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LETTERS TO THE EDITOR

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Double-wall sign for differentiation of spontaneous pneumothorax from giant bullous emphysema

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Sir/Madam,

The patient, a 59-year-old male diagnosed with emphysematous disease and a giant emphysematous bulla, presented with sudden onset grade III shortness of breath. Upon auscultation, diminished breath sounds were detected on the right side of the chest. On admission, the patient's pulse rate, blood pressure, and peripheral oxygen saturation (SpO2) were 110 beats/min, 150/90 mmHg, and 80%, respectively. Chest computed tomography (CT) revealed giant emphysematous bullae with air outlining both sides of the bulla wall parallel to the chest wall, known as the double-wall sign, indicating secondary pneumothorax and collapsed lungs in the right upper and lower hemithorax. Multiple emphysematous bullae were also observed in both the lungs (Fig. 1a–c). The patient was treated with intercostal tube thoracostomy at the eighth intercostal space.

Giant emphysematous bullae are characterized by sharply demarcated areas of cystic air lucencies measuring > 1 cm, with a wall thickness of < 1 mm. The presence of one or more bullae occupying at least one-third of the hemithorax on imaging is indicative of giant bullous emphysema. This condition has been referred to by various terms, including vanishing lung syndrome, type 1 bullous disease, bullous pneumopathy, and primary bullous disease of the lung [1, 2]. Weak points in the visceral pleura caused by subpleural blebs, bullae, lung necrosis, and other abnormalities in the connective tissue can lead to alveolar rupture, resulting in secondary spontaneous pneumothorax. The main complications associated with bullae include secondary spontaneous pneumothorax, infections, and haemorrhage [3].

Distinguishing pneumothorax from the progression of the underlying bullous emphysema in giant bullous lung disease is challenging. Clinical signs of pneumothorax are often unreliable in patients with giant bullous emphysema. Furthermore, the clinical management of these conditions varies, as spontaneous pneumothorax necessitates prompt insertion of an intercostal tube. The image illustrates the presence of the double-wall sign of pneumothorax in multiple bullous emphysema.

The diagnostic challenge of the complex and distorted radiographic appearance of the lungs in these patients is compounded by the potential for a false diagnosis of pneumothorax. This is further complicated by the difficulty in distinguishing the pleural line of pneumothorax from the bulla wall. In such cases, the double-wall sign, which is a characteristic feature, may be observed when the air outlines both sides of the bulla wall and the wall direction is oriented parallel to the chest wall. However, in the absence of pneumothorax, the bulla wall is typically characterized by a normal lung tissue with vascular and bronchial markings. One potential pitfall is the appreciation of the double-wall sign in situations where two large bullae are adjacent to one another, which can create an apparent double-wall sign that mimics pneumothorax. Nevertheless, careful examination of multiple images should reveal the absence of both, air in the

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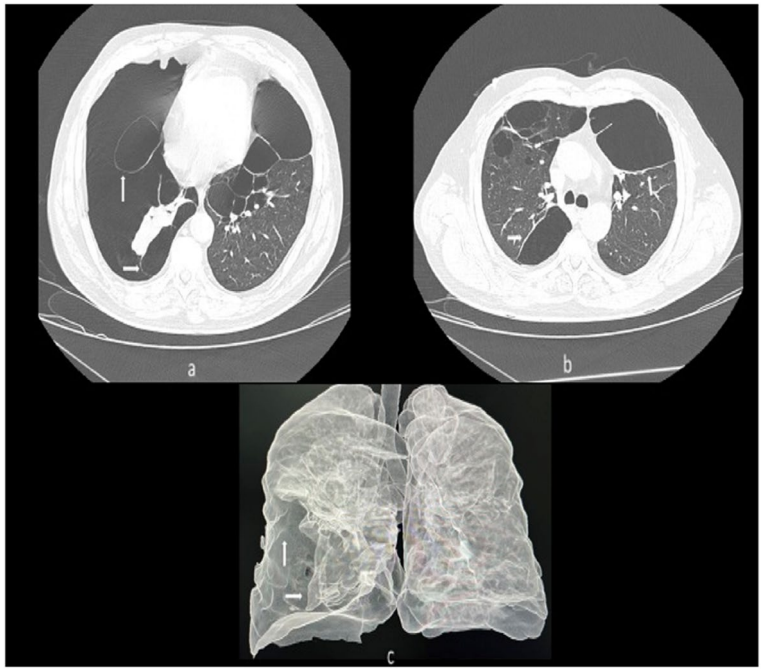

Fig. 1 **a**–**c** Axial high-resolution computed tomographic images of 59-year-old male patient with severe dyspnea. **a** Demonstrating double wall sign, with air outlining the wall of the bulla on both the sides and the wall parallel to chest wall suggestive of pneumothorax (white arrow), on right side. **b** Section taken cranially demonstrating multiple emphysematous bullae with the wall perpendicular to the chest wall and normal adjacent lung tissue in bilateral lungs. **c** Surface-rendered multiplanar projection reformatted images demonstrating the pneumothorax in right hemithorax compressing the adjacent lung (white arrows). Also, note the rest of the lungs demonstrating bulle with bronchial and vascular markings within

pleural space, and parallel alignment of the bulla and chest wall or parietal pleura [4, 5].

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