Pathogenicity in Two Cases of *Staphylococcus schleiferi*, a Recently Described Species

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*Staphylococcus schleiferi* is a new species of coagulase-negative staphylococcus first described in April 1988 (J. Freney, Y. Brun, M. Bes, H. Meugnier, F. Grimont, P. A. D. Grimont, C. Nervi, and J. Fleurette, Int. J. Syst. Bacteriol. 38:160–172, 1988). There are few data in the literature on its pathogenicity. We report two cases in which its role as an opportunistic nosocomial pathogen appears to be incontestable.

**Case 1.** A 64-year-old woman underwent surgery on 19 February 1988 for osteoarthrosis of the right hip with total joint replacement. The history showed pulmonary tuberculosis, posthepatitic hepatocellular dysfunction, and excessive alcohol consumption ending in 1976 with the onset of hepatitis. Postoperatively, the patient’s temperature was 38°C, and 15 days later a hot, painful swelling developed over the hip. Treatment with gentamicin (80 mg twice daily) for 15 days restored normal temperature, but the pains gradually increased and major functional incapacity appeared. On 4 July 1988, the patient was admitted to the orthopedics department, where septic loosening of the prosthesis was diagnosed. Fever was absent. Preoperative laboratory examination showed erythrocyte sedimentation rates of 80 mm/h and 121 mm/2 h, fibrinogen at 6 g/liter, alkaline phosphatase at 106 IU/liter, slight anemia, and a normal leukocyte count. Surgery to replace the prosthesis was carried out on 5 July 1988. Intraoperative assessment showed a zone of detachment between the fascia lata and the subcutaneous cellular tissue with complete loosening of the acetabulum. Six samples were taken for bacteriological analysis: two from subcutaneous tissues, one of synovial fluid, two from the femur, and one from the hip. *Staphylococcus schleiferi* was found in all of the samples. Postoperatively, the body temperature rose to 38°C on 6 July; this was managed by appropriate treatment combining cefamandole (750 mg four times daily) and tobramycin (150 mg twice daily) from 6 to 22 July, followed by pefloxacin (400 mg twice daily) from 23 to 29 July. The patient was released on 29 July and seen at follow-up 2 months later, showing satisfactory joint mobility.

**Case 2.** A 59-year-old man was hospitalized on 4 May 1988 for sudden dyspnea with edema of the lower limbs but no fever. During a similar episode which occurred in February, he had been diagnosed for bilateral thrombophlebitis, complicated by pulmonary embolism. The history showed left carotid stenosis in 1974, incurring right hemiplegia and aphasic sequelae, and a right internal carotid occlusion in 1985. Chronic treatment consisted of platelet agglutination inhibitors and vasodilators. The initial laboratory examination was as follows: normal erythrocyte sedimentation rate, leukocytosis (18,800/mm³) with neutrophilia (88%), elevated erythrocyte count (6.04 × 10¹²/mm³), hemoglobin at 17.6 g/100 ml, and a hematocrit of 52%. Further examination revealed right femoral phlebitis with pulmonary embolism in the left lower lobe. Heparin treatment was initiated. The course was stationary, and on 6 June an umbrella device was introduced into the inferior vena cava via the right internal jugular vein. An initial febrile response occurred on 8 and 9 June without pulmonary or urinary clinical signs or leukocytosis. A painful, inflammatory varicose cord was present near the femoral phlebitis. Two blood cultures were positive for *S. schleiferi*. On 16 June, a sudden fever was accompanied by reflex ileus. Leukocytosis was observed (18,700/mm³) with neutrophilia (83%). Oxacillin treatment (750 mg daily) was started. Symptomatic treatment (ice bags) relieved the ileus, but intermittent fever persisted. Three blood cultures on 19 June, one on 25 June, and three on 26 June were positive for *S. schleiferi*. Echocardiography excluded endocarditis. Abdominal scanning revealed extensive subrenal and suprapenal bilateral iliac and cava thrombosis, reaching the posterohepatic region with compensatory collateral circulation. Antibiotic treatment combining pefloxacin (400 mg three times daily), amikacin (500 mg twice daily), and rifampin (600 mg twice daily) was started on 27 June and replaced on 12 July with ofloxacin per os (200 mg twice daily) until 1 August. A normal body temperature was obtained on 11 July, a normal leukocyte count was obtained on 15 July, and the patient was discharged on 16 August.

The intraoperative samples were cultured on Columbia sheep blood agar containing nalidixic acid and colistin and in Schaedler broth with vitamin K3 and 2% agar. Blood cultures were prepared by using the BCB system (Roche Diagnostica, Neuilly sur Seine, France). Following incubation for 24 to 48 h at 37°C, a gram-positive, oxidase-negative, catalase-positive coccus was isolated from six intraoperative samples (case 1) and from nine blood cultures (case 2). The test for fibrinogen affinity factor (FAF) by means of stabilized sheep erythrocytes coated with rabbit plasma (Staph-Rapid; Roche) varied depending on the strain and the medium. Performed with the chocolate agar slide of the blood culture, it was negative, whereas weak agglutination appeared with subcultures from Columbia sheep blood agar containing nalidixic acid and colistin. Free coagulase was consistently absent in the rabbit plasma test. With a Staphylococcus-Kit (bioMérieux, Marcy l’Étoile, France), a technique which compares the nuclease activities of bacterial growths on two different sections of an agarose gel (one with antinuclease antibodies specific to *Staphylococcus aureus* and one without), all of the strains produced a thermonuclease not inhibited by anti-*S. aureus* DNAse serum. The biochemical characters, determined with API-Staph galleries (API System; La Balme les Grottes, France), were as follows: presence of arginine dihydrolase; absence of urease;
positive Voges-Proskauer reaction; nitrate reduced to nitrite; alkaline phosphatase production; acidification of D-glucose, D-mannose, D-trehalose, and N-acetylglucosamine; and variable acidification of D-fructose depending on the strain tested. The code obtained was 2 (or 6) 116141. A large ring of total hemolysis was observed after 48 h on Columbia sheep blood agar. Identification of the strains as S. schleiferi was confirmed by the French National Staphylococcus Reference Center (J. Fleurette, Lyon, France). Antimicrobial susceptibility was tested by the diffusion method on Mueller-Hinton agar (Biokema, Nimes, France) with disks (Diagnostics Pasteur, Marnes-la-Coquette, France), and methicillin resistance was tested on salt-supplemented Mueller-Hinton agar at 37°C. By the norms of the French Antibiogram Committee (1), susceptibility to the following antibiotics was noted: penicillin G, oxacillin, cephalothin, gentamicin, tobramycin, amikacin, erythromycin, lincomycin, pristinamycin, chloramphenicol, minocycline, fosfomycin, rifampin, vancomycin, pefloxacin, ofloxacin, ciprofloxacin, and trimethoprim-sulfamethoxazole.

Most of the characters observed in the two strains of S. schleiferi isolated here correspond to those in the first description of this new species (2). The presence of FAF noted in our cases varied depending on the culture medium, as previously reported. The antimicrobial susceptibility was in conformance with that of the type species. The only difference was the presence of substantial hemolysis on sheep blood agar, whereas the description of the species reported only weak hemolysis on this type of medium. It should be noted that this strain raises a problem of differential diagnosis. S. aureus can be falsely diagnosed if identification is based only on tests for FAF and/or thermonuclease without verification of the effect of anti-S. aureus DNase serum. As far as other coagulase-negative staphylococci are concerned, there may be problems of differential diagnosis, for instance, with S. lugdunensis, which also produces FAF (2), and with FAF-negative staphylococci which give false agglutinations with commercial identification latex particles, like S. saprophyticus (3). In that case, the lack of heat-stable nuclease in these species and their biochemical characters are very helpful.

On the basis of these two cases, this new coagulase-negative staphylococcal species can be incriminated as an opportunistic nosocomial pathogen. This applies to postoperative infections (caused by implantation of a hip prosthesis or introduction of an umbrella device) in older, compromised (alcoholism or thromboembolism) hosts. The coccus was isolated in all of the intraoperative samples of the infection site in case 1 and in a total of nine blood cultures taken over a period of 15 days in case 2. It is worth considering whether FAF might have played a role in prolonging septicemia by allowing colonization of the clot in this case of extensive thrombosis. No other deep site capable of harboring persistent septicemia was detected in supplementary examinations.

LITERATURE CITED