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Integrating Classical and Contemporary Perspectives on Leech Therapy in Eye Disease: An Ayurveda-Biomedicine Evidence Synthesis

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Abstract

Background: *Jalaukavacharana* (leech application) is a type of *Raktamokshana* (bloodletting). Ayurvedic texts describe it for diseases caused by vitiated *Pitta* and *Rakta*. Many eye diseases (*Netra Roga*) are described as *Pitta-Rakta* diseases, and *Ayurvedic* eye doctors still use leeches for painful, congested conditions around the eye. In modern medicine, medicinal leech therapy (MLT) is mainly used in reconstructive surgery, and a few case reports describe its use for periorbital hematoma.

Aim: To review what classical *Ayurvedic* texts say about *Jalaukavacharana* in *Netra Roga*, and to compare this with the modern medical evidence on leech therapy that is relevant to the eye.

Materials and Methods: This is a narrative review. We read *Ayurvedic* review papers and searched the web on 7 October 2026 for papers on leech therapy and on leech use around the eye in PubMed-indexed and AYUSH-related journals. A classical statement was included only if we could confirm it in a printed edition or in a named secondary source.

Results: Ayurvedic texts place *Jalaukavacharana* under *Raktamokshana* for *Raktaja* and *Pittaja* eye diseases. We checked six disease-procedure links directly in printed editions of the *Sushruta Samhita* and *Ashtanga Hridaya*. Modern evidence for the eye region is limited to a few case reports on bleeding around and on the eye, and two small single-group studies of *Jalaukavacharana* in *Abhishyanda* (allergic conjunctivitis) from Ayurvedic journals. Leech saliva contains known active substances such as hirudin, calin and hyaluronidase. We found no controlled trial of *Jalaukavacharana* for any classical eye disease.

Conclusion: The classical idea of removing bad blood from a congested site fits with what we know about leech saliva. However, the evidence is weak and comes from single case reports and two small studies without comparison groups. Well-planned clinical studies with a fixed procedure and safety monitoring are needed before any claim of benefit can be made.

Keywords: *Jalaukavacharana*; *Raktamokshana*; *Netra Roga*; *hirudotherapy*; *medicinal leech therapy*; *Shalakya Tantra*; *Ayurveda*; *periorbital hematoma*

Introduction :

Shalakya Tantra is one of the eight branches (*Ashtanga*) of *Ayurveda*. It deals with diseases of the parts above the collarbone, mainly the eye, ear, nose and throat. This branch gives special attention to eye care (*Netra Chikitsa*). A well-known saying, *sarvendriyanam nayanam pradhanam* ("of all the senses, the eye is the most important"), reflects this. The *Uttaratantra* of the *Sushruta Samhita* gives a long account of eye diseases and their treatment.

Raktamokshana (bloodletting) is used when vitiated blood (*Rakta*) and *Dosha*, especially *Pitta*, are thought to cause disease. It can be done in more than one way. *Siravedha* (opening a vein) suits larger areas. *Jalaukavacharana* (leech application) suits small, delicate and surface areas such as the eye. A third method, *Pracchana* (scraping or pricking the skin), is also mentioned. These methods are explained in a review by Singh and Rajoria^[1].

Outside *Ayurveda*, leech therapy came back into use in Western medicine from the 1980s. Surgeons use medicinal leeches (purpose-bred *Hirudo medicinalis*) to relieve blood congestion after reattaching body parts or after flap surgery^[2]. The United States Food and Drug Administration cleared the medicinal leech as a medical device in 2004^[2]. Many *Netra Roga* are described as *Pitta-Rakta* diseases with redness, burning, congestion and pain. For this reason, *Jalaukavacharana* has long been suggested for some of them. Recent Indian papers on the *Ayurvedic* care of eye disease show that interest in this area continues^[3], although good comparative trials are still lacking.

The *Ayurvedic* and the modern approaches come from very different backgrounds. This review puts them side by side. We state clearly what the classical texts say about *Jalaukavacharana* in *Netra Roga*, what modern research has actually shown about leech therapy near the eye, and where the two views meet or do not meet. We state openly any classical reference we could not confirm in a printed edition, and we have not invented any verse, page, trial, or reference.

Materials and Methods :

This is a narrative review, not a systematic review. We did not run a full database search with article counts, so there is no PRISMA flow diagram. For classical texts we used the *Sushruta Samhita* (*Sutrasthana* and *Uttaratantra*) and the *Ashtanga Hridaya*. The *Ashtanga Sangraha* was looked at only where it was quoted in secondary papers. For modern literature we searched the web on 7 October 2026 for papers in *PubMed*-indexed journals and in *AYUSH*-related journals (for example *J Ayurveda Integr Med*, *AYUSHDHARA*, *Indian J Tradit Knowl*, *Int J Ayurveda Pharma Res* and *J Ayurveda Integr Med Sci*), and we read the abstract or full text on the journal page. Search words included "medicinal leech therapy", "hirudotherapy" and "*Hirudo medicinalis*" together with "ophthalmology", "ocular", "periorbital" or "eyelid". We also searched "*Jalaukavacharana*" or "*Raktamokshana*" together with "*Netra Roga*". Direct searches of *PubMed* and Europe PMC could not be run in our setting, and we did not search *Scopus*, *Web of Science* or the *Cochrane Library*, so some papers may have been missed

.We included peer-reviewed articles, case reports, case series and reviews on (a) *Jalaukavacharana* or *Raktamokshana* in *Netra Roga*, (b) leech therapy around the eye, or (c) the actions of leech saliva that could matter for the eye. We left out web pages with no clear source, promotional material, and any classical reference that we could not confirm. Each modern paper was grouped by study type and by how close it was to the eye. We kept three things apart in the text: what the classical books say, what modern studies show, and our own interpretation.

Results

Raktamokshana And *Jalaukavacharana* In Classical Texts

In *Ayurvedic* scholarship, *Raktamokshana* is a cleansing procedure that removes vitiated *Rakta* and the *Dosha* mixed with it, most often *Pitta*, from the diseased site or from the body. It is counted among the *Ashtavidha Shastrakarma* (eight surgical and para-surgical procedures) in the *Sutrasthana* of the *Sushruta Samhita*. It is advised for *Raktaja* and *Pittaja* diseases that show redness, burning, local heat, and congestion. These include skin disease (*Kushtha*), joint disease and eye disease. Secondary sources list old age, young age, pregnancy, great weakness and bleeding disorders as reasons to avoid it. These match the modern cautions about bloodletting.

Jalaukavacharana means placing live leeches on a diseased site to draw out vitiated blood in a controlled way. The *Sushruta Samhita* has a separate chapter on leeches^[1]. It divides leeches into "*Savisha*" (venomous) and "*Nirvisha*" (non-

venomous) kinds. Only the non-venomous kinds are used for treatment. A good leech is active, hungry, of fair size and free from disease. The procedure has three steps. *Purva Karma* is cleaning the site and preparing the leech. *Pradhana Karma* is placing the leech and watching it feed. *Paschat Karma* is care of the bite site and watching for reactions. The *Sushruta Samhita* gives a clear sign for removal. Pain (*toda*) and itching (*kandu*) at the bite show that the leech is now taking pure blood, and it should then be removed. If it does not let go because of the smell of blood, *Saindhava* (rock salt) powder is sprinkled on its mouth (Su. Su. 14/21, p. 58)^[4]. For *Jalaukavacharana* in particular, the eye is a common example of a delicate site where *Siravedha* is not practical.

Classical References In *Netra Roga*

The *Uttaratantra* of the *Sushruta Samhita* sorts eye diseases by the part of the eye involved: *Sandhigata*, *Vartmagata*, *Shuklagata*, *Krishnagata*, *Sarvagata* and *Drishtigata Roga*. Secondary sources also list seventy-six eye diseases. Some *Sarvagata* diseases, such as *Abhishyanda* (inflammation of the conjunctiva) and *Pittaja Timira*, are said to need *Raktamokshana* or *Jalaukavacharana* when *Rakta* and *Pitta* are the main cause. Table 1 reproduces the list given by *Alaskar*, *Shaikh*, and *Shaikh*^[5], which covers eight eye diseases. It is reported here as given by that source. Readers who need the exact verse should check a printed edition.

Table 1. *Raktamokshana/Jalaukavacharana* in selected classical *Netra Roga*, as reported in a secondary source[5]

Classical condition	Reported procedure	Type of evidence
<i>Puyalasa</i>	<i>Siramokshana</i> followed by <i>Upanaha</i>	Direct textual indication (secondary source)
<i>Vataja Abhishyanda</i>	<i>Siramokshana</i>	Direct textual indication (secondary source)
<i>Pittaja Timira</i>	<i>Sarpipana</i> and <i>Siravedhana</i>	Direct textual indication (secondary source)
<i>Savvana Shukla</i>	<i>Sarpipana</i> , <i>Siramokshana</i> followed by <i>Jalaukavacharana</i>	Direct textual indication (secondary source)
<i>Kaphaja Timira</i>	<i>Sarpipana</i> and <i>Siravedhana</i>	Direct textual indication (secondary source)
<i>Pittaja and Kaphaja Abhishyanda</i>	<i>Ghritapana</i> then <i>Siravedhana</i>	Direct textual indication (secondary source)
<i>Pothaki</i>	<i>Jalaukavacharana</i>	Direct textual indication (secondary source)
<i>Raktaja Abhishyanda</i>	<i>Siravedha</i> and <i>Jalaukavacharana</i>	Direct textual indication (secondary source)

Unlike Table 1, we checked the entries in Table 1a in printed editions of the *Sushruta Samhita*^[6] and the *Ashtanga Hridaya*^{[7], [8]}. They can be quoted as verified classical indications for *Jalaukavacharana* in *Netra Roga*.

Table 1a. Verified classical (primary-source)

indications for *Jalaukavacharana* in *Netra Rog*

Classical condition	Verified citation	Note
<i>Raktaja Abhishyanda</i> and <i>Raktaja Adhimantha</i>	Su. Ut. 12/8 (p. 42)	Verified against ref. [6]
<i>Ragaprapta Timira</i>	Su. Ut. 17/54 (p. 58)	Verified against ref. [6]
<i>Kukunaka</i>	Su. Ut. 19/10 (p. 76); A.H. Ut. 9/27 (p. 808)	<i>Sushruta</i> locus per ref. [6]; <i>Ashtanga Hridaya</i> locus per refs. [7,8]
<i>Netraruk</i>	A.H. Su. 26/42 (p. 323)	Verified against refs. [7,8]
<i>Paksmasadana</i>	A.H. Ut. 9/18-19 (p. 808)	Verified against refs. [7,8]
<i>Kshatashukra</i>	A.H. Ut. 11/30 (p. 814)	Verified against refs. [7,8]

Three Levels Of Evidence

Table 2 groups the material into three levels. The first is a direct textual indication reported in a secondary source. The second is an *Ayurvedic* interpretation in which later authors extend a classical idea. The third is a modern extrapolation, our own suggestion based on leech studies outside the eye, not stated in any classical or *Ayurvedic* source.

Table 2. Structured evidence correlation

Classic al Netra Roga	Dosha/pa thogenesis (brief)	Categ ory	Modern clinical correlatio n	Evide nce level
<i>Raktaja Abhishy anda</i>	<i>Rakta-Pitta</i> vitiation; <i>conjuncti val</i> congestio n	Direct (seco ndary sourc e)	Allergic/in flammator y conjunctiv itis (interpreti ve)	Two small single-group studies in <i>Abhish yanda</i> (allergi c conjun ctivitis), see Table 4; case-level eviden ce near the eye
<i>Pittaja Timira</i>	<i>Pitta</i> vitiation affecting <i>Drishhti</i>	Direct (seco ndary sourc e)	No direct modern correlate establishe d	None identifi ed
<i>Pothaki</i>	Localized <i>Rakta-Pitta</i> vitiation, eyelid margin	Direct (seco ndary sourc e)	<i>Chalazion /hordeolu m</i> -type lid pathology (interpreti ve)	None identifi ed specifi c to this entity
<i>Savvana Shukla</i>	Ulcerativ e corneal/s cleral involvem ent	Direct (seco ndary sourc e)	No direct modern correlate establishe d	None; extrap olation only
<i>Periorbi tal/eyeli d</i> hemato ma (not classical)	Not applicabl e	Mode rn extrap olatio n only	Post-traumatic/ post-surgical hematoma	Case reports /series (Table 4)

Procedure Near The Eye

The classical text tells the doctor to remove the leech when pain and itching appear at the bite, and to sprinkle rock salt powder on its mouth if it will not let go ^[4]. Modern safety rules are stricter and do not rely on classical texts. The leech should be purpose-bred, quarantined, and used only once, and should come from a regulated supplier. Clean the skin around the eye with aseptic care. The eyeball and cornea must be shielded, for example with a moist pad, so that the leech never touches the cornea or conjunctiva. Someone must watch the leech the whole time. Remove it gently with saline, a flick of the finger, or a drop of local anesthetic or alcohol on its front sucker. Pulling it off can make it vomit gut bacteria into the wound. Some surgical protocols give antibiotics because of the risk of *Aeromonas* infection from the leech gut ^[9]. Watch the site for prolonged bleeding because leech saliva can delay clotting for a long time. The leech should be thrown away after use. Leech therapy must never replace proper eye care in sight-threatening problems such as orbital compartment syndrome, a ruptured eyeball, or bleeding behind the eye with high eye pressure. Its recorded modern use is only as an extra treatment for soft tissue around the eye, and not for disease inside the eye.

What Leech Saliva Contains

Leech saliva contains more than twenty active substances. Several of them could matter for swollen and congested tissue around the eye ^[2]. Table 3 lists some of them.

Table 3. Selected leech salivary bioactive molecules and their documented actions

Molecule	Documented mechanism	Evidence type	Ocular/periorbital relevance
<i>Hirudin</i>	Direct, potent thrombin inhibitor; local anticoagulant	Biochemical/pharmacological	Sustains local bleeding to evacuate pooled/coagulated blood
<i>Calin</i>	Inhibits collagen-mediated platelet adhesion	Biochemical/in vitro	Supports sustained local bleeding at the site
<i>Destabilase</i>	<i>Isopeptidase</i> ; thrombolytic/anti-aggregatory action	Biochemical/in vitro	Proposed contributor to local clot dissolution
<i>Hyaluronidase</i>	Degrades hyaluronic acid, increasing tissue permeability	Biochemical/in vitro	Facilitates spread of other salivary components
Histamine-like/vasodilatory substances	Local vasodilation, increased blood flow	Biochemical/pharmacological	May aid decongestion of pooled periorbital blood
Anti-inflammatory/analgesic constituents	Local anti-inflammatory and analgesic effect	Clinical observation; mechanism incompletely characterized	Reported local pain relief in published case material

These actions are well shown for skin and soft tissue, where almost all leech studies were done. We found no data on how leech saliva acts on the cornea, conjunctiva or inside the eye. Applying skin findings to these tissues is only a guess.

Modern Reports From The Eye Region

Leech use around the eye is reported mainly in two situations. One is draining an eyelid or periorbital hematoma after injury or surgery^{[10] [11]}. The other is harm caused when leeches were placed near the eye for another reason, such as headache^[12]. We also include a case from outside the eye, because it shows how leeches were used to clear a hematoma^[13]. *Ayurvedic* journals report three further studies. *Syam Chandran* and colleagues^[14] gave *Jalaukavacharana* to 30 patients with *Abhishyanda* (allergic conjunctivitis) in three sessions on alternate days. Symptoms improved; the absolute *eosinophil* count improved in 23.3% of patients, and no side effects were reported. *Prakruthi* and *Hamsaveni*^[15] treated 20 patients with *Vataja Abhishyanda* in two sessions five days apart and reported improvement in all measured symptoms and signs. Both studies had one treatment group and reported no comparison group. *Sreenath* and *Gopikrishna*^[16] reported one patient with *subconjunctival* hemorrhage after a road traffic accident, in whom healing was reported after leech therapy. We found no controlled trial of *Jalaukavacharana* for any classical eye disease.

Table 4. Contemporary published reports of periorbital/ophthalmic leech application

Study	Year	Condition	Design	n	Intervention	Main finding	Evidence strength
Menage and Wright [10]	1991	Periorbital hematoma (trauma)	Case report	1	Leech application to eyelid	Hematoma evacuated; globe examination enabled	Very low
Bunker [11]	1981	Periorbital hematoma (head injury)	Clinical commentary	NS	Leech evacuation	Rapid, painless decongestion described	Very low
Sevml et al. [12]	2021	Periorbital ecchymosis (adverse event)	Case report	1	Leech applied to glabella for headache	Self-limiting ocular bruising as complication	Very low
Marquez-Gil et al. [13]	2023	Non-ocular post-procedural hematoma	Case report	1	Medicinal leech application	Complete healing at 2 weeks	Very low
Syam Chandra et al. [14]	2025	Abhishyanda (allergic conjunctivitis)	Single-arm trial	30	Jalaukavacharan, 3 sessions on alternate days	Symptoms improved; eosinophil count improved in 23.3%; no side effects reported	Low

Study	Year	Condition	Design	n	Intervention	Main finding	Evidence strength
Prakruthi and Hamsaveni [15]	2018	Vataja Abhishyanda	One-group study	20	Jalaukavacharana, 2 sessions five days apart	Improvement in all measured symptoms and signs	Low
Sreenath and Gopikrishna [16]	2021	Subconjunctival hemorrhage (trauma)	Case report	1	Leech application	Healing reported	Very low

There are no controlled studies. Evidence for leech therapy in eye care is limited to single-case reports and two small, single-group studies. It can suggest ideas for study but cannot show that the treatment works.

Safety

Leech therapy has real risks. Bleeding can last long because *hirudin* and *calin* stop clotting, and the blood vessels around the eye are delicate. Infection is possible because *Aeromonas hydrophila* and related bacteria live in the leech gut, so some protocols give antibiotics. Repeated or long feeding can cause anemia, especially in small or weak patients. Some people react to the proteins in leech saliva. People taking blood thinners or *antiplatelet* drugs have a higher bleeding risk, and most protocols treat this as a relative reason to avoid leeches. Other problems are injury to the eyeball or cornea, long-lasting bruising and scarring.

Leeches must be regulated, quarantined and used once. A trained clinician must watch throughout. Emergencies such as a ruptured eyeball, bleeding behind the eye with compartment syndrome, and *endophthalmitis* need standard eye or surgical treatment at once. Leech therapy has no recorded role in them. The classical cautions given in secondary sources^[1] are similar: old age, young age, pregnancy, great weakness and bleeding tendency. Readers who need the exact verse for each caution should check a printed edition.

Gaps In Research

No adequately powered randomised trial of *Jalaukavacharana* exists for any classical *Netra Roga*. No fixed procedure has been published for the eye (leech type and size, time on the skin, number of sittings, gap between sittings). There are no agreed outcome measures, and no study has tested leech saliva on tissue of the eye region itself. Reviews of grey literature on *Ayurvedic* procedures exist for wound care^[17], but we found none for leech therapy in eye disease. It is also hard to match classical *Netra Roga* names with modern diagnoses. Useful next steps include: a randomised controlled trial of *Jalaukavacharana* added to standard care for *Abhishyanda* (allergic conjunctivitis), building on the two small single-group studies; a randomised trial of *Jalaukavacharana* added to standard care for *periorbital* soft tissue problems, using measures such as photographic scoring of hematoma and a pain scale; a comparison with *Siravedha* or with standard medicines for *Pitta-Rakta* type conditions; laboratory work on leech saliva proteins in tissue

models; a study linking *Dosha*-based findings with blood or tissue markers; and a written standard procedure for use near the eye.

Discussion :

The classical texts, read through secondary scholarship and our own checks of printed editions, make it clear: *Raktaja* and *Pittaja* eye diseases can be treated with *Raktamokshana*, and *Jalaukavacharana* is chosen for delicate or surface sites. We could confirm six specific disease-procedure links (Table 1a). The links in Table 1 come from a secondary source and should be treated as provisional until checked. Modern research supports leech therapy for blood congestion and soft-tissue hematoma in general, and a few case reports support it for hematoma around the eye. Two small single-group studies in *Abhishyanda* (allergic conjunctivitis) report symptom relief^[14],^[15], but without a comparison group they cannot show that the leeches caused the change. It does not support leech therapy for the wider group of classical eye diseases, such as *Pittaja Timira* or *Drishtigata* diseases, because we found no study on them. An earlier review by *Pundge* and *Kotangale* looked at *Jalaukavacharana* in *Netra Roga*^[18] and covered a similar range of classical indications. Our review differs in that it keeps citations in printed editions, except those from secondary sources, and grades the modern evidence more carefully. Three more *Ayurvedic* reviews list eye conditions for which *Raktamokshana* or *Jalaukavacharana* is advised. *Smitha* and *Vaghela* name *Raktaja Abhishyanda*, *Kukunaka*, *Pakshmathata*, *Kshatashukra* (*Savran*

Shukla) and *Kacha* ^[19]. *Silamwar* and colleagues, and Mule and colleagues, list *Abhishyanda*, *Adhimantha*, *Siraharsha*, *Sirotpata*, *Puyalasa*, *Vatparyaya*, *Anyatovata*, *Sashopha Akshipaka* and *Ashopha Akshipaka*, and attribute the list to *Sushruta* ^[20], ^[21]. These papers give no verse numbers for this second list, so we treat it as provisional until we check it against a printed edition. We also read *Su. Ut. 12/8* in a second printed edition with *Dalhana's* commentary ^[4], where *Su. Ut. 12* is titled *Raktabhishyanda Pratishedha*. *Smitha* and *Vaghela* ^[19] and *Silamwar* and colleagues ^[20] also list *bdellins* and *eglin*s (anti-inflammatory), and *Silamwar* and colleagues add a factor *Xa* inhibitor among the active substances of leech saliva. These substances have not been tested in eye tissue, so their relevance here is unknown, and more study is needed. *Silamwar* and colleagues ^[20] and Mule and colleagues ^[21] also suggest that leech application helps aqueous humour drain in glaucoma. They provide no pressure measurements or supporting studies, and we do not endorse this. *Silamwar* and colleagues ^[20] discuss the anticoagulant action of *hirudin* and *calin* in subconjunctival hemorrhage but provide no data. One report describes this bleeding as a complication of leech therapy ^[12], and one case report describes healing of post-traumatic subconjunctival hemorrhage after leech therapy ^[16]. The two views meet in one situation: congestion or hematoma of the soft tissue around the eye. The classical idea is to remove the locally vitiated *Rakta*. The modern explanation is local relief of congestion through the anticoagulant and blood-

vessel-widening actions of leech saliva. These explanations differ but point to a similar effect. They differ in how much they cover. Classical *Netra Roga* includes diseases of the cornea, conjunctiva, and the inside of the eye, and there is no modern leech data for these. Stretching the hematoma findings to these diseases is not justified. Some *Ayurvedic* ideas resemble modern ones: *Raktadushti* (spoiled blood) and local inflammation or congestion; *Raktamokshana* and local reduction of blood volume; *Jalauka* and controlled blood removal together with active saliva; *Srotodushti* (blocked channels) and poor small-vessel flow. These are possible comparisons and not proven matches. We found no study that links these *Ayurvedic* ideas to measurable changes in the body, so they remain working ideas and do not prove the classical theory.

At present, the evidence is not enough for routine use. The only uses with any published support are as an extra treatment for hematoma or bleeding around the eye and for *Abhishyanda*, always under proper eye or surgical care. Even there the evidence comes from single cases and small groups without controls. Use for other classical eye diseases should be called investigational. The next steps are a few well-planned pilot and comparison studies with a fixed procedure, clear outcome measures and open reporting of side effects, done under the supervision of an eye specialist.

Conclusion :

Jalaukavacharana has a long and consistent place in *Ayurvedic* eye care for *Rakta-Pitta* type *Netra Roga*. Modern science gives a reasonable, though

incomplete, explanation for how leech saliva could ease congestion, inflammation and pain. Modern evidence from the eye region is limited to a few case reports of bleeding around the eye, a few reports of side effects, and two small single-group studies on *Abhishyanda*. These findings suggest, but do not prove, a benefit in congestion of the soft tissue around the eye. They do not cover the wider range of classical *Netra Roga*. More study with fixed methods and comparison groups is needed before *Jalaukavacharana* can be said to work in *Netra Roga*. *Ayurvedic* doctors and eye specialists should plan this work together, with registered protocols and proper ethics approval.

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