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Endocarditis Caused by Relatively Penicillin-Resistant *Stomatococcus mucilaginosus*

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We report a case of *Stomatococcus mucilaginosus* endocarditis in which the isolate was relatively resistant to penicillins and cephalothin. The patient was treated successfully with vancomycin and valve replacement.

Stomatococcus mucilaginosus has been reported as a cause of endocarditis, bacteremia, and peritonitis complicating continuous ambulatory peritoneal dialysis. We report a case of *S. mucilaginosus* endocarditis in which, unlike in previous reports, the isolate was relatively resistant to penicillins and cephalothin.

A 35-year-old man with a history of intravenous drug abuse was admitted to Yale-New Haven Hospital in November 1987 for semielective aortic valve replacement. He had been treated with 4- and 6-week courses of intravenous penicillin at another hospital in February and again in May 1987 for reported penicillin-susceptible *Streptococcus mitis* endocarditis and with a 6-week course of intravenous vancomycin in August and September 1987 for persistent fever and presumed endocarditis with negative blood cultures. Cardiac catheterization in October 1987 revealed 4+ aortic insufficiency, 3+ mitral insufficiency, a dilated left ventricle with premature mitral valve closure, and a small aortic valve vegetation. On admission 3 weeks later, he described having experienced the abrupt onset of right leg weakness 5 days previously, for which he had not sought further evaluation. He also described recurrent fevers and sweats, and a persistent mild bifrontal headache, for approximately 10 days before admission.

Physical examination was remarkable for a rectal temperature of 100°F (37.8°C), a single splinter hemorrhage, 3/6 basal systolic ejection and decrescendo diastolic murmurs, a 2/6 apical holosystolic murmur, faint rales at both lung bases, and 4/5 strength with diminished sensation of the right lower extremity. Leukocyte count was 9,600/mm^3 with a normal differential, hemoglobin was 12.7 g/dl, and Westergren sedimentation rate was 31 mm/h. Renal and liver function tests, urinalysis, and other routine laboratory tests were all within normal limits. Chest radiograph showed cardiomegaly with faintly increased interstitial markings and bilateral pleural effusions, right greater than left. An electrocardiogram showed left ventricular hypertrophy. Head computed tomography scan showed a single large irregular nonenhancing lucency deep in the left frontal lobe. Lumbar puncture was performed, with recovery of clear colorless fluid containing 40 erythrocytes and 17 leukocytes (87% mononuclear cells) per high-power field, glucose at 55 mg/dl, and protein at 18 mg/dl; Gram stain and subsequent culture were negative.

Three of three sets of blood cultures drawn on admission were detectably positive in a BACTEC 660 analyzer in the aerobic bottles only by 48 h. No anaerobic growth was detected subsequently on subculture. Colonies were small, unpigmented, nonhemolytic, mucoid, slightly rubbery, and adherent to agar. Organisms were gram positive, coffee-bean shaped, and arranged in small irregular clusters. Catalase reaction was weakly positive, coagulase reaction was negative, and oxidase and urease reactions were negative. Esculin hydrolysis was positive, and growth was inhibited in 5% NaCl. Voges-Proskauer and L-pyroglutamyl-β-naphthylamide reactions were positive. Gelatin hydrolysis was not observed, and capsule stains were negative. The isolate was tentatively identified as *S. mucilaginosus* and subsequently confirmed by the Centers for Disease Control in Atlanta, Ga.

Broth macrodilution MICs were determined by using cation-supplemented Mueller-Hinton broth according to standards of the National Committee for Clinical Laboratory Standards (7). The MBC was determined by subculturing 0.01 ml from each tube onto antibiotic-free sheep blood agar plates and was defined as the lowest concentration of antibiotic that resulted in 99.9% killing after 18 to 24 h of incubation at 37°C. Results were as follows (MIC/MBC, in micrograms per milliliter): penicillin, 0.4/0.4; oxacillin, 1.6/0.8; cephalothin, 1.6/1.6; ampicillin, 0.2/0.2; vancomycin, 3.1/3.1; gentamicin, 1.6/1.6; tetracycline, 0.2/0.2; erythromycin, <0.1/<0.1; and chloramphenicol, 0.8/1.6. The isolate was screened for β-lactamase by using nitrocefin as previously described (8) and was negative.

Treatment was begun with intravenous vancomycin and gentamicin before culture results were obtained. At surgery 1 week after admission, vegetations were present on all aortic valve leaflets, with near destruction of the valve apparatus. A shallow abscess cavity was present surrounding the left coronary artery ostium. Aortic valve replacement and closure of the abscess cavity were carried out. Histologically, the valve was fibrotic and calcified; no organisms were visualized on appropriately stained sections. Cultures of portions of the resected valve and abscess contents were negative; no blood cultures were performed subsequent to the initial three sets. A total of 4 weeks of intravenous vancomycin was given postoperatively. The subsequent hospital course was unremarkable.

S. mucilaginosus, previously referred to as *Staphylococcus salivarius* (5) and *Micrococcus mucilaginosus* (1, 13), is a gram-positive, nonmotile, non-spore-forming coccus of the family *Micrococcaceae*. It is usually differentiated from the genera *Micrococcus* and *Staphylococcus* by an absent or weakly positive catalase reaction and failure to grow in media containing 5% NaCl. Previous reports have identified this organism as a cause of endocarditis, both in intravenous drug abusers (3, 12) and in patients with preexisting valvular

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heart disease (9, 13), bacteremia (J. F. Barlow, K. A. Vogele, and P. F. Dzintars, Clin. Microbiol. Newsl. **8**:22, 1986), and recurrent peritonitis during chronic ambulatory peritoneal dialysis (10). In all of these reports and in the definitive description of the organism by Bergan and Kocur (2), isolates have been uniformly susceptible, either by Bauer-Kirby disk diffusion or by MIC determination, to penicillin (MIC, 0.015 to 0.1 μg/ml), semi-synthetic penicillinase-resistant penicillins (MIC, <0.06 to 0.1 μg/ml), and cephalosporins, in addition to most other antibiotics tested, and penicillin has been recommended as the antibiotic of first choice (12).

The role of previous antibiotic exposure in this case is unknown, but it is of interest that the patient had received recent prolonged courses of penicillin and vancomycin, possibly contributing to the resistance pattern observed. Although vancomycin MICs were also relatively high, in light of the patient's continued clinical improvement with therapy when final identification and susceptibility testing were available, it was elected not to alter therapy. The first appearance of symptoms of endocarditis in this case shortly after cardiac catheterization is also of interest, having been observed in a previous study (13).

We can provide no definitive explanation for the apparent bactericidal activity of tetracycline, erythromycin, and chloramphenicol, all usually considered bacteriostatic antibiotics. Bactericidal activity, though, has been demonstrated previously for tetracycline against group A streptococci, *Streptococcus pneumoniae*, and some strains of *Escherichia coli* (14), for erythromycin against group A streptococci and *Staphylococcus aureus* (4, 6), and for chloramphenicol against a variety of gram-positive and gram-negative organisms (11, 15). Other methods of measuring bactericidal activity, such as timed killing curves, might have clarified this issue further.

Our findings show that relative penicillin resistance can exist in clinically important isolates of *S. mucilaginosus* and that pending definitive susceptibility testing, alternative antibiotics may be preferable. Given the initial difficulty often encountered in differentiating *S. mucilaginosus* from coagulase-negative staphylococci and occasionally from the group D streptococci, vancomycin may be a reasonable component in an empiric antibiotic regimen.

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