Case Report

Severe Lung Disease due to *Mycobacterium kansasii*: Report of a Case and Review of the Literature

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Abstract

Mycobacterium kansasii disease present epidemiological, clinical and radiological features similar to *Mycobacterium tuberculosis*. *Mycobacterium kansasii* is the second most frequent mycobacteria isolated in human immunodeficiency virus infected patients. Confirmed diagnosis is often difficult according with the American Thoracic Society criteria. Here we describe a patient with AIDS that developed a severe lung compromise due to *Mycobacterium kansasii*. Epidemiological, clinical, radiological and diagnosis methods are analyzed.

Keywords *Mycobacterium kansasii;* Sputum and bronchoalveolar lavage; Lowenstein Jensen and Middlebrook broth; Rifampicin

Introduction

Diseases caused by mycobacteria other than tuberculosis or non-tuberculous mycobacteria (NTM) are a rare but severe complication in the immunosuppressed patients, especially those with advanced human immunodeficiency virus (HIV) infection. The most common NTM in AIDS patients include *Mycobacterium avium- Mycobacteriun intracellulare- Mycobacterium scrofulaceum* complex, named as MAIS complex, and *Mycobacterium kansasii*. *Mycobacterium kansasii* caused up to 4% of all mycobacterial infections [1,2]. Definitive diagnosis of NTM disease is often difficult and must be established in order to differentiate colonization from infection. Additionally, the confirmation of the etiology is important because the differences in the susceptibility to various antituberculous agents [1].

Mycobacterium kansasii is considered the second most common NTM that affects AIDS patients after the MAIS complex [2-4]. The most frequent clinical form of *Mycobacterium kansasii* disease in HIV-infected patients is the bronchopulmonary or lung disease, but extrapulmonary and disseminated disease has been also described in this kind of patients [5].

Here we present a patient with AIDS who developed a severe lung compromise due to *Mycobacterium kansasii*.

Case Report

A 35-year-old man was admitted to our HIV/AIDS Department with two months history of fever, weight loss (10 kg in that time) and night sweats. He had diagnosis of AIDS since 5 years ago, because he had history of Cryptococcal meningitis, but uncontrolled due to his poor adherence to highly active antiretroviral therapy (HAART). During the last month previous to the admission, he presented productive cough and progressive dyspnea (shortness of breath with effort). He acquired human immunodeficiency virus infection secondary to unprotected heterosexual intercourse or intravenous drug abuse. On physical examination patient was febrile (38.5°C) and mild tachypneic. Crackling rales were auscultated over both pulmonary fields. No peripheral adenopathies were detected. Abdominal examination revealed hepatosplenomegaly. Laboratory findings showed a mild anemia (hemoglobin 10 g%), hematocrit 28%, leukopenia (white blood cells count 2,800 cells/μl) with lymphocytopenia, platelets 78,000/mm³. Renal and liver function tests were normal (creatinine 0.60 g% and prothrombin concentration 90%). Hepatitis C antibodies were positive; the CD4 T cell count was of 50 cell/μl and the plasma viral load was over than 100,000 copies/ml $\log_{10} 6.0$.

Patient underwent a chest X-ray that showed bilateral infiltrates with patched aspect, similar to bronchopneumonia, with some areas of cavitation and with basal predominance (Figure 1). A Computed Tomography Scans (CTS) demonstrated extensive pulmonary diffuse infiltrates with irregular nodules (Figures 2 and 3). Sputum and bronchoalveolar lavage (BAL) smears were obtained and examined for the presence of acid-fast bacilli (AFB) under oil-immersion (100X) using a light microscope and standard Ziehl-Neelsen staining. Also, stained smears of sputum and BAL were done on solid media of Lowenstein-Jensen within two days of specimen collection. Direct sputum examination was negative to AFB, bacteria and fungus. Fiberoptic bronchoscopy was performed and did not reveal endobronchial lesions. Direct examination of BAL with Ziehl-Neelsen AFB, Gram and Gomori methenamine-silver stain was negative for microbiological examinations. Both, sputum (2 smears) and BAL samples cultures on Lowenstein-Jensen were positive to NTM that later was identified as *Mycobacterium kansasii* by GeneXpert assay. Histopathological examination of transbronchial biopsy showed an inflammatory infiltrate of lymphocytes, histiocytes and scarce Langhans giant cells with no caseation.
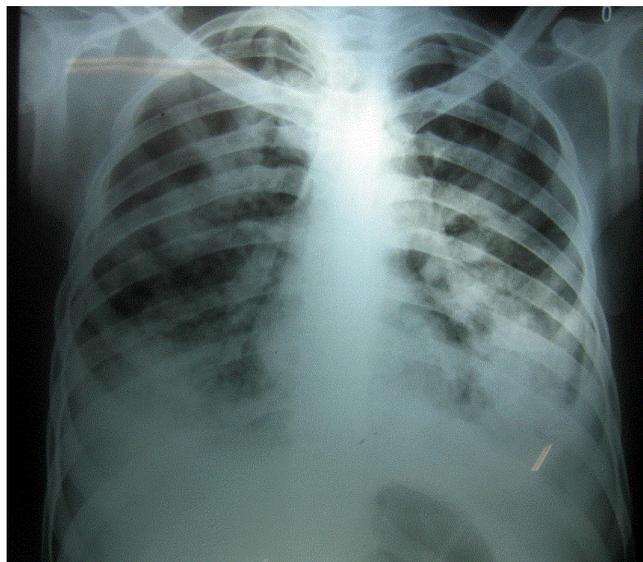
Figure 1: Chest radiograph showing extensive bilateral infiltrates due to *Mycobacterium kansasii.*
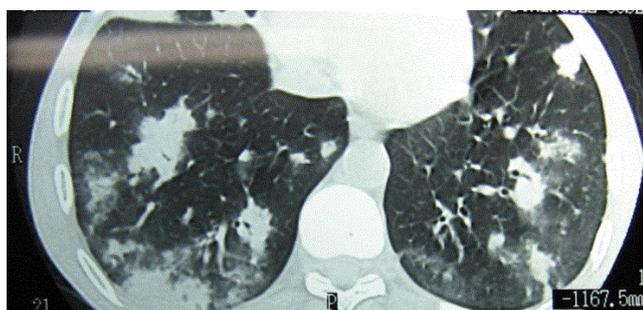
Figure 2: Axial view of computed tomography of the chest showing bilateral nodules with areas of consolidation and cavities.
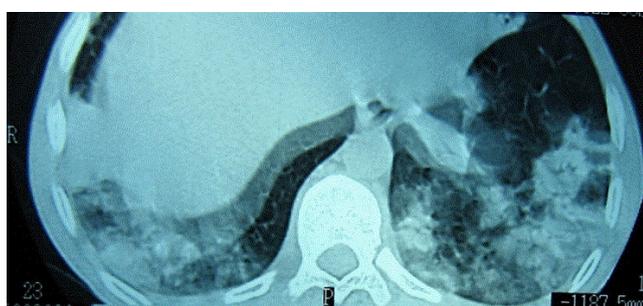
Figure 3: Computed tomography scan of the lungs: multiple nodules, consolidation and cavitation lesions caused by *Mycobacterium kansasii.*

Since the high incidence of pulmonary tuberculosis in our hospital in the HIV population and the clinical and radiological findings,

patient was initially treated with isoniazid, rifampicin, pyrazinamide and ethambutol. Later, culture yielded *Mycobacterium kansasii* resistant to isoniazid, pyrazinamide and streptomycin and susceptible to all other agents tested (rifampin, ethambutol, Clarithromycin, rifabutin, ciprofloxacin, moxifloxacin and amikacin). A triple drug regimen based on rifampin 600 mg/day, ethambutol 1200 mg/day and ciprofloxacin 1000 mg/day was initiated with a poor response. One month later, patient died without response to treatment.

Discussion

Mycobacterium kansasii is a common cause of pulmonary disease and is associated with the presence of chronic pulmonary disease, previous pulmonary tuberculosis, chronic liver disease, some hematological diseases, long-term treatment with high doses of corticosteroids, organ transplantation and idiopathic CD4+ lymphocytopenia syndrome. Also, *Mycobacterium kansasii* pulmonary infection can affect HIV/AIDS patients [6-10].

Differential diagnosis between *Mycobacterium tuberculosis* (MTB) and *Mycobacterium kansasii* lung disease is often difficult. In fact, MTB and *Mycobacterium kansasii* both infect and colonize the respiratory tract but *Mycobacterium kansasii* shows in vitro resistance to pyrazinamide and often isoniazid [11-14].

In order to confirm definitive diagnosis of *Mycobacterium kansasii*-related bronchopulmonary disease, it is important to consider the American Thoracic Society (ATS) criteria that include: multiple positive isolations and cultures and biopsies with clinical and radiological findings compatible with mycobacterial disease [11-15]. These criteria are very difficult to perform in the clinical practice because multiple cultures and biopsies are not routinely performed [16,17]. However, in our patient, we obtained two positive cultures of sputum smears and one positive culture of BAL. Although transbronchial biopsy smears were obtained, cultures were negatives.

Epidemiological, clinical and radiological characteristics of pulmonary *Mycobacterium kansasii* disease in HIV-infected patients appear to be similar to MTB disease in this population. The first important difference is that *Mycobacterium kansasii* is environmental mycobacteria and there is no evidence that human transmission may occur [18]. Patients infected with *Mycobacterium kansasii* has a lower CD4 T cell counts in comparison with those with MTBC disease, has more frequently previous diagnosis of AIDS and has a high risk of concomitant opportunistic infections and AIDS defining-illnesses. These findings demonstrate that MTBC has a higher pathogenicity in comparison with *Mycobacterium kansasii* [19].

Additionally, the presence of previous pulmonary disease was described as a risk factor to develop *Mycobacterium kansasii* lung disease; however, this finding has not been noted in series of patients co-infected with *Mycobacterium kansasii* and HIV [20-22].

Radiological findings are similar between *Mycobacterium kansasii* and MTB lung disease; alveolar infiltrates, cavity lesions mediastinal lymphadenopathy and normal chest radiologic examination may be observed in patients infected with both pathogens. Only interstitial infiltrates with military pattern appears to be most frequent in patients with tuberculosis [6]. Finally, the presence of pleural effusions in patients with pulmonary disease caused by *Mycobacterium kansasii* has been rarely described in different series [5,13,23].

Microbiological diagnosis of NTM is based on the Ziehl-Neelsen stain technique, two culture media: Lowenstein Jensen and

Middlebrook broth base 7H9 (MGIT), two typification techniques: Gen Probe and Genotype, antimicrobial susceptibility methods and a rapid technique of polymerase chain reaction GeneXpert. GeneXpert requires less time until obtaining of positive results (hours vs. days) and show as a simple technique with a high sensitivity and specificity [24].

Due to the similar clinical and radiological findings, the majority of patients are initially treated as pulmonary tuberculosis, as we can see in our patient. The standard regimen based on isoniazid, rifampicin and pyrazinamide is prescribed generally until the final results of the cultures are available. However, it is important to know that *Mycobacterium kansasii* show lower susceptibility to isoniazid and pyrazinamide. This is an important difference between *Mycobacterium kansasii* and MTB. Some authors recommend an initial scheme based on 4 antimicrobial agents including ethambutol, when *Mycobacterium kansasii* lung disease is suspected [25]. In these cases, previous lung disease could be taken as an indicator of *Mycobacterium kansasii* infection. Two aspects require especial consideration in the clinical and therapeutic management of *Mycobacterium kansasii* disease: the use of isoniazid and the duration of the treatment. As the *Mycobacterium kansasii* resistance to pyrazinamide is considered absolute, the use of isoniazid has been considered as adequate by some authors. Additionally, the majority of authors recommend rifampicin and ethambutol regimen for patients with *Mycobacterium kansasii* suspected disease. Other drugs used with good results in patients with *Mycobacterium kansasii* disease: aminoglycosides others than streptomycin has been proven effective against some strains; macrolides and quinolones have been used with good results [26].

The appropriate duration of treatment is controversial: the majority of authors recommend long-term treatment, from 12 to 18 months [1]. International recommendations suggest that patients with diagnosis of *Mycobacterium kansasii* disease should be treated for 18 months but one year of treatment seems to be adequate [27].

Conclusion

In conclusion, pulmonary involvement by *Mycobacterium kansasii* should be included in the differential diagnosis of HIV-infected patients with lung disease and severe immunosuppression associated with the retrovirus. Early diagnosis followed by an adequate treatment based on the epidemiological, clinical and radiological findings and the susceptibility tests can be modified the poor prognosis of this kind of patients.

Disclosure Statements

No conflict of interest declared.

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