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Original Research Paper

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NEISSERIA CINEREA : A RARE AND MISSED PATHOGEN CAUSING MENINGITIS

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ABSTRACT Neisseria cinerea is a human commensal. It colonises the upper respiratory tract. It has been rarely found in blood cultures. The authors report a rare case of bacteremia in a 3 year old child caused by Neisseria cinerea .To the best of our knowledge this is the first reported case of Bacteremia and meningitis by Neisseria cinerea in Western Uttar Pradesh region of India. This case calls attention to the uncommon pathogens associated with bacteremia.

KEYWORDS : *Neisseria cinerea,* Bacteremia, Meningitis

INTRODUCTION

Neisseria cinerea is a commensal Neisseria spp.It is found in upper respiratory tract of human beings.[1] It was first described by von Lingelsheim in 1906 and named Micrococcus cinereius. It was described subsequently as Neisseria pseudocatarrhalis but was later assigned as *N. cinerea*.[2] It is gram-negative diplococci, oxidase and catalase-positive and asaccharolytic .

It is often misidentified in laboratories as its resembles *Neisseria gonorrhoeae* and *Branhamella catarrhalis*.[1]Although it is classified as non-pathogenic bacterium, In this report, we present a case of a 3 year old child with bacteremia caused by *Neisseria cinerea*.

CASE REPORT

A 3 year old girl child was admitted in the Paediatric unit of our Hospital, with complaints of fever off and on for 2 weeks , multiple episodes of abnormal body movements for 10 days and one episode of unconsciousness 3 days back.As per the mother, she was apparently well 2 weeks back when she started developing fever which was low grade in intensity and continuous in nature but one episode of high grade fever (106 F) was recorded by her parents in last 2wks. Fever was associated with vomiting and headache, which relieved on medication. .It was not associated with rigor. It was 10 days back when her parents noticed abnormal body movements which was in the form of increased tone of all the four limbs along with uprolling of eyeball and frothing from mouth , which lasted for 1-2 minutes and subsided on its own.Similar episode of abnormal activity occurred 3 days back which was followed by unconsciousness for 15 min.

She was taken to a local practitioner and then the admitted in a near by hospital where she was started on intravenous steroids and Piperacillin-tazobactum .During these 3 days she had multiple episodes of abnormal body movements Then she was referred to our hospital. On clinical examination, the patient was thin built and emaciated . Her pulse rate was 102/min, blood pressure was 90/60 mm of Hg and the body temperature was 100°F. There was mild pallor and pedal edema but no icterus, cyanosis and clubbing. Examination of the respiratory system revealed a respiratory rate of 18/min. She was started on I/V fluids , I/V Ceftriaxone. I/V steroids , I/V anti-convulsants and Ryle's tube feeding.

CSF and blood was sent for culture to Clinical Microbiology laboratory and for biochemical analysis to Clinical Biochemistry laboratory. CSF glucose was 35mg/dl while protein was elevated ,300 mg/dl. Blood urea was slightly raised(42mg/dl). Serum creatinine(0.40mg/dl),Na^+ (132mMol/l), K^+(5.3mMol/l),Ca^{2+} (9.60 mMol/l) were wihin normal limits.

Her hemoglobin was 12.6 g%, total leucocyte count was 25,500/cu mm with differential leucocyte counts showing 90% of neutrophils and 10% of lymphocytes

In Microbiology lab , Blood culture bottle was incubated in BAC/T Alert 3D (Biomerieux , France) Gram stain of CSF revealed moderate no. of polymorphonuclear leukocytes and Gram negative diplococci and clinician was alerted immediately. The sample was cultured on blood agar, chocolate agar and Mac Conkey agar plates and incubated at 37°C overnight .

Blood culture bottle showed a positive signal for bacterial growth and on staining gram negative diplococci were seen and clinician was alerted again. It was cultured on blood agar, chocolate agar and Mac Conkey agar plates and incubated at 37°C overnight .

Similar growth was seen in both the samples. Smooth grayish white colonies were observed on blood agar [Figure 1 - Smooth Grayish white colonies on blood agar.] & chocolate agar plates. There was no growth on Mac conkey agar . The

isolate was catalase and oxidase positive. Culture smear revealed Gram negative diplococci. On biochemical analysis the isolate failed to produce acid from sugars and unable to reduce nitrates to nitrites, showed asaccharolytic reaction in Hugh Leifson's Oxidation/Fermentation media for glucose.. These findings alerted us of growth of some unusual pathogen which required further confirmation,by VITEK® 2 system (biomerieux , France) using NH REF 21348 card which identified the isolate as *N. cinerea*.The drug susceptibility of the isolate was also performed using VITEK® 2 AST- N281 REF 414532 card.

Both the samples grew *N. cinerea* with similar sensitivity pattern. Following this, the patient was continued on intravenous Ceftriaxone for 2 weeks. Follow up done after completion of 2 weeks therapy showed significant improvement in patient's condition and repeat blood culture was negative for growth of *N. cinerea*.

DISCUSSION

N. cinerea was first recognized in 1905 by von Lingelsheim as *Micrococcus cinereus* and was again described as an asaccharolytic commensal of the human oropharynx by Berger and Paepcke in 1962 . In 1984, *N. cinerea* was accurately characterized by Knapp et al. [3]

Only limited information exists on either the frequency of commensal colonization or the potential pathogenicity of this organism. In the only published study, the oropharyngeal colonization rates for N. cinerea were found to be 30% of 83 women, 24% of 92 heterosexual men, and 37% of 27 homosexual men . In this same group of individuals, N. cinerea was isolated from the urethra of only one heterosexual man. Many strains of N. cinerea have been isolated but incorrectly identified as B. catarrhalis . These species differ biochemically only in their ability to reduce nitrate, a test which was not introduced into the classification of Neisseria spp. until 1961. B. catarrhalis strains reduce nitrate, whereas N. cinerea strains do not. Berger and Paepcke "rediscovered" and described N. cinerea in 1962 and showed that there was no antigenic relatedness between N. cinerea and Neisseria catarrhalis; the latter species was subsequently reassigned to the genus Branhamella in 1970.[2]

It is a commensal of the human oropharynx and sometimes the urogenital tract with low pathogenic potential, although invasive infections are rarely reported . [3]

In our case,Neisseria cinerea might have penetrated from respiratory tract into the blood stream, proliferated and led to bacteremia and , as patients immunune system was compromised due to administration of intravenous steroids and broad spectrum antibiotics. However, the underlying mechanism by which *Neisseria cinerea* penetrated into blood stream still needs further investigation.

Few case reports describing bacteremia like meningitis and bacteremia,[3] posttraumatic meningitis and bacteremia , [4] bacteremia in immunocompromised patients and resulting in death [1,5,6] have been published.

Only a few other cases have been reported by various workers like lymphadenitis in an immunosuppressed youth, ophthalmia neonatorum in a newborn, bacterial peritonitis in a 38-year-old man with Chronic Ambulatory Peritoneal Dialysis(CAPD), proctitis in an 8-year-old boy and nosocomial pneumonia in a 25-year-old man and) one case of endocarditis in an intravenous drug user have been reported. [7,8,9,10,11,12]
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Phenotypic identification of *N. cinerea* is difficult due to the limited number of expressed characteristics, and misclassification as *N. gonorrhoeae* has been reported . Certain characteristics (i.e., no growth of *N. cinerea* on chocolate agar at 22°C or golden-brown pigmentation in many of the strains) allow identification, but none of these are reliable for accurate species identification. [3]

Hence , we confirmed its identification and antimicrobial susceptibility by VITEK® 2 system (biomerieux , France) .

CONCLUSION

To conclude, this case alerts the emergence of *Neisseria cinerea* as a potential threat in immunocompromised patients . Because of the rarity of *Neisseria cinerea*'s isolation in clinical laboratories, care must be taken to distinguish this organism from *N. gonorrhoeae*, and other asaccharolytic gram-negative diplococci such as *N. flavescens* or *B. catarrhalis*. Laboratory microbiologists must be familiar with this organism's colonial characteristics and variable biochemical reactions, especially when they are isolated from non-oropharynx sites.

Automation plays a major role in correct and rapid identification of such rare pathogens. Rapid identification and susceptibility of this pathogen followed by prompt communication with the clinician for appropriate and timely initiation of treatment is the key for efficient management of infections caused by such rare pathogens.

Ethical clearance :The approval from the Institutional Ethics and Research Committee was obtained before conducting the study.

Conflict of Interest – None
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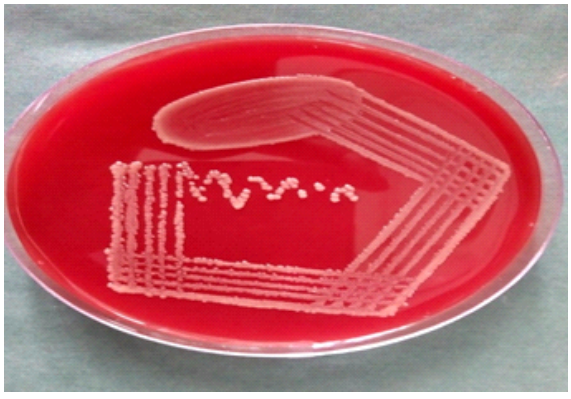
FIGURE 1- Smooth Grayish white colonies on blood agar.



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