



MORAXELLA AS A PATHOGEN...TO BE OR NOT TO BE THAT IS THE QUESTION

Clinical Microbiology

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ABSTRACT

Moraxella catarrhalis is long considered to be a commensal of upper respiratory tract in children as well as adults, causing upper respiratory infections but rarely. Slowly literatures brought to the forefront multiple instances of lower respiratory tract infections and antibiotic resistance. Here two cases of lower respiratory tract infections in pediatric age group are presented, both showing beta-lactam resistance by *Moraxella*.

KEYWORDS

Moraxella catarrhalis, LRTI, Lower respiratory tract infection, emerging pathogen, beta-lactam resistance

INTRODUCTION

Moraxella catarrhalis is increasingly being recognized to be a pathogen and showing a Dr Jekyll to Mr Hyde transformation rather rapidly. In order to be successful in the host, it has become able to interact and compete with the commensal flora and overcome stressful environment such as nutrient limitation. In childhood, it can cause sinusitis, otitis media, tracheitis, bronchitis, pneumonia, bacteraemia and even meningitis.[1,2,3,4] Whatever may be the disease, nasopharyngeal colonisation almost always precedes development of *M. catarrhalis* mediated disease.[2] Several investigators have suggested its role in healthcare-associated infections as well.[1,2,4] Apart from being universally beta-lactam resistant and showing inherent resistance to trimethoprim, it remains universally sensitive to most antibiotics.[1,4] Here two cases of lower respiratory tract infections are being presented, both from pediatric age group, and having beta-lactam resistance.

Case Studies

Case 1: A five years ten months old girl was admitted with history of fever and cough for past three weeks with progressive respiratory distress developing over past few days. Her USG examination revealed right sided pleural effusion. Her sputum sample was sent for Gram stain, ZN stain and for culture sensitivity. Gram stain revealed plenty of pus cells with abundant Gram negative diplococci. Z-N stain did not show any Acid-fast bacilli. On culture, pure non-hemolytic colonies were grown on Sheep Blood agar showing Hockey-puck sign. Gram's stain showed catalase positive, oxidase positive, Gram negative diplococci closely resembling *Acinetobacter* spp. Phenotypic identification established the diagnosis of *Moraxella catarrhalis* after repeated isolation of the same bacterium in pure growth giving same result in colony morphology, Gram staining, motility and biochemical tests. This isolate showed resistance to Beta-lactam group of antibiotics, being sensitive to BL-BLI (beta lactam-beta lactamase inhibitor) combination, tetracyclines, Tobramycin and fluoroquinolones.

Case 2: A ten years old girl was admitted with complains of mild productive cough for two weeks along with right sided hip and knee joint pain. She is a known case of beta thalassemia major. Her USG examination revealed collection around right hip joint. Her sputum samples were sent for Gram stain, ZN stain and for culture sensitivity.

Here also, Gram stain revealed plenty of pus cells with Gram negative diplococci and Z-N stain did not show any Acid-fast bacilli. Culture on Sheep blood agar showed pure non- hemolytic colonies showing Hockey-puck sign. Gram's stain showed catalase positive, oxidase positive, Gram negative diplococci. *Moraxella catarrhalis* was diagnosed as the pathogen after repeated isolation of the same bacterium in pure growth giving same result in Gram staining, motility and biochemical tests. This isolate also showed resistance to Beta-lactam group of antibiotics as well as Tobramycin, and susceptibility to BL-BLI combination, tetracyclines, and fluoroquinolones.

DISCUSSION

Moraxella catarrhalis was originally considered as an upper respiratory commensal, and was classified as *Neisseria catarrhalis* based on the colony morphology and phenotypic characteristics. [5] Genomic studies using DNA hybridization in the late twentieth century re-classified it as *Branhamella catarrhalis*. [6] Later evidences of nucleic acid hybridization and 16S rDNA sequence analysis furnished more similarity to the Genus *Moraxella*. [5,7]. Despite the unresolved controversy of *Branhamella* spp. and *Moraxella* spp., majority voted for *Moraxella catarrhalis* as the accepted nomenclature. [4] In the last one or two decades, more studies reported *M. catarrhalis* as a proven pathogen causing childhood otitis media, upper respiratory tract infections and rarely bacteremia. [4,8,9]. The bacterium has emerged as an important causative agent of acute exacerbations of COPD in adults [4], and occasionally being isolated from blood-stream infection, pleural effusion [4], sinusitis, septic arthritis [10], cellulitis [11], endocarditis [12], pericarditis [9] and osteomyelitis.[10] There is documented evidence of nosocomial outbreaks as well as scattered cases of community acquired pneumonia,[13,14] though data is scarce regarding *Moraxella* induced childhood pneumonia from our country.

Flipping to our current chapter, both of our cases presented with pneumonia in children aged between 5 to 10 years. One of them had associated pleural effusion and the other had features of septic arthritis. Their sputum samples yielded *Moraxella catarrhalis* in pure culture. Previous studies documented that as high as 77.5% of under two-years children can harbor *M. catarrhalis* as their respiratory colonizer in comparison to 4% of the adults. [4,15]. The pathogenic significance of the isolates is established by the four predetermined criteria [16]– (i)

clinical evidence of respiratory infections proven from history, clinical examinations and chest X ray, (ii) isolation of *M. catarrhalis* as the sole potential pathogen, (iii) absence of response to antibiotic treatment in the previous two weeks and (iv) subsequent clinical response to an antibiotic to which the isolate was susceptible. [16] Both of our isolates fulfilled all the criteria except the last one, establishing them as 'possibly significant pathogens'. Both the cases presented here with community acquired pneumonia. Reportedly, they are showing worsening pattern of drug resistance, with as high as 95% of the isolates being beta-lactamase producers by producing two types of beta-lactamases - BRO-1 and BRO-2, with BRO-1 showing a higher degree of resistance to beta-lactam drugs. [17,18] Reinforcing the fact, both of our isolates were beta lactamase producers, being resistant to cephalosporins in-vitro, and non-responsive clinically to 14-days and 10-days course of ceftriaxone and cefuroxime respectively. Researchers documented susceptibility to macrolides, fluoroquinolones, tetracyclines and cotrimoxazole [4], being at par with our antibiotic susceptibility report. Both of our isolates were sensitive to doxycycline, levofloxacin, and BL-BLI combinations like amoxicillin-clavulanic acid.

CONCLUSION:

Hence this bacterium with an interesting and checkered history of hundred years in medical literature, being suspected by Sir William Osler to be the cause of his own terminal pneumonia, has joined the club of virulent pathogens. It is very important for a clinical microbiologist not to under-diagnose this emerging pathogen which might lead to emergence of multidrug resistance in this so-called beta-lactamase producer.

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