

Therapeutic Remission of Community Acquired Pneumonia Caused by *Rothia Mucilaginosa* in an Adult Patient with Idiopathic Pulmonary Fibrosis

Secchi-Nicolas Nikos Christo, Gomez-Alarcon Angel de Jesus, Barrera-Cruz Ramon Jesus

Center for Medical Research and Specialized Care, Minatitlan, Mexico

Email address:

drsecchi@hotmail.com (Secchi-Nicolas Nikos Christo), ajga_med@hotmail.com (Gomez-Alarcon Angel de Jesus)

*Corresponding author

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Abstract: *Rothia Mucilaginosa* (RM) is part of the microbiota of the pharynx and upper respiratory tract. RM is a gram-positive, enveloped, coagulase-negative coccus of the family Micrococcaceae. Clinical manifestations range from mild bronchitis to recurrent pneumonia and lung abscess. It is difficult to determine the clinical significance of this organism in respiratory specimens, therefore, in the diagnosis of pneumonia caused by *R. mucilaginosa*, bronchoscopy specimens should be cultured. Risk factors associated with *Rothia* are hematologic malignancies and neutropenia. At present, the importance of *Rothia* in various pathologies remains unclear due to its difficulty in culture and high potential for contamination at the time of sampling. Although it is an oral microbiota, it has been implicated in pneumonia after being identified in sputum or bronchoalveolar lavage smears and in infectious lesions of the respiratory tract, such as lung abscess and empyema. The challenge of MRI infection in clinical practice is deciding whether it is a real infection or a product of sample contamination. We present the case of a 50-year-old adult patient, without neutropenia, without hematological malignancy, with progressive idiopathic pulmonary fibrosis (IPF) of 1 year of evolution. On admission to the hospital, this person presented signs of respiratory failure, tachycardia, upper rales. auscultation and 85% oxygen saturation, that's why he went through many different studies to diagnose *Rothia Mucilaginosa* pneumonia.

Keywords: *Rothia Mucilaginosa*, Pneumonia, Respiratory Tract

1. Introduction

Rothia mucilaginosa is an aerobic, coagulase-negative, gram-positive coccus that was known until the year 2000 as *Stomatococcus mucilaginosus*. Its identification can be difficult and it has been underestimated when confused with *Micrococcus*, *Streptococcus* or *Staphylococcus*. The genus *Rothia* is within the Micrococcaceae family and includes at least four species: *Rothia dentocariosa*, *mucilaginosa*, *nasimurium* and *amarae*. [1, 2] The first two are part of the microbiota of the oropharyngeal cavity and have been described as causative agents of different pathologies in humans. In 1978 it was described for the first time as the cause of infection in humans in a case of endocarditis. In recent years it has been isolated mainly in immunocompromised patients, and rarely in

immunocompetent patients. [3, 4, 6] Cases of bacteremia, endocarditis, central nervous system infections, urinary tract infections, osteomyelitis, peritonitis and, rarely, in the lower respiratory tract have been reported. [5, 7] We present a case of a 50-year-old adult patient, non-neutropenic, without hematological malignancy, with idiopathic pulmonary fibrosis (IPF) for 1 year who, on admission, revealed signs of respiratory failure described as tachycardia, rales to auscultation and an oxygen saturation of 85%, which underwent various studies for the diagnosis of pneumonia by MR.

2. Case Report

A 50 years old male, having a diagnosis of idiopathic pulmonary fibrosis a year ago, is admitted to our hospital

because of dyspnea, productive cough, fever $>38.3^{\circ}\text{C}$ and weight loss. At clinical examination are highlighted signs of respiratory insufficiency, which are described as tachycardia, rales on auscultation, and an oxygen saturation of 85%.

Blood tests revealed only leukocytosis of 25,700 cells/ μL , with predominance for neutrophils of 21,320 cells/ μL .

A thorax X-ray revealed only a reticular pattern. A thorax CT shown in figure 1 is consistent with a honeycombing pattern with a heterogeneous distribution of fibrosis.

A sputum sample is obtained for culture where RM is reported. Because of the high index of contamination of the sample, a diagnostic flexible bronchoscopy is obtained, reporting again RM ($>10,000$ colony forming units). An hemoculture and uroculture are obtained, which both resulted negative for disease. HIV tests resulted negative, but the patient was taking steroids as a treatment for IPF. Pneumonia was diagnosed, and a quinolone regimen with levofloxacin was initiated. The patient showed immediate recover.



Figure 1. Thorax CT of the patient showing a honeycombing pattern with a heterogeneous distribution of fibrosis.

3. Discussion

The microbiological identification of *R. mucilaginosa* is difficult since biochemically it is not very active and can be confused with *Micrococcus*, *Streptococcus* or *Staphylococcus*. The presumptive identification is made from the characteristics of its colony and the presence of the capsule. In general, it is catalase variable and does not grow on media with 5% or more NaCl. It is oxidase (-), immobile and hydrolyzes esculin and gelatin. The conspicuous adherence to the surface of the agar differentiates it from the rest of the gram-positive catalase-positive cocaceae. Differentiation with *R. dentocariosa* can be difficult, although the latter usually presents as a Gram stain with coccobacillary forms or diphtheromorph bacilli. It grows well on chocolate agar and blood agar in a 5% CO₂ atmosphere. Macroscopically, the convex, mucoid, whitish

and non-hemolytic colonies stand out for their rubbery consistency and firm adherence to the agar. [8, 9]

There are no established cut-off points to define the susceptibility of *R. mucilaginosa*; It also shows poor growth on Müller-Hinton or MH agar supplemented with sheep blood. The difficult formation of a homogeneous suspension, given its elastic consistency, makes susceptibility testing by diffusion tests very difficult. MIC studies suggest that it is usually sensitive to vancomycin and has variable susceptibility to penicillin, oxacillin, aminoglycosides, and cotrimoxazole. The presence of β -lactamases has not been identified; however, an increase in resistance to quinolones has been described. The main risk factors for *Rothia* infections are hematological malignancies and severe neutropenia. Other factors are diabetes mellitus, alcoholism, chronic liver disease, valve disease, intravenous drugs and HIV infection, as well as intravascular catheters and prostheses, places where it has the ability to adhere and form part of the biofilm, favoring the appearance of infections. *R. mucilaginosa* was considered to cause infection in humans for the first time in 1978, in a case of endocarditis after cardiac catheterization. [10]

It is an infrequent agent of lower respiratory tract infection and its isolation in respiratory samples must be carefully evaluated, differentiating whether it is a contaminant or the causative agent of the disease. Whenever the situation requires it, it is recommended to have a bronchoscopy culture (BAS or bronchoalveolar lavage) due to its greater diagnostic value. The role it may have in exacerbations in COPD patients with bronchiectasis is not clear. One could speculate on the similarity between the adhesion of *Rothia* to the damaged bronchial endothelium of patients with bronchiectasis and the adhesion power of the microorganism on the agar plate, forming mucilaginous colonies. [11]

The mortality rates due to *Rothia* infections have varied in the literature according to age, presence of neutropenia and immunodeficiency, and type of infection. Immunocompromised patients are more susceptible to develop severe complications, including death. Chavan et al. reported 36 neutropenic patients with underlying hematologic malignancies with *R. mucilaginosa* infection, and 8 of 28 (28.6%) of patients with *R. mucilaginosa* bacteremia died as a result of their infection. In another study, 10-year data about *Rothia* bacteremia at a single center was presented and 25 blood stream infections attributable to *R. mucilaginosa* was identified including 22 neutropenic patients; one of these patients died due to the infection. This bacterium is generally known to be susceptible to glycopeptides, third-generation cephalosporins, carbapenems and rifampicin. Penicillin, clindamycin and macrolide sensitivity is variable while resistance to quinolone and aminoglycoside is common. Treatment duration varies between different reports according to patients comorbidities; generally reported cases have antibiotic treatment for 7-21 days. [12, 13]

We present a case of pneumonia in which *R. mucilaginosa* was the only agent isolated in two sputum samples and BAS in a patient with no evidence of immunosuppression,

however, he presented a diagnosis of idiopathic pulmonary fibrosis one year ago for which he was administered steroids as part of your treatment. It is an infrequent agent as a cause of lower respiratory tract infection. It is difficult to determine the clinical significance of this germ in respiratory samples, so in the diagnosis of pneumonia caused by *R. mucilaginosa* it is recommended to have a bronchoscopy sample culture. After the studies carried out, the diagnosis of pneumonia was achieved by MRI, for which in this case treatment with quinolones and levofloxacin was started, for which the patient showed an adequate response to treatment and rapid recovery. In the face of various serious pathologies, including pneumonia, we must bear in mind the pathogenic power of *Rothia*, since its diagnosis seems to be underestimated.

4. Conclusions

According to the literature, our experience with RM represents one of the first cases of pneumonia associated to this opportunistic pathogen. [14] Chronic obstructive pulmonary disease and bronchiectasis are noted as predisposing factors for RM infection of the respiratory tract. [15] In our case report, a localized chronic inflammatory state from IPF could predispose a susceptibility for RM infection. RM must be considered between the differentials when an atypical pneumonia is suspected. Especially on patients with specific comorbidities such as hematologic malignancies, a recent hematopoietic stem cell transplantation, HIV, with or without neutropenia.

The challenge of a RM infection in clinical practice is to decide whether it represents a true infection or the product of a sample contamination. In most cases in a ten-year experience at the Mayo clinic, neutropenic patients were more likely to have a true infection from *Rothia* than nonneutropenic patients. [16]

We widely recommend the use of diagnostic flexible bronchoscopy because of the high index of sample contamination. Our antibiotic regimen showed a successful remission of the infection. Nevertheless, more research is required to find an adequate antimicrobial treatment according to the different sociodemographic and clinical variations. [17]

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