Aeromonas hydrophila Infection Associated with the Use of Medicinal Leeches

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Received 2 December 1988/Accepted 21 February 1989

The use of medicinal leeches (Hirudo medicinalis) is becoming more common after plastic surgery to control venous congestion of skin grafts. We describe a patient with Aeromonas hydrophila infection whose graft was treated with medicinal leeches. The infection required systemic antibiotic therapy. A. hydrophila is the predominant bacterial flora in the gut of the leech, where it plays an essential role for the animal in the digestion of blood. The potential for A. hydrophila wound infection, and appropriate antibiotic prophylaxis of the leech or patient, should be considered when medicinal leeches are used.

Aeromonas hydrophila is an oxidase-positive, glucose-fermenting, gram-negative rod. It is found in fresh and brackish water, sewage, soil, and foodstuffs. Aeromonas infections have been divided into four categories (12): (i) cellulitis or wound infections associated with exposure to water or soil; (ii) septicemia, mostly in association with hepatic, biliary, or pancreatic disease or with malignancy, particularly acute leukemia; (iii) acute-onset diarrheal disease of short duration; and (iv) miscellaneous infections unassociated with any discernible physiological condition or environmental event.

A wound infection in an immunologically normal host caused by A. hydrophila derived from the medicinal leech (Hirudo medicinalis) (Fig. 1), which was the vector, is described here. Because leeches are being increasingly used after plastic surgery to relieve venous congestion, the possibility of infection from them is a constant threat (1, 2).

A 62-year-old woman with a history of multiple recurrent basal cell epitheliomas of the left forehead was admitted to the hospital for reexcision of the tumor and skin graft coverage. She had the tumor removed four times previously, and a successful skin graft was placed after each of the last two excisions.

The basal cell epithelioma was excised on the day of admission, and a skin flap from the forearm was grafted over the defect. However, this graft failed by postoperative day 4, and a new flap from the leg was placed on the defect. On postoperative day 1, the new graft appeared congested and medicinal leeches were applied to it in order to relieve the swelling. After the application of leeches there was a striking decrease in graft congestion and the process was repeated. In all, leeches were applied on four separate occasions. In each case the leech was taken with sterile forceps from the leech tank and placed on the forehead flap, where it attached itself. After the leech sucked for approximately 1 h, it was removed and discarded. By postoperative day 11 the graft had failed and appeared infected, and the flap was debrided and cultured. The patient was treated parenterally with gentamicin, vancomycin, and metronidazole. After this graft failure, a subsequent skin graft on which leeches were not used did well.

The specimen obtained from the failed graft during removal was cultured aerobically in 8% CO2 and anaerobically with incubation at 35°C. Two organisms were isolated. One, a coagulase-negative Staphylococcus species, was considered insignificant; and the other, a gram-negative rod, was confluent on the aerobic blood and chocolate agar plates. The organism also grew well on MacConkey agar, was a nonlactose fermenter, was cytochrome c oxidase positive, and did not grow on acetamide agar. Conventional tests identified it as A. hydrophila (12). Disk diffusion studies on Mueller-Hinton agar (BBL Microbiology Systems, Cockeysville, Md.) showed that the organism was susceptible to amikacin, ampicillin, cefotaxime, cefuroxime, cephalothin, chloramphenicol, gentamicin, mezlocillin, tetracycline, trimethoprim-sulfamethoxazole, and tobramycin. This organism was considered to be the etiologic agent of the infection in the patient.

The source of A. hydrophila wound infection from this patient was the medicinal leech. The actual leeches used on this patient had been discarded, but another leech and the leech tank water were obtained from the distributor (Leeches U.S.A., Ltd., Plainview, N.Y.). In addition, water from the original leech tank was recovered. All tank water samples, leech mucous secretions, leech anterior and posterior suckers, and the gut of the leech, after dissection, were cultured. A. hydrophila was the predominant microbe that was isolated. Five different strains of A. hydrophila, all with different colony morphologies, were obtained. Three of the strains were resistant to ampicillin; one was resistant to ampicillin and cephalothin; and one was susceptible to all antibiotics tested, including ampicillin and cephalothin. We could demonstrate no plasmids in the A. hydrophila clinical isolate (8), although, some of the environmental isolates possessed them (data not shown).

A. hydrophila is a normal flora symbiote in the gut of medicinal leeches (7). The animal lacks proteolytic enzymes in its digestive tract. A. hydrophila is the only bacterium consistently found there and produces the enzymes that are necessary to digest blood ingested by the leech. In 1983, Whitlock et al. (13) found A. hydrophila in the mucus secretions, suckers, and gut of the medicinal leech. They predicted that A. hydrophila infection could result from the use of these animals. Later, Dickson et al. (4) reported the first case of A. hydrophila wound infection associated with the medicinal leech. It occurred in a skin flap placed during...
breast reconstruction. Mercer et al. (10), in England, reported six cases of *A. hydrophila* wound infection in 30 patients with plastic surgical repairs who were treated with leeches: five of these six isolates were resistant to ampicillin.

Medicinal leeches are used in plastic surgery to treat venous congestion of skin grafts (i.e., flaps) (3, 6). Surgical venous repair in a graft may be impossible, leading to failure of venous return, congestion, thrombosis, and tissue necrosis. Leeches remove the stagnant blood and allow capillary ingrowth. The efficacy of the leech in this process is not only because of the 5 to 10 ml of blood it consumes but also because the site of leech activity continues to ooze 50 to 100 ml of blood during the next 24 to 48 h. This bleeding is mediated by hirudin, a specific inhibitor of thrombin, which is present in medicinal leech salivary secretions (9).

Because the use of medicinal leeches is common and is likely to increase, it appears prudent to use antibiotic prophylaxis whenever they are used. Many isolates of *A. hydrophila* are resistant to ampicillin and cephalosporins, and therefore, a β-lactamase-resistant drug such as amoxicillin-clavulanic acid or a quinolone can be used. Alternatively, the leeches themselves and their tank water could be treated with a variety of agents that are active against *Aeromonas* species, the least expensive being aminoglycosides or tetracycline. However, one should consider the potential for the selection of a resistant strain if this type of prophylaxis is used. Leeches should probably not be used in patients with underlying conditions leading to impaired host defenses, such as hematological malignancies, aplastic anemia, acquired immune deficiency syndrome, and hepatobiliary disease. The infection, along with the bacteremia, caused by *A. hydrophila* is more severe in these patients (5, 11). Plastic surgeons, infectious disease practitioners, and clinical microbiologists should be aware that leeches can serve as a potential source of *Aeromonas* infection.

We thank Christine Kontnick for assistance in bacterial identification.

**LITERATURE CITED**