Graft Infection and Bacteremia with a Tolerant L-Form of *Streptococcus sanguis* in a Patient Receiving Hemodialysis

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I report a case of a tolerant L-form *Streptococcus sanguis* infection involving an artificial vascular access site that was probably acquired from a nonhuman source; this is the first report of such an infection in a human. Gram stains from the infected access site and blood cultures revealed an aberrant form which could only be recovered by passage through hypertonic sucrose media before being reisolated and subsequently identified as *S. sanguis*. The same organism was isolated from a pet dog of the patient. The organism was also felt to be tolerant to penicillin. The patient was successfully treated by removal of the artificial graft and intravenous erythromycin therapy. Microorganisms acquired from nonhuman sources are potential pathogens in the immunocompromised patient.

Infection represents a major problem for patients with end-stage renal disease receiving hemodialysis. Several factors have been incriminated in this patient population that makes them more susceptible to infection, including altered immunologic mechanisms and the presence of a vascular access site. It has been estimated that 75% of the bactereemic episodes occurring in hemodialysis-dependent patients originate from the vascular access site (3, 8, 10). The microorganisms most commonly implicated are the staphylococci, although others are less commonly recovered. This report describes a patient with chronic renal failure on hemodialysis who developed a graft infection and bacteremia with a tolerant L-form of *Streptococcus sanguis*.

A 73-year-old woman with chronic renal failure of unknown etiology being treated with maintenance hemodialysis was admitted with a 9-day history of fever, chills, pain, swelling, and purulent discharge in the area of her artificial arteriovenous graft (Gore Tex). Approximately 8 days before admission, the patient received 1 g of vancomycin intravenously posthemodialysis. Past medical history was significant for no prior episodes of sepsis or graft infection.

Upon admission the temperature of the patient was 39.5°C. Examination of the left arm containing the artificial arteriovenous graft revealed a 2-cm area of redness, tenderness, and induration which on compression drained seropurulent material.

Admission laboratory data included hemoglobin of 6.4 g/dl and a leukocyte count of 24,300/mm³ with 43% polymorphonuclear leukocytes, 53% band forms, and 4% lymphocytes. Blood urea nitrogen was 62 mg/dl, creatinine was 8.9 mg/dl, and the blood glucose was 110 mg/dl. A Gram stain of the seropurulent drainage from the vascular access site revealed many polymorphonuclear leukocytes and gram-variable coccoid-to-cocacobacillary forms. Three days after admission blood cultures revealed gram-variable coccoid forms. Because of a history of penicillin allergy, the patient was treated with erythromycin (500 mg intravenously every 6 h). On hospital day 3, the patient was taken to surgery for removal of an infected Gore Tex graft in the left arm. Cultures of the graft revealed the same microorganism. The patient was continued on intravenous erythromycin for 10 days and was discharged from the hospital on oral erythromycin for another 10 days.

Upon further questioning, the patient said she had an extremely affectionate collie dog which on occasion would lick her left arm in the area of her vascular access site. The patient consented to bring her dog to the hospital where the author cultured the gingival tissue and oral secretions of the animal. A Gram stain of the dog’s oral secretions revealed epithelial cells, gram-positive cocci, and gram-negative cocacobacillary forms. Subsequent cultures of these oral secretions and gingival tissue revealed *S. sanguis* and *Pasteurella multocida*. The gram-variable cocci and cocacobacillary forms that were demonstrated on Gram stain in the patient’s initial blood cultures, culture of the graft site, and the excised graft did not grow on a variety of primary isolation media. The microorganisms demonstrated in the initial blood culture were inoculated into hypertonic sucrose media. The excised graft tissue was also cultured in hypertonic sucrose media. The microorganisms that were initially observed on Gram stain of the blood cultures were subsequently plated on blood agar inoculated with a laboratory isolate of *Staphylococcus aureus*. The latter procedure did not reveal the presence of nutritionally deficient streptococci. After passage through hypertonic sucrose media, the microorganisms grew well on the usual primary isolation media. Gram stains of the isolates revealed gram-positive cocci. The organism was identified as *S. sanguis* and was sent along with the dog’s isolate to the Centers for Disease Control, Atlanta, Ga., where both organisms were subsequently identified as *S. sanguis*. The biochemical characteristics of both isolates of *S. sanguis* were identical.

The results of susceptibility tests (Kirby-Bauer method) for both the dog and patient isolates showed the same susceptibility patterns; that is, susceptibility to penicillin, tetracycline, erythromycin, clindamycin, cephalothin, chloramphenicol, and vancomycin. The MIC and MBC for the
patient’s isolates were 0.03 and 2.0 μg/ml, respectively. The MIC and MBC of penicillin for the dog’s isolates were 0.06 and 2 μg/ml, respectively.

Infection remains a frequent complication of long-term hemodialysis. The frequency of infection associated with different types of vascular access for hemodialysis has ranged from 4 to 29% (10). However, the frequency of peripheral-access-related bacteremias is lower, in the range of 4.7 to 12.7% (10). The microorganisms most commonly implicated in vascular access site-related infections are staphylococci, possibly because these microorganisms are part of the patient’s indigenous flora.

The in vivo and in vitro changes in the morphology of microorganisms by antibiotics, as well as the identification and significance of microorganisms grown or isolated only in hypertonic sucrose media are well documented (5–7). An initial Gram stain of the exudate from the vascular access site of this patient’s infection revealed gram-variable coccoid-to-coccobacillary forms which did not grow on primary isolation media. The same microorganism was found in the blood cultures but failed to grow on either primary isolation media or the excised Gore Tex graft, but the organism had to be passed through hypertonic sucrose media before it was reisolated on primary isolation media. Production of the abnormal or L-form may have been caused by the cell-wall-acting antibiotic (vancomycin) the patient had received before her hospital admission. This phenomenon has been well described previously (5). This case demonstrates the in vivo morphological effect of antibiotic therapy on a direct smear from the patient’s vascular site and the delayed recognition and isolation in vitro of the microorganism responsible for the patient’s infection.

The other interesting aspects of the patient’s infection were the source of the infection and the presence of a tolerant streptococcus. The source of the patient’s infection was possibly derived from the close contact of the patient with her dog. Resulting in contamination or colonization of the patient’s peripheral vascular access site. By culturing the dog’s oral secretions and gingiva, we demonstrated that S. sanguis with the same antimicrobial susceptibility patterns were recovered from both the patient and her dog. Animal-related microorganisms causing infections in the compromised host are not an uncommon occurrence and should be investigated by the physician (1, 2). Although specific tests for tolerance were not performed (9), the MIC and MBC of penicillin for S. sanguis isolated from both the dog and the patient suggested that the organism demonstrated tolerance to penicillin. Tolerance of S. sanguis to beta-lactam antibiotics has been described previously (4). To my knowledge this case represents the first reported patient with a tolerant L-form S. sanguis infection involving an artificial vascular access site that was possibly acquired from a nonhuman source.

In summary, this report underscores the importance of microorganisms that can be acquired from nonhuman sources as potential pathogens in patients who are immunocompromised and demonstrates the need for patient education concerning meticulous vascular access site care.

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LITERATURE CITED