Rare disease

Williams-Campbell syndrome presenting in an adult

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Summary

A 59-year-old man presented with a 4-year history of productive cough, shortness of breath and wheeze. He had been treated for asthma and given several courses of antibiotics which improved his symptoms. Medical history was unremarkable. There was no history respiratory disease in childhood although he was prone to chest infections in adult life. A high-resolution chest CT showed marked proximal cystic bronchiectasis associated with collapse of distal bronchi on expiration. A diagnosis of cystic bronchiectasis due to undiagnosed adult Williams-Campbell syndrome was made on the basis of these characteristic radiological features and the exclusion of other possible causes.

BACKGROUND

Williams-Campbell syndrome is a rare disorder characterised by congenital deficiency of cartilage in subsegmental bronchi leading to cystic bronchiectasis and airway collapse on expiration. The syndrome is almost exclusively described in paediatric literature. However, a handful of adult cases have now been reported. These patients probably have less severe cartilage deficiency than those who present in childhood. Although rare, Williams-Campbell syndrome should be considered in the differential diagnosis of cystic bronchiectasis in adults.

CASE PRESENTATION

A 59-year-old man presented with a 4-year history of productive cough, wheeze and shortness of breath on exertion. He had been treated for asthma and given antibiotics on several occasions which results in improvement in his cough and dyspnoea. He recalled being prone to chest infections as a younger man. There was nothing in the history suggestive of an autoimmune disease. Medical history was unremarkable. There was no history of tuberculosis or sinusitis or any childhood respiratory disorder and no relevant family history. He had never smoked. On auscultation of his chest there was a scattered wheeze and a few basal crackles. His oxygen saturation was 97% on room air.

INVESTIGATIONS

A full blood count, urea and electrolytes and liver function tests were normal.

Antinuclear antibody, immunoglobulin (Ig), total IgE, aspergillus precipitins and aspergillus IgE were also within the normal range. Sputum cultures were negative. Lung function tests showed essentially normal spirometry forced expiratory volume in 1 second (FEV₁): 3.7 (101%) forced vital capacity (FVC) 5.4 (110%) FEV₁/FVC: 68% with reduced gas transfer with little correction for alveolar volumes diffusion capacity of the lung for carbon monoxide (DLCO) 55%, diffusion capacity of the lung per unit lung volume (KCO): 60%. The residual volume was 140% predicted consistent with gas trapping.

A high-resolution CT of his chest showed marked proximal cystic bronchiectasis with large (up to 5 cm) thin-walled cysts many of which were seen to communicate with distal bronchi (figure 1—coronal reconstruction). Axial images in inspiration and expiration showed collapse of cystic areas on expiration (figures 2 and 3).

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of congenital or acquired cystic bronchiectasis includes cystic fibrosis, ciliary dyskinesia, α 1-antitrypsin deficiency, immunoglobulin deficiency, autoimmune disease and allergic bronchopulmonary aspergillosis.

The patient was diagnosed with Williams-Campbell syndrome on the basis of the highly characteristic radiological appearances (which fit the descriptions in the literature perfectly) and the exclusion of other potential causes of proximal cystic bronchiectasis in an adult

Figure 1 Coronal CT image showing thin-walled proximal cystic bronchiectasis.

Figure 2 Axial CT image in inspiration.

including allergic bronchopulmonary aspergillosis, immunoglobulin deficiency and autoimmune disease.

OUTCOME AND FOLLOW-UP

The patient was treated for bronchiectasis and has been followed up for 2-years to date.

He has had several courses of antibiotics and continued in employment. His lung function has remained stable.

DISCUSSION

In 1960, Williams and Campbell¹ and subsequently Williams *et al*² in 1972 described a total of 16 children

Figure 3 Axial CT image in expiration showing marked collapse of cystic areas.

with an unusual form of bronchiectasis. All the children presented in early childhood with cough, shortness of breath and recurrent chest infections. Chest x-ray and bronchography revealed thin-walled proximal cystic bronchiectasis. Williams and Campbell noted that the distal bronchi were unusually soft and compliant. Bronchography showed that the subsegmental bronchi collapsed on expiration and ballooned in inspiration. A post mortem performed on one of the children showed the absence of cartilage in fourth to eighth generation bronchi leading Williams and Campbell to postulate that they had a congenital deficiency of bronchial cartilage. The mechanism of the cartilage deficiency itself was unclear. There was no evidence of cartilage deficiency outside the bronchi. Williams and Campbell thought that collapse of soft compliant bronchi during coughing caused poor airway clearance and eventually development of bronchiectasis.

Since the 1970s, several additional descriptions of Williams-Campbell syndrome have been reported in the paediatric literature. A further post mortem study confirmed the original findings³ and familial occurrence in two families was reported.^{4 5}

Although Williams-Campbell syndrome normally presents with respiratory symptoms in childhood a handful of newly diagnosed cases in adults have been reported.⁶⁻¹⁰ None has been confirmed by post mortem. The oldest patient described was a 70-year-old Japanese man.¹⁰ The existence of an 'adult-type' Williams-Campbell syndrome suggests patients with less severe cartilage deficiency may remain subclinical or undiagnosed for years, and in common with other genetic disorders such as cystic fibrosis, those afflicted with a mild variant may present in middle or even old age.

The diagnosis of Williams-Campbell syndrome is based on history, exclusion of other causes of bronchiectasis (such as cystic fibrosis, ciliary dyskinesia, allergic bronchopulmonary aspergillosis and immunodeficiency) and the presence of characteristic radiological findings. These are cystic bronchiectasis distal to third-generation bronchi associated with pulmonary hyperinflation and collapse of subsegmental bronchi on expiration while the trachea and central bronchi remain normal in diameter.^{8 11 12}

Williams-Campbell syndrome is treated with chest physiotherapy and appropriate antibiotics. There is no definitive treatment. One case of bilateral sequential lung transplantation has been reported.¹³ The authors found complete absence of cartilage in distal bronchi of the native lung. The patient subsequently developed bronchomalacia of the remaining native right and left main bronchi associated with recurrent pulmonary infections and died 1-year post-transplant. The authors recommended against further sequential bilateral lung transplants in Williams-Campbell syndrome because of the high risk of airway complications and suggested en bloc transplantation instead.

The clinical course of Williams-Campbell syndrome appears to be very variable. In a series of 21 children published in 1993, 5 progressed rapidly to respiratory failure and death while the remainder reached adulthood.⁴ Prognosis in Williams-Campbell syndrome diagnosed in adults is unknown.

Learning points

- ▶ Williams-Campbell syndrome is a rare congenital disorder characterised by deficiency of bronchial cartilage resulting in cystic bronchiectasis and subsegmental collapse of bronchi on expiration.
- ▶ Although Williams-Campbell syndrome normally presents in childhood it can also present in adults and should be considered in the differential diagnosis of adult cystic bronchiectasis.
- ▶ CT scans in expiration are helpful in making the diagnosis.

Competing interests None.

Patient consent Obtained.

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