



Thoracic and Cardiac Imaging / Imagerie cardiaque et imagerie thoracique

Pitfalls in Radiographic Interpretation of Emphysema Patients

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Abstract

Emphysema commonly accompanies various complications such as pneumonia. Sometimes, these comorbidities look so strange on images, because destroyed airspaces could change the usual disease progression. So, we demonstrated various cases of common comorbidities with unusual radiographic findings in emphysema patients. Awareness of various findings of emphysema with commonly coexistent diseases may aid in the proper diagnosis and management of emphysema patients.

Résumé

L'emphysème est souvent associé à diverses complications telles que la pneumonie. Ces comorbidités ont parfois un aspect étrange en imagerie médicale puisque la destruction des voies aériennes peut changer la façon dont la maladie évolue. Nous avons donc compilé des exemples de caractéristiques radiographiques inhabituelles chez des patients présentant de l'emphysème et diverses comorbidités courantes. Savoir reconnaître de telles caractéristiques peut favoriser l'établissement d'un diagnostic exact et la prise en charge efficace de ces patients. © 2016 Canadian Association of Radiologists. All rights reserved.

Key Words: Computed tomography; Emphysema; Lung

Emphysema is defined as abnormal, permanent enlargement of airspaces distal to the terminal bronchioles and accompanied by the destruction of airspace walls without obvious fibrosis [1]. The main purpose of radiographs in emphysema patients is to exclude comorbidities such as pneumonia, pulmonary oedema, lung cancer, and so on [2]. We are already well informed of the image findings of emphysema and other common pulmonary diseases, so we can easily diagnose those conditions. However, there are often unfamiliar cases of emphysema with unusual radiographic findings. Dilated airspaces without intact walls can influence disease progression of common pulmonary diseases in emphysematous lungs, causing changes in the usual radiographic patterns [3]. Herein, we demonstrate various cases of pulmonary diseases commonly accompanied by emphysema, showing unusual image findings. Many articles about the radiographic findings of emphysema have been

published, but there have been none emphasizing radiographic findings of emphysema-related complications and their unusual radiographic changes.

Pitfalls

Pneumonia

Typical appearance of pneumonia is a consolidation, but in patients with emphysema or bullae, lung consolidation may be inhomogeneous, with consolidation outlining areas of lung destruction or holes. In this situation, the lung may have a cystic or “Swiss cheese” appearance, mimicking cavitations (Figure 1). Occasionally these cavity-like holes within the pneumonic consolidations can be confused with other cavity forming conditions such as tuberculosis, necrotizing pneumonia, and adenocarcinoma in situ. Infection in a preexisting bulla can result in an air-fluid level within the bulla or collapse or distension of the bulla (Figure 2) [4]. Kim et al [5] reported 2 cases of intraparenchymal air fluid in emphysematous lungs caused by pneumonia. They explained that exudates could freely move

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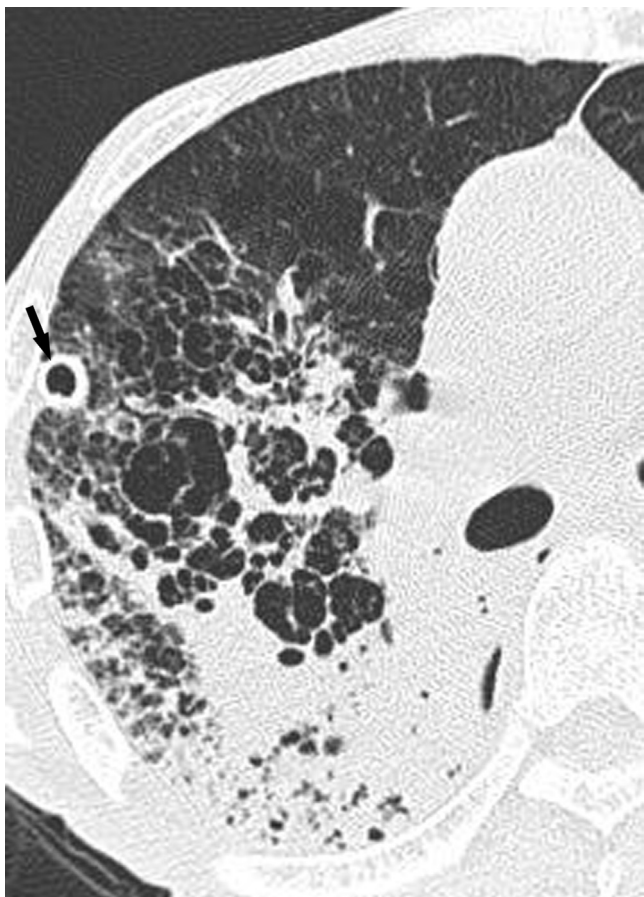


Figure 1. “Swiss cheese” appearance in pneumonia superimposed on emphysema in a 67-year-old man. High-resolution computed tomography shows a large area of heterogeneous air space opacity with innumerable small air cysts, emphysema cysts, resulting in Swiss cheese appearance. This appearance may be confused with one of ground glass opacity with bubbly lucency in bronchioloalveolar carcinoma. A drainage tube is kept in the right pleural cavity (arrow).

into nearby alveolar spaces through the destroyed alveolar walls, making air fluid levels (Figure 3). This condition can be misinterpreted as hydropneumothorax.

Tuberculosis

The most common computed tomography (CT) findings of reactivation pulmonary tuberculosis (TB) is focal consolidation with centrilobular nodules, tree-in-bud, and cavitation involving upper lungs [6]. In patients with impaired host immunity, active TB can be manifested as a lobar or segmental airspace consolidation in the basal segments of the lower lobes, mimicking pneumonia. In this case, multiple cavities within the consolidation or nearby tree-in-bud can be helpful in diagnosis of atypical TB [7]. Sometimes, differentiation of atypical TB and pneumonia can be a hard one in patients with underlying emphysema, because of cystic destruction of the lung [8]. However, centrally located vascular structures within the cysts can suggest emphysema not cavitation by TB (Figure 4) [4].

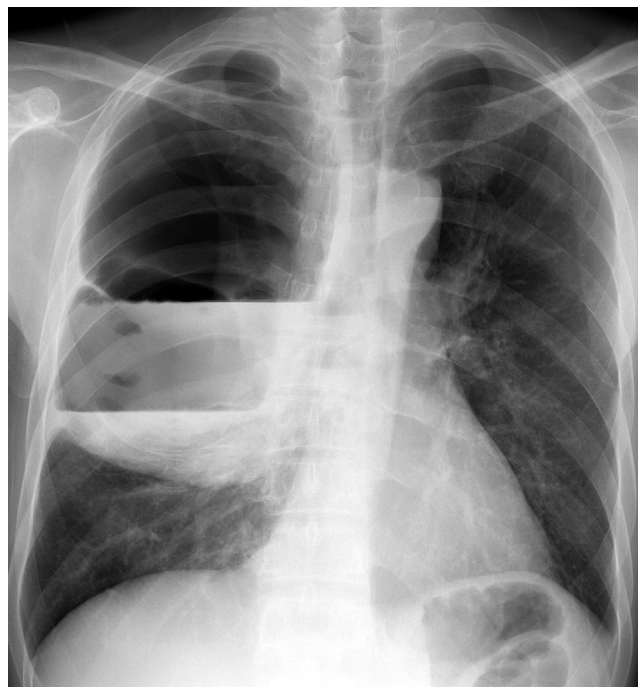


Figure 2. Air-fluid levels in giant bullous emphysema with superimposed infection in a 48-year-old man. Plain radiography shows 2 air fluid levels within a large transradiant vascular area with diffusely thickened walls. The volume of the avascular area is over two-thirds of the right lung.

Pulmonary Oedema

Hydrostatic pulmonary oedema is usually manifested as alveolar opacities and smooth interstitial thickening with bilateral and symmetric distribution. However, changes in blood flow or hydrostatic pressure in ipsilateral or contralateral lungs can cause asymmetric distribution of pulmonary oedema. The most common cause of such asymmetry is underlying chronic pulmonary disease such as emphysema, which obliterates portions of the pulmonary vascular bed. Oedema appears in normal or less severely abnormal portions of the lung (Figure 5) [4,9].

Lung Cancer

Emphysema is a risk factor of lung cancer. Lung cancer usually appears to be a round nodule or mass. However, its appearances can be changed in emphysematous lungs, as tumours tend to grow along the intervening normal lung with unusual shapes. Some cases mimic postinflammatory changes with a thick band-like structure or a cystic lesion with focal nodularity (Figures 6 and 7) [3]. Adenocarcinoma in situ, formerly known as bronchioloalveolar carcinoma, is a well-differentiated adenocarcinoma without invasion of the pleura, vessels, or lung stroma [10,11]. On high-resolution CT (HRCT), it may present as a focal area of ground glass opacity containing bubbly lucencies or pseudocavitation [4,11]. In this situation, adenocarcinoma might resemble “Swiss cheese” in appearance and be

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