Recurrent *Gemella haemolysans* Meningitis in a Patient with Osteomyelitis of the Clivus

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**Abstract**

Systemic infection caused by *G. haemolysans* has rarely been reported. We herein describe the case of a 69-year-old woman with recurrent *G. haemolysans* meningitis that led to abducens nerve palsy. Osteomyelitis of the clivus was likely present at the first admission, which led to reinfection of the meninges because the course of antibiotic treatment was too short. The patient has remained free of relapse for one year after undergoing a second round of treatment that lasted 63 days. In cases of *G. haemolysans* meningitis, coexisting infectious diseases, such as endocarditis and/or osteomyelitis, should therefore be investigated to prevent recurrence.

**Key words:** *Gemella haemolysans*, meningitis, osteomyelitis, abducens nerve palsy

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**Introduction**

*Gemella haemolysans* is a normal inhabitant of the human oral cavity and upper respiratory tract (1). The reported nasopharyngeal carriage rate is approximately 29.7% of healthy individuals (2). Therefore, *G. haemolysans* is not considered to be particularly virulent. However, related case reports began to appear in the 1980s describing infectious endocarditis (3) and meningitis (4).

Most infections caused by this organism appear to have gone unrecognized. We herein describe the first case of recurrent *G. haemolysans* meningitis complicated by osteomyelitis of the clivus.

**Case Report**

A 69-year-old woman with no remarkable medical history or predisposing heart conditions was admitted to our hospital with a fever of 37°C and a headache that had persisted for three weeks. No neurological abnormalities, such as nuchal stiffness, were detected. The laboratory data revealed an inflammatory state with an erythrocyte sedimentation rate (ESR) of 91 mm/h and a CRP (C-reactive protein) level of 52 mg/L. Computed tomography (CT) imaging of the brain showed no abnormalities. Enhanced CT imaging of the body disclosed several round nodules measuring 6 to 13 mm in the bilateral lung fields. Due to a penicillin allergy, the patient was treated with 300 mg of intravenous ciprofloxacin every 12 hours after drawing blood for culture.

She developed right abducens nerve palsy with a fever of 39°C on the 5th day of hospitalization. Enhanced T1-weighted magnetic resonance imaging (MRI) of the brain showed low intensity in the clivus and hypertrophic dura matter with enhancement around the cavernous sinus (Figure). A cerebrospinal fluid (CSF) analysis demonstrated a white blood cell count of 855/mm³ comprising 46% neutrophils and 54% lymphocytes, with a glucose concentration of 39 mg/dL. The results of Gram’s staining of the CSF were negative.

*G. haemolysans* was identified in three pairs of blood cultures and found to be sensitive to ampicillin, cefmetazole, imipenem, levofloxacin, clindamycin and minocycline. CSF cultured in pediatric blood culture bottles was also positive for *G. haemolysans*, which was found to be sensitive to the same antibiotics as the bacteria detected in the blood cultures.

We supposed that the septicemia resulted in a secondary...
In the CSF decreased to 89/mm³ days because a CSF culture was negative and the cell count of 100 mg twice daily. Doxycycline was discontinued for 35 days of ceftriaxone administration, the an- and the patient did not develop an allergic reaction to ceftriaxone. After 28 days of ceftriaxone administration, the an- and trabecular thinning, indicating osteomyelitis of the clivus that had probably been present at the time of the first presentation, with more enhancement in the clivus. Bone CT of the skull demonstrated clival erosion and trabecular thinning, indicating osteomyelitis of the clivus that had probably been present at the time of the first admission and relapsed due to an insufficient course of anti- septic pulmonary embolism and meningitis and that inflammation had extended to the base of the skull due to the meningitis. To treat the abducens nerve palsy, intravenous steroids (prednisolone: 0.5 mg/kg/day) were administered until a spontaneous recovery was achieved. An examination of the oral cavity revealed diffuse periodontitis, the portal of entry in *G. haemolysans* septicemia. Dental procedures as a part of source control were also performed on the 9th day.

Blood cultures performed on the 10th day were negative, and transesophageal echocardiography revealed no areas of vegetation on the 12th day. The white blood cell count in the CSF decreased to 489/mm³ on the 15th day of hospitalization, and the size of the pulmonary nodules decreased. The patient’s headache and diplopia improved by the 23rd day of hospitalization. Ciprofloxacin was discontinued for 28 days because the CSF culture performed on the 21st day was negative and the cell count in the CSF decreased to 25/mm³ with an ESR of 2 mm/h and a CRP level of 0.1 mg/L at the end of treatment. She was discharged on the 46th day.

However, on the 73rd day after admission, the right abducens nerve palsy relapsed, and the CSF cell count and CRP level increased again to 3,081/mm³ slowly and has fastidious requirements. Enhancing MRI of the brain revealed almost identical findings to the first presentation, with more enhancement in the clivus. Bone CT of the skull demonstrated clival erosion and trabecular thinning, indicating osteomyelitis of the clivus that had probably been present at the time of the first admission and relapsed due to an insufficient course of antibiotic therapy or an inappropriate choice of antibiotics. Therefore, the meninges became infected. The patient was readmitted and treated with 2 g of intravenous ceftriaxone every 12 hours. The diplopia disappeared by the 78th day, and the patient did not develop an allergic reaction to ceftriaxone. After 28 days of ceftriaxone administration, the antimicrobial agent was switched to oral doxycycline at a dose of 100 mg twice daily. Doxycycline was discontinued for 35 days because a CSF culture was negative and the cell count in the CSF decreased to 89/mm³ with an ESR of 7 mm/h and a CRP level of 0.2 mg/L at the end of treatment. The patient has remained free of relapse for one year after a total of 63 days of treatment.

**Discussion**

*G. haemolysans* is a diplococcus or short streptococcus that was first isolated from the sputum of a patient with chronic bronchitis and was initially described by Thjøtta and Bøe as *Neisseria haemolysans* in 1938 (5). This organism was originally classified as *Neisseria* because it is easily decolorized by alcohol due to having a thin (10-20 nm) cell wall and being either Gram-variable or Gram-negative (6). Berger showed in 1961 that this organism is catalase- and cytochrome oxidase-negative and microbiologically unlike *Neisseriaceae*. Therefore, it should be allocated to the new genus *Gemella* (little twin) within the family of *Streptococcaceae* as the single species, *G. haemolysans* (7). Identifying *G. haemolysans* on blood agar takes 96 hours, as it grows slowly and has fastidious requirements.

Infections of the central nervous system or bone caused by *G. haemolysans* have rarely been encountered over the past 30 years, and only five instances of meningitis (4, 8-11) and four cases of spondylodiscitis/osteomyelitis (12-15) have been described. However, meningitis coexisting with osteomyelitis has not been previously reported.

The most common portals of entry for *Gemella* species infection are the upper respiratory tract and an unsanitary oral cavity (4, 8, 13, 16). A dental site appeared to be the culprit in our patient because she had periodontitis that required medical treatment. *Gemella* species can cause infections in immunocompromised patients (16), as well as healthy individuals with no underlying disease (17).

The antimicrobial susceptibility of *G. haemolysans* is similar to that of other *Streptococcaceae*, and all isolates described in 1982 are highly sensitive to penicillin and ampicillin (18). Many species reported thereafter are penicillin-sensitive, and almost all patients progress satisfactorily after the administration of one or two antibiotics. Vancomycin or quinolones alone have been proven effective (19, 20), although alternative treatments for patients with penicillin al-

**Figure.** Axial (a), coronal (b) and sagittal (c) enhanced T1-weighted magnetic resonance imaging (MRI) slices of the brain. Low intensity in the clivus and hypertrophic dura matter with enhance-ment around the cavernous sinus (white arrowheads) are observed.
Meningitis relapsed in our patient because we missed the coexisting osteomyelitis and thus administered a short course of treatment. Penicillin or vancomycin, with gentamicin or streptomycin exert synergistic effects on all Gemella strains (18). Accordingly, these combination therapies should have been chosen to treat the bacteremia in order to prevent secondary complications, such as osteomyelitis.

G. haemolysans can be easily mistaken for viridans group streptococci, which are biologically similar and also comprise a part of the normal flora. Therefore, many infections caused by this organism may go unrecognized. The presence of coexisting infectious diseases, such as endocarditis and/or osteomyelitis, that require prolonged combination therapy should be investigated whenever this organism is detected in aseptic samples.

The authors state that they have no Conflict of Interest (COI).

References