Salvage of Venous Congestion Using Medicinal Leeches for Traumatic Nasal Flap

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Received: 21 October 2012 / Accepted: 20 December 2012 / Published online: 10 January 2013
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Abstract Medicinal leeches are extremely useful and safe in the salvage of venous outflow compromised tissue, particularly in digit replants and various forms of flaps. Although it is unusual for a partial soft tissue avulsion of the face to require medicinal leech therapy, situations may occur in which there is adequate arterial inflow but inadequate venous outflow. In such cases, medicinal leeches may play a very important role in salvaging the soft tissue segment. We report a case of a 34-year-old gentleman who showed signs of venous congestion following primary management for a traumatic nasal flap. Successful salvage of venous congestion was done using medicinal leech therapy, once daily, for 5 days. His recovery deemed satisfactory and uncomplicated. Medicinal leeches are well-known in the treatment of venous congestion or complete venous outflow obstruction in larger pedicled flaps and microvascular transfers. In trauma, it is well established that medicinal leeches are invaluable in treating venous congestion in digit replants and replantation of totally avulsed external ear segments. A limited number of other reports have demonstrated the use of medicinal leeches for salvage of other partially avulsed facial structures. Medicinal leeches have a significant role in the management of traumatic and microvascular flaps, the oral and maxillofacial surgeon should weigh the benefits of such

treatment before instituting other expensive or complex treatment modalities.

Introduction

The iatrogenic creation of blood loss with blood-letting has a prominent place in the history of medicine. Well-known proponents of blood-letting included Hippocrates and Galen, although historical evidence of “blood-letting” precedes them by many millennia [1]. It was thought that they would cure a number of ailments such as mental illness, nose bleeds, insomnia, obesity, tumours, strokes, and gout [2].

Physicians have used the medicinal leech (*Hirudo medicinalis*) for centuries. Indeed, the etymology of the word *leech* shows it is a derivative of the anglo-saxon term *laece*, meaning *physician*. The earliest recorded use of the medicinal leech was depicted graphically in ancient Egypt (1567–1308 BCE), and written records date to 200–130 BCE. Their use has varied substantially over the past 3,500 years, with indications ranging from treatment of sexually transmitted diseases to tuberculosis, kidney disease, and arthritis. Their use waned until the 1960s, when they were used to salvage tissues that were endangered from venous congestion [3] after replantation. Scientific understanding of the physiology of leeches and of human coagulation has encouraged a re-emergence of such a treatment [4]. This paper describes the use of medicinal leeches to salvage traumatic nasal flap.

Presentation of Case

A healthy 34 year old who had been assaulted by a slashing weapon was admitted to our health care centre. On

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examination he was fully conscious and oriented, but sustained multiple abrasions on the face with no jaw fractures or dentoalveolar injuries. A complex nasal laceration involved a large full thickness skin to mucosa flap that encompassed 2/3rd of the right and left nostril equally from the alar base to the nasal midline and down to the tip of the nose. The flap was pedicled by a 3×4 mm section of the base of the columella (Fig. 1). Capillary refill was present in the nasal flap, but the limited arterial supply and, more importantly, venous outflow made its prognosis questionable.

The pedicle was actively spurting then and thus the primary objective was hemostasis followed by restoration of anatomy. Ice packs were continuously applied to the nasal flap while the patient was prepared for theatre. Oedema was further controlled by hydrocortisone given as a 100 mg bolus followed by 8 mg of dexamethasone every 12 h for 2 days. Wound management was done under local anaesthesia using 2 % plain lignocaine; local debridement followed by primary closure without tension including mucosa, cartilage and skin using 4/0 absorbable and 5/0 poly propylene sutures. The patient was put on 1 g of cefotaxime every 12 h for 5 days for prophylaxis without the advent of anticoagulation as it deemed unnecessary for this situation.

Viability of the nasal flap was monitored closely during the first 24 h. Capillary refill and pinprick were used to assess the degree of venous congestion and the adequacy of the arterial perfusion of the flap. The location of the flap and the length of the pedicle did not permit colour Doppler

flowmetry and hence clinical parameters were used to assess the degree of flap take. Within the first 24 h itself there were signs of marked venous congestion as the flap failed to blanch upon compression followed by bluish discolouration at its edges (Fig. 2). Immediately venous letting was instituted using multiple pinpricks every 2 h and in view of the likely loss of the flap because of venous congestion, treatment with medicinal leeches was initiated. The flap immediately became less congested and the local temperature started normalizing.

The flap was treated with two leeches, once daily, for 5 days. The leeches were put in place with large non-toothed forceps and watched by the operator while they were allowed to feed until satiated (Fig. 3). The field in which they fed was circumscribed with gauze packs and all the natural orofacial orifices were plugged to prevent the entry of the leech through them. Once engorged the leeches were removed, placed in an alcohol-filled container, and disposed off. After the leeches had been removed the puncture sites continued to bleed, further relieving the venous congestion. Congestion in the flap decreased and treatments were weaned off over a 7-day period (Fig. 4).

Complete blood counts with differential white counts were used to monitor infection and anaemia. The patient's temperature remained normal and his packed cell volume remained stable throughout the admission. Overall the treatment was well tolerated by the patient.

The outcome was satisfactory in this case as the nasal flap remained viable and with no infection during the

Fig. 1 Complex nasal laceration immediately after trauma

Fig. 2 Venous congested flap

Fig. 3 Administration of leeches

Fig. 4 7th day post-op showing complete resolution

course of treatment. A revision surgery was recommended to correct the residual scar once the vascular and scar tissue of the nasal flap had matured.

Considering the initial poor prognosis of the nasal flap and the difficulty of reconstructing nasal soft tissue loss, we thought that the results were quite promising.

Discussion

Medicinal leeches are well-known in the treatment of venous congestion or complete venous outflow obstruction in larger pedicled flaps and microvascular transfers. In trauma, it is well established that medicinal leeches are invaluable in treating venous congestion. A medicinal leech, once attached, will extract eight to nine times its body weight, approximately 20 ml of blood. Once the leech has fallen off an additional amount is lost via slow but continuous flow over the next 48 h because of a localized anticoagulant effect [5].

Leech saliva contains the powerful anticoagulants hirudin and bdellin which help the leech to feed. Hirudin inhibits thrombin by blocking substrate binding groups and Bdellin prolongs bleeding time by its antiplasmin activity. The saliva also contains histamine-like vasodilators that maintain capillary blood flow, a prostaglandin that reduces swelling [6], local anaesthetic, and hyaluronidase [7]. *Aeromonas hydrophilius* found in the gut of the leech aid digestion of the ingested blood and denature ingested haemoglobin. Leeches use the globin and the bacteria use the haem [8, 9]. In situ, leeches tend not to move until they have finished feeding, after which they promptly fall off. The area bitten by the leech should be checked regularly for any infection. The bite wounds need to bleed to achieve the best therapeutic effect. If bleeding is severely prolonged, haemoglobin concentrations should be checked daily [1, 10]. Psychiatric assessment should always be considered, such that the patients can be physically and mentally prepared and also the merits of such therapy must be explained beforehand.

The potential for infection caused by medicinal leech have been a result of contamination by *Aeromonas hydrophila* species. These infections have been noted in local necrotic tissue and in the blood [4, 11, 12]. Accordingly, prophylactic antibiotic therapy is recommended using a second-generation or greater cephalosporins, aminoglycosides, trimethoprim sulfamethoxazole, or ciprofloxacin [4, 11, 12].

In our case we decided to institute leech therapy for salvaging venous congestion as it was readily available, cost effective and also reported to have predictable outcomes in contrast to secondary reconstruction or microvascular anastomoses. The need for heparinisation was not considered here as the quality of the vessel within the avulsed flap was of low calibre type and the potential for thrombosis was highly unlikely from such vasculature. The patient was put on routine antibiotics such as a 3rd generation cephalosporin after the primary closure of the flap and hence additional prophylactic antibiotics or dose modification against aeromonas species during leech therapy was discouraged. We followed a protocol of once daily

administration of leech therapy as signs of resolution were faster than expected and also to minimise the chances of infection associated with such a therapy.

Conclusion

Medicinal leeches have a significant role in the management of traumatic and microvascular flaps. The oral and maxillofacial surgeon should weigh the benefits of such a treatment before instituting other expensive or complex treatment modalities.

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