



**Figure 2.** Plain cervical radiographs 3 months after the injury and after traction showing the odontoid fracture reduced to correct position. *a*, Lateral. *b*, Through-the-mouth view.

### Case report

A previously fit 75-year-old woman fell into a ditch at night while pushing her car. The result was a severe hyperextension injury of her neck.

On admission she complained of headache and a pain in the back of her neck and right shoulder. On examination, there was redness of the back of the throat but no swelling, and generalized muscular weakness. No sensory deficit was detectable. Reflexes in both upper limbs were not detectable; lower limb reflexes were normal.

A radiograph revealed a fracture-dislocation at the level of the first and second cervical vertebrae with the displaced odontoid process apparently occluding the spinal canal (*Figure 1*).

Skull calipers and 2.72 kg of skull traction were applied in 10° of flexion. She was placed in a Stryker frame and maintained on traction for 6 weeks. On examination the day after injury, all reflexes and muscle power had returned to normal. A Minerva plaster jacket was subsequently applied and she was discharged home. She has since had the jacket removed and remains well. Bony union has occurred and there is no clinical neurological deficit (*Figure 2*).

### Discussion

Posterior displacement with an extension injury to the odontoid process has frequently been described and is more common in the elderly; however, the extent of posterior dislocation as seen in this case has not previously been described (Beatson, 1963; Marar, 1974; Aply, 1982; Watson-Jones, 1982; Adams and Crawford, 1987). Surprisingly, this patient not only survived but did not suffer permanent neurological injury. This suggests that the spinal canal is more variable in diameter than was previously thought.

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### References

- Adams J. Crawford (1987) *Outline of Fractures*, Ch. 7. London and Edinburgh: Churchill Livingstone, 96.
- Apley A. G. (1982) *A System of Orthopaedics and Fractures*, Ch. 25. London: Butterworth, 418.
- Beatson T. R. (1963) Fractures and dislocations of the spine. *J. Bone Joint Surg.* **45B**, 21.
- Cornish B. L. (1968) Traumatic spondylolithosis of the axis. *J. Bone Joint Surg.* **50B**, 31.
- Francis W. R. and Fielding J. W. (1978) Traumatic spondylolithosis of the axis. *Orthop. Clin. North Am.* **9**, 1011.
- Marar B. C. (1974) Hyperextension injuries of the cervical spine. *J. Bone Joint Surg.* **56A**, 1655.
- Watson-Jones R., Ed Wilson, J. N. In: *Fractures and Joint Injuries* 1982. London and Edinburgh: Churchill Livingstone, Ch. 26, 815.

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## 'Reach for a leech': leeches and microsurgery

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### Introduction

Reconstructive microsurgery is growing very fast. It is not long since surgeons began performing detailed operations on minute structures of the body with the aid of the microscope.

In 1962 Malt replanted the completely severed arm of a 12-year-old boy, which was the first clinical experience of this kind. Since then microsurgery has frequently been used for replantation of amputated parts and tissue transfers.

It is recognized that the replanted part or transferred tissue may undergo necrosis, often as a result of venous congestion. In spite of a satisfactory initial venous anastomosis, thrombosis may set in and block the venous return.

The part gradually becomes swollen and congested; the arterial supply then diminishes due to compression, and eventually stops. Leeches are used as an alternative to venesection to reduce the engorgement and oedema of the tissue for a few days until new vasculature is formed. This period may be 4–5 days for a replant, provided the arterial entry is satisfactory (Foucher, 1981).

In the case of arterial or venous block in a clean, guillotine type of trauma, re-exploration should be considered first. Leeches are used only in venous congestion with a patent artery where, due to the extent of the damage to the venous structures, a satisfactory venous anastomosis or graft is impossible.



Figure 1. A leech on the ring finger on the 5th postoperative day.

### Case report

A 27-year-old right-handed manual worker sustained a degloving injury to his left ring finger, when his ring was caught on a metal cleat as he jumped off a skip. There was a circumferential laceration down to the flexor and extensor tendons, the ring was bent and disappeared under degloved skin at the level of the middle phalanx, and the blood supply to the finger was completely cut off. The ring was cut and removed on arrival in the accident department. He was taken to theatre for exploration and revascularization of the finger under the microscope, and one arterial graft and three direct venous anastomoses were carried out. Initially the finger looked pink, but after 24 h it began to swell and became congested. Leeches were used for 4 days and the circulation gradually returned to normal (Figure 1). He was back at work doing a heavy manual job after 10 weeks.

### Discussion

The use of leeches became very popular in the nineteenth century. This is shown in the records of St Bartholomew's Hospital Pharmacy for 1837, when 96 000 leeches were used on 50 557 patients. A shortage was reported at the time and they were imported from India and Mexico. They gradually went out of favour until recent years, when microsurgical complications have renewed their popularity (Rao et al., 1985). These authors emphasized the value of leeches in decongesting replants and flaps. Brody et al. (1989) expressed the value of leeches in digital replantation when the venous repair was marginal or technically impossible. They reviewed seven cases after application of medicinal leeches and found that six out of seven digits survived; patient acceptance was high and no infections developed.

Leeches are able to produce three chemical substances. Once attached to the site, they release first a local anaesthetic to numb the area from which they suck the blood. Second, they release a vasodilator to promote the blood flow and, third, an anticoagulant to prevent blood from their host clotting. The patient reported in this article demanded to have a leech on his finger at night as well as daytime for pain relief.

To apply leeches, the part should be isolated using a plastic sheet or bandage. The leech is then applied using plastic forceps. Needle stabs and dextrose solution some-

Table I. Details of 8 cases where leeches were used following replantation, revascularization and flap reconstruction with inadequate venous return.

No.	Age	Sex	Injury	Operation	Survival
1	60	M	Loss of thumb	Foucher flap	+
2	68	M	Untidy* amputation of thumb	Replantation	-
3	28	F	Adamantinoma of tibia 19 cm	Composite fibular graft	+
4	18	M	Full-thickness skin and tendon loss from dorsum of hand	Forearm flap	-
5	53	M	Osteomyelitis of tibia and full- thickness skin loss	Forearm flap	-
6	17	M	Untidy* amputation of index finger	Replantation	+
7	27	M	Degloving injury to ring finger	Revascularization	+
8	21	M	Untidy* amputation of index finger	Replantation	-

\*Amputation due to crushing injury.

times encourage a reluctant leech to bite. It is difficult to attach leeches on to a bloodless part. Depending on the amount of blood in the replant or flap, it takes 0.5–2 h to suck up to 10 ml of blood, which is the maximum for an average sized leech. When the leech is full it drops off spontaneously. After detachment of the leech there will be a slow oozing of blood for 3–4 h. Up to three leeches a day may be used and therefore the total blood loss is insignificant. None of our patients required blood transfusion.

Leeches are now accepted as part of the armamentarium of microsurgeons, especially in Europe. Their usefulness has been shown by a large number of cases reported by various authors (Batchelor et al., 1984; Foucher et al., 1981; Brody et al., 1989).

So far we have used leeches on eight patients in this hospital with a success rate of 50 per cent and no complications. These cases were proved to be unsalvageable by secondary microsurgical procedures. Details of these patients are shown in Table I.

### References

- Batchelor A. G. G., Davison P. and Sully L. (1984) The salvage of congested skin flaps by the application of leeches. *Br. J. Plast. Surg.* **37**, 358.
- Brody G. A., Maloney W. J. and Hentz V. R. (1989) Digit replantation applying the leech *Hirudo medicinalis*. *Clin. Orthop.* **245**, 133.
- Foucher G., Henderson H. R., Maneau M. et al. (1981) Distal digital replantation—one of the best indications for microsurgery. *Int. J. Microsurg.* **3**, 263.
- Rao P., Bailie F. B. and Bailey B. N. (1985) Leechmania in microsurgery. *Practitioner* **229**, 901.

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