Molecular Identification of *Staphylococcus lugdunensis* in a Patient with Meningitis

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A 12-year-old child developed meningitis 6 days after a third ventriculostomy by endoscopy. A coagulase-negative *Staphylococcus* sp. was isolated in pure culture from the cerebrospinal fluid and was definitely identified as *Staphylococcus lugdunensis* after the 16S ribosomal DNA gene and *rpoB* gene were sequenced. This report describes the first case of *S. lugdunensis* meningitis.

There is only one report of *Staphylococcus lugdunensis* (4), a coagulase-negative organism, causing an opportunistic infection of the central nervous system; the organism was isolated from a brain abscess but not in pure culture (3). Here we describe the isolation of *S. lugdunensis* from a patient with meningitis; the organism was isolated in pure culture and characterized by molecular methods.

A 12-year-old male underwent a third ventriculostomy by endoscopy for the treatment of congenital obstructive hydrocephalus. An intravenous catheter was placed for anesthesia, and the endoscopy was performed with prophylactic oxacillin at 100 mg/kg of body weight. The child recovered uneventfully from the surgery; the intravenous catheter was removed after 24 h, and the patient was discharged 72 h after the surgery. Three days after leaving the hospital, the patient was readmitted with an intense headache, vomiting, and lethargy. Abnormal findings on physical examination were fever (39.5°C) and meningeal rigidity in the absence of localizing signs. The treponemal test was unremarkable, and cardiac auscultation and echocardiography results were normal. Laboratory results showed a leukocyte count of 17,700 cells/µl with 82% being polymorphonuclear cells, a platelet count of 348,000 cells/µl, a C-reactive protein level of 140 mg/liter, and an erythrocyte sedimentation rate of 60 mm after 1 h. Three blood samples for aerobic cultures were drawn, and cerebrospinal fluid (CSF) was obtained by lumbar puncture. Examination of the CSF showed 600 leukocytes/µl with 60% of the cells being polymorphonuclear. There were no visible erythrocytes, but there were approximately 5 to 10 gram-positive cocci per microscope field (magnification, ×400). The protein concentration in the CSF was elevated at 0.85 mg/dl, and the glucose concentration was 2.2 mmol/liter. Cultures of the CSF and all the blood samples on 5% sheep blood agar (bioMérieux, La Balme les Grottes, France) at 37°C produced slightly yellow-pigmented colonies of catalase-positive cocci with positive agglutination for the fibrinogen affinity factor (Staphaurex agglutination test; Murex Diagnostics, Darford, United Kingdom). Tube coagulase tests using rabbit plasma were negative, and the API 32 STAPH identification strip (bioMérieux) identified the isolates as *S. lugdunensis*. We found 100% homology in the 16S ribosomal DNA gene sequences of the isolates and *S. lugdunensis* (GenBank accession number AB009941), and a partial sequence of the *rpoB* gene of each of the isolates was identical to that of *S. lugdunensis* type strain CIP 103642 (Pasteur Institute Collection, Paris, France) (1). The isolates were tested by the agar disk diffusion test and were found to be susceptible to all the antibiotics against which they were tested, including oxacillin, cephalexin, gentamicin, rifampin, pefloxacin, and vancomycin. When the culture results became available, the initial treatment, consisting of 2 days of vancomycin at 45 mg/kg/day and cefotaxime at 25 mg/kg/day, was changed to oxacillin (3 g/day, oral route) and rifampin (20 mg/kg/day), treatment which was continued for 12 days. Defervescence occurred after 2 days of treatment with the vancomycin-cefotaxime combination, and at follow-up, 2 months later, the child was normal.

Although *S. lugdunensis* has been reported to cause a brain abscess (3), this is the first report of *S. lugdunensis* causing meningitis. In our study, contamination of the CSF by organisms present in the blood was improbable, as the CSF sample contained no erythrocytes. The fact that the same organism was recovered from CSF and from three blood samples and that *S. lugdunensis* was not recovered from any other specimens submitted to our laboratory at that time exclude the possibility of laboratory contamination. In our case, sequence analysis of two universal molecular targets definitively confirmed the identification of the isolates. Indeed, *S. lugdunensis* can be misidentified as *Staphylococcus aureus* or *Staphylococcus schleiferi* because colonies of these organisms have similar morphologies and all give positive results in tests for clumping factor (8, 12). Some automated identification systems are unable to identify *S. lugdunensis* since they are unable to produce the required discriminatory biochemical test results (mainly, a weak positive reaction for ornithine decarboxylase) or have insufficient databases (5, 9, 11, 13). Although algorithms have been proposed for the phenotypic identification of *S. lugdunensis* in routine laboratory processing of samples (10), we recommend the use of molecular methods to definitively identify the organism in unusual case presentations such as the one described herein. Bacteremia probably led to the seeding of the CSF in this case, since all three blood cultures were positive...
and there were no signs of infection at the surgical wound. *S. lugdunensis* endocarditis was excluded from the diagnosis by clinical examination and the echocardiography findings. The intravenous catheter may have played a role in the infection, although no local inflammation was noted at the site of catheter placement and bacteremia and meningitis appeared 5 days after catheter removal. Most probably, the bacteremia in our patient was community acquired (3), as is the case for most patients with endocarditis (2, 6, 8) and non-soft-tissue infections due to *S. lugdunensis* (7, 14). In these cases, a perineal source of *S. lugdunensis* has been suspected (2, 8), although controlled studies to investigate the hypothesis have yet to be performed and there was no perineal lesion to support such evidence for this route of infection in our patient.

Our report adds meningitis to the list of infections caused by *S. lugdunensis* and highlights the usefulness of molecular methods to quickly detect its presence.

REFERENCES