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CASE STUDY

Chronic pneumonia caused by *Rhodococcus equi* in a patient without impaired immunity

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Chronic pneumonia caused by Rhodococcus equi *in a patient without impaired immunity. M.J. Linares, A. López-Encuentra, S. Perea. ©ERS Journals Ltd 1997.*

ABSTRACT: A 48 year old, human immunodeficiency virus (HIV)-negative, immunocompetent male patient had a chronic progressive pulmonary infiltrate, without radiological cavitation, in the middle lobe of the right lung produced by *Rhodococcus equi*. He reported direct contact with a diseased dog.

The patient was diagnosed by thoracotomy and treated by lobectomy. After 16 months of follow-up, the patient was asymptomatic and had neither recurrence nor immunological disturbances.

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There have been few reports of pulmonary infection caused by *Rhodococcus equi* in immunocompetent hosts. *R. equi* is a common pathogen in herbivores, particularly domesticated species. It rarely produces human disease, and infected subjects are usually persons with impaired immunity. Eleven cases of infection by *R. equi* in patients without impaired immunity have been reported in the literature, and four of these cases have involved pulmonary disease [1–3].

We report the case of a patient with chronic progressive pulmonary infiltrate in the right middle lobe produced by *R. equi*. The patient treated by lobectomy. The characteristics of the case differed from those reported in other immunocompetent patients.

Case report

A 48 year old male was referred to our hospital in August 1993 for investigation of a persistent pulmonary infiltrate with homolateral pleural effusion. He was a nonsmoker and had no medical history other than symptoms suggestive of gastro-oesophageal reflux.

The patient's condition had arisen 10 months previously with 39°C fever, dry cough, and right pleuritic chest pain. He was diagnosed as having right basal pneumonia and treated with macrolides, leading to disappearance of the fever and improvement in the cough. He subsequently presented four similar clinical recurrences.

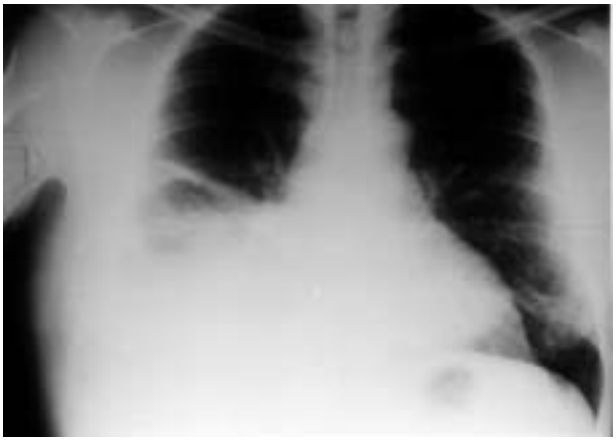
Clinical exploration at admission disclosed a decrease in the vesicular murmur in the lower third of the right lung. Laboratory analyses disclosed decreased haemoglobin level (7.3 $mmol \cdot L^{-1}$) and haematocrit (0.37), and increased erythrocyte sedimentation rate (92 $mm \cdot h^{-1}$), and triglyceride (2.29 $mmol \cdot L^{-1}$) and glucose (6.38 $mmol \cdot L^{-1}$) levels. The leucocyte count (9.14×10^9 $cells \cdot L^{-1}$), formula, and other analytical parameters were normal. A tuberculin test was negative. Serological studies for respiratory viruses, mycoplasma, legionella, chlamydia, and other respiratory microorganisms showed no changes in titres. Human immunodeficiency virus (HIV) serology was negative.

The patient's radiographs from 7 months earlier showed a well-delimited nodular image in the outer part of the right middle lobe, and involvement of the fissure and right cardiophrenic sinus. Computed axial tomography (CAT) performed 5 months before admission showed improvement in the nodular image, condensation in the right middle lobe, and discrete pleural thickening. A further CAT performed 1 month later showed disappearance of the nodular image, increased condensation and loss of volume in the right middle lobe. On admission, the radiograph and CAT of the chest showed condensation and loss of volume in the right middle lobe, no cavitation, and homolateral pleural effusion (figs. 1 and 2).

The pleural effusion disappeared spontaneously in the next few days. Two fibrebronchoscopies showed a normal endoscopic image; the first transbronchial biopsy revealed foci of obstructive pneumonia and fibrosis in the lung parenchyma. The second transbronchial biopsy showed a peribronchial mononuclear infiltrate. All microbiological studies of the bronchial aspirate, bronchoalveolar lavage (BAL) fluid, brushing samples, and transbronchial biopsy were negative for the culture of viruses, fungi, bacteria and mycobacteria. No specimen contained malignant cells. The pleural fluid was an exudate, that yielded negative microbiological cultures and cytology for malignant cells. The patient had not received any antimicrobial therapy during or immediately before bacteriological sampling.

Given the chronicity of the process and the absence of any diagnosis, thoracotomy was performed for diagnostic and therapeutic purposes. The right middle lobe was condensed and adhered to diaphragm, mediastinum

a)



b)

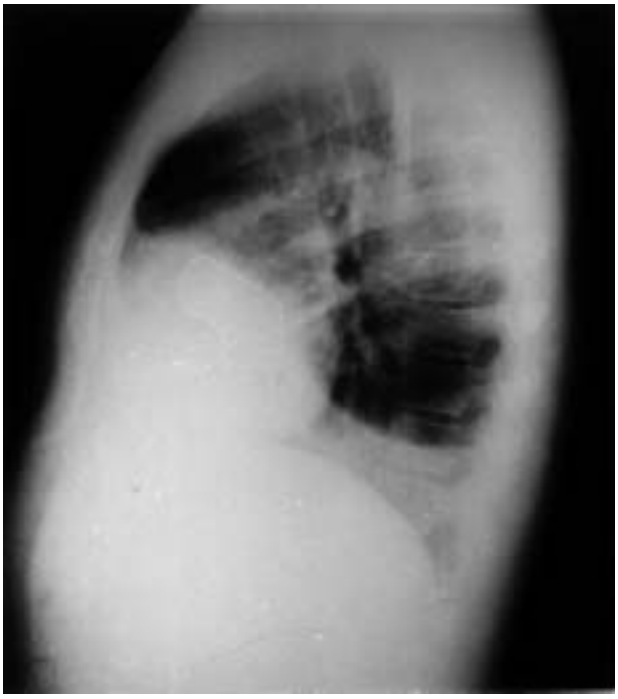


Fig. 1. – a) Posteroanterior; and b) lateral chest radiographs showing infiltration of the lower right lung and pleural effusion.

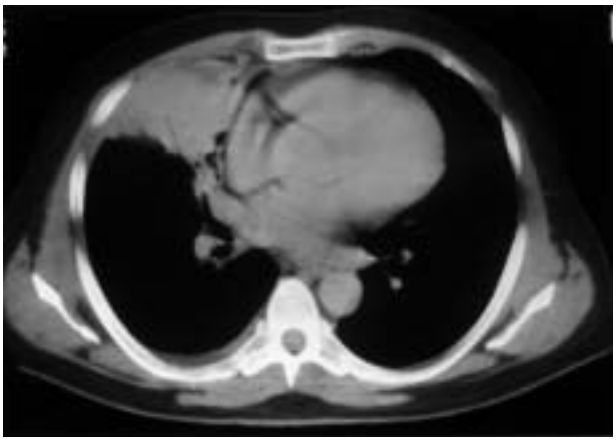


Fig. 2. – Chest computed axial tomography (CAT) showing infiltration of the right middle lobe and homolateral pleural effusion.

and the upper and lower lung lobes. As the intraoperative biopsy revealed chronic pneumonia, middle lobectomy and wedge resection of the right upper lobe was performed. Histology revealed extensive parenchymal destruction, acute inflammation, and multiple microabscesses containing colonies of microorganisms of actinomycetes-like morphology. On Gram-staining, polynuclear leucocytes and Gram-positive cocobacillary microorganisms were observed, that were consistent with *R. equi*. After 48 h of incubation in blood and chocolate agar at 37°C, abundant and small, nonhaemolytic colonies were evident. Catalase reaction was positive and bacteria were partially acid-fast. Definitive identification as *R. equi* was achieved by the Rapid CORYNE (Api-Biomerieux). Camp factor was also positive. Cultivation yielded only colonies of *R. equi*. In other regions, the parenchyma was substituted by fibrous tissue, fibroblasts, and granulation tissue with chronic inflammation. The pleura showed cicatricial fibrosis.

Immunological studies made every 6 months after diagnosis were normal. HIV serology was negative 1 year after surgery. Cranial CAT with contrast (at 2 months) showed no abnormality. After 16 months of follow-up, the patient was asymptomatic. No medical treatment was given.

In a new interview with the patient, he reported direct contact with a dog that had to be destroyed as a result of "progressive disease" 9 months after the patient's symptoms began. Prior to its death, the dog had skin cysts for 12 months that had not been diagnosed by a veterinarian.

Discussion

R. equi is a Gram-positive, pleomorphic, intracellular bacillus that is an obligatory aerobe, sometimes weakly acid-alcohol resistant, and with distinctive biochemical features. *R. equi* is ubiquitous in soil and in the faeces of herbivores and birds, and in animals such as the dog. It is a common pathogen in domestic animals and an occasional pathogen in humans, mostly in host who are immunosuppressed. Almost one hundred cases of human infection have been reported in the literature, 85% of which occurred in immunosuppressed patients. Pneumonia is the most common form of disease produced by *R. equi* in humans, occurring in approximately two thirds of cases in the series [3–5]. The upper lung lobes are the most frequently affected region. Pleural involvement is rare, particularly in immunosuppressed subjects. The course of pneumonia is subacute or chronic, and characteristically tends to produce cavitation in 2–4 weeks [4].

Of the 11 cases reported in patients with unimpaired immunity, only four had pulmonary disease that showed very different radiological and developmental forms [1–3]: multiple pulmonary nodules and a chronic course; multiple bilateral lobar affectation and acute respiratory failure requiring mechanical ventilation; and atypical community pneumonia. All these patients had cavitation. Only one of them required open lung biopsy for diagnosis.

The present patient was a male, without immunological impairment, who had repeatedly negative HIV

serologies and negative sequential immunological studies during 16 months after diagnosis. In contrast with other cases of *R. equi* pulmonary infection in patients without immune impairment, this patient did not develop radiological cavitation, even after a long evolution. To our knowledge, this is the first case in the literature of a patient without impaired immunity who had *R. equi* infection and did not present radiological cavitation. Moreover, thoracotomy was required for diagnosis; microbiological diagnosis by noninvasive methods is apparently easier in HIV-positive subjects or in patients with immunological impairment than in patients without impaired immunity [3, 5]. Thoracotomy was curative and the patient did not require medical treatment, as has been described previously [6]. In the present case, the infection may have been transmitted by the diseased dog with cutaneous cysts [7]. Most cases reported have had no history of exposure [4, 5]. After thoracotomy, the patient remained asymptomatic during 16 months of follow-up, including close immunological control; no evidence of cutaneous, pulmonary or cerebral recurrence was found.

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