

Moraxella catarrhalis Pneumonia in an AIDS Patient: A Case Report

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Moraxella catarrhalis pneumonia, although in the immunocompromised patients is very uncommon for community-acquired pneumonia (CAP). It demonstrates a potential pathogen with high mortality when the presence of heavy numbers of organisms, intracellularly and extracellularly, in the sputum Gram's stained smears confirmed by cultures.

*In 2007, the authors reported a case of a 28-year-old Thai single male patient with acquired-immunodeficiency syndrome (AIDS) and *Moraxella catarrhalis pneumonia* who dramatically responded to two weeks of oral Amoxyclav (Amoxicillin trihydrate 500 milligrams + Clavulanic acid (Potassium clavulanate) 125 milligrams) treatment at 625 milligrams every 8 hours and then discharged. The present case report describes clinical and initial chest roentgenographic presentations of *Moraxella catarrhalis pneumonia* in AIDS patient. The importance of chest roentgenographic pictures, CD4/CD8-T lymphocyte ratio, sputum Gram's stainings, cultures with susceptibility testing in establishing a diagnosis, and protective vaccine are discussed.*

Keywords: *Moraxella catarrhalis, pneumonia, AIDS*

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Moraxella catarrhalis is a gram-negative, aerobic diplococcus that is a normal upper respiratory tract commensal, ranges from 1 to 5% in healthy adults^(1,2). However, for the laboratory diagnosis of *Moraxella catarrhalis* respiratory tract infections, it shows numerous of polymorphonuclear leukocytes (PMN) and intra- or extracellular gram-negative diplococci in a good quality sputum⁽²⁾. *Moraxella catarrhalis pneumonia* is quite unusual, accounting for 1 to 3% of community-acquired pneumonia cases. It was largely ignored as a potential lower respiratory tract pathogen until a spate of reports of significant isolates obtained mostly from patients with coexisting and often chronic pulmonary disease. Such isolates are usually found in exacerbations of chronic bronchi-

tis⁽²⁻⁵⁾. It has been demonstrated in the immunocompromised patients⁽²⁾.

The mortality of *Moraxella catarrhalis pneumonia* is approximately 10%⁽²⁾.

Case Report

In 2007, a 28-year-old Thai single man with a long history of smoking, and hepatitis B virus (HBV) co-infection with human immunodeficiency virus (HIV) presented to the 10th Zonal Tuberculosis and Chest Disease Center, Chiang Mai, Thailand with productive cough and high fever for three days, and chronic diarrhea for two months. On physical examination, the body temperature was 38.2 degrees Celsius. Rales were found at both lower chest areas. At the first attendance, the PMN count was 46% (40-75), and serum C-reactive protein levels was 6.3 milligrams per liter (0-5). His blood urea nitrogen, serum creatinine, serum electrolytes, and serum uric acid levels were within normal limits except for proteinuria, microscopic

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hematuria, and elevations of serum globulin, alkaline phosphatase, aspartate aminotransferase, and alanine aminotransferase levels. Gelatin particle agglutination and rapid tests for HIV were positive. The absolute lymphocyte count was 3.66×10^9 (1.5-4.0) cells per liter. The CD4-T and CD8-T cell counts were 128 (641-1,369) and 2,653 (400-1,000) cells per microliter, respectively. The CD4-T cell count/CD8-T cell count ratio was 0.05. Chest roentgenographic findings revealed patchy infiltration in both lower lobe areas with right minimal pleural effusion. The first three consecutive sputum acid-fast bacilli (AFB) examinations with Ziehl-Neelsen staining and *Mycobacterium tuberculosis* cultured on 3% Ogawa medium, and hemocultures on blood and chocolate agars showed negative results. The sputum Gram's stains revealed numerous PMNs and many extracellular gram-negative diplococci. The sputum cultured on blood and chocolate agars revealed small, opaque and grey-white, circular, non-hemolytic and 1 to 3 millimeters in diameter colonies. The drug susceptibility test showed that the organism was sensitive to Amoxycylav but resistant to Ampicillin. His clinical and chest roentgenographic findings, and results of HIV blood tests, CD4-T cell count, serum C-reactive protein levels, urinalysis and liver function test results, sputum Gram's stainings and cultures established the diagnosis of *Moraxella catarrhalis* pneumonia with renal and hepatic complicated AIDS. The patient was prescribed oral Amoxycylav (Amoxicillin trihydrate 500 milligrams + Clavulanic acid (Potassium clavulanate) 125 milligrams) at 625 milligrams every 8 hours for two weeks and lifelong oral anti-retroviral treatment. After completion of treatment, there were dramatically clinical and chest roentgenographic improvements, decreasing of serum C-reactive protein levels to less than 3.1 milligrams per liter, decreasing of PMN count to 36%, absolute lymphocyte count was 3.35×10^9 (1.5-4.0) cells per liter, CD4-T cell count was 134 (641-1,369) cells per microliter, CD8-T cell count was 2,678 (400-1,000) cells per microliter, CD4/CD8 T-lymphocyte ratio was 0.05, and negative results of sputum Gram's stainings and sputum cultures.

Discussion

This organism came to be recognized as a significant pathogen of the lower respiratory tract infections in adults by Catlin in 1990⁽³⁾. It is very important to note, that in the 18% of laboratories that did not identify the organisms as *Moraxella catarrhalis*, it was usually reported as *Neisseria*



Fig. 1 Chest roentgenogram from the initial presentation showing patchy infiltration in both lower lobes, predominantly in the right side with right minimal pleural effusion



Fig. 2 Chest roentgenogram at 2 weeks of Amoxycylav treatment showing clearing of patchy infiltration in both lower lobes and decreasing of the right pleural effusion

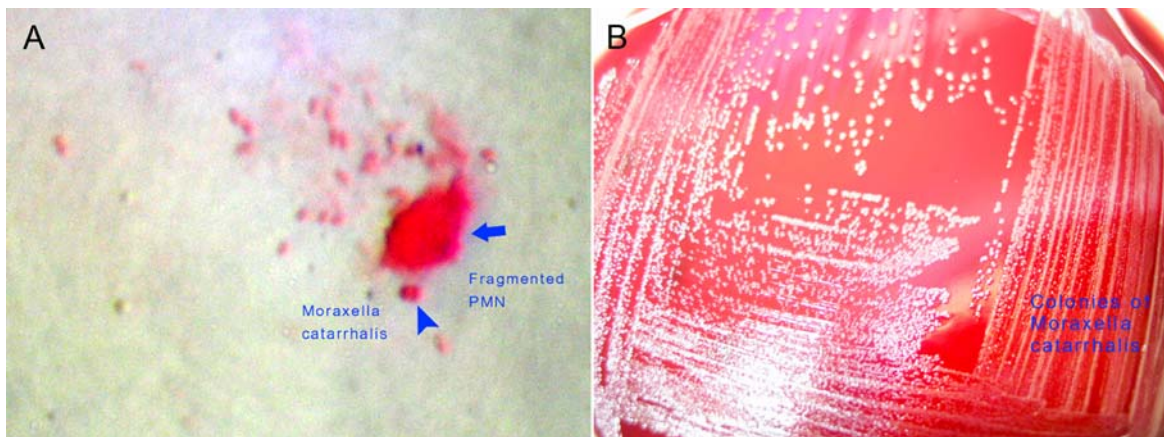


Fig. 3 Left, A: Sputum Gram's stained smear obtained from this patient, demonstrates a gram-negative diplococcal microorganism (arrowhead), resembling *Moraxella catarrhalis* which presents adjacent to a fragmented PMN (arrow, original x 1,000). Right, B: Sputum bacterial culture on a blood agar obtained from this patient, demonstrates small, opaque and grey-white, circular, non-hemolytic and 1 to 3 millimeters in diameter colonies, resembling *Moraxella catarrhalis* colonies (original x 1)

and *Moraxella* species, names that would not have suggested a potential pathogen⁽⁶⁾.

Sputum Gram's stainings cannot distinguish *Moraxella catarrhalis* respiratory infection from *Actinobacter* and *Neisseria* infections because they are all gram-negative diplococci⁽⁷⁾. The colony characteristics of *Moraxella catarrhalis* sputum cultured on blood or chocolate agar can distinguish *Moraxella catarrhalis* respiratory infection from the *Actinobacter* and *Neisseria* infections^(6,7). *Moraxella catarrhalis* pneumonia present a clinical picture similar to that of other pneumonias⁽⁶⁾. The present case demonstrated the pathogenicity of *Moraxella catarrhalis* in the lungs by at least 3 in 5 criteria described by Murphy and Sethi in 1992⁽⁶⁾ in addition to bilaterally lower lobes patchy infiltration with right minimal pleural effusion, which is more common roentgenographic appearance of AIDS patients with bacterial pneumonia compared with HIV-seropositive patients without AIDS and HIV-seronegative persons⁽⁸⁾, clinical manifestations, and serum C-reactive protein levels elevation. The initial serum C-reactive protein level in the present case was only 6.3 milligrams per liter. Lobar consolidation on chest roentgenograms with pleural effusions were found 38% of AIDS patients with bacterial pneumonia⁽⁹⁾, which was found in the initial chest roentgenogram of this patient. This roentgenographic finding may mimic other common bacterial pulmonary infections in immunocompromised

persons such as non-typable *Haemophilus influenzae* and *Streptococcus pneumoniae*⁽¹⁰⁻¹⁸⁾. Where there is upper lobe consolidation, *Pneumocystis carinii* pneumonia should be considered in the differential diagnosis⁽⁹⁾. Chest roentgenograms in *Moraxella catarrhalis* pneumonia show bronchopneumonia or lobar pneumonia that usually involves a single lobe⁽¹⁹⁾. Pleural effusion and cavitation may occur⁽¹⁹⁾. The pneumonia caused by *Streptococcus pneumoniae* is also bilaterally and presence of ipsilateral intrathoracic lymphadenopathy to the pneumonia in 57% and 100% of HIV-negative and HIV-positive patients, respectively⁽²⁰⁾. Three consecutive sputum AFB smear examinations and Mycobacterial cultures must be performed in suspected cases of CAP with AIDS since it is one of the two most significant pulmonary opportunistic infections in the tropics with HIV/AIDS epidemic in addition to pneumococcal pneumonia⁽¹⁴⁾. The acute decrease in circulating total lymphocytes and CD4 T-lymphocyte subsets is reversible in most patients, regardless of the stage of HIV infection as shown in the present case with slightly increasing from 128 to 134 cells per microliter at two weeks of treatment with Amoxycyclav and antiretrovirals and in the complete absence of antiretroviral therapy. A CD4 T-lymphocyte count measured during the acute stage of infection with *Moraxella catarrhalis* and other bacteria should not be used to determine the stage of HIV disease or prognosticate on the course of HIV infection⁽²¹⁾. The

CD4/CD8 T-lymphocyte ratio in the present case at two weeks of Amoxycylav and antiretroviral treatments were not changed compared to the initial ratio. Longer duration for regular follow-up of this ratio is very interesting for predictor of the risk and recurrence of *Moraxella catarrhalis* pneumonia. *Moraxella catarrhalis* causes a fairly non-invasive infection and no evidence of bacteremia, which demonstrated by negative hemoculture results in the present patient⁽⁶⁾. *Moraxella catarrhalis* infection may be promoted by HIV and HBV, which were co-infected diseases in the present patient by viral damage to respiratory tract epithelium⁽⁶⁾. Forty-five percentages of immunocompromised patients dying within three months of acquiring *Moraxella catarrhalis* pneumonia⁽⁶⁾. Amoxycylav continues to show the best activity against *Moraxella catarrhalis*. The rapid appearance of beta-lactamase-producing strains of *Moraxella catarrhalis* which BRO-1 is produced at least two to three times higher than BRO-2 beta-lactamase enzymes and is also present in other *Moraxella* species (BRO: **BR**anhamella and **MO**raxella)^(6,7,22-25) still requires further investigation, but resistance to antimicrobials other than penicillin is not a problem⁽⁶⁾. Some authors have defined BRO-3 as another type of beta-lactamase enzyme⁽⁷⁾ the prevalence of which has not been described in the literature. Most of the isolates studied by Leszczynska K et al were resistant to ampicillin as well as the susceptibility test result in the present patient, which indicated BRO-1 beta-lactamase producing *Moraxella catarrhalis*⁽²⁶⁾. Antibodies to *Moraxella catarrhalis* antigens are regularly found in healthy adult sera⁽⁶⁾. Many research works have concentrated on the identification of *Moraxella catarrhalis* antigens that may form the basis of a protective vaccine. Vaccine candidates include OMP B1(outer membrane protein) or TbpB, HMW-OMP (high-molecular-weight protein) or UspA (UspA1 and UspA2), OMP CD (OMPC and OMPD), and LOS (lipooligosaccharides)^(6,7). Because *Moraxella catarrhalis* is found very rarely in respiratory specimens^(2,6,27,28), its role as a commensal organism has probably been overstated in the past and should not be overlooked in the present and future.

Conclusion

It is unclear whether the increase in the number of reports is due to an increased awareness of the organism by medical investigators or whether there has been an increase in virulence. Clinicians and micro-biologists who care for immunocompromised

patients should carefully consider the potential pathogenicity of *Moraxella catarrhalis* because of its high mortality.

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ปอดอักเสบที่เกิดจากเชื้อโมแน็ครีเซลล์ลา แค้ททะราลิสในผู้ป่วยโรคเอดส์ 1 ราย

อรรถพล ชีพัสต์ยากร, ประสิทธิ์ ธราวิจิตรกุล, ศักดิ์ชัย เดชตรัยรัตน์, วรศักดิ์ สุทาศัย

ปอดอักเสบจากการติดเชื้อโมแน็ครีเซลล์ลา แค้ททะราลิสในผู้ป่วยที่มีภูมิคุ้มกันของร่างกายบกพร่อง พบได้ไม่บ่อยในกลุ่มผู้ป่วยปอดอักเสบจากการติดเชื้อในชุมชน ปอดอักเสบที่เกิดจากเชื้อนี้จะตรวจพบตัวเชื้อจำนวนมากทั้งในและนอกเซลล์เม็ดเลือดขาวในเสมหะของผู้ป่วยที่ย้อมด้วยสีแกรมและยืนยันการวินิจฉัยด้วยการเพาะเลี้ยงเชื้อ ใน พ.ศ. 2550 คณะผู้นิพนธ์ได้รายงานผู้ป่วยเอดส์ชายไทยโรค อายุ 28 ปีที่ป่วยด้วยปอดอักเสบจากเชื้อนี้ ซึ่งตอบสนองต่อการรักษาเป็นอย่างดีด้วยการรับประทานอะม็อกซิซิลลาฟ 625 มิลลิกรัม (อะม็อกซิซิลลิน ไทรไฮเดรต 500 มิลลิกรัม + คลาวูลานิค แอัสซิด (โพแทสเซียม คลาวูลานิค) 125 มิลลิกรัม) ทุก 8 ชั่วโมงนาน 2 สัปดาห์จึงจำหน่ายจากการรักษา กรณีศึกษาบรรยายถึงอาการและอาการแสดงทางคลินิกและภาพรังสีทรวงอกครั้งแรกที่ผู้ป่วยไปพบแพทย์ คณะผู้นิพนธ์ได้วิจารณ์ความสำคัญของภาพรังสีทรวงอก อัตราส่วน CD4/CD8-T lymphocyte การย้อมเสมหะด้วยสีแกรม การเพาะเลี้ยงเชื้อนี้รวมกับการทดสอบความไวของเชื้อต่อยาปฏิชีวนะเพื่อยืนยันการวินิจฉัย และวัคซีนที่จะใช้ป้องกันการป่วยจากเชื้อนี้ด้วย
