

Thoracic Imaging Features of Legionnaire's Disease



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KEYWORDS

• Legionnaire's • Legionella • Pneumonia • Radiology • CT • Radiography • Imaging

KEY POINTS

- On chest radiography, legionella pneumonia usually presents as a patchy unilobar process that can progress to confluent opacities.
- Imaging findings in legionella pneumonia often lag behind clinical improvement.
- The most common thoracic computed tomography (CT) finding of legionella pneumonia is multilobar or multisegmental well-circumscribed air-space disease intermingled with ground-glass opacities.
- Although uncommonly identified on chest radiographs, small pleural effusions and lymphadenopathy are occasionally identified on thoracic CT in patients with legionella infection.

INTRODUCTION

Legionnaire's disease was first described following an outbreak of a respiratory illness that occurred during a 1976 convention of the American Legion in Philadelphia, with more than 200 reported cases and 34 deaths.^{1,2} After extensive microbiologic and epidemiologic investigation, *Legionella pneumophila* was determined to be the causative organism 6 months after the outbreak occurred.³ *L pneumophila* is a flagellated gram-negative bacterium that colonizes aquatic environments and enters the respiratory tract via inhalation of aerosols.⁴

Disclosure Statement. The authors have nothing to disclose.

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Infect Dis Clin N Am 31 (2017) 43–54
<http://dx.doi.org/10.1016/j.idc.2016.10.004>

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Risk factors for acquiring legionella pneumonia are advanced age, a smoking or substance abuse history, underlying lung disorders, and conditions leading to a compromised immune system.⁵ A higher incidence in men, in the elderly, and during the summer months has been reported, the latter because of the association with inhaled aerosolization of contaminated water, commonly produced by air conditioning systems.

Clinical presentations of legionella pneumonia include cough, dyspnea, pleuritic chest pain, and nausea, as well as generalized malaise, weakness, and fatigue. Compromised renal function, microscopic hematuria, hyponatremia, and rhabdomyolysis also can be found on further workup of some affected patients.⁶ Beta-lactams, which are commonly used as empiric antibiotics for pneumonia, are ineffective for the treatment of *L. pneumophila* pneumonia.⁷ Therefore, a high degree of clinical and radiologic suspicion is required, and a presumptive diagnosis should prompt specific testing and anti-legionella therapy to prevent intensive care unit (ICU) admission and substantial morbidity as well as potential mortality.

Establishing or suggesting the diagnosis of legionella infection rests on the identification of legionella antigen in the urine, immunofluorescent antibody, and enzyme-linked immunosorbent assay tests, or isolation of the organism by culture from sputum specimens. Treatment with macrolide or fluoroquinolone antibiotics has been shown to be effective, and portends a good prognosis if started early in the disease course.⁶

The literature to date has documented that the imaging findings in Legionnaire's disease are unfortunately relatively nonspecific, and it is therefore difficult to prospectively differentiate legionella pneumonia from other forms of pneumonia and from other noninfectious thoracic processes.⁸ Through a selection of recent clinical cases at our institutions and a brief review of the literature, we aim to overview the thoracic imaging manifestations of legionella pneumonia.

DISCUSSION

Review of Thoracic Radiographic Features

Legionnaire's disease is classified as an "atypical pneumonia," which is usually defined as a bacterial pneumonia caused by organisms including mycoplasma, chlamydia, and legionella. These organisms are more difficult to identify and frequently have less severe clinical manifestations than classic causes of bacterial pneumonia, such as pneumococcus, streptococcus, and klebsiella.⁹ Legionnaire's disease on chest radiography is often rapidly progressive, and asymmetric in pattern.⁸ Several series have noted that the initial chest radiographic presentation of legionella pneumonia is frequently unilobar, with patchy air-space disease, although these findings are not specific for the diagnosis of legionella.⁹⁻¹³ Tan and colleagues⁹ studied the chest radiographs of 43 patients hospitalized with legionella pneumonia in Ohio. Forty of the patients had pulmonary findings on the initial chest radiographs. Seventy-seven percent of the 43 patients had patchy air-space disease, and 16% had confluent or lobar findings. More than two-thirds of the 77% of patients with patchy pulmonary findings had unilobar involvement.⁹ Kroboth and colleagues noted that 76% of 34 patients with Legionnaire's disease had initial patchy air-space disease, and more than three-fourths of their patients had single-lobe disease at presentation.¹¹ Similarly, Kirby and colleagues¹² found that in a group of 65 nosocomially acquired Legionnaire's disease cases, almost all presented with unilobar patchy air-space disease on their initial chest radiographs. As the disease progressed, the most common pattern was progression to consolidation in the area of the initial air-space disease (Figs. 1 and 2). The abnormalities remained unilateral in 64% of cases.¹² Dietrich

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