

CASE REPORT

Mycobacterium avium-intracellulare associated with tracheobronchopathia osteochondroplastica

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Mycobacterium avium-intracellulare associated with tracheobronchopathia osteochondroplastica. P.E. Baugee, L.M. Delaunois. ©ERS Journals Ltd 1995.

ABSTRACT: A previously healthy woman aged 53 years presented with cough, night sweats and weakness. Chest roentgenogram revealed a reticulonodular infiltrate of the right upper lung. Multiple sputum cultures were positive for *Mycobacterium avium-intracellulare*, with no immunodeficiency disease. Fibreoptic endoscopy showed multiple tracheal cartilaginous knobs from a tracheobronchopathia osteochondroplastica. The infiltrate improved after chest physiotherapy, but sputum cultures remained positive.

Despite its low incidence, tracheobronchopathia osteochondroplastica can be associated with atypical mycobacterial disease.

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Infection with *Mycobacterium avium-intracellulare* complex (MAC) has become one of the most frequent complications of the acquired immunodeficiency syndrome (AIDS), but primary pulmonary colonizations and infections have been described in non-AIDS patients with and without pre-existing bronchopulmonary disease. We report one patient with MAC pneumonia associated with tracheobronchopathia osteochondroplastica.

Case report

A previously healthy and nonsmoking woman aged 53 yrs presented with symptoms of dry cough, night sweats and weakness of 2 yrs duration. On admission, physical examination was remarkable only for clubbing of the fingers: Her physical status was fair (weight 72 kg, height 1.72m); pulse 76 beats·min⁻¹; blood pressure 130/60 mmHg; temperature 37.2°C; and respiratory rate 12 breaths·min⁻¹, with normal breath sounds over both lung fields. The erythrocyte sedimentation rate was 22 mm·h⁻¹, but routine blood, coagulation and serum biochemistry studies were within normal limits. A test for antibodies to human immunodeficiency virus (HIV) was also negative.

The chest roentgenogram showed a reticulonodular infiltration of the right upper lobe, with a small atelectasis in the ventral segment, but without any cavitation or pleural effusion (fig. 1). This infiltration was already obvious on a chest X-ray performed 2 yrs previously. The computed tomography (CT) scan of the thorax (fig. 2) revealed localized bronchiectasis of the right upper lobe, surrounded by soft infiltrates and small rounded well-circumscribed nodules.

A tuberculin skin test with 5 tuberculin units (TU)



Fig. 1. – Reticulonodular infiltrate of the right upper lobe with a small atelectasis of the ventral segment.

purified protein derivative (PPD) induced a very small wheal. Acid-fast bacilli from the sputum were observed on Ziehl-Neelsen staining.

The patient was treated with isoniazid, rifampicin and pyrazinamide for 4 months. Sputum cultures remained repeatedly positive for *Mycobacterium avium-intracellulare*. No other potential pathogens were identified.

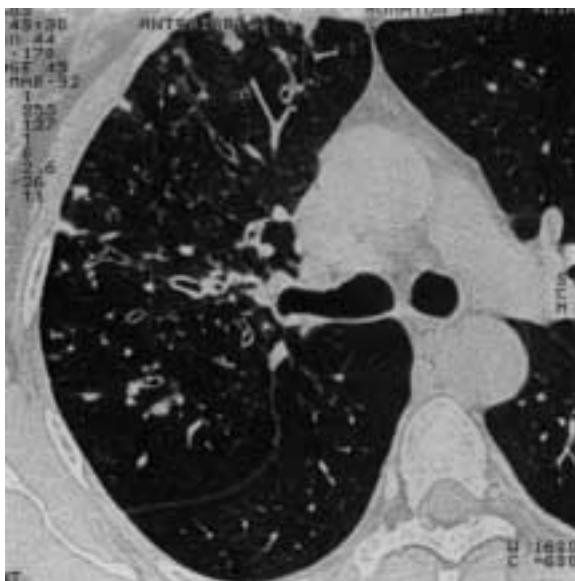


Fig. 2. – Computed tomographic (CT) scan showing multiple small rounded and well-circumscribed nodules with no calcification in the right upper lobe, mostly in the posterior segment; small triangular atelectasis of the ventral segment with air bronchogram; and small cylindrical bronchiectasis. There were no lesions in other parts of the lung.

After confirmation of the diagnosis by some cultures and according to the wide resistance of the strains of MAC to first-line antimycobacterial agents, the patient was treated with rifabutine, ciprofloxacin and ethambutol for six months, according to the *in vitro* activity of these drugs.

This treatment was not followed by any clinical or roentgenographic improvement, and sputum cultures remained positive. Lung function tests were within normal limits: forced vital capacity (FVC) 4.14 l (116% of predicted value), forced expiratory volume in one second (FEV₁) 3.2 l (105% pred), and transfer factor of the lungs for carbon monoxide (Tlco) 89% pred. However, on forced flow-volume curves, inspiratory flows were always limited to values lower than the normal expiratory flows: peak inspiratory flow 2.56 l·s⁻¹ (154 l·min⁻¹) and forced expiratory flow when 50% of vital capacity (VC) has been exhaled 2.41 l·s⁻¹ (145 l·min⁻¹) (fig. 3) suggesting variable extrathoracic obstruction.

When the patient was admitted to our hospital, a fiberoptic bronchoscopy revealed multiple white and hard cartilaginous knobs on the anterior and lateral walls of the trachea, from 1 cm below the vocal cords to the carina. Abundant secretions stagnated below the level of the knobs.

Biopsy produced only normal mucosal and bony tissues. Congo-red staining for amyloidosis was negative. Cultures from endobronchial mucus were repeatedly positive for *Mycobacterium avium-intracellulare*, which was resistant to all drugs except for ethionamide, but this susceptibility was not found in all cultures.

The patient has since been treated with chest physiotherapy, with only clinical and roentgenographic improvement, as the cultures have remained positive for MAC.

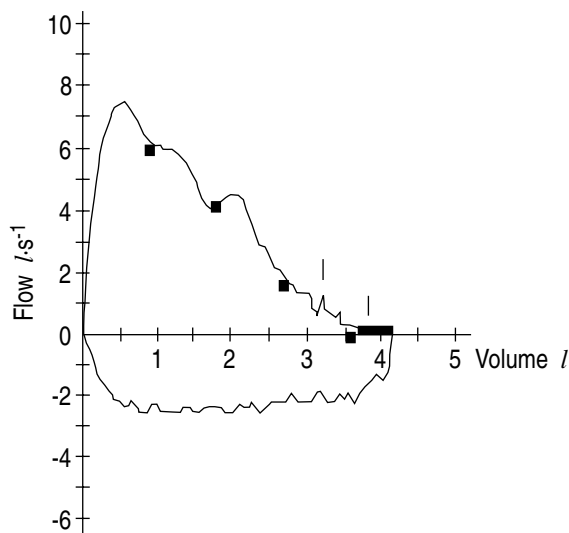


Fig. 3. – Inspiratory and expiratory flow-volume curve with limited flows during inspiratory forced manoeuvre. A variable extrathoracic obstruction is suggested by the low inspiratory forced flows despite normal expiratory flows. Small black squares show normal values.

Discussion

Mycobacteria other than the aetiological agents of tuberculosis usually develop in pre-existing debilitating diseases. The infection with *Mycobacterium avium-intracellulare* has become one of the most severe complications in patients with the acquired immunodeficiency syndrome (AIDS). In addition to AIDS, the other predisposing factors are chronic obstructive pulmonary disease (COPD), pneumoconiosis, bronchiectasis, old inactive tuberculous lesions, malignant diseases, immunosuppression due to haematological disorders (lymphoma, Hodgkin's disease, hairy-cell leukaemia), diabetes, alcoholism and gastrectomy. The hallmark of the infection is upper lobe cavitary disease that mimics tuberculosis, occurring mostly in male smokers (80%) with COPD. A second syndrome has recently been described as a small nodules/interstitial disease associated with cylindrical bronchiectasis; 80% of these patients are women with a negative or a minimal smoking history, and no apparent underlying lung disease [1, 2].

Our patient does not suffer from any of these well-known predisposing factors but from tracheobronchopathia osteochondroplastica (TO), a disease that disturbs mucociliary clearance and, accordingly, local defence mechanisms of the bronchi.

Described for the first time by Rokitsky in 1855 [3], tracheobronchopathia osteochondroplastica is a very rare disease (245 cases in the review of literature by MARTIN [4] in 1974), with prevalence (sex ratio 3:1) in males >50 yrs of age, though some cases have been described among children [3].

Tracheobronchopathia osteochondroplastica has been attributed to various factors, such as chronic inflammatory process or degeneration, ozone, chemically-induced inflammation, tuberculosis, or syphilis. It has also been considered as the terminal stage of the bronchial primary amyloidosis [5, 6], but more recent studies have shown that they are distinct pathological processes [7, 8].

Tracheobronchopathia osteochondroplastica is often asymptomatic, but can cause dry or productive cough, dyspnoea, inspiratory stridor, dry throat, dysphonia, bronchial obstruction, haemoptysis, recurrent pneumonia, and, occasionally, difficult tracheal intubation before surgery.

Histological examination of the knobs shows cartilaginous nodules with some (lamellar or not) bone formations that may contain blood marrow. These greyish-white nodules (2–3 mm diameter) grow from the cartilaginous tracheal rings of the anterolateral lower two-thirds of the trachea, seldom extending to the vocal cords or the right upper lobe bronchus, have a very tough consistency and are hard-to-biopsy. The mucosal epithelium is always normal. Tracheobronchopathia osteochondroplastica is almost always fortuitously diagnosed during bronchoscopy or autopsy [9]. Retrospective examination of chest roentgenograms can occasionally show a fine scalloped calcified border on the internal walls of the trachea on the lateral aspect [10, 11]; this was not obvious in our case. Subclinical variable extrathoracic obstruction can be shown on inspiratory flow-volume curves (fig. 3). To our knowledge, chronic infection by a MAC has never previously been published in tracheobronchopathia osteochondroplastica.

In a recent study, SWENSEN *et al.* [1] found that the concomitant presence of multiple small well-circumscribed lung nodules and bronchiectasis on CT scan (as in fig. 2) is an indication that the patient is likely to have sputum or bronchial washing cultures positive for MAC. This association raises the possibility that the bronchiectasis is the risk factor, but it could also occur as a consequence of the mycobacterial disease [2]. In this paper, as in previous ones, the main feature was the absence of underlying lung disease [1, 12–14].

It is not clear whether these patients are colonized or infected by MAC, but if the nodules are MAC granulomas, the process must be infection and not just colonization. It is unclear whether MAC could lead to progressive lung disease if the patients are not treated with antibiotics for mycobacteria, but in the series by PRINCE *et al.* [12], 4 out of 18 patients with at least one year of follow-up died of their MAC disease. Therefore, if the cultures remain positive for MAC and the patient's clinical response to the usual treatment of bronchiectasis, *i.e.* periodic courses of antibiotics and postural drainage, is inadequate, antimycobacterial therapy may be indicated [1].

In a recent extensive review on the MAC, Inderlied *et al.* [15] suggested that, as pulmonary infection due to MAC in patients without AIDS can result in significant morbidity and mortality, a multiple drug regimen administered for long periods of time, with surgical resection of disease in selected patients, should be the approach to this disease, but acknowledged that relapses are nevertheless frequent. Two multiple drug regimens have

been used in our patient, but resistance has occurred against all the now available drugs. A surgical resection should be considered, but complications have to be expected due to the tracheobronchial disease [15]. New cultures are now performed to test the susceptibility of the strain to combinations of antibiotics, but a recent study has shown that resistance still appears to these combinations during treatment [16].

To our knowledge, a chronic infection due to a MAC has never previously been published in association with a tracheobronchopathia osteochondroplastica.

References

- Swensen SJ, Hartman TE, Williams DE. Computed tomographic diagnosis of *Mycobacterium-avium intracellulare* complex in patients with bronchiectasis. *Chest* 1994; 105: 49–52.
- Wallace RJ. Mycobacterium avium complex lung disease and women. *Chest* 1994; 105: 6–7.
- Dalgaard JB. Tracheopathia chondro-osteoplastica. *Acta Pathol Microbiol Scand* 1947; 24: 118–134.
- Martin CJ. Tracheobronchopathia osteochondroplastica. *Arch Otolaryngol* 1974; 100: 290.
- Sakula A. Tracheobronchopathia osteoplastica: its relationship to primary tracheobronchial amyloidosis. *Thorax* 1968; 23: 105–110.
- Alroy GG, Lichtig C, Kaftori JK. Tracheobronchopathia osteoplastica: end-stage of primary lung amyloidosis? *Chest* 1972; 61: 465–468.
- Pounder DJ, Pieterse AS. Tracheobronchopathia osteoplastica: report of four cases. *Pathology* 1982; 14: 429–433.
- Pounder DJ, Pieterse AS. Tracheobronchopathia osteoplastica: a study of the minimal lesion. *J Pathol* 1982; 138: 235–239.
- Ashley DJB. Bony metaplasia in trachea and bronchi. *J Pathol* 1970; 102: 186–188.
- Young RS. Tracheopathia osteoplastica: clinical, radiologic and pathological correlations. *J Thorac Cardiovasc Surg* 1980; 79: 537–541.
- Bergeron D. Tracheobronchopathia osteochondroplastica. *Am Rev Respir Dis* 1976; 114: 803–806.
- Prince DS, Peterson DD, Steiner RM, Gottlieb JE, Scott R, Israel HL. Infection with *Mycobacterium avium* complex in patients without predisposing conditions. *N Engl J Med* 1989; 321: 863–868.
- Reich JM, Johnson RE. *Mycobacterium avium* complex pulmonary disease. *Am Rev Respir Dis* 1991; 143: 1381–1385.
- Harman TE, Swensen SJ, Williams DE. *Mycobacterium avium-intracellulare* complex: evaluation with CT. *Radiology* 1993; 187: 1–4.
- Inderlied CB, Kemper CA, Bermudez LE. The *Mycobacterium avium* complex. *Clin Microbiol Rev* 1993; 6: 266–310.
- Hoffner SE, Heurlin N, Petrini B, Svenson SB, Kallienus G. *Mycobacterium avium* complex develops resistance to synergistically active drug combinations during infection. *Eur Respir J* 1994; 7: 247–250.