CASE REPORT

Endobronchial avium mycobacteria infection in an immunocompetent child

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SUMMARY

A 12-month-old boy, with no medical history, was admitted for dyspnoea with no cough or fever. Chest auscultation revealed an expiratory wheezing with decreased right-sided breath sounds. Chest imaging revealed subcarinal adenopathy and a nodule in the right principal bronchus (RB). Bronchoscopy showed a major obstruction of the RB by a granuloma, and a smaller granuloma in the left principal bronchus. The granulation tissue was removed by laser section. Histological examination revealed a necrotising granulomatous inflammation, culture showed a *Mycobacterium avium complex* (MAC). Tests to rule out tuberculosis and immunodeficiency were negative. The diagnosis of an MAC endobronchial granuloma was ascertained and a multidrug therapy associating clarithromycin, rifampin and ethambutol was started. The clinical outcome was good after 3 months of treatment and the bronchoscopy normalised after 1 year. Although rare, the frequency of MAC respiratory infections in immunocompetent children can increase. Reporting these cases should help to optimise diagnosis and treatment.

BACKGROUND

Pulmonary disease caused by non-tuberculous mycobacteria (NTM) occurs rarely in immunocompetent children. These cases are worth being reported, to help optimise the diagnosis and the treatment. Among the various NTM species, *Mycobacterium avium complex* (MAC) is the most common with an increasing incidence of pulmonary infection.¹

CASE PRESENTATION

A 12-month-old boy was admitted to our hospital with symptoms of dyspnoea which gradually increased over a 1 month. He had no such medical history. Prior to admission, he received 1 week of oral corticosteroids that lead to a complete disappearance of the dyspnoea, but it reappeared after the steroids were stopped. At admission, he had no cough or fever and no fatigue or weight loss, the room air oxygen saturation was normal. Chest auscultation revealed a bilateral expiratory wheezing and decreased right-sided breath sounds.

INVESTIGATIONS

A chest X-ray was performed and it showed air trapping in the right lung and hilar lymphadenopathy (figure 1A). The lung CT scan revealed large subcarinal lymphadenopathy with the constriction of the two principal bronchi, and also a nodule in the right principal bronchus (RB;

figure 1B). Thus, a bronchoscopy was indicated and showed a granuloma in the RB, leading to an almost complete obstruction, as well as another smaller granuloma in the left principal bronchus (LB). During the bronchoscopy, the granulation tissue was removed by laser section and sent for histological examination and culture. The Haematein–Eosin–Safran-stained tissue sections revealed a necrotising granulomatous inflammation; and the acid-fast staining showed no mycobacterial organism. Bacterial, fungal and viral cultures were carried out, all of which were negative.

DIFFERENTIAL DIAGNOSIS

The diagnosis of an endobronchial granuloma caused by a mycobacterial infection was suspected. *Mycobacterium* species that were discussed were: (1) *Mycobacterium tuberculosis* and (2) NTM.

Several tests were performed to rule out tuberculosis, they were all negative: morning gastric aspirates were collected on three consecutive days, tuberculin skin test and QuantiFERON test. Extensive tuberculin testing of the household and close contacts was negative. We performed several tests to rule out immunodeficiency: white cell count was normal, levels of IgG and IgM were normal, interleukin 12/interferon γ (IL-12/IFN- γ) ratio and nitroblue tetrazolium (NBT) test were normal and he had a negative testing for HIV.

TREATMENT

Before the MAC was identified by culture, a conventional antituberculous therapy (isoniazid, rifampin, ethambutol and pyrazinamid) was started. To follow the evolution under treatment, and because the clinical status was unchanged, a second bronchoscopy was performed 2 weeks later revealing the reappearance of the granuloma in the RB, as well as a larger one in the LB (figure 2). Thus, the LB granulation tissue was also removed by laser section. Finally, a third bronchoscopy 1 week later showed a complete disappearance of the LB granuloma and a 50% decrease of the RB granuloma. Three weeks after the first bronchoscopy, cultures of the endobronchial mass, the bronchial aspiration, and two of the three gastric aspirates revealed MAC (liquid culture medium, then identification by PCR), confirming the diagnosis of pulmonary MAC infection in this immunocompetent child. The antibiotic regimen was then switched to clarithromycin, rifampin and ethambutol, according to the antimicrobial susceptibility testing.

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Figure 1 (A) Chest X-ray showing a dissymmetric transparency with right air trapping and hilar lymphadenopathy at admission. (B) Lung CT scan revealing large subcarinal lymphadenopathy constricting the two principal bronchi, as well as a nodule in the right principal bronchus at admission.

OUTCOME AND FOLLOW-UP

After 3 months of this new treatment, dyspnoea and wheezing disappeared; the auscultation and the chest X-ray was

normalised (figure 3). After 6 months, a new bronchoscopy was carried out and it revealed the persistence of the RB granuloma with a 50% occlusion; and the granulation tissue was, once

Figure 2 Second bronchoscopy after 15 days of treatment.

Figure 3 The chest X-ray was normal after 3 months of triantibiotherapy against *Mycobacterium avium* complex.

again, removed by laser section. Cultures of the second and following endobronchial aspirations remained negative. The treatment was well tolerated with no side effects (especially no auditory and vision side effects). Finally, the bronchoscopy after 1 year of treatment had normalised, with no persistent granuloma and/or compression; and the treatment was then stopped.

DISCUSSION

NTM are normal inhabitants of a wide variety of environmental reservoirs including natural and municipal water, soil, aerosols, animals and humans.¹ They rarely cause invasive respiratory diseases in immunocompetent hosts. However, the number of cases reported in the literature increases, especially in children, and with a majority of MAC among the various NTM species. So far, MAC has been isolated from various environments, mainly aquatic. It has indeed been shown that municipal water could contain up to 10^3 colony forming units of planktonic MAC per 100 mL of water.² In the present case, the mother had noticed that her child regularly swallowed stagnant water from a little swimming pool that could cause the infection. The water of the pool had not been analysed because of technical reasons.

In 2001, a review of MAC intrathoracic infection in immunocompetent children has highlighted that the presentation pattern appeared characteristic: children aged 3 years or less, without exposure to *M tuberculosis*, and presenting with clinical and radiographic evidence of bronchial obstruction. Since then, other cases along with the case presented here have confirmed their speculations.³ A few years later, another team reviewed 43 cases of intrathoracic diseases from NTM in children.⁴ At diagnosis, they reported that the children had cough and/or wheezing; two of three had fever, anorexia, weight loss or fatigue; the median age was 24 months; and the majority of pulmonary isolates were MAC (60%). In the present case, the 12-month-old child had no other symptom than dyspnoea (no other respiratory or constitutional symptom). Our case is compared with these 43 NTM cases in table 1.

As MAC lung disease remains a rare infection, especially in an immunocompetent host, the diagnosis should be ascertained. Thus, in 2007 the American Thoracic Society proposed the following diagnosis criteria: (1) clinical: pulmonary symptoms, abnormalities on the chest X-ray and CT scan, and exclusion of other diagnoses; (2) microbiological: positive culture results from at least two separated expectorated sputum samples or one bronchial wash, or lavage or mycobacterial histopathological features on lung biopsy.⁵ In the present case, the diagnosis was

indeed ascertained after the positive MAC cultures from the endobronchial mass, the bronchial aspiration and from two of the three gastric aspirates.

However, controversial in children, the classical recommended treatment of endobronchial MAC infection is a focal surgical resection in combination with multidrug treatment regimens. One major advancement in the drug treatment of MAC infection has been the introduction of macrolides such as clarithromycin and azithromycin, which have substantial in vitro and in vivo activity against MAC. Thus, the recommended initial therapy comprises: clarithromycin or azithromycin, ethambutol and rifampin.⁵ The primary microbiological goal of this therapy's length is 12 months of negative cultures; therefore, sputum must be collected from patients for examination throughout treatment.⁵ In the literature, MAC pulmonary diseases in children have generally been treated with various antibiotic regimens with variable outcome. Interestingly, a recent

Table 1 Comparison of this case with Nolt *et al* review

	This case	Review of 43 cases by Nolt <i>et al</i> ⁴
Age	12 months	24 months (median age)
Clinical presentation	Cough, wheezing and no fever	Respiratory symptoms in 40% of the cases
Tuberculin skin test	0 mm	7 mm in average
Chest X-ray	Asymmetric air trapping	Asymmetric air trapping in one-third of the cases
Positive cultures	Gastric washing, endobronchial biopsy and bronchial aspiration	Gastric washing (n=12), endobronchial biopsy (n=10), lymph node biopsy (n=8), sputum (n=4), bronchoalveolar lavage (n=3), pleural effusion (n=2) and lung tissue biopsy (n=2)
Median time to diagnosis	21 days	28 days
Duration of the antibiotic regimen	12 months	11.5 months if systemic symptoms/6 months if only respiratory symptoms
Clinical outcome	No sequelae; the chest X-ray after 3 months was normal	No serious sequelae in two-third of the patients. Persistently abnormal radiographic findings in 14% of the patients

case reported a satisfactory outcome after removal of an isolated bronchoscopic endobronchial mass.⁶ In the present case, the clinical outcome was good as soon as the granulation was removed by laser section during the first bronchoscopy. However, despite several laser sections, the granuloma finally disappeared only after 12 months of triantibiotherapy associating clarithromycin, rifampin and ethambutol.

Learning points

- ▶ The prevalence of *Mycobacterium avium complex* (MAC) respiratory infections in immunocompetent children is increasing.
- ▶ MAC diagnosis requires positive microbiological cultures (plus identification by PCR).
- ▶ Several culture samples optimise the chances to ascertain the diagnosis: gastric aspirates, bronchoscopic aspirations and biopsy if needed.
- ▶ Endobronchial MAC infection treatment associates surgical or laser resection plus multidrug treatment regimens for at least 1 year after the negativation of cultures.

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REFERENCES

- 1 Litman DA, Shah UK, Pawel BR. Isolated endobronchial atypical mycobacterium in a child: a case report and review of the literature. *Int J Pediatr Otorhinolaryngol* 2000;55:65–8.
- 2 Whitley H, Keegan A, Giglio S, *et al.* Mycobacterium avium complex—the role of potable water in disease transmission. *J Appl Microbiol* 2012;113:223–32.
- 3 Osorio A, Kessler RM, Guruprasad H, *et al.* Isolated intrathoracic presentation of Mycobacterium avium complex in an immunocompetent child. *Pediatr Radiol* 2001;31:848–51.
- 4 Nolt D, Michaels MG, Wald ER. Intrathoracic disease from nontuberculous mycobacteria in children: two cases and a review of the literature. *Pediatrics* 2003;112:e434.
- 5 Griffith DE, Aksamit T, Brown-Elliott BA, *et al.* An official ATS/IDSA statement: diagnosis, treatment, and prevention of nontuberculous mycobacterial diseases. *Am J Respir Crit Care Med* 2007;175:367–416.
- 6 del Rio Camacho G, Soriano Guillen L, Flandes Aldeyturriaga J, *et al.* Endobronchial atypical mycobacteria in an immunocompetent child. *Pediatr Pulmonol* 2010;45:511–13.

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