

Medicinal Leech Therapy

Efficacy in Tissue Replantation Threatened by Venous Congestion

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Venous Congestion

- One of the most common causes of the failure of tissue replantation and microvascular surgery.
- Occurs when venous outflow becomes obstructed, leading to insufficient venous drainage in the presence of a normal arterial supply.
- Contributing factors:
 - Anastomoses of a vein inadequate to drain the region, an effect secondary to:
 - Arterial insufficiency
 - Venous spasm
 - Venous occlusion
 - Absence of venous repair

Signs of Arterial Occlusion and Venous Occlusion after Tissue Replantation (Daane *et al*)

	Arterial Occlusion	Venous Occlusion
Color	Pale	Blue-purple
Tissue turgor	Decreased	Increased; engorged and tense
Capillary refill	Slow, absent	Brisk, instantaneous
Temperature	Low	Low

Venous Congestion

- Quickly leads to:
 - Extravasation of erythrocytes
 - Deposits of fibrin in the perivascular regions
 - Endothelial breakdown
 - Microvascular collapse
 - Arterial compromise
 - Arteriovenous shunting away from capillary bed
 - Ischemia
 - Thrombosis within the microcirculation
 - Ultimately death of the tissue

Venous Congestion

- The effects of venous congestion are irreversible, therefore urgent treatment of this complication is recommended.
- Immediate treatment with medicinal leeches is one method of treating venous congestion.

Hirudo Medicinalis

The Medicinal Leech

- Bloodletting has been practiced for at least two and a half millennia.
- It was used as a tool in illness, which was believed to occur due to an imbalance of the four bodily fluids, or humors; blood, phlegm, and black and yellow bile.
- This humoral concept of disease was one first outlined by Hippocrates.



- The leech's anatomy consists of two sucker heads located on the anterior part of the head and on the posterior end.
- The mouth of the leech is located in the anterior sucker and has three jaws that contain 70 pairs of horny, cutting teeth for biting.
- The wound made by the jaws of the leech is shaped like a Mercedes "Y" symbol.



Hirudo Medicinalis

The Medicinal Leech

- A leech can ingest approximately 5 to 15 mL of blood, almost ten times its own weight, in a matter of 15 to 60 minutes.
- Once satiated, the leech automatically releases itself.

Hirudo Medicinalis

The Medicinal Leech

- The major benefit of leech therapy is not how much blood it ingests while attached, but rather the oozing of blood that occurs from the bite wound after leech detachment.
- Continued bleeding from the wound site is due to the therapeutic properties that leech saliva contains and ejects into the wound site while feeding.
 - Hirudin
 - Morphine-like anesthetic
 - Histamine-like vasodilator

Hirudo Medicinalis

The Medicinal Leech

- Modern clinical uses:
 - Digital replantation
 - Total auricular replantation
 - Penile replantation
 - Nasal replantation
 - Tissue flap replantation
- The most important indication, today, for the use of leeches, is venous insufficiency.

Studies: Medicinal Leech Therapy

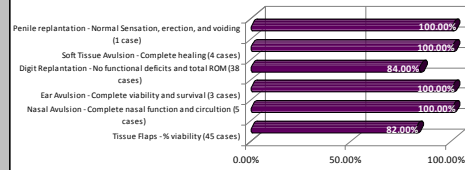
- **Free tissue flaps**
 - Forty-five cases involving free tissue flap replantation, were analyzed. At follow-up, 37 cases were reported as viable tissue flaps.
- **Nasal avulsions**
 - Five cases involving partial or complete nasal avulsion, were analyzed. At follow-up, there was complete nasal function and circulation appeared normal, with some scar formation pending.
- **Ear avulsions**
 - Three cases, involving complete and partial ear avulsion, were analyzed. At follow-up, all cases demonstrated complete viability and survival.

Studies: Medicinal Leech Therapy

- **Penile replantation**
 - One case study/report, involving penile amputation, was analyzed. At two months follow-up, sensation of the glans, normal erections, and continued normal voiding were experienced.
- **Digit Replantation**
 - Thirty-eight cases, involving digit and hand amputations, were analyzed. At follow-up, 32 of these cases were successful; showing no functional deficits and demonstrating total active range of motion intact (see Figure 1).
- **Soft Tissue Avulsion**
 - Four cases, involving soft tissue avulsion, was analyzed. These cases involved the lower lip and other facial tissues. At follow-up, these cases revealed complete healing.

Studies: Medicinal Leech Therapy

Case study results in the use of leeches



Studies: Medicinal Leech Therapy

Case 1. Class IIC ring avulsion injury of the ring finger. (A) Patient seen 3 days after the initial injury. (B) View of the injured finger at the fourth day of leech therapy. (C) Dorsal view at the 17-month follow-up evaluation. (D) Palmer view at the 17-month follow-up evaluation. (Tuncali *et al*)



Conclusion

- Although, this systematic review did not provide double-blinded randomized studies or meta-analyses, those cases studied demonstrated the effectiveness of medicinal leech therapy in the complications of venous congestion.
- Unfortunately, there is no great data to support the efficacy of medicinal leech therapy in relieving venous congestion.

Clinical Pearls

- The effects of venous congestion are irreversible, therefore, urgent treatment of this complication is recommended.
- Immediate treatment with medicinal leeches is one method of treating venous congestion.

References

- Adams SL. The Medicinal Leech. *Annals of Internal Medicine*. 1988; 109: 399-405.
- Brody GA, Maloney WJ, Heritz VR. Digit Replantation in Applying the Leech *Hirudo medicinalis*. *Digit Replantation*. 1989 Aug; 245: 133-137.
- Chepeha DB, Nussenbaum B, Bradford CR, Teknos TN. Leech Therapy for Patients with Surgically Unsalvageable Venous Obstruction after Revascularized Free Tissue Transfer. *Arch Otolaryngol Head Neck Surg*. 2002; 128: 960-965.
- Cho BH, Ahn HB. Microsurgical Replantation of a Partial Ear. With Leech Therapy. *Ann Plast Surg*. 1999; 43: 425-429.
- Chou CB, Laing JHE. A case of pediatric nasal avulsion replanted using microsurgery. *Injury Extra*. 2005; 36: 254-256.
- Concannon MJ, Puckett CL. Microsurgical Replantation of an Ear in a Child without Venous Repair. *Plast Reconstr Surg*. 1998 Nov; 102(5): 2088-2093.
- Davies S, Zamora S, Rockwell WB. Clinical Use of Leeches in Reconstructive Surgery. *The American Journal of Orthopedics*. 1997 Aug; 528-532:7-212.
- Fiorini RL, Bassidra N, Galliano RD. Successful replantation of an amputated nose after dog bite injury. *Otolaryngology-Head and Neck Surgery*. 2007; 136: 326-327.
- Frost JJ, Bann P, Wagner J. Salvage of partial soft tissue avulsion with medicinal leeches. *Otolaryngol Head Neck Surg*. 2004; 131: 934-939.
- Geddes K, Vidim S, Alan Musicki, Alex T. Immediate use of Medicinal Leeches to Salvage Venous Congested Reverse Pedicle Neurocutaneous Flaps. *Scan J Plast Surg Hand Surg*. 2003; 37: 277-282.
- Kaykicoglu A, Karamursel S, Kelek A. Replantation of Nearly Total Nose Amputation without Venous Anastomosis. *Plastic and Reconstructive Surgery*. 2001 Sep; 1: 106(3): 702-704.
- Kowalczyk T. A low-tech approach to venous congestion. *RN*. 2002 Oct; 65(10): 26-30.
- Milovic Miroslav, Jolley T, Rodrigues A. Leech Therapy in Penile Replantation: A Case of Recurrent Penile Self-Amputation. *Urology*. 2004; 63: 981-983.
- Montesani BW, Dawson IH, Murakami C. Medicinal leeches used to salvage a traumatic nasal flap. *British Journal of Oral and Maxillofacial Surgery*. 1998; 36: 462-464.
- Souzaos P, Berth AE, Malozos KN, Kibarsi CT, Palusz S. The use of medicinal leeches, *Hirudo medicinalis*, to restore venous circulation in trauma and reconstructive microsurgery. *Int Angiol*. 1994; 13: 251-258.
- Souzaos PN, Berth AE, Malozos KN, Xenakis TA, Georgiou A. Successful Treatment of Venous Congestion in Free Skin Flaps Using Medicinal Leeches. *Microsurgery*. 1994; 15: 466-501.
- Tuncali D, Terzioğlu A, Cipeş B, Aslan G. The Value of Medicinal leeches in the Treatment of Class II Ring Avulsion Injuries: Report of 2 Cases. *J Hand Surg*. 2004; 29A: 943-946.
- Upshaw J, O'Leary JP. The Medicinal Leech: Past and Present. *The American Surgeon*. 2000 March; 66: 313-314.
- Ullery DS, Koch RJ, Goode RL. The Floating Flap in Facial Plastic and Reconstructive Surgery: Role of the Medicinal Leech. *Laryngoscope*. 1998 Aug; 108 (8): 1281-1285.
- Wentfield AB, Yikael E, Bournos S, Gura DH, Ayurek Muscle, Friedman JD. Clinical and Scientific Considerations in Leech Therapy for the Management of Acute Venous Congestion: An Updated Review. *Ann Plast Surg*. 2000; 45: 207-212.