by family members led to successful dislodgement of a part of the object. The patient had a history of depression but no history of smoking.

On arrival, she was cyanotic and in respiratory distress. On physical examination, the patient was afebrile, with a heart rate of 112 beats per minute, blood pressure of 142/93 mm Hg, respiratory rate of 26 breaths per minute and oxygen saturation of 93% on 10L/min via face mask. Her body mass index was 27 (64 kg for 1.53 m). Significant physical examination findings included inspiratory crackles in the right upper zone without wheezing, regular heart sounds without murmur or gallop, and no oedema.

A 12-lead ECG showed normal sinus rhythm with no ischaemic changes. Arterial blood gas analysis obtained on high-flow oxygen showed a pH of 7.17, a PaCO<sub>2</sub> of 66 mm Hg, a PaO<sub>2</sub> of 41 mm Hg and HCO<sub>3</sub><sup>-</sup> of 23 mmol/L. Routine blood tests were unremarkable. A chest radiograph demonstrated consolidation, predominantly within the right upper lung, and to a lesser degree within the left upper lung (figure 1A). A CT scan of the chest revealed ground-glass opacities and consolidation bilaterally, as well as interlobular septal thickening with an upper lung predominance (figure 1B). The patient's clinical condition rapidly normalised over

the next few hours, and a repeat chest radiograph at 24 hours was normal (figure 1C).

Negative-pressure pulmonary oedema is a non-cardiogenic pulmonary oedema that can emerge shortly after relief of upper airway obstruction.<sup>1</sup> Extremely large negative intrathoracic pressure against an obstructed airway leads to transudation of fluid across capillary membranes and formation of alveolar oedema. Pressure gradients between the thoracic cavity and interstitium tend to be more negative in central and non-dependent regions than in dependent and peripheral lung regions,<sup>2</sup> which contribute to the central distribution of the pulmonary oedema. In an upright obese individual, the distribution of regional ventilation may be greatest in the upper lung zones and decreases towards the lower zones, whereas this distribution is reversed in non-obese individuals.<sup>3</sup> This phenomenon may contribute to the pulmonary oedema predominant in the upper zones. Because resolution of the pulmonary oedema is usually rapid after relieving upper airway obstruction, treatment is supportive and includes close observation, supplemental oxygen and addition of positive-pressure ventilation.

## Learning points

- ▶ Negative-pressure pulmonary oedema should be considered in differential diagnosis of non-cardiogenic pulmonary oedema after a choking incident.
- ▶ Body weight affects the distribution of regional ventilation, which may contribute to atypical radiological features in pulmonary oedema.

**Contributors** SM cared for the patient, performed the clinical reasoning and wrote the article. TM, MI and TI cared for the patient.

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**Patient consent** Obtained.

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**Figure 1** (A) Chest radiograph on admission, (B) CT scan of the chest on admission and (C) repeat chest radiograph at 24 hours after admission.



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