Johann Friedrich Dieffenbach: successful use of leeches in plastic surgery in the 1820s

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SUMMARY. Johann Friedrich Dieffenbach (1792–1847) regularly and successfully utilised leeches in sophisticated plastic surgery in Berlin in the 1820s and 1830s, well before anaesthesia, antisepsis and antibiotics. Inexplicably, it took nearly another 150 years before the use of leeches in this context was revived. © 2000 The British Association of Plastic Surgeons

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The medicinal leech, *Hirudo medicinalis*, was used widely as a mild form of bloodletting for more than 2000 years.1,2 The practice of leeching reached a peak in the 18th and, especially, the first half of the 19th Centuries, by which time the much valued leech became an endangered species throughout Europe.3 The term 'leech' itself, taken from the Anglo-Saxon word originally meaning healer or physician, slowly became synonymous with this bloodsucking animal. With the rise of scientific medicine in the second half of the 19th Century leeching, along with bloodletting, became unfashionable. As a traditional treatment which stood the test of time, however, the use of leeches is undergoing a critical re-evaluation in modern medicine.4

Medicinal leeches are used widely as a surgical tool in modern plastic and reconstructive surgery to relieve venous congestion.5,9 This revival can be traced continuously from the mid-1970s when pioneering French surgeons convincingly demonstrated the benefit of leeches in survival of tissue flaps and distal digital replantation.10,11 The recent revival goes back even further, to 1960, when two Slovenian surgeons published in this journal a paper on the use of leeches in tissue flap surgery.12

With an inexplicable hiatus of nearly 150 years, leeches had been once before used in plastic surgery, in Berlin and Paris in the 1820s and 1830s. Their successful introduction at this time can be attributed directly to the influential Johann Friedrich Dieffenbach (1792–1847), sometimes called the 'Father of Plastic Surgery' for his advancements in rhinoplasty and other reconstructive techniques (Fig. 1).13 The inherently interesting history of rhinoplasty lies outside the scope of this paper, which focuses on Dieffenbach's originality in utilising leeches.

Dieffenbach was Head Surgeon of the Charité-Krankenhaus, Berlin, where he performed many sophisticated operations to restore accidental, congenital and pathological damage to the face and limbs well before the discoveries of anaesthesia, antisepsis and antibiotics. A prolific surgeon, he described the clinical details of scores of successful cases which would be impressive even by today's high standards. He recounted the need to apply leeches in no fewer than 17 of these cases, starting as early as 1827.14,15

Dieffenbach's case reports

The first documented case involving leeches in plastic surgery appears to be an unnamed 70-year-old man who had an operation for lip cancer.14 (p.133) Unfortunately, few details are given other than

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Figure 1—Johann Friedrich Dieffenbach, about 40 years old. Lithograph by C. Mittag. By permission from Wellcome Institute Library, London.
Dieffenbach used ‘cold compresses, leeches and vigorous bloodletting’ to counteract a strong post-operative inflammatory response.

Dieffenbach’s first identified patient who benefited from leeches was a young B. v. S. (Baron von S—) who had suffered a serious slash across the left cheek and nose from a sharp sabre in a duel. About this same time a similar, but much better documented, case was that of 24-year-old Baron von W— who came to Dieffenbach with a mutilated nose and upper lip sustained in a fight. The subsequent operation was attended also by Drs Barez, Böhr and Heyfelder.

On the evening of the same day [of the operation], because of strong pain and violent inflammation around the nose, I arranged to have 24 leeches applied to both cheeks which resulted in a quiet night for the patient. The same amount of leeches were applied on day three which reduced the swelling of the nose significantly ... A few weeks after the operation Baron von W— left fully recovered and freed from his disfigurement after a final examination by Dr Barez.

Perhaps the most remarkable of Dieffenbach’s early patients to benefit from leeches was Caroline Röhl, a 22-year-old maiden who was admitted to Charité-Krankenhaus on 12 June 1829. The patient had suffered from early childhood from ‘different forms of scrofula’ which mostly affected her eyes and eyelids. After the chronic ophthalmic affliction ceased at the age of 11 her nose developed a degenerative scrofulous condition which destroyed it within a few years right down to the bone. Soon after the loss of her nose her upper lip was affected. Upon presentation at the hospital the cartilage part of her nose was completely lacking and she had only a small round opening for a nostril (Fig. 2).

After a week Dieffenbach carried out the operation. In attendance were Chairman Rust, General Surgeon Kothe, Medical Councillor Eck and four students. His Excellency the Councillor of State von Crichton from St. Petersburg was also present. Dieffenbach described in some detail the reconstruction of the nose involving the aponeurotic scalp area.

In the first hours after the operation the flap had a pale colour; by evening it appeared quite swollen. A bloodletting of approximately 10 ounces was carried out. Within the following three days no changes in the patient’s state of health were noticed, apart from a change of colour toward blue in the flap, so 16 leeches were applied around the nose. On day four after the operation a second bloodletting of 10 ounces was done and Thenden’s *Aqua Vulneraria* was added to the cold water [compress]. On day five the colour of the flap appeared darker in the lower part and the surrounding area was very inflamed; again 10 leeches were applied. It seemed that the lower, wider part of the nose flap was dying and shortly afterwards a clear border line between living and dead tissue developed. Luke warm water compressions were applied. The discharging area, soon forming a pale soft scab, was treated daily with tincture of cantharide and dressed with *Ung. Basilica*. The wound of the forehead healed without any scar formation and the wound in the scalp was also much smaller and discharging well.

Dieffenbach later wrote:

Immediately after the transplant the tip of the nose appeared chalk-white and started to change colour after a few hours. Therefore, cold compressions were made and 20 leeches were applied to the surrounding area to soften the developing inflammation, especially around the bridge of the nose.

Dieffenbach illustrated the result of the healed nose reconstruction on Miss Röhl after 3 weeks (Fig. 3).
Already on the next day a massive inflammation and swelling on both eye lids occurred, so I decided to put on 12 leeches.15 (p.36)

Similarly, Mr Wilkens, a 21-year-old shoemaker from Bavaria, had a skin transplant from the back of the foot to cover a prominent ulcer on the stump of a toe phalanx:

The tissue had swollen so much in the evening already that I introduced 20 leeches in the surrounding area the next day ... After three weeks the toe was healed ...15(p.148)

Discussion

In reading through the many operations which Dieffenbach carried out at the Charité-Krankenhaus in the period 1827–1834 one is struck by how casually he refers to his use of leeches following reconstructive surgery. He does not comment on their use as being unusual or remarkable, thereby implying their application for such purposes was taken for granted and even common knowledge. We do not yet know how Dieffenbach came to use leeches nor, indeed, if he was the first to use them in the context of plastic surgery. We can be confident, however, that Dieffenbach was the driving force behind their use at this time. In fact Dieffenbach had great confidence in leeches, as observed by his biographer:

Four principles distinguished the success of Dieffenbach’s operating techniques: 1. Excision of a significantly larger piece of tissue from the forehead than other surgeons were accustomed. 2. Fastening of the forehead flap to the stump all around with medium size insect pins. 3. Aggressive anti-inflammatory management of the transplanted flap through cold compresses and leeches. 4. Later shaping of the nose through repeatedly smaller blood operations.13(p.350)

Dieffenbach also influenced the use of leeches in plastic surgery outside of Germany. In his 1837 review of the current state of ‘Autoplastie’, Philippe Frédéric Blandin (1798–1849), Surgeon of the l’Hôpital Beaujon, Paris, documented two cases by Dieffenbach in which leeches were used.16 (p.351, p.354) Blandin definitely used leeches in his own practice as we know from the writing of Alphonse Guérin who some years earlier had served his residency under Blandin:

For autoplasty to succeed, it is necessary that the flap is attached to the body by a pedicel provided with vessels and of adequate size. The surgeons do not always have the relatively correct amount of vessels in the pedicel; thus, while Dieffenbach gave the advice of cutting the biggest arterial branches of the flap, Blandin taught that the conservation of these vessels was of the greatest usefulness; but I must say that, inconsistent with this conviction, Blandin followed the practice of Dieffenbach when he saw the repaired part swell and turn blue. Then, as the surgeon from Berlin, he put some leeches on the flap in order to diminish the quantity of blood which had accumulated.17 (p.325)

Leeches were used successfully in plastic surgery for at least a ten-year period from 1827–1837 by Dieffenbach in Berlin and later Blandin in Paris. It is not yet clear precisely why the practice was discontinued. Interestingly, however, Derganc and Zdravic acknowledged that in 1954 A. B. Wallace of Edinburgh informed them of Blandin’s use of leeches in rhinoplasty.12 A link to the past is secure.

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References


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The Medical Leech Museum is a private museum dedicated to documenting and preserving the history of leeching, bloodletting and cupping. Its resources are available to interested professionals by appointment with the author [e-mail: leechmuseum@compuserve.com].

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