

Optochin Resistance - *Streptococcus pneumoniae* in case of Pneumonia – A case report

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Abstract: We report a case of Pneumonia due to *Streptococcus pneumoniae* which was resistant to optochin in 50 yr old female patient who presented with high fever and chills to hospital. She also complained of productive cough. Sputum for microbiological evaluation was sent to lab from which streptococcus pneumoniae resistant to optochin was isolated. Isolate was resistant to major antibiotic used for pneumonia treatment. She was put on linezolid treatment as per antibiotic susceptibility testing report given by microbiology lab. After two weeks of treatment fever and cough subsided. Repeat induced sputum culture after two week didn't showed growth of streptococcus pneumoniae. Traditionally, *Streptococcus pneumoniae* is identified in the laboratory by demonstrating susceptibility to optochin. Misidentification of optochin-resistant *S. pneumoniae* as a viridans streptococcus can have significant implications. Minimum invasive α -hemolytic streptococci resistant to optochin be checked for lack of bile solubility before being identified as viridans streptococci. The addition of this latter test should minimize the possibility of misidentification.

Keywords: optochin resistant, Pneumonia, *Streptococcus pneumoniae*

I. Introduction

Streptococcus pneumoniae remains a major cause of human morbidity and mortality, particularly at both extremes of the age spectrum.^[1] The recent emergence of pneumococci resistant to penicillin, third-generation cephalosporins, and other antimicrobial agents has raised concerns about treatment of patients with serious pneumococcal infections.^[2] Because of the increasing frequency of antimicrobial resistance, accurate identification and antimicrobial susceptibility testing are crucial for correct diagnosis and treatment of patients. Differentiation of *S. pneumoniae* from other viridans streptococci depends on demonstrating optochin susceptibility, bile solubility, reaction with a specific DNA probe, or detection of species-specific capsular polysaccharides.^[3] Most clinical microbiology laboratories today depend on the optochin susceptibility test.^[4] Optochin-resistant pneumococcal strains were first reported in Finland in 1987^[5] and since then, sporadic reports of isolates from diverse geographic areas have appeared in the literature.^[6,7] To our knowledge very few optochin resistant *Streptococcus pneumoniae* were isolated. We report a case of optochin resistant *Streptococcus pneumoniae* from an old age pneumonia patient.

II. Case history

A 50yr old female came to medicine O.P.D of government hospital of Maharashtra with history of fever with chills since 10 days. She also complained of productive cough, shortness of breathe, fatigue, headache and loss of appetite since 10 days. She was known case of hypertension since 7 years and was on antihypertensive medication for the same. On examination she was toxic having dysnea and febrile. In investigation complete blood picture showed Hb-9.5gm/dl, neutrophil were raised. X-ray PA view chest showed middle lobe opacity in right lung. Sputum for culture and sensitivity was sent to our lab. On gram stain microscopy pus cell were seen, gram positive cocci in pairs were seen. ZN staining didn't show any acid fat bacilli. After 24 hr of incubation culture on blood agar showed small 0.5mm to 1mm draughtsman appearance colonies with alpha haemolysis. Secondary smear from culture showed gram positive cocci in pairs. (Figure 1) On maconkey ager there was no growth. Colonies were tested for catalase which showed no effervescences after adding 3% of H₂O₂. Oxidase negative, bile solubility test was positive, inulin was fermented. Optochin susceptibility test was also performed, strain was found to be optochin resistant. (Figure 2) On antibiotic susceptibility testing strain was sensitive to linezolid and tetracycline and resistant to penicillin, cotrimaxole, gentamycin and ciprofloxacin. Patient was put on linezolid for two week. After two weeks of treatment fever and cough subsided. Repeat induced sputum culture after two week didn't showed growth of streptococcus pneumoniae. Patient recovered.

Optochin is used as one of the test for identification of *Streptococcus pneumoniae*. In recent times there were few reports of optochin resistant were found. The purpose of this communication is to report optochin resistance strain and to alert physicians and clinical microbiologists to the existence of these strains in the community.

III. Discussion

Optochin-resistant pneumococcal strains were first reported in Finland in 1987.^[5] Optochin, a quinine analogue, was introduced early in the twentieth century as a chemotherapeutic agent for the treatment of lobar pneumonia. However, serious side effects coupled with treatment failures quickly terminated the therapeutic use of this agent.^[8] Although optochin susceptibility was first described for differentiating pneumococci from other α -hemolytic streptococci in 1915,^[9] the test was virtually unused by laboratories until the mid-1950s.^[10] During the first 30 years of its use, there were no reports of optochin-resistant pneumococci. Since then, there have been sporadic reports of optochin-resistant pneumococci.^[5] Investigators from Spain have cloned, sequenced, and characterized H⁺-ATPase c-subunit as the gene encoding the optochin determinant.^[11]

Despite the development of newer techniques (e.g., use of DNA probes and PCR)^[12, 13] the optochin susceptibility test remains the primary and, in some cases, the only method used by clinical microbiology laboratories to differentiate *S. pneumoniae* from other viridans streptococci.^[14,15] Strains displaying a growth inhibitory zone more than 14 mm in diameter around a 6-mm optochin disk are identified as *S. pneumoniae*. Those producing zones <14 mm in diameter are questionable pneumococci and should be tested further to determine whether they are bile soluble.^[3] When there is no inhibitory zone around the optochin disk, laboratories routinely identify isolates as viridans streptococci and do not perform bile solubility testing.^[16]

Although *S. pneumoniae* was considered universally susceptible to optochin for almost 30 years after the optochin susceptibility test was introduced, a number of isolates have been reported as optochin resistant in recent years. In 1987, Kontiainen and Sivonen^[5] were the first to report pneumococci that exhibited an optochin-resistant subpopulation. A similar phenomenon was described a year later by Phillips et al.^[6] Muñoz et al.^[16] reported that 10 (1.2%) of 814 pneumococcal isolates submitted to their reference center in 1987–1988 contained optochin-resistant variants.

A minimum invasive α -hemolytic streptococcus resistant to optochin is checked for lack of bile solubility before being identified as viridans streptococci. Even though bile-insoluble pneumococcal isolates have been reported,^[15] the addition of this latter test should minimize the possibility of misidentification. A commercial DNA probe test is of higher sensitivity and specificity than standard tests^[12] but may be too expensive for routine use. However, it should be considered for evaluation of isolates with typical colony morphology for *S. pneumoniae* that yield questionable results by other methods.

IV. Figures

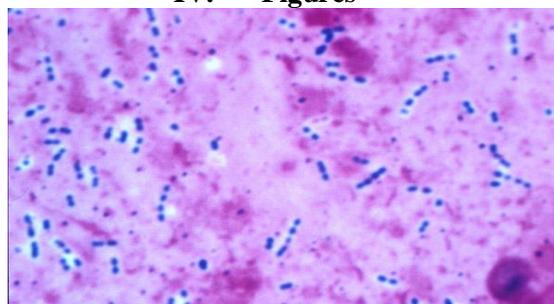


Figure 1 Gram stain from blood agar colonies



Figure 2 Optochin resistant *Streptococcus pneumoniae*

V. Conclusion

Optochin susceptibility should be complemented with other pneumococcal identification tests, such as bile solubility tests or PCR-based techniques, when suspected pneumococcal cultures exhibiting resistance to optochin are isolated. Accurate identification of pneumococci is important not only for the diagnosis but also for treatment of infections.

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