NDT Plus (2011) 4: 39–41
doi: 10.1093/ndtplus/sfq196
Advance Access publication 24 November 2010

Case Report

NDT PLUS
Nephrology Dialysis Transplantation

A case of pulmonary dialysis-related amyloidosis with reticular opacity of the lung in a patient undergoing long-term dialysis

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Abstract

Dialysis-related amyloidosis (DRA) is one of the most important complications in long-term dialysis patients. Pulmonary involvement in patients with DRA has been rarely described, and lung radiographic findings have not yet been reported. The most common chronic lung disease process in chronic dialysis patients is interstitial fibrosis. This is the first case report of DRA presenting in the lung in a manner resembling interstitial pneumonia. This case study suggests that interstitial pneumonia as a result of DRA should be considered when dyspnoea and reticular opacity of the lung are observed in patients undergoing long-term dialysis.

Keywords: beta2-microglobulin; interstitial pneumonia; pulmonary dialysis-related amyloidosis; reticular opacity of the lung

Background

Long-term dialysis patients occasionally exhibit radiographic findings showing reticular opacity of the lung of unknown cause. These patients typically have mild respiratory symptoms, such as exertional breathlessness and coughing, but they usually do not undergo a bronchoscopy. One report has shown that the most common chronic lung disease process among long-term dialysis patients is interstitial fibrosis [1]. Reticular opacity of the lung on radiographs and computed tomography images is a common characteristic of interstitial pneumonia arising from interstitial fibrosis.

Dialysis-related amyloidosis (DRA) is one of the most important complications in long-term dialysis patients [2], and beta2-microglobulin has been identified as the principal protein component of this type of amyloidosis [3]. DRA primarily affects the osteoarticular system and causes carpal tunnel syndrome, chronic arthropathy, cystic bone lesions, destructive osteoarthropathy and pathologic fractures [4]. Systemic and visceral involvement of DRA has also been reported with increasing frequency, and the deposition of beta2-microglobulin amyloid in the lung has been reported [5,6]. However, pulmonary involvement with DRA has been rarely described, and lung radiographic findings have not yet been reported. Here, we report an autopsy case of DRA in which the deposition of beta2-microglobulin amyloid in the lung was evaluated using immunohistochemistry.

Case report

A 64-year-old man with chronic renal failure arising from chronic glomerulonephritis had been on maintenance haemodialysis for 33 years since 1975. The patient was a non-smoker. He had suffered from bilateral carpal tunnel syndrome with amyloid deposition 16 and 20 years previously and had swollen, painful joints and hip amyloid nodules. He had undergone the emergency removal of his complete large intestine because of necrotizing colitis 1 year earlier. His maintenance haemoperfusion method had been changed from haemodialysis to haemodiafiltration in 1992.

In 2005, a lower lung reticular opacity resembling findings characteristic of interstitial pneumonia was first identified on a chest radiograph and computed tomography (CT) examination. An elevation in the serum beta2-microglobulin level was noticed in a blood chemistry analysis (29.7 mg/L; normally <2 mg/L). In 2007, he developed coughing and exertional breathlessness. The lower lung reticular opacity was aggravated on a chest radiograph and CT image (Figure 1A–C) obtained in 2008. A small amount of bilateral effusion and an enlargement of the cardio-thoracic ratio were also detected. Echocardiography disclosed a hypertrophied left ventricle and an ejection fraction of 61%. The loss of dry weight, oxygen administration and bronchial dilatation therapy were started for the dyspnoea and coughing. However, the blood pressure level could not be maintained during haemodialysis without the injection of catecholamine. In July 2008, the patient experienced sudden cardiopulmonary arrest. He was admitted into the intensive care unit for 1 week but died.

An autopsy was subsequently performed. Macroscopic evaluation of the lung revealed a hard and wet region

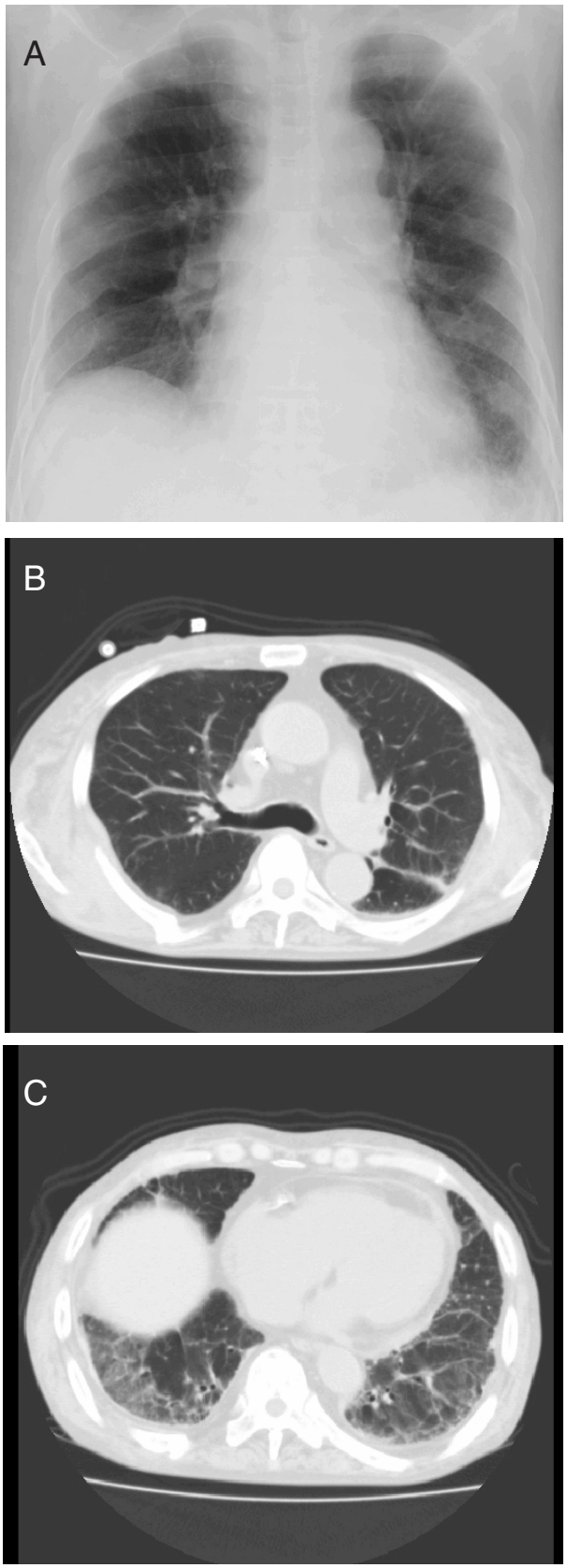

Fig. 1. Chest radiographs and computed tomography images showing bilateral reticular opacities of the lung obtained in 2008. (**A**) Chest radiograph obtained in 2008. (**B**, **C**) Chest computed tomography images obtained in 2008.

(Figure 2A). Microscopic evaluation revealed a callous-thickened alveolar wall and the destruction of the alveolar architecture in all the lung fields (Figure 2B). Pathological analysis of the autopsied specimen showed thickening of the alveolar wall arising from amyloid deposition, as confirmed using Congo red staining and polarized light preparations (Figure 2C). Immunohistochemistry using anti-human beta2-microglobulin antibody (Dako, Tokyo, Japan) further demonstrated the presence of beta2-microglobulin in the same lung specimen (Figure 2D). Immunohistochemistry for serum amyloid A and transthyretin were negative in the same lung specimen (data not shown). The lung autopsy revealed that the pulmonary interstitial fibrosis component was beta2-microglobulin. Pathological analyses of the autopsied specimens showed amyloid deposits in the heart, liver, kidney, gastrointestinal tract and skin; these deposits were confirmed using Congo red staining.

Discussion

DRA has been recognized as a frequent chronic complication in long-term haemodialysis patients [2]. In 1985, it was shown that dialysis-related amyloid fibrils are primarily composed of beta2-microglobulin [3]. Beta2-microglobulin is normally present at a concentration of <2 mg/L in the serum and is catabolized exclusively within the kidney. In the present patient, the serum beta2-microglobulin concentration had been about 20–30 mg/L for at least 8 years, although this patient had been treated with haemodiafiltration. Significant removal of beta2-microglobulin occurs with haemodiafiltration [7]. The main clinical manifestations of DRA are carpal tunnel syndrome, bone cysts and swollen painful joints, probably because beta2-microglobulin preferentially binds to collagen, which is abundant in musculoskeletal tissue [8]. Among patients receiving haemodialysis for >30 years, 81% require surgery for carpal tunnel syndrome [2]. Gastrointestinal complications have also been described in patients with DRA. Colon dilatation and perforation are the most frequent complications [9]. The present case had been treated for bilateral carpal tunnel syndrome, painful joints, hip amyloid nodules and necrotizing colitis with amyloid deposition. Thus, the present case had several severe DRA symptoms.

The differential diagnosis of chronic interstitial pneumonia, as suggested by the presence of a reticular opacity of the lung on a CT image, includes idiopathic interstitial pneumonia, sarcoidosis, pulmonary Langerhans cell histocytosis, etc., but does not include amyloidosis [10].

In conclusion, we report here the first case of DRA with lung involvement resembling interstitial pneumonia. Lung involvement of DRA should be considered when radiographic findings reveal a reticular opacity on a lung radiograph in a patient who has been undergoing long-term dialysis. Pulmonary DRA should be considered in long-term dialysis patients who exhibit reticular opacity of the lung of unknown cause or interstitial pneumonia of unknown cause.

Acknowledgements. We thank Tomoko Yamamoto and Shigeru Horita, Department of Blood Purification and Pathology, for their technical assistance and for providing data.

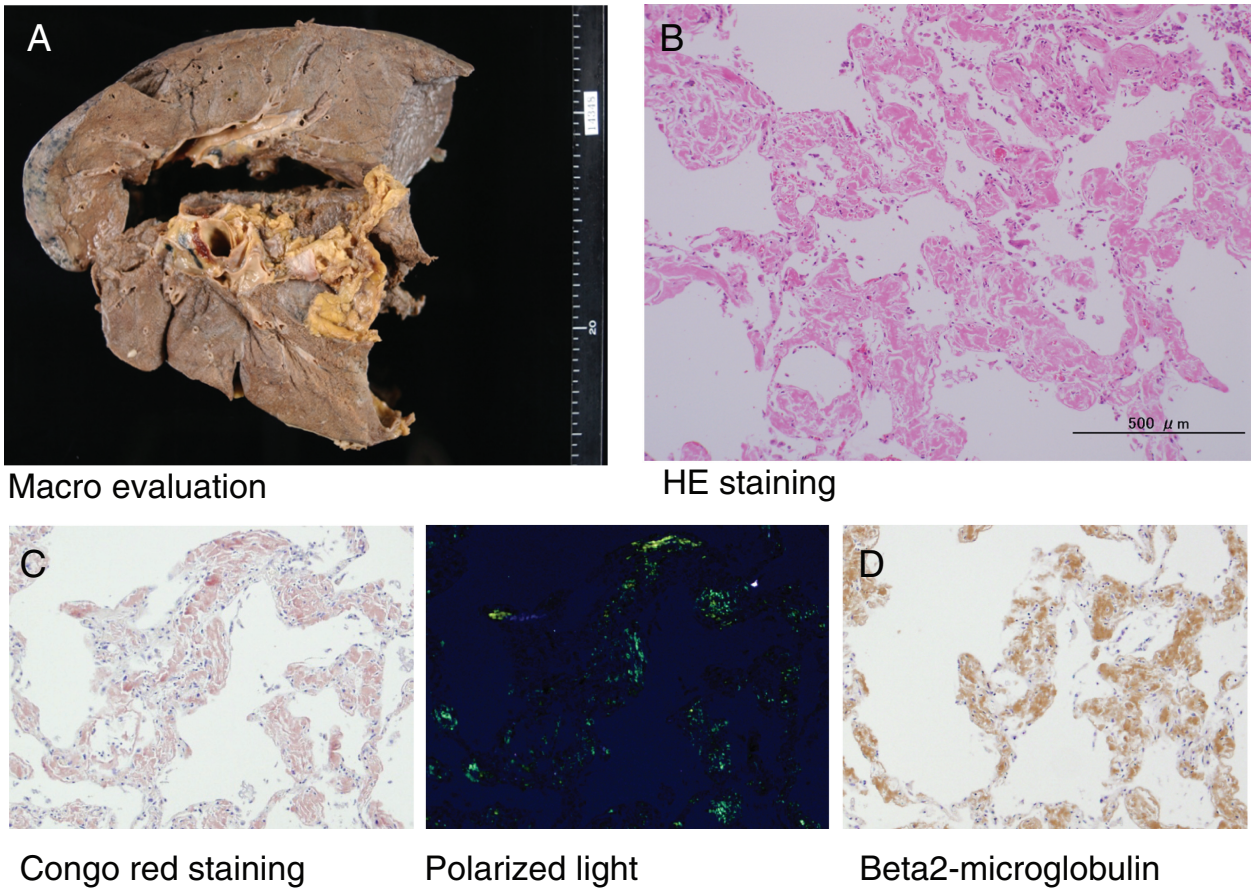

Fig. 2. Lung autopsy findings. (**A**) Macroscopic evaluation of the lung. (**B**) HE staining in the lung; magnification, ×40. (**C**) Deposition of amyloid in the lung (Congo red staining and polarized light; magnification, ×40). (**D**) Immunohistochemistry showing the deposition of beta2-microglobulin in the same lung specimen (immunohistochemistry for beta2-microglobulin; magnification, ×40).

Conflict of interest statement. None declared.

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Received for publication: 17.8.10; Accepted in revised form: 25.10.10