Fatal Case of *Weeksella virosa* Sepsis

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*Weeksella virosa* is an aerobic Gram-negative rod that has rarely been reported to cause infection. We describe a fatal case of *W. virosa* sepsis in a young female with end-stage renal disease, report three additional cases of *W. virosa* infection, and review the literature regarding this infection.

CASE REPORT

A 31-year-old female with a history of end-stage-renal disease on hemodialysis, hepatitis C virus infection, and myocardial infarction presented to an affiliated hospital’s emergency department complaining of chest pain and shortness of breath. On physical examination, the patient was afebrile, with a heart rate of 74 beats per minute, a blood pressure of 89/47 mmHg, and a respiratory rate of 38 breaths per minute with an oxygen saturation of 98% on 4 liters via nasal cannula. The patient quickly decompensated and required support for worsening blood pressure and intubation for respiratory distress. Blood cultures were drawn in the emergency room, and the patient was transferred to the intensive care unit with a temperature of 39.5°C.

The patient was started empirically on aztreonam, daptomycin, and tobramycin because of reported penicillin and vancomycin allergies. Laboratory studies revealed a white blood cell count of 21.4 × 10^9/liter, a hemoglobin level of 9.1 mg/dl, and a platelet count of 69 × 10^9/liter. A chest X-ray revealed bilateral airspace opacities consistent with pneumonia. No sputum culture or bronchial lavage specimen was obtained during the hospitalization. The patient continued to deteriorate and expired 2 days after admission secondary to overwhelming sepsis. Postmortem, the blood cultures drawn on admission were reported to be positive for a Gram-negative rod after 36 h of incubation in 2 sets in the aerobic bottles only. The bacterial isolate was identified as *Weeksella virosa* via the BD Phoenix automated microbiology system. Because this was a rare isolate, the identification was confirmed by 16S rRNA gene sequencing with the B162 forward primer (5′-CGCTCGTTGCG GGACTTAACCCAACATCTC-3′) and BR16SR reverse primer (5′-GAGAGTTTGATCGTGGCTCAGATTGAACGC-3′), which produced a 100% 936-bp sequence match with *W. virosa* using the SmartGene bacterial sequence database (SmartGene, Inc., Raleigh, NC).

The strain was retested with a MicroScan Gram Negative Combo panel (MicroScan Microbiology Solutions, Tarrytown, NY) in order to obtain the following susceptibility report and MICs (g/ml): amikacin, >32, resistant (R); aztreonam, ≤8, susceptible (S); ceftazidime, ≤8, S; ciprofloxacin, >4, R; gentamicin, ≤4, S; meropenem, ≤4, S; piperacillin, =16, S; tobramycin, >8, R; and imipenem/cilastin, ≤4, S.

*Weeksella virosa* is an uncommon aerobic Gram-negative rod that was first described in the literature in 1970 by Pickett and Manclark as a nonsaccharolytic flavobacterium (11). Tatem et al. described 78 strains of this organism, at the time called flavobacterium species II, isolated most commonly from urine (43%), cervical (14%), and vaginal (16%) specimens (14), but also including 2 specimens each from blood and spinal fluid. Later, Holmes et al. suggested the current genus and species name, *Weeksella virosa*, and isolated the organism from the genital tract (34.4%), urine (37.9%), and other sites (17.2%), including blood, the umbilical area, the rectal area, ears, eyes, mastoid, and cerebrospinal fluid (5). Mardy et al. reported isolation from high vaginal swabs of the female genital tract at an incidence of 2% (2/100) from both asymptomatic healthy females and a group of females with symptoms of vaginal infections (7). Interestingly, a third group from a British detention center, felt to be at high risk for sexually transmitted diseases, had an incidence of 15% (15/100). Also, Reina et al. described 3 strains of *W. virosa* identified from the analysis of female genital samples sent to their laboratory over a 12-month period (3/707 [0.42%]) (12).

*W. virosa* appears as a Gram-negative rod on Gram stain. The organism will grow on blood and chocolate agar after 48 h of incubation at 22°C, 35°C, and 42°C. This organism does not grow on MacConkey agar, which is a distinguishing characteristic. Culture will produce cream-colored, mucoid colonies that may have a yellow tinge secondary to a nondiffusible pigment. The organism is oxidase positive, indole positive, and catalase positive (5, 14). Care must be taken not to confuse *Weeksella virosa* with *Bergeyella zoohelcum*, an organism that has been associated with infections from animal bites (9). Both are similar in most respects, but they can be differentiated based on the fact that *B. zoohelcum* is urease positive and polymyxin resistant.

There are no species-specific testing standards for this organism; however, the CLSI susceptibility testing interpretive standards table for “other non-Enterobacteriaceae” Gram-negative rods can be used (1a). Studies of *in vitro* susceptibilities report that the following antimicrobials have activity against this organism: piperacillin, monobactams, cephalosporins, fluoroquinolones, and carbapenems. Resistance has been noted in *in vitro* with aminoglycosides, nalidixic acid, and nitrofurantoin (3, 4, 7, 13). There...
are varied results in the literature regarding the organism’s sensitivity to tetracycline and trimethoprim-sulfamethoxazole (3, 4).

We report a patient with *W. virosa* bacteremia and suspected pneumonia who presented with overwhelming sepsis. Despite the administration of appropriate empirical antibiotics, the patient expired 2 days after admission. The patient’s severe course was likely exacerbated by ischemic cardiomyopathy complicated by acute on chronic systolic heart failure. A review of our microbiology cultures from 2003 to the present revealed an additional 3 cases of *W. virosa* infection (Table 1). Additionally, there are four case reports in the literature describing *W. virosa* infections (Table 1).

A review of these 8 cases revealed the following comorbidities: female (6/7), end-stage renal disease (3/8), obesity (3/8), liver disease (2/8), and diabetes mellitus (2/8). Of the 6 cases in which antimicrobial use was reported, aztreonam, ampicillin, imipenem/cilastin, trimethoprim-sulfamethoxazole, cefoxitin, and ceftazidime were used. Success was reported in 4 of 6 patients. In addition, one patient was successfully treated for a labial abscess with incision and drainage alone, and one patient’s treatment history was not reported. From these patients’ isolates, the following antimicrobial resistance rates were noted: amikacin, 5/5; gentamicin, 5/7; tobramycin, 5/5; ciprofloxacin, 4/7; trimethoprim-sulfamethoxazole, 2/2; and ceftazidime, 2/6. All of the organisms tested were sensitive to aztreonam (4/4), meropenem, 2/2; and ceftazidime, 2/6. All of the organisms tested were sensitive to aztreonam (4/4), meropenem (4/4), and piperacillin-tazobactam (4/4).

*W. virosa* is a rare pathogenic bacterium that has been associated with pneumonia, bacteremia, peritonitis, and urinary tract infections. This organism appears to be more prevalent in females and in patients with comorbidities, such as renal disease, obesity, liver disease, and diabetes mellitus. It is important to consider this organism if your laboratory isolates an aerobic Gram-negative rod that grows after 36 to 48 h of incubation from either blood, sputum, urine, or peritoneal fluid. Piperacillin, aztreonam, and the carbapenems have reliable activity against this organism and should be used empirically once the organism is identified. Trimethoprim-sulfamethoxazole, ciprofloxacin, and the aminoglycosides should not be used unless antibiotic susceptibility results are available. More information is needed on the clinical presentation, diagnosis, and treatment of this uncommon organism.

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**REFERENCES**