

Review Article

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“JALAUKAVACHARANA (LEECH THERAPY) IN VENOUS ULCERS AND VARICOSE VEINS: CLASSICAL BASIS, MECHANISMS AND CLINICAL EVIDENCE”

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ABSTRACT

Background: Chronic venous insufficiency, varicose veins and venous leg ulcers are common, disabling and costly. Compression therapy is the mainstay of treatment, but healing is slow and recurrence is frequent. Jalaukavacharana, the application of medicinal leeches, is one of the classical methods of Raktamokshana (bloodletting) described in detail by Sushruta and is widely used in Ayurvedic surgery for venous disease.

Objective: To review the classical basis of Jalaukavacharana, the bioactive constituents of leech saliva, and the clinical evidence for leech therapy in varicose veins and venous ulcers. **Methods:** Narrative review of Sushruta Samhita and of experimental, clinical and review literature on medicinal leech therapy. **Results:** Sushruta classifies leeches into poisonous and non-poisonous types, describes their collection, storage, application and removal, and recommends them especially for Pitta-dominant blood disorders and for delicate patients. Leech saliva contains hirudin and other anticoagulant, antiplatelet, anti-inflammatory, vasodilatory and anaesthetic substances. In a prospective study of 20 patients with complicated varicose veins, leech application around ulcers was followed by healing of all ulcers and reductions in oedema and pigmentation. A randomised trial in knee osteoarthritis showed that leech therapy reduced pain more than topical diclofenac. Leeches have regulatory clearance as a medical device in reconstructive surgery. Infection with *Aeromonas* species is the main recognised risk. **Conclusion:** Leech therapy has a strong classical basis and plausible mechanisms in venous disease, and early clinical studies are encouraging. Controlled trials in venous ulcers, combined with standard compression therapy, are needed.

KEYWORDS: Jalaukavacharana; leech therapy; hirudotherapy; Raktamokshana; varicose veins; Siraja Granthi; venous ulcer; hirudin

INTRODUCTION

Chronic venous disease ranges from varicose veins to skin changes and venous leg ulcers. It results from venous hypertension caused by valve incompetence, venous obstruction or calf-muscle pump failure^[1]. Venous leg ulcers are the most severe manifestation; they heal slowly, recur frequently and impair quality of life. Compression therapy improves healing compared with no compression^[2] and reduces recurrence^[3], but many ulcers remain unhealed for months, and adherence to compression can be difficult, especially in hot climates.

Ayurveda describes varicose veins under the name Siraja Granthi (venous swelling) and chronic ulcers under Dushta Vrana (non-healing wounds). Sushruta, the founder of Ayurvedic surgery, gave great importance to Raktamokshana (bloodletting) in conditions involving vitiated blood and described leech application (Jalaukavacharana) as its gentlest form^[4]. Leeches are still used in Ayurvedic practice for varicose veins, venous ulcers, thrombophlebitis, abscesses, skin diseases and joint pain.

Leech therapy has also re-entered mainstream medicine, particularly in reconstructive and plastic surgery, where leeches are used to relieve venous congestion in flaps and replanted digits^[5,6]. This review brings together the classical basis, mechanisms and clinical evidence for leech therapy, with a focus on venous disease.

METHODS

The classical source was Sushruta Samhita, Sutra Sthana 13 (Jalaukavacharaniya Adhyaya) and Nidana Sthana 11^[4]. Modern literature was identified through PubMed and Google Scholar using leech therapy, hirudotherapy, Hirudo medicinalis, hirudin, varicose veins, venous ulcer, Jalaukavacharana and Raktamokshana. This is a narrative review.

CLASSICAL BASIS

Raktamokshana and its methods

Sushruta regards blood as the fourth Dosha in surgical practice and recommends Raktamokshana in many conditions caused by vitiated blood^[4]. Methods include Shastra Visravana (using sharp instruments, such as venepuncture and scarification) and Anushastra methods (without sharp instruments), which include leeches (Jalauka), horn

(Shringa) and gourd (Alabu). Leeches are described as suitable for Pitta-vitiated blood and for delicate people such as kings, the wealthy, children, the elderly, women and the timid, because they are the least invasive^[4].

Types of leeches

Sushruta describes twelve types of leeches, six poisonous (Savisha) and six non-poisonous (Nirvisha)^[4]. He describes their colours, shapes and habitats, and states that non-poisonous leeches live in clean water with fragrant plants, whereas poisonous ones live in polluted water. Bites of poisonous leeches cause swelling, itching, fever and other symptoms. This distinction reflects a clear understanding of the need to select safe leeches.

Procedure

Sushruta describes a detailed procedure^[4]:

- **Preparation of leeches:** leeches are activated by placing them in water mixed with turmeric and mustard paste.
- **Preparation of the site:** the site is cleaned and, if the leech does not attach, a small prick or a drop of milk or blood is applied.
- **Application:** the leech is applied and covered with a wet cloth; when it attaches, it forms a characteristic horseshoe-shaped bite and arches its neck.
- **Removal:** when the patient feels itching or pain at the site, indicating that pure blood is being drawn, the leech is removed by sprinkling rock salt on its mouth.
- **After-care of the leech:** the leech is made to vomit the ingested blood by applying turmeric to its body and gently squeezing it, and is kept separately before reuse.
- **After-care of the wound:** the bite is cleaned and dressed, sometimes with honey or other wound-healing applications.

Siraja Granthi

Sushruta describes Siraja Granthi as a condition in which vitiated Vata compresses and twists the veins, producing tortuous swellings, especially in people who are weak or who exert themselves excessively^[4]. This corresponds closely to varicose veins. Raktamokshana is among the recommended treatments.

MECHANISMS: BIOACTIVE SUBSTANCES IN LEECH SALIVA

Modern research has identified more than one hundred bioactive substances in the saliva of medicinal leeches^[7,8]. The main groups are summarised below. Hirudin was the first well-

characterised anticoagulant from the leech and became the model for synthetic direct thrombin inhibitors used in clinical practice^[8].

Table 1: Bioactive substances in leech saliva and their relevance to venous disease

Substance or group	Main action	Relevance to venous disease
Hirudin	Potent direct thrombin inhibitor (anticoagulant)	Reduces local clotting; improves venous drainage
Calin, saratin	Inhibit platelet adhesion to collagen	Antiplatelet effect; prolonged bleeding after bite
Destabilase	Dissolves fibrin; antimicrobial	Fibrinolysis
Hyaluronidase	Breaks down hyaluronic acid; spreading factor	Enhances diffusion of other salivary substances
Eglins, bdellins	Inhibit inflammatory proteases	Anti-inflammatory effect
Histamine-like vasodilators	Local vasodilation	Improves local blood flow
Anaesthetic substances	Local analgesia	Painless bite

After a leech detaches, the bite continues to ooze for several hours because of the anticoagulant and antiplatelet effects, further relieving venous congestion.

The combined effects of decongestion, anticoagulation, anti-inflammation and improved microcirculation provide a plausible mechanistic basis for the use of leeches in varicose veins, thrombophlebitis and venous ulcers. The classical description of leeches drawing out “vitiated blood” corresponds well to the modern understanding that leeches relieve venous stasis.

CLINICAL EVIDENCE

Varicose veins and venous ulcers

In a prospective clinical study at a medical college in Mumbai, 20 patients with complicated varicose veins had medicinal leeches applied around their varicose ulcers^[9]. All ulcers healed; 95% of patients had reduced oedema and limb girth, and 75% had reduced hyperpigmentation. Blood drawn by leeches had an oxygen tension similar to that of venous blood, suggesting that leeches draw venous blood. The authors concluded that leech therapy may be a useful adjunct but that controlled trials were needed. Numerous Ayurveda case reports and small studies describe similar improvements in varicose veins and ulcers with Jalaukavacharana, usually combined with oral and topical Ayurvedic medicines. A clinical trial of medicinal leech therapy in varicose ulcers has been registered in the Clinical Trials

Registry of India^[10]. Controlled trials comparing leech therapy plus compression with compression alone are still lacking.

Osteoarthritis

The best-quality randomised evidence for leech therapy comes from knee osteoarthritis. In a randomised controlled trial, a single application of leeches reduced pain more than topical diclofenac over the first week, with benefits on function and stiffness persisting up to three months^[11]. Although not a venous condition, this trial shows that leech therapy can produce measurable clinical effects in a controlled setting.

Reconstructive surgery

Leeches are used in plastic and reconstructive surgery to salvage flaps and replanted tissues threatened by venous congestion^[5,6]. In 2004, the United States Food and Drug Administration cleared medicinal leeches for marketing as a medical device for this purpose^[12]. This illustrates the acceptance of leech-induced venous decongestion as a therapeutic principle.

Reviews

Reviews of leech therapy in Indian medicine and of medicinal leech therapy generally describe its long history, wide range of indications and growing evidence base, while noting that many clinical studies are small and uncontrolled^[5,7].

SAFETY

Leech therapy is generally safe when properly

performed, but several adverse effects are recognised:

- **Infection:** leeches carry *Aeromonas* bacteria in their gut, which help digest blood. *Aeromonas* infections, sometimes serious, have been reported after leech therapy, particularly in reconstructive surgery, and prophylactic antibiotics are often given in that setting^[13].
- **Prolonged bleeding:** oozing may continue for several hours; anaemia can occur with repeated or multiple applications.
- **Local reactions:** itching, pain, swelling, scarring and, rarely, allergic reactions or skin necrosis.
- **Transmission of infection:** reuse of leeches between patients carries a theoretical risk of transmitting blood-borne infections. Current practice is to use each leech for one patient only.

Contraindications include bleeding disorders, anticoagulant therapy, severe anaemia, immunosuppression, pregnancy, and arterial insufficiency in the treated limb. In venous ulcers, arterial disease should be excluded (for example by measuring the ankle-brachial pressure index) before both leech therapy and compression.

A PRACTICAL PROTOCOL FOR MODERN CLINICS

Drawing on Sushruta's description and current infection-control standards, a practical protocol for leech therapy in venous disease could include the following elements.

Sourcing and storage. Leeches should be obtained from controlled breeding facilities rather than collected from the wild, so that species and hygiene are known. They should be kept in clean, dechlorinated water at cool temperatures, with water changed regularly, and examined for health before use.

Patient assessment. Before treatment, the clinician should record a history of bleeding disorders, anticoagulant or antiplatelet use, diabetes, immunosuppression and allergies; measure haemoglobin and, where indicated, clotting parameters; assess arterial circulation; and measure the ulcer.

Application. The skin is cleaned with plain water, avoiding antiseptics or perfumes that may deter the

leech. Typically two to four leeches are applied around the ulcer margin or over congested varicosities, not on the ulcer bed itself. Each feeding usually lasts 20 to 60 minutes, after which the leech detaches spontaneously or is removed with a pinch of turmeric or salt.

After-care. The bite site is covered with a sterile absorbent dressing and allowed to ooze; a turmeric dressing is commonly used in Ayurvedic practice. Patients are told to expect oozing for several hours and to report fever, spreading redness or excessive bleeding. Many clinicians give prophylactic antibiotics active against *Aeromonas* in immunocompromised patients or high-risk settings^[13].

Frequency and course. Sessions are commonly repeated weekly for four to six weeks, depending on response and haemoglobin.

Disposal. Used leeches should not be reused on other patients. They should be humanely killed, for example in alcohol, and disposed of as clinical waste.

Documentation. Each session should record the number of leeches, site, duration, blood loss estimate, adverse events and wound measurements, to allow audit and research.

AYURVEDIC ADJUNCTS IN VENOUS DISEASE

In Ayurvedic practice, leech therapy is usually combined with other measures. Oral formulations commonly used include Kaishore Guggulu and Triphala Guggulu for their traditional blood-purifying and wound-healing actions, Manjishtha and Sariva as Raktashodhaka (blood purifying) herbs, and Punarnava for oedema. Topical applications include Jatyadi Taila, Jatyadi Ghrita and honey-based dressings for ulcers. Leg elevation, avoidance of prolonged standing, light exercise to activate the calf-muscle pump, and weight control are emphasised, which correspond to standard advice in venous disease^[1,14].

These adjuncts have not been individually tested in controlled venous ulcer trials. In research, they should be standardised across groups, or the trial should be designed to test the complete Ayurvedic package against standard care.

INTEGRATING LEECH THERAPY INTO VENOUS ULCER CARE

Leech therapy should be seen as a possible adjunct to, not a replacement for, standard venous ulcer care. A

practical integrated approach would include: assessment of venous and arterial status; compression therapy where appropriate; wound care with debridement and dressings; leech therapy around the ulcer and over congested varicosities, with infection precautions; oral and topical Ayurvedic wound-healing measures; leg elevation and exercise; and management of contributing factors such as obesity and immobility. Patients with significant reflux may also benefit from endovenous or surgical treatment of the underlying veins, as recommended in vascular surgery guidelines^[14].

DISCUSSION

Leech therapy is a striking example of an ancient Ayurvedic surgical practice that has found a place in modern medicine. Sushruta's description of leech selection, application and after-care is remarkably detailed and remains the basis of current practice. Modern science has identified the bioactive substances that explain its effects, and leeches are now used in reconstructive surgery worldwide.

For venous disease, the evidence is encouraging but limited. The Mumbai study showed promising results in complicated varicose veins, but it was small and uncontrolled. No randomised trial has compared leech therapy with standard care in venous ulcers. Such trials are feasible: patients could be randomised to compression plus standard wound care with or without leech therapy, with time to ulcer healing as the primary outcome.

Practical standards are also needed. These include sourcing leeches from controlled breeding facilities, single-patient use, infection control, standardised application protocols and documentation of adverse events.

CONCLUSION

Jalaukavacharana is a classical Ayurvedic form of bloodletting with a detailed procedure described by Sushruta. Leech saliva contains anticoagulant, antiplatelet, anti-inflammatory and vasodilatory substances that provide a strong mechanistic basis for its use in venous congestion. Early clinical studies in varicose veins and ulcers are encouraging, and randomised evidence exists for other conditions. Controlled trials of leech therapy as an adjunct to compression in venous ulcers, with strict infection control, are needed.

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