Short reports

Abnormal lung lymphatics and respiratory failure

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ABSTRACT A 65 year old man presented with respiratory failure, pleural effusions, fine reticulonodular shadowing on a chest radiograph, and severe impairment of carbon monoxide diffusing capacity (transfer factor). Open lung biopsy showed only dilated pleural and subpleural lymphatic channels. Hypoplastic deep pulmonary lymphatics may have led to respiratory failure.

Abnormalities of the lymphatic drainage of the lung may be overlooked as a contributory cause of disease. We report the case of a patient with respiratory failure in whom the only pathological finding from open lung biopsy was dilated pleural and subpleural lymphatics.

Case report

A 65 year old man, a retired newsagent, presented with an 18 month history of gradually progressive dyspnoea and weight loss of 6 kg. Nine months previously a chest radiograph had shown patchy lower zone shadowing with bilateral small pleural effusions, which had improved with diuretic treatment. He had smoked 4 oz (113 g) of pipe tobacco a week until one year before presentation.

On examination he was thin and centrally cyanosed. There was no finger clubbing or yellow discoloration of the nails. Fine end inspiratory crackles were audible at both lung bases. There was no evidence of cardiac insufficiency or peripheral lymphoedema.

Chest radiography at presentation showed bilateral widespread reticulonodular shadowing and pleural effusions (fig 1). Computed tomography of the chest showed reticular shadowing in all areas, most marked in the right lower lobe. The mediastinum was normal. Arterial blood gas analysis with the patient breathing room air indicated severe hypoxaemia (oxygen tension (Pao₂) 5.9 kPa, carbon dioxide tension (Paco₂) 4.2 kPa, pH 7.45). Lung function tests showed a mixed obstructive and restrictive defect. FEV₁ was 1.35 l (46% predicted), FVC 3.24 l (80%), and FEV₁/FVC 42%; total lung capacity was 5.0 l (80%) and residual volume 1.8 l (76%) (both measured by constant volume whole body plethysmography); single breath carbon monoxide transfer (TLCO) was 1.96 mmol min⁻¹ kPa⁻¹ (22%) and TLCO corrected for lung volume (Kco) 0.44 mmol min⁻¹ kPa⁻¹ l⁻¹ (32%). On aspiration the pleural fluid was straw coloured with a protein content of 39 g/l. Ninety per cent of the cells were neutrophils; no malignant cells were seen.

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Accepted 18 January 1989

Fig 1 Posteroanterior chest radiograph showing bilateral widespread reticulonodular shadowing and pleural effusions.

The erythrocyte sedimentation rate was 5 mm in the first hour. Serum IgA was raised at 6.1 (normal range 0.7-3.2) g/l, as were IgG binding immune complexes (67 µg/ml human aggregate gammaglobulin equivalents; normal range 20-35 µg/ml). The results of all other serological investigations, including serum angiotensin converting enzyme, avian precipitins, complement, autoantibodies, and viral titres, were within the normal range. There was no evidence of abnormal cardiac function on electrocardiography, echocardiography, or right heart catheterisation. Pulmonary artery capillary wedge pressure was normal. Further diuretic treatment for a fortnight did not improve either his symptoms or his radiographic abnormalities. DTPA permeability scanning gave a $t_{1/2}$ value of 35 (normal range 40-120) minutes. Aqueous lymphangiography of the legs and a small bowel barium meal showed no evidence of a generalised lymphatic abnormality.

Transbronchial biopsy material was non-diagnostic; open lung biopsy showed widely dilated lymphatics within the pleura and interlobular septa (fig 2). The walls of some of the larger lymphatics contained prominent smooth muscle. There was diffuse chronic inflammatory pleural thickening with prominent lymphocytic aggregates. The pulmonary blood vessels were normal and there was no evidence of neoplasia or interstitial fibrosis.

Bilateral pleural aspiration to dryness on three occasions three months apart relieved his breathlessness and increased

Fig 2 Open lung biopsy material showing dilated pleural lymphatics (l). The alveolar (a) walls are normal. (Elastin-van Gieson.)

arterial oxygen tension, though his TLCO has fallen further to 13% predicted. Pleurodesis of the left pleural space with tetracycline was successful.

Discussion

Under normal circumstances superficial (pleural) and deep (peribronchial and perivenous) pulmonary lymphatic channels with valves drain lymph towards the hilum. If the deep system is obstructed, subpleural channels allow lymph to flow into the superficial system.¹

We propose that the restrictive defect and respiratory failure in our patient resulted from excess interstitial lung water and pleural effusions secondary to abnormal deep pulmonary lymphatics. The mild obstructive defect may be due to pipe smoking. An abnormality of the deep lymphatic system may be caused by obstruction of mediastinal or central pulmonary lymphatics by lymphoma, lymphangiomatosis or other tumours,² or by hypoplasia. The normal computed tomography scan of the mediastinum and the absence of tumour at open lung biopsy make infiltration or obstruction of the central lymphatics unlikely in this case.

Hypoplastic lymphatics have been identified in the arms and legs of patients with the yellow nail syndrome,^{3,4} and it has been suggested that in this condition hypoplastic pulmonary lymphatics predispose to bronchiectasis and the development of recurrent pleural effusions, which are characteristically exudates.^{4,5} The lymphatic abnormality is presumed to be congenital, though the lymphoedema, yellow nails, and pleural effusions may present at any age. Possibly our case is a *forme fruste* of this condition, though respiratory failure with reduced gas transfer and reticular shadowing on the computed tomography scan have not been

reported. Dilated pleural lymphatics have been reported in one patient with primary lymphoedema and pleural effusions.⁶ Our case differs from primary pulmonary lymphangiectasis, which usually presents with respiratory failure in infancy.⁷ The oldest reported patient, a 19 year old man, had cystic dilatation of lymphatics localised to the right middle and lower lobes and mediastinum.⁸ Cystic dilatation of the deep lymphatic system was not seen in our patient on the computed tomography scan or in lung biopsy material.

The association of breathlessness and diffuse pulmonary shadowing has a broad differential diagnosis. It may be difficult to determine as in this case, in which open lung biopsy was required to establish the diagnosis, whether breathlessness is primarily cardiac or pulmonary in origin.

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