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MORAXELLA CATARRHALIS: A FREQUENTLY NEGLECTED LOWER RESPIRATORY TRACT PATHOGEN – A CASE REPORT

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ABSTRACT **Background:** *Moraxella catarrhalis*, a Gram-negative diplococcus, is commonly detected in the sputum of adults suffering from chronic obstructive pulmonary disease (COPD). Though a common cause of exacerbations in COPD, they may be overlooked or under reported during the culture of sputum specimen. **Case Presentation:** Here we present a case report of *M. catarrhalis* with a description of its laboratory identification from sputum specimen of a COPD patient. **Conclusion:** Rapid identification leads to prompt diagnosis and treatment of *M. catarrhalis* infection.

KEYWORDS : COPD; Exacerbation; *Moraxella Catarrhalis*

INTRODUCTION

Moraxella catarrhalis is a potential pathogen that colonizes the upper respiratory tract. It commonly causes otitis media in children, while in adults, it plays a significant role in triggering exacerbations in chronic obstructive pulmonary disease (COPD). [1,2] An acute increase in respiratory symptoms in COPD patients coincides with the acquisition of a new strain of *M. catarrhalis.* [3] However, *M. catarrhalis* may be overlooked or under reported because of its morphological similarity to commensal *Neisseria* species and inability to ascertain its pathogenicity in the background of normal oropharyngeal flora in aerobic culture of sputum specimen. [4] This case report highlights the laboratory identification of *M. catarrhalis* isolated from COPD patient's sputum sample.

CASE PRESENTATION

A 67-year-old male patient presented to the Pulmonary Medicine outpatient department at All India Institute of Medical Sciences (AIIMS), Nagpur with complaints of breathlessness, fever, cough with expectoration, and body ache for a month. Patient is a known case of COPD for the past 4 years and is under treatment with dry powder inhalers Formoterol/Fluticasone. Patient is also a known hypertensive for 5 years and is on Amlodipine 5mg tablet once daily.

His differential count of leucocytes was suggestive of neutrophilia (87%). Chest X-ray showed left lung lower zone volume loss with pleural thickening and calcification. Sputum sample was sent for microscopy (Gram stain and Ziehl-Neelsen [ZN] stain), bacterial culture and molecular diagnosis of *Mycobacterium tuberculosis* (TRUNAT®, Molbio, India) to the Microbiology laboratory.

The number of pus cells and epithelial cells were noted on gram stain and quality of the sputum sample was assessed by the Bartlett grading score. [5] Bartlett score was +2 (good quality) with plenty of pus cells and Gram-negative diplococci in association with pus cells (intracellular). [Fig.1] ZN staining and TRUNAT® were negative for *M. tuberculosis.* Bacterial culture on the blood agar and chocolate agar showed pure heavy growth of round, convex, greyish-white and opaque colonies, with no hemolysis on blood agar. [Fig.2] Gram stain from culture showed Gram-negative cocci in pairs. [Fig.3] It was further identified by biochemical tests. Colonies were catalase positive and oxidase positive. The colonies remained intact when pushed across the surface of the agar (Hockey puck sign – Positive). The isolate was confirmed by MALDI-TOF MS (Biomerieux, France) as *M. catarrhalis.*

Kirby-Bauer disc diffusion method was employed for antibiotic susceptibility testing (AST) and breakpoints were interpreted in accordance with Clinical Laboratory Standards Institute (CLSI) M45 3rd edition. [6] AST was performed on a Mueller Hinton agar and incubated in 5 % CO_2 for 24 hours. The isolate was sensitive to amoxicillin-clavulanate, azithromycin, erythromycin, tetracycline and cotrimoxazole. [Fig.4]

DISCUSSION

During the course and pathogenesis of COPD, bacterial infections are responsible for causing acute exacerbations and chronic lower airway infections. It increases host inflammatory responses which leads to the acceleration of symptoms and exacerbation in COPD patients. [7]

M. catarrhalis is one of the prevalent bacteria found in the sputum of persons experiencing exacerbations of COPD. Advanced age and suppression of host immunity are the most important predisposing factors responsible for causing *M. catarrhalis* infection in COPD patients. [8] Use of inhaled corticosteroids for longer duration affects the normal flora in the respiratory tract of COPD patients and may lead to the persistence of *M. catarrhalis.* [9]

Neutrophilic inflammation is much higher in bacterial exacerbations. [8] In this case, presence of Gram-negative diplococci in association with pus cells along with heavy growth of *M. catarrhalis* isolated from sputum culture represents infection rather than colonization. Clinical evidence of an exacerbation in COPD with simultaneous acquisition of *M. catarrhalis* in the absence of another bacterial pathogen and alternative causes of exacerbations is suggestive of its infection. [7]

Nearly all strains produce beta-lactamase and hence are predominantly resistant to penicillin, ampicillin and amoxicillin. [10] Hence, extended-spectrum cephalosporins, amoxicillin/clavulanic acid or ampicillin/sulbactam are recommended for treating *M. catarrhalis* infections. The isolate in this case was sensitive to amoxycillin-clavulanate, which may be considered the treatment of choice.

CONCLUSION

This case report highlights the important role of *M. catarrhalis*, which is often overlooked pathogen in lower respiratory tract infection, particularly in adult patients with an underlying disease such as COPD. Rapid identification by combination of sputum Gram stain examination and the hockey puck sign leads to prompt diagnosis and treatment of *M. catarrhalis* infection can lead to favourable outcome. It is the need of the hour for microbiologists to be vigilant in identifying *M. catarrhalis* and reporting them in sputum specimen from adult patients with underlying comorbidity, since definite antimicrobial susceptibility testing can be done and specific treatment can be given to the patients.

LIMITATIONS

It is a single case study, these findings cannot be generalized for all COPD or lower respiratory tract cases. Co-infection with other fungal and respiratory viruses cannot be excluded. Repeated sputum samples for cultures of a patient were not obtained. In addition, post treatment follow up of a patient was not available. Severity of COPD exacerbation cannot be assessed. Despite these limitations this case report highlights the importance of clinical awareness and accurate diagnosis of *M. catarrhalis* as a cause of lower respiratory pathogen in COPD patients.

List of Abbreviations

1. COPD - Chronic Obstructive Pulmonary Disease
2. ZN - Ziehl-Neelsen
3. AST - Antibiotic Susceptibility Testing
4. CLSI - Clinical Laboratory Standards Institute

Declaration

- Ethical Approval: Not Applicable
- Consent for publication: Written informed consent was obtained from the participant for the publication of their personal or clinical details along with any identifying images to be published in this study.
- Author Contributions: Mentioned in author contribution form
- Conflict of Interest: Not Applicable
- Funding sources: Not Applicable
- Competing interests: Not Applicable
- Acknowledgement: None
- Data availability: None

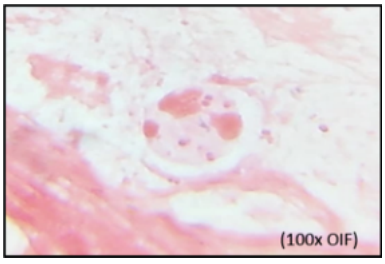

Figure 1: Direct Smear of Sputum Showing Intracellular Gram Negative Diplococci (100x)

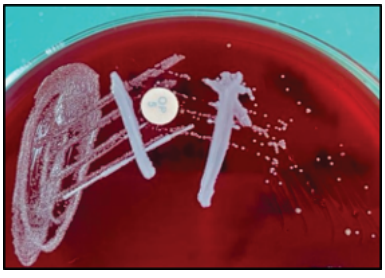

Figure 2: Primary Culture on Blood Agar showing Greyish White Non-haemolytic Colonies

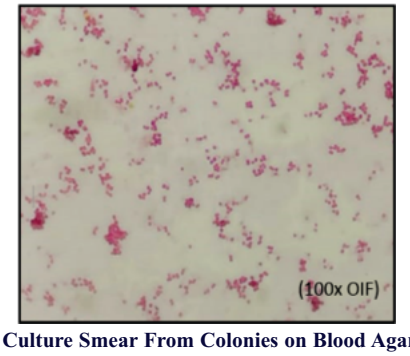

Figure 3: Culture Smear From Colonies on Blood Agar Showing Gram Negative Diplococci (100x OIF)

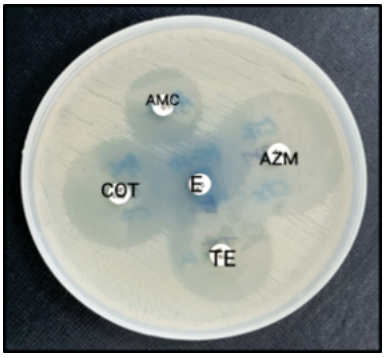

Figure 4: Antibiotic Susceptibility Testing by Kirby-bauer Disc Diffusion Method on Mueller Hinton Agar

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