Singapore Med J 2013; 54(3): e66-e67
doi:10.11622/smedj.2013056

Endogenous lipoid pneumonia associated with *Legionella pneumophila* serogroup 1

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ABSTRACT Endogenous lipoid pneumonia is an uncommon condition. This is a report of a 29-year-old woman diagnosed with endogenous lipoid pneumonia associated with *Legionella pneumophila* serogroup 1 infection. The patient's endogenous lipoid pneumonia resolved completely after treatment for *Legionella pneumophila* infection. This suggests that early diagnosis and aggressive treatment of the underlying infection may prevent any long-term sequelae of lipoid pneumonia.

Keywords: endogenous, Legionella pneumophila, lipoid pneumonia, pneumonia, serogroup 1

INTRODUCTION

Lipoid pneumonia is an uncommon form of pneumonia, usually due to the inhalation or aspiration of substances such as mineral oil, petroleum jelly or nasal drops. The condition is characterised by the presence of intra-alveolar lipids and lipid-laden macrophages on microscopy. Lipoid pneumonia is classified as endogenous or exogenous.[1,2] Exogenous lipoid pneumonia is caused by aspiration of fat-containing substances,[3,4] whereas endogenous lipoid pneumonia can be caused by non-small cell lung cancers, pulmonary alveolar proteinosis and lipid storage disorder.[3,4] This is the first report of an endogenous lipoid pneumonia associated with *Legionella pneumophila* serogroup 1 infection.

CASE REPORT

A 29-year-old nonsmoking woman presented with a three-week history of cough, sputum, fever and loose stool. She had persistent fever despite having undergone one week of treatment with Augmentin®. On admission, physical examination revealed fever of 39.5°C and consolidation of the middle zone of the left lung. Investigation showed an erythrocyte sedimentation rate (ESR) of 60 mm/hr (normal range < 10 mm/hr) and C-reactive protein (CRP) level at 74 mg/L (normal range 0–5 mg/L). Her QuantiFERON®-TB Gold test, tuberculin skin test and autoimmune markers were all unremarkable. Computed tomography (CT) of the thorax showed consolidation of the left lingular lobe with multiple reactive mediastinal lymphadenopathies. These reactive lymphadenopathies measured 0.9–1.0 cm in diameter. Transbronchial lung biopsy obtained with fibreoptic bronchoscopy showed the presence of foamy macrophages and intra-alveolar foreign body-type histiocytic giant cells around cholesterol clefts, forming cholesterol granuloma that was suggestive of endogenous lipoid pneumonia (Fig. 1). Bronchoalveolar lavages for bacterial, fungal, viral and

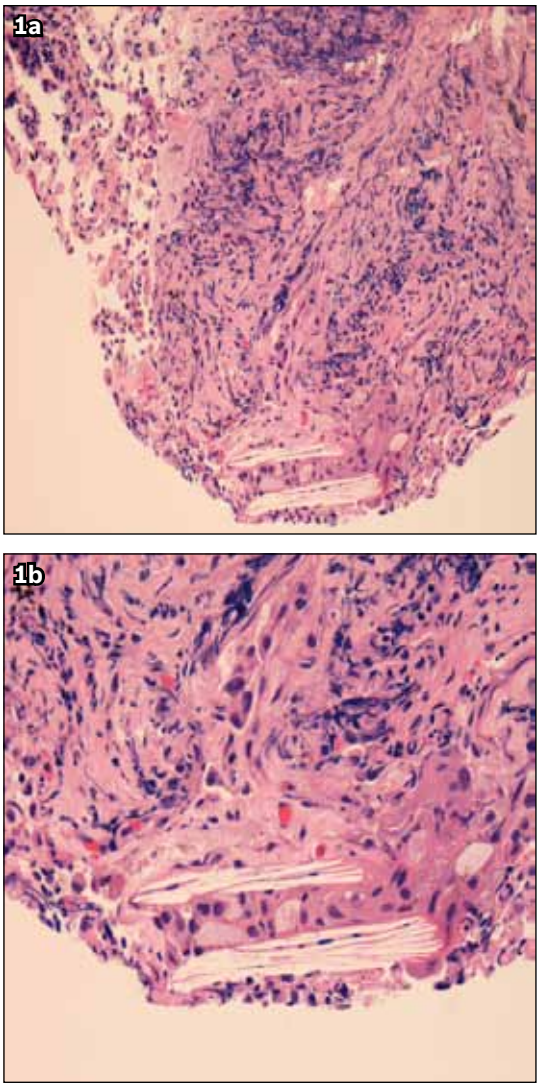

Fig. 1 Photomicrographs of alveolar tissue show foamy macrophages and intra-alveolar foreign body-type histiocytic giant cells around cholesterol clefts, forming cholesterol granuloma that is suggestive of endogenous lipoid pneumonia [(a) Haematoxylin & eosin, × 200; (b) Haematoxylin & eosin, × 400].

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Mycobacterial infections were all negative. The patient denied any use of mineral oil, laxatives or nasal droplets/sprays. Her lipid profile was also normal.

On admission, serum *Legionella pneumophila* serogroup 1 immunoglobulin (Ig) G antibody (Ab) and IgM Ab were measured (indirect immunofluorescence antibody test [IFAT]; polyvalent Legionella IFA test kit serogroups 1–6; Meridian Bioscience Europe, Cincinnati, OH, USA) and the antibody titres obtained were 1:1,024 (normal range < 1:64) and 1:1,024 (normal range < 1:64), respectively. The urinary antigen test (BinaxNOW *Legionella* urinary antigen test; Binax, Portland, ME, USA) for *Legionella pneumophila* serogroup 1 was also positive.

The patient was treated with intravenous moxifloxacin and azithromycin over a period of 14 days. Her CRP and ESR returned to normal upon completion of the antibiotics. Repeat CT of the thorax eight weeks after the completion of antibiotics showed complete resolution of pneumonia and mediastinal lymphadenopathy. Repeat serum *Legionella pneumophila* serogroup 1 IgG Ab and IgM Ab four weeks post admission (seven weeks after the onset of symptoms) was 1:256 titre and 1:256 titre, respectively.

DISCUSSION

Although lipoid pneumonia usually presents insidiously, it has been reported to occur as an acute illness.[3] Endogenous lipoid pneumonia is reportedly caused by bacterial infection (e.g. by *Mycobacterium tuberculosis* and *Mycobacterium smegmatis*) and fungal infections.[4-6] To the best of the author's knowledge, this is the first case of endogenous lipoid pneumonia due to *Legionella* infection. *Legionella* is an aerobic, Gram-negative, motile, rod-shaped bacterium that forms a distinct taxonomic unit within the gamma-2 subdivision of Proteobacteria. In the human lung, *Legionella* can invade the alveolar macrophages, resulting in its destruction.[7] This destruction of the alveolar macrophages may cause lipids to be released and accumulated in the lung tissue, resulting in endogenous lipoid pneumonia. This may explain why lipoid pneumonia occurred in this patient despite her normal serum cholesterol level.

It is often difficult to diagnose lipoid pneumonia because the condition is associated with both nonspecific symptoms and radiological features.[1,2] The frequency of lipoid pneumonia is reported to be 1.0%–2.5%.[1,2] As most cases of community-acquired pneumonia do not undergo bronchoscopy, the full spectrum of histological changes of lipoid pneumonia is not available. Therefore, there is a need for increased awareness of this disease. Lipoid pneumonia should be considered in cases with respiratory symptoms and lung shadows. A detailed history of the patient's exposure to various substances should also be obtained in those with community-acquired pneumonia. This will help to improve the rate of diagnosis of lipoid pneumonia.[4]

Lipoid pneumonia is a progressive disease.[8] Risk factors associated with progression of the disease are concurrent debilitating illness and continued exposure to mineral oil. Unlike community-acquired pneumonia, lipoid pneumonia is associated with persistent and progressive radiological abnormality, even in those with symptomatic improvement.[2,8] Protracted exposure can result in respiratory deficiency and cor pulmonale. There have also been reports of lipoid pneumonia associated with lung cancer.[9,10] The treatment modality for lipoid pneumonia is still uncertain, as it is mainly based on clinical experience and anecdotal reports. The treatment regimen may consist of repeated bronchoalveolar lavage, systemic steroids, immunoglobulin, or even surgical resection.[5,6] In cases where an infectious cause is found, treatment of the underlying infection may suffice, as was the case in this patient. The treatment of lipoid pneumonia differs significantly from that of community-acquired pneumonia.

In conclusion, lipoid pneumonia is a rare disorder that may be associated with *Legionella pneumophila* infection. Due to its progressive nature, greater awareness of this condition is required. Lipoid pneumonia should be considered in patients with respiratory symptoms and lung shadows.

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