Surgical Site Infection Complicating Leech Therapy

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Abstract

Aeromonas hydrophila infections are a recognized complication of postoperative leech application, and can occur with measurable frequency in populations of patients treated with leeches. We report a case of an abdominal flap infection caused by multiple organisms, including A. hydrophila, in a patient treated with leech therapy. Prompt surgical evaluation of wounds in combination with appropriate antibiotic therapy is recommended for the management of these infections.

CASE REPORT

A 57-year-old man was admitted for an elective abdominal wall reconstruction of a large ventral incisional hernia, which complicated emergent surgical repair of an abdominal aortic aneurysm rupture 2 years prior admission. One day after admission, he underwent a free tensor fascia lata (TFL) flap reconstruction. On hospital day 4th, he underwent exploratory laparotomy due to abdominal distention and superficial necrosis of the flap, with exploration and debridement of the TFL flap secondary to venous congestion. Leech therapy was initiated to alleviate the venous congestion of the TFL flap.

The postoperative course was complicated by persistent fevers (103°F), leukocytosis, worsening renal function, and purulent discharge from the surgical site. Intravenous vancomycin (1 g Q24h) and piperacillin/tazobactam (4.5 g Q8h) were initiated empirically. Relevant laboratory data included a white blood cell count of 12,4000/mm^3, a hemoglobin of 13.8 g/dl, a platelet count 190,000/mm^3, a serum creatinine 2.4 mg/dl, a creatine kinase 1118 units/L, and a C-reactive protein of 13.0 mg/dl. Liver function and coagulation studies were within normal limits. Chest radiography was normal.

His clinical condition improved after several days, with resolution of fever and renal function. Abdominal wound culture grew Aeromonas hydrophila, Pseudomonas aeruginosa, Proteus mirabilis and gamma-hemolytic streptococcus. Abdominal flap culture demonstrated A. hydrophila and P. mirabilis. Blood and urine cultures were negative.

The patient was discharged on intravenous antibiotic regimen composed of meropenem (1 g Q8h) and ciprofloxacin (400 mg Q12h) for 3 weeks, followed by ciprofloxacin (750 mg PO Q12h) for an additional 4 weeks. After several weeks, the patient was electively admitted for a removal of the infected mesh with a placement of an alloderm graft.

DISCUSSION

Aeromonas spp. are gram-negative, motile, facultative anaerobic, oxidase positive rods associated with a wide variety of human infections, often in conjunction with other organisms ([1], [2]). They are usually considered to be opportunistic pathogens but infections in immunologically competent individuals have been described ([1], [3], [4]). They are ubiquitous organisms isolated worldwide from aquatic environments and soil, including hospital water supplies, especially during warmer months ([5], [6], [7], [8]). Currently 14 species have been named, but only A. hydrophila, A. caviae and A.veronii are of major clinical significance to humans ([9]). Aeromonas spp. posses several virulence factors such as enterotoxins, aerolysin, hemolysin and mucinase, which mediate the pathogenesis of human infections ([10]).

Gastroenteritis is the most common clinical manifestation of Aeromonas infection, resembling traveler's diarrhea and hemolytic uremic syndrome ([7], [11], [12]). Diarrhea is usually watery and self-limited but patients may developed abdominal pain and bloody stools ([8]). Bacteremia ([9]), urinary tract infection ([13]), meningitis ([14]), hepatobiliary system infection ([15]), peritonitis ([16]), endocarditis ([17]), septic arthritis ([18]) and respiratory infections ([9]) have also been reported.

Soft tissue infections from Aeromonas spp. are sporadic and infrequent, but typically occur as a result of contamination of broken skin by water containing the organism. These infections range in presentation from cellulitis mimicking streptococcal or staphylococcal soft-tissue infections ([19]) to more severe infections such as myonecrosis, fasciitis and ecthyma gangrenosum. The more severe infections have been described in immunosupressed patients ([2, 8, 20]). Wound infections mostly affect lower extremities ([21]) and often progress rapidly requiring surgical debridement or amputation of the involved limb ([22]). They have been described among tsunami survivors ([23]) and patients in the burn units ([24]).

Medicinal leeches have an important and expanding role in medicine, but infection can complicate their use. Leeches have been used by surgeons, especially those in plastics and reconstruction, to decrease venous congestion of skin flaps and to improve micro-revascularization of flaps, grafts and replants. Hirudin, a powerful anticoagulant that inhibits thrombin, is secreted in salivary secretions of leeches and injected into the flap. Hemoglobin that is sucked by the leeches is denaturated by Aeromonas. Of the hemoglobin degradation products, heme is utilized by Aeromonas and the protein components of globulin, is utilized by the leech ([25, 26]). Each leech directly extracts 5-10 ml of blood from the flap, and an extra 20-50 ml of blood is lost from oozing from the bite site after the leech detaches. The leech saliva also contains collagenase and hyaluronidase, which facilitate local infiltration of antithrombotic mediators into the congested tissue ([27, 28, 29]).

As this case illustrates, patients receiving medicinal leech therapy are at risk of developing Aeromonas infections, and up to 20% of patients treated with medicinal leeches may develop gram-negative bacterial infections ([30]). This is reflective of the fact that Aeromonas spp are a normal inhabitants of the foregut of leeches ([8]). Infections complicating leech therapy can range from minor wound complications to extensive tissue loss and sepsis, especially in patients with compromised arterial blood supply to the affected area ([30]). The onset can range from 24 hours to over 10 days after leech application. Late infections may represent bacterial invasion from colonized necrotic tissue ([27, 31, 32]). Prophylactic antibiotics such as cefotaxime, third generation cephalosporins and ciprofloxacin have been recommended at the time of leech application ([32]).

Antimicrobial therapy of Aeromonas infections may be difficult, especially empirically, because of intrinsic resistance to penicillin and other beta-lactams as a result of a chromosomal -lactamase ([3, 33, 34]). Furthermore, the use of -lactamase inhibitors plays no role in inhibiting the Aeromonas -lactamase and therefore rarely enhances -lactam antibiotic activity ([35]). Antibiotics such as ampicillin-sulbactam, piperacillin or cefotetan, which are often administered in the empiric treatment of intrabdominal infections, have reduced activity against Aeromonas.

Most Aeromonas are susceptible to quinolones, aztreonam, carbapenems, third generation cephalosporins, tetracyclines, chloramphenicol and aminoglycosides ([35, 36, 37]). It is important to emphasize the necessity of prophylactic antibiotic therapy at the time of leech therapy using agents with activity against Aeromonas in order to decrease the likelihood of serious complications associated with this treatment.

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