ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Apr. 1984, p. 527–528
0066-4804/84/040527-02$02.00/0

Vol. 25, No. 4

Infection Caused by Vancomycin-Resistant *Streptococcus sanguis* II

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Received 14 September 1983/Accepted 19 January 1984

A patient with bacteremia caused by vancomycin-resistant *Streptococcus sanguis* II is presented. This rare occurrence suggests that vancomycin may not be a completely reliable antibiotic in the treatment of infections due to viridans species of the genus *Streptococcus*. Gram-positive isolates from blood and otherwise sterile body fluids should be tested for susceptibility to vancomycin.

Vancomycin has received greater attention and has been used with greater frequency in recent years due to the emergence of antibiotic-induced enterocolitis associated with *Clostridium difficile* and methicillin-resistant *Staphylococcus aureus* (4, 10). It has also been a reliable drug in the therapy of serious gram-positive infections in the penicillin-allergic patient. Resistance to vancomycin among gram-positive cocci has been exceedingly rare (1, 2, 4–6, 10). We have recently observed a serious infection caused by vancomycin-resistant *Streptococcus sanguis* II.

Case report. A 55-year-old male was admitted for having pain in the right jaw for 1 month. Biopsy of an ulcer near the second right mandibular molar revealed squamous cell carcinoma with extension into the mandible. The tumor was resected, and within 24 h the patient developed fever to 103°C. No etiology could be established, but oral cephalexin was prescribed. During a second temperature elevation 3 days later, two of two blood cultures yielded *S. sanguis* II. Upon examination, a purulent soft-tissue infection of the operative site was obvious, and cultures of this material grew both *Streptoccus anginosus-constellatus* and the same *S. sanguis* II. The latter was thought to be identical to the organism isolated from blood on the basis of biochemical characterization and disk diffusion susceptibility testing. Intravenous cefoxitin was administered, and the entire area was debrided with removal of a large quantity of purulent material. The patient rapidly became afebrile, and the wound healed without complication.

The streptococci isolated from this patient were identified by the method of Setterstrom and co-workers (8) plus conventional tests for acid production from inulin and esculin, starch hydrolysis, and growth on 5% sucrose agar and by using the classification of Facklam (3). The organism identified as *S. sanguis* II failed to hydrolyze esculin and did not produce acid from mannitol, sorbitol, or inulin, but it did form acid from lactose, raffinose, and sucrose. Dextrans were produced on 5% sucrose agar. The antimicrobial susceptibilities of *S. sanguis* II were determined initially by the method of Bauer and Kirby, using the zone size criteria recommended by the National Committee for Clinical Laboratory Standards. No zone of inhibition around the 30-μg vancomycin disk was noted. Further testing was performed by microdilution and macrodilution methods, using brain heart infusion broth with a final concentration of 5×10^5 CFU/ml. This broth was chosen because of lack of growth in Mueller-Hinton broth. MBCs were determined by subculturing 0.01 ml of each antibiotic macrodilution to Trypticase soy agar with 5% sheep blood. The MICs and MBCs are shown in Table 1. *S. sanguis* II was not only resistant to vancomycin but was tolerant to all the β-lactam antibiotics tested, including the third-generation cephalosporin cefotaxime. This tolerance to the β-lactams is not surprising for this organism (7, 9). Additionally, the organism appeared to be resistant to cefoxitin, the agent with which the patient was successfully treated. It is conceivable that this organism was a nosocomial invader occurring after the administration of oral cephalexin, but this cannot be established with certainty. Susceptibilities of the *S. anginosus-constellatus* were not obtained because of difficulty in growing the organism.

TABLE 1. Susceptibilities of *S. sanguis* II[a]

Antibiotic	MIC	MBC[b]
Vancomycin	>128	>128
Penicillin	0.5	>16
Cephalothin	2	>16
Cefoxitin	256	>256
Cefotaxime	2	>64

[a] MICs and MBCs (given in micrograms per milliliter) were determined by macrodilution (see text).
[b] MBC, Lowest concentration killing 99.9% of CFU.

Although uncommon, vancomycin-resistant viridans strains of streptococci have been reported (1, 2, 5, 6, 10). Most of the reported resistance has occurred among *Streptococcus mutans*, or the resistant strains were not identified to species level beyond viridans. In a study of the susceptibilities of viridans streptococci that had been identified to species level, Bourgalt and co-workers (2) showed that vancomycin was effective against 54 of 63 strains at 1 μg/ml or less. All 12 *S. sanguis* II strains they tested were inhibited by 4μg/ml, and 8 of 9 *S. anginosus* strains were inhibited by 8 μg/ml.

Some laboratories do not test vancomycin susceptibility routinely. Our results suggest that such testing might be useful for those isolated from blood or otherwise sterile body fluids.

LITERATURE CITED

1. **Baker, C. N., and C. Thornsberry.** 1974. Antimicrobial susceptibility of *Streptococcus mutans* isolated from patients with endocarditis. Antimicrob. Agents Chemother. **5**:268–271.
2. **Bourgault, A.-M., W. R. Wilson, and J. A. Washington.** 1979. Antimicrobial susceptibilities of species of viridans streptococci. J. Infect. Dis. **140**:316–321.
3. **Facklam, R. R.** 1977. Physiological differentiation of viridans streptococci. J. Clin. Microbiol. **5**:184–201.
4. **Geraci, J. E., and P. E. Hermans.** 1983. Vancomycin. Mayo Clin. Proc. **58**:88–91.
5. **Griffith, R. S., and F. B. Peck.** 1957. Vancomycin, a new antibiotic. III. Preliminary clinical and laboratory studies, p.

619–622. *In* H. Welch and F. Marti-Ibanez (ed.), Antibiotics Annual 1956–1957. New York Medical Encyclopedia, New York.

6. **Harder, E. J., C. J. Wilkowske, J. A. Washington, and J. E. Geraci.** 1974. *Streptococcus mutans* endocarditis. Ann. Intern. Med. **80**:364–368.
7. **Hess, J., J. Dankert, and D. Durack.** 1983. Significance of penicillin tolerance in vivo: prevention of experimental *Streptococcus sanguis* endocarditis. J. Antimicrob. Chemother. **11**:555–564.
8. **Setterstrom, J. A., A. Gross, and R. S. Stanko.** 1979. Comparison of Minitek and conventional methods for the biochemical characterization of oral streptococci. J. Clin. Microbiol. **10**:409–414.
9. **Tomasz, A.** 1979. From penicillin-binding proteins to the lysis and death of bacteria: a 1979 view. Rev. Infect. Dis. **1**:434–467.
10. **Watanakunakorn, C.** 1981. The antibacterial action of vancomycin. Rev. Infect. Dis. **3**:S210–S215.