CASE REPORT

Mycoplasma pneumoniae associated organising pneumonia in a 10 year old boy

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We describe a 10 year old boy with organising pneumonia associated with acute *Mycoplasma pneumoniae* infection. The diagnosis of organising pneumonia was made by open lung biopsy and the *M pneumoniae* infection was proven serologically. Antibiotic and long term corticosteroid treatment resulted in steadily improving pulmonary function monitored by spirometry. The introduction of anti-inflammatory treatment with NSAIDs/immunosuppressive agents in order to spare steroids was well tolerated and resulted in further improvement of the pulmonary function. To our knowledge this is the first documented case of *Mycoplasma pneumoniae* associated organising pneumonia to be reported in a child.

Organising pneumonia, also described as bronchiolitis obliterans organising pneumonia (BOOP) is a rare disorder, usually occurring in patients over 50 years of age (range 20–80 years), with an equal sex distribution. There are only a few cases reported in adolescents. This rare disorder can be divided into cryptogenic (idiopathic) organising pneumonia (COP) of unknown cause, and secondary organising pneumonia associated with many recognised conditions, for example, infections, drug reactions, malignancy, radiation therapy, or autoimmune diseases. The pathological pattern is not specific for any disorder or cause, but reflects one special type of inflammatory process resulting from lung injury.¹ It is characterised by patchy inflammatory changes of the bronchoalveolar lumen and wall, with some associated peribronchial scarring. The characteristic histological feature is the presence of buds of granulation tissue in the distal airspaces and interstitial mononuclear cell infiltrate.

Various infectious agents have been described as rare causes of organising pneumonia.² To our knowledge the association of *Mycoplasma pneumoniae* infection and development of organising pneumonia in children has not been reported to date.

CASE REPORT

A 10 year old boy presented with a six week history of dyspnoea on even mild exertion, fatigue, weight loss, and dry cough. These symptoms showed steady worsening that prompted hospital admission. The patient had an uneventful medical history apart from known hay fever. There were no cardiovascular, autoimmune, or pulmonary diseases in the past or in the family history.

Physical examination revealed tachypnoea, dyspnoea with reduction of the oxygen saturation below 80% after mild exercise, and fine diffuse crackles on lung auscultation. Spirometry revealed a severe restrictive ventilation defect with the forced vital capacity (FVC) impaired to 25% of reference values (fig 1). Chest roentgenogram and high resolution computed tomography (HR-CT) scan images showed notable alveolar and

interstitial opacities with bilateral infiltration of the lung parenchyma (fig 2). Laboratory studies showed normal full blood count, negative C reactive protein, and slightly raised erythrocyte sedimentation rate (20/40 mm). Serological assays revealed raised *M pneumoniae* antibody titres (IgM 18 U/ml, IgG 80 U/ml, ELISA) indicating a recent infection. In the course of the disease the IgG titre decreased to 23 U/ml, and IgM became negative. All other serological studies for infectious agents were negative. Initially we showed the presence of autoantibodies (antinuclear antibody, cardiolipin and phospholipid IgG, circulating immune complexes); however, their titres decreased during the course of steroid treatment. Bone marrow aspiration performed prior to steroid therapy showed no abnormal pathology.

Open lung biopsy performed in order to disclose the cause of the restrictive lung disorder showed partly acute and subacute inflammation process especially localised at the bronchiolo-alveolar spaces with activation of the monocyte-macrophage system (fig 3). In the transitional zone between the bronchioles and the respiratory epithelium there was accumulation of foamy and grainy secretion. The cellular phase of the inflammatory reaction was predominant, with signs of beginning fibrosis at the bronchioles and alveoli. These results were consistent with the diagnosis of organising pneumonia.

Initial treatment consisted of a combination of antibiotics against *M pneumoniae* (clarithromycin, ciprofloxacin), and a course of corticosteroids. He received a pulse steroid therapy (methylprednisolone 20 mg/kg/day for three days intravenously) followed by oral steroid therapy (prednisone 2 mg/kg/day). Therapy was monitored by performing serial pulmonary function tests (fig 1). Notable improvement was evident, with FVC up to 80% of the reference value. Subsequent weaning of steroids after 23 weeks of treatment, however, resulted in worsening of pulmonary function as measured by spirometry. Deterioration of the FVC under 70% necessitated a further increase of the steroid dose. Because of massive side effects we initiated a trial of NSAIDs/immunosuppressive agents (diclofenac 4 × 25 mg/day, sulphasalazine 500 mg/day), and were subsequently able to considerably reduce the steroid dose (<0.2 mg prednisone/kg/day). An episode of disease relapse five months after introduction of the combination therapy was successfully treated by high dose methylprednisolone pulse therapy. Pulmonary function was soon restored, after a transient deterioration (fig 1).

The patient experienced no serious side effects from the new medication. Monthly monitoring of pulmonary function as well as laboratory evaluation indicated a stable condition with slight improvement.

Abbreviations: BOOP, bronchiolitis obliterans organising pneumonia; COP, cryptogenic organising pneumonia; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; HR-CT, high-resolution computer tomography; NSAID, non-steroidal anti-inflammatory drug; ssDNA single strand DNA

Figure 1 Results of spirometry tests.

Figure 2 Computed tomography scan images: (A) initial presentation prior to therapy; (B) after four months of steroid therapy.

DISCUSSION

Organising pneumonia has rarely been described in children, and little is known about its pathogenesis. Here we report a

case of organising pneumonia associated with acute *Mycoplasma pneumoniae* infection in a 10 year old boy.

In our patient, increased *Mycoplasma pneumoniae* antibody titres (IgM and IgG) as well as serological autoimmune phenomena were found. Cases of organising pneumonia associated with autoimmune disorders such as systemic lupus erythematosus, rheumatoid arthritis, Sjögren syndrome, and dermatomyositis have been described.³⁻⁵ However, our patient showed no other signs or symptoms of an underlying autoimmune disorder apart from the above mentioned autoantibodies. We therefore attribute their occurrence to the *M pneumoniae* infection, as a consequence of a host immune response to the infection.^{6,7}

It is unusual to see a pattern of BOOP following infection. To our knowledge, only a few adult patients have been reported with *Mycoplasma pneumoniae* associated BOOP^{2,8,9} to date. All patients had histories, laboratory and histopathological findings, and therapeutic responses to steroids similar to our patient. Most of the reported patients responded to steroid therapy; however, they required long term steroid administration (for 6–24 months). Relapses were reported following gradual reduction of the steroid doses, which could be overcome with increased steroid doses. The final outcome of the patients was not affected by disease relapses.^{2,8}

As the pathology of the organising pneumonia can be attributed to an ongoing inflammation, the use of anti-inflammatory drugs in the treatment of this condition appears justified. We therefore started treatment with diclofenac and sulfasalazine in addition to the steroids, and were able to reduce the steroid doses without any adverse effects on pulmonary function. Recent results showed a stable condition with an tendency to improvement. It is possible that this improvement reflects the natural course of the disease more than our therapeutic efforts. However, reducing the steroid dose to prednisone 0.24 mg/kg/day led to worsening of the pulmonary function, whereas the combination therapy

Figure 3 Open lung biopsy showing partly acute and subacute inflammation process.

recently allowed a steroid dose reduction to <0.2 mg/kg/day. Even the episode of rapid deterioration of pulmonary function could be reversed more rapidly with the combination therapy.

There are no reports in the literature describing treatment of organising pneumonia with NSAIDs. We believe that additional treatment with NSAIDs may represent a sensible approach in patients suffering serious side effects of steroid treatment. Moreover, such an approach may be justified from the start in order to spare steroid medication.

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