



ELSEVIER



<http://intl.elsevierhealth.com/journals/ijid>

CASE REPORT

Community-acquired *Streptococcus mitis* meningitis: a case report

Selda Sayin Kutlu^{a,*}, Suzan Sacar^a, Nural Cevahir^b, Huseyin Turgut^a

^a Department of Infectious Diseases and Clinical Microbiology, Faculty of Medicine, Pamukkale University, Kinikli, 20070 Denizli, Turkey

^b Department of Microbiology and Clinical Microbiology, Faculty of Medicine, Pamukkale University, Kinikli, Denizli, Turkey

Received 27 April 2007; received in revised form 26 October 2007; accepted 5 January 2008

Corresponding Editor: J. Peter Donnelly, Nijmegen, The Netherlands

KEYWORDS

Streptococcus mitis;
Community-acquired meningitis;
Older age (>50 years);
Alcoholism;
Poor oral hygiene

Summary

Background: *Streptococcus mitis* is prevalent in the normal flora of the oropharynx, the female genital tract, gastrointestinal tract, and skin. Although it is usually considered to have low virulence and pathogenicity, *Streptococcus mitis* may cause life-threatening infections, particularly endocarditis. Meningitis with *S. mitis* is rare, but has been described in individuals with previous spinal anesthesia, neurosurgical procedure, malignancy, or neurological complications of endocarditis.

Case report: A 58-year-old, alcoholic male patient with a high fever, headache, and changes in mental status was admitted to hospital with the diagnosis of meningitis. *S. mitis*, isolated from cerebrospinal fluid, was sensitive to penicillin. He was given a 14-day course of ampicillin and made a full clinical recovery.

Conclusions: The purpose of this report is to emphasize the importance of the occurrence of *S. mitis* meningitis in patients with concomitant factors such as older age (>50 years), alcoholism, poor oral hygiene, and maxillary sinusitis.

© 2008 International Society for Infectious Diseases. Published by Elsevier Ltd. All rights reserved.

Introduction

Streptococcus mitis, an important member of the viridans streptococci and a normal part of the oropharynx, skin, gastrointestinal system, and female genital system flora, is a bacterium with low pathogenicity and virulence.^{1–5} How-

ever viridans streptococci are the most common cause of subacute bacterial endocarditis.³ *S. mitis* causes severe clinical conditions including sepsis and septic shock especially in neutropenic patients.^{4,6} Meningitis with *S. mitis* is rare, but has been described in individuals with previous spinal anesthesia, neurosurgical procedure, malignancy, or neurological complications of endocarditis, and in newborns.^{2,3,7–12} We report herein an unusual case of *S. mitis* meningitis in a man with a history of alcoholism, poor oral hygiene, and maxillary sinusitis.

* Corresponding author. Tel.: +90 258 2118585 (2293); fax: +90 258 2410040.

E-mail address: sayinkutlu@yahoo.com (S.S. Kutlu).

Case report

A 58-year-old alcoholic male was admitted to the emergency department of our hospital with symptoms and signs of meningitis. He had had no recent dental treatment and had periodontitis and poor oral hygiene including dental caries and tongue plaque. The patient presented with a high fever (39 °C), headache, and confusion. He had no nuchal rigidity but had a positive Kernig's sign. Laboratory tests revealed the following: hemoglobin 13.26 g/dl, hematocrit 40%, white blood cell count $15.4 \times 10^9/l$ (83% neutrophils, 12% lymphocytes, and 5% monocytes), platelet count $177 \times 10^9/l$, alanine aminotransferase 20 IU/l, aspartate aminotransferase 30 IU/l, gamma-glutamyl transpeptidase 34 U/l, alkaline phosphatase 49 IU/l, direct bilirubin 0.3 mg/dl, indirect bilirubin 0.7 mg/dl, total protein 6 g/dl, and albumin 3.1 g/dl. Lumbar puncture yielded cloudy cerebrospinal fluid (CSF) containing 600×10^6 cells/l with 85% neutrophils. The CSF glucose level was 48 mg/dl (concomitant blood glucose 121 mg/dl) and protein level was 178 mg/dl. A computed tomography scan of the brain revealed maxillary sinusitis.

The empiric antibiotic treatment for patients of older age (>50 years) and having a history of alcoholism was initiated: ceftriaxone 4 g/day and ampicillin 12 g/day IV to cover *Listeria monocytogenes* also. All the results of the blood cultures were negative. Alpha-hemolytic streptococcus was found in CSF culture. The isolate was identified by standard criteria, on the basis of colony morphology, Gram stain, optochin test, bile esculin, growth 6.5% NaCl, and catalase reaction. *S. mitis* identification was initially performed using the API 20 STREP (bioMérieux). The identification was also confirmed by conventional biochemical tests (arginine dihydrolase, hippurate hydrolysis, esculin hydrolysis, acetoin production, urease, acid production from mannitol, inulin, maltose, sorbitol, glucose, lactose, sucrose).³ Antibiotic sensitivity was studied according to Clinical and Laboratory Standards Institute (CLSI) criteria.¹³ Because it was determined to be sensitive in vitro to penicillin (minimum inhibitory concentration $\leq 0.12 \mu\text{g/ml}$), treatment was continued with ampicillin. Echocardiography showed no evidence of vegetations or valve pathology. On the fourth day of follow-up, the CSF was reexamined and the measurements were as follows: clear appearance, normal pressure, leukocyte count of $10 \times 10^6/l$, protein 72 mg/dl, glucose 82 mg/dl (concomitant blood glucose level 109 mg/dl). No bacteria were isolated from the CSF. The patient's treatment lasted 14 days and he was totally cured at discharge.

Discussion

S. mitis and other viridans streptococci are the agents of numerous infections, primarily of subacute bacterial endocarditis and upper respiratory tract infections.^{3,4} Oral hygiene and dental treatment have an important role in bacteremia and following endocarditis.⁵ Although the patient's blood cultures were negative, in our opinion poor oral hygiene was the probable cause of the bacteremia. It is probable that the viridans streptococci had initially caused the above-mentioned focal infections like sinusitis, which are well known predisposing factors that increase the risk of

bacterial meningitis.¹⁴ In the present case there was established maxillary sinusitis, which can be the source of meningitis. However, in a third of these meningitis cases the exact source of infection is not clear.¹⁵

In pneumonias caused by *S. mitis* the underlying factors are old age, diabetes, alcoholism, lung cancer, and hypothyroidism.¹⁶ We speculate that older age (>50 years) and alcoholism were the predisposing conditions in the development of meningitis in our patient. To our knowledge, this is the first description of *S. mitis* meningitis with co-morbidities like older age (>50 years) and alcoholism.

Streptococcal meningitis except that caused by *Streptococcus pneumoniae*, might develop secondary to brain abscess. In these cases peptostreptococci or *Streptococcus milleri* are generally isolated. Brain abscesses and meningitis might develop also in infective endocarditis. If anaerobic streptococci and other streptococci including *S. milleri* are isolated in community-acquired meningitis, physicians should examine brain abscess, and if viridans streptococci are isolated he/she should look for infective endocarditis.⁷ We evaluated our patient for the presence of infective endocarditis, and echocardiography showed that there was no vegetation or valve disease.

Viridans streptococci have become increasingly resistant to antibiotics including penicillin, cephalosporin, erythromycin, and tetracycline. *S. mitis* is more resistant to antibiotics than other viridans streptococci.^{1,3,6} Viridans streptococci can transfer their resistant genes to more pathogenic pneumococci and group A streptococci.⁶ The subtype isolated in our case was sensitive to penicillin.

Although *S. mitis* is believed to be a rare cause of meningitis in the community, it should be considered in the differential diagnosis of this disorder, especially in patients having different accompanying factors such as older age (>50 years), alcoholism, poor oral hygiene, and maxillary sinusitis.

Conflict of interest: No conflict of interest to declare.

References

1. Lyytikäinen O, Rautio M, Carlson P, Anttila VJ, Vuono R, Sarkkinen H, et al. Nosocomial bloodstream infections due to viridans streptococci in haematological and non-haematological patients: species distribution and antimicrobial resistance. *J Antimicrob Chemother* 2004;**53**:631–4.
2. Balkundi DR, Murray DL, Patterson MJ, Gera R, Scott-Emuakpor A, Kulkarni R. Penicillin-resistant *Streptococcus mitis* as a cause of septicemia with meningitis in febrile neutropenic children. *J Pediatr Hematol Oncol* 1997;**19**:82–5.
3. The Gram-positive cocci part II: streptococci, enterococci and the 'Streptococcus-like' bacteria. In: Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Win WC, editors. *Color atlas and textbook of diagnostic microbiology*. 5th ed. New York, USA: Lippincott; 1997, p. 577–649.
4. Lu HZ, Weng XH, Zhu B, Li H, Yin YK, Zhang YX, et al. Major outbreak of toxic shock-like syndrome caused by *Streptococcus mitis*. *J Clin Microbiol* 2003;**41**:3051–5.
5. Johnson CC, Tunkel AR. Viridans streptococci, groups C and G streptococci and *Gemella morbillorum*. In: Mandell GL, Bennet JE, Dolin R, editors. *Principles and practice of infectious diseases*. 6th ed. New York, USA: Churchill Livingstone; 2005. p. 2434–51.
6. Seppala H, Haanpera M, Al-Juhaish M, Jarvinen H, Jalava J, Huovinen P. Antimicrobial susceptibility patterns and macrolide

- resistance genes of viridans group streptococci from normal flora. *J Antimicrob Chemother* 2003;**52**:636–44.
7. Cabellos C, Viladrich PF, Corroira J, Verdaguer R, Ariza J, Gudiol F. Streptococcal meningitis in adult patients: epidemiology and clinical spectrum. *Clin Infect Dis* 1999;**28**:1104–8.
 8. Villeveille T, Vincenti-Rouquette I, Petitjeans F, Koulmann P, Legulluche Y, Rousseau JM, et al. *Streptococcus mitis*-induced meningitis after spinal anesthesia. *Anesth Analg* 2000;**90**:500–1.
 9. Bussink M, Gramke HF, Van Kleef M, Marcus M. Bacterial meningitis ten days after spinal anesthesia. *Reg Anesth Pain Med* 2005;**30**:210–1.
 10. Moller K, Frederiksen EH, Wandall JH, Skinhoj P. Meningitis caused by streptococci other than *Streptococcus pneumoniae*: a retrospective clinical study. *Scand J Infect Dis* 1999;**31**:375–81.
 11. Bignardi GE, Isaacs D. Neonatal meningitis due to *Streptococcus mitis*. *Rev Infect Dis* 1989;**11**:86–8.
 12. Adams JT, Faix RG. *Streptococcus mitis* infection in newborns. *J Perinatol* 1994;**14**:473–8.
 13. Clinical and Laboratory Standards Institute. *Performance standards for antimicrobial susceptibility testing*. Fifteenth informational supplement M7-A6. Wayne, PA, USA: Clinical and Laboratory Standards Institute; 2005.
 14. Lu CH, Chang WN, Chang HW. Adults with meningitis caused by viridans streptococci. *Infection* 2001;**29**:305–9.
 15. Koorevaar CT, Scherpenzeel PG, Neijens HJ, Derksen-Lubsen G, Dzoljic-Danilovic G, de Groot R. Childhood meningitis caused by enterococci and viridans streptococci. *Infection* 1992;**20**:118–21.
 16. Marrie TJ. Bacteremic community-acquired pneumonia due to viridans streptococci. *Clin Invest Med* 1993;**16**:38–44.