CASE REPORT

Leech related *Aeromonas veronii* complex infection after reconstruction with a microvascular forearm flap

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Abstract Medical leeches (*Hirudo medicinalis*) in plastic and reconstructive surgery are often used for the treatment of vascular failure after microvascular surgery. Leeches are a reservoir for bacteria of the *Aeromonas* group that help digesting the blood meal. In some cases these bacteria are able to cause severe wound infections that can lead to loss of tissue transplants. We report about a patient with a common microvascular forearm flap after resection of an oral squamous cell carcinoma which got infected by *Aeromonas* spp. after treatment with medical leeches. Most of these species are resistant for common antibiotic treatment after surgery. This report shows the importance of an early concomitant antibiotic prophylaxis in the treatment of venous congestion with medical leeches.

Keywords Aeromonas · Leech therapy · Microvascular transplant · *Hirudo medicinalis* · Woundinfection · Fluorchinolone

Introduction

The use of medical leeches (*Hirudo medicinalis*) is a common option for the treatment of vascular failure after microvascular plastic and reconstructive procedures [1].

Leeches are widely used, especially for venous insufficiency after microvascular tissue reconstruction or organ transplantation to maintain proper circulation [2–4]. The most common leech related side effects comprise prolonged bleeding induced by anticoagulant effects and infection. Wound infection following leech therapy is often caused by bacteria, especially of the genus *Aeromonas* [5, 6], which have experienced frequent reclassifications in the past [7]. *Aeromonas* spp. are Gram-negative, facultative anaerobic rods causing septicemia and skin and soft tissue infections whereas their role in gastroenteritis is still controversial [7].

Particularly, *Aeromonas veronii* biovar *sobria* is the most prevalent species because it is a symbiont of the digestive tract of *H. medicinalis* [8, 9]. If these bacteria are secreted a severe adverse event caused by *Aeromonas* infection after leech therapy may be the loss of the transplant. For the prevention of this negative outcome, infections have to be treated by debridement and systemic antibiotic therapy in time [2].

We are presenting a typical case of flap infection caused by *A. veronii* complex with new information about how to prevent and treat an event like this.

Case Report

A 51-year old patient with squamous cell carcinoma of the left oral cheek (Fig. 1) underwent an anterior resection of the floor of the mouth, resection of the buccal mucosa up to the left labial angle and a bilateral selective neck dissection in level I–III [10] due to suspect lymph nodes in the B-mode sonography (Fig. 2). The defect was reconstructed with a free radial forearm flap from the left arm (Fig. 3). The patient was administered an anti-infectious therapy with ampicillin-sulbactam for one week.

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Fig. 1 Oral squamous cell carcinoma

Fig. 2 Reconstruction of the enoral defect with a microvascular forearm flap

On the first day after surgery, leech therapy was initiated because the forearm flap showed livid discoloration indicating a venous failure. Medical leeches were stored in distilled salt water, in a 200 ml container with a maximum amount of 5 animals per container. They were located in a dark and quiet area with a room temperature between 4 and 25 °C.

After 3 days of treatment with leeches twice a day clinical signs of vascular congestion disappeared. In each therapy session two leeches were used and guided with dental forceps without tweezing the animal. It took up to 5 min before the leeches were biting. The patient showed no infectious complications for nine days until a wound dehiscence under the left mandible developed. This was accompanied by raising inflammation parameters such as a C-reactive-protein level of 149 mg/dl (norm: <5 mg/L)

Fig. 3 Direct Gram-stain (×1000) from the pus with microscopic detection of Gram-negative rods (Rightwards arrow)

Fig. 4 Columbia blood agar plate with growth of *A. veronii* complex

and leucocyte counts of up to 11.6 cells/nl (norm; 3.5–10/nl). The antibiotic therapy was switched to piperacillin-tazobactam and pus was collected for microbiological analysis which revealed the direct microscopic detection of Gram-negative rods (Fig. 3) and a pure culture of bacteria of the *A. veronii* complex (Fig. 4). Based on the results of the susceptibility testing and considering tissue penetration, the therapy was changed to ciprofloxacin. Finally, complete wound healing was achieved.

Discussion

Leeches live of hemoglobin and its degradation products. They inject hirudin with their saliva as anticoagulant when sucking blood from their hosts [11]. Therefore,

Table 1 Number of isolates found in postoperative samples with respectively susceptibility as tested by NCCLS

Isolates	No. of isolates	Sensibility		
		FQ	CF	SXT
<i>A. hydrophilia</i>	2	S	S	S
	1	S	S	R
<i>A. sobria</i>	2	S	S	R

Table from Bauters et al. [17]

NCCLS National Committee for Clinical Laboratory Standards, *FQ* fluoroquinolones, *CF* cefuroxime, *SXT* co-trimoxazole. Standard routine testing of quinolones involved ofloxacin (representative for levofloxacin, pefloxacin and ciprofloxacin also)

medicinal leeches are commonly used in plastic and reconstructive surgery to reduce the venous congestion of skin flaps. Further, each leech is able to extract up to 10 ml of blood from a flap with additional 50 ml that can be lost from the bite site after removal of the leech [12] (Table 1).

Leech therapy is known to cause infections in 2.4–20 % of the patients [13, 14]. Wound infection following leech therapy is often caused by bacteria of the genus *Aeromonas* [5, 6]. *Aeromonas* spp. are ubiquitous in nature and are mainly found in aquatic environments [7]. They also inhabit the digestive tract of *H. medicinalis* [8]. These bacteria are not only found in the digestive tract but also in the water the animals are stored inside [9]. In conclusion it must be assumed, that leeches excrete the bacteria via their bowel movements, their spit or both and that they can have them on their surface. The infections range from minor wound complications up to extensive tissue loss and sepsis, especially in patients with compromised arterial blood supply [12]. Beside a delayed onset after 10 days or more the highest risk of *Aeromonas* spp. infections occurs in the first days after leech therapy [4].

Aeromonas spp. are amongst others considered to be susceptible to extended-spectrum cephalosporins and fluoroquinolones [7] which have been recommended as pre-emptive therapy using medicinal leeches [4]. However drug resistance has been reported, especially for ciprofloxacin [15]. In accordance with Bauters et al. [16] levofloxacin showed the best results in pre-emptive treatment and cost-effectiveness administered as 500 mg, twice daily. In contrast, less than 30 % of clinical isolates have been found to be susceptible to ampicillin-sulbactam [7]. In order to decrease tissue loss and severe infectious complications pre-emptive antibiotic therapy covering *Aeromonas* spp. should be considered in patients with medicinal leech therapy [4].

Compliance with ethical standards

Conflict of interest For this type of study (retrospective case report) formal consent is not required. All authors declare that they have no conflict of interest.

Ethical approval All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

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