



Peripheral Vascular Disorders in Shalyatantra: Classical Concepts and Modern Clinical Correlation

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Abstract

Peripheral vascular disorders involve abnormalities of blood circulation in the limbs and may affect arteries, veins, or smaller vascular channels. Clinically, patients can present with limb pain, swelling, heaviness, altered skin colour, coldness, sensory changes, visible veins, ulceration, or tissue damage. If vascular compromise is not recognized at an early stage, progressive tissue injury, infection, gangrene, and limb loss may occur.

Ayurvedic texts do not provide a single disease entity that can be directly equated with modern peripheral vascular disease. Nevertheless, descriptions concerning *Sira*, *Dhamani*, *Raktavaha Srotas*, *Siragata Vata*, *Siraja Granthi*, *Shopha*, and *Vrana* offer useful conceptual points for understanding vascular manifestations. The clinical features described under *Siragata Vata*, including pain, swelling, altered pulsation, sensory changes, and wasting, may be discussed in relation to some vascular presentations. Similarly, the appearance of dilated and tortuous vessels in *Siraja Granthi* provides a basis for comparison with varicose veins.

Contemporary vascular diagnosis depends on clinical examination supported by investigations such as ankle-brachial index, duplex ultrasonography, CT angiography, and MR angiography. Ayurvedic procedures including *Siravedha*, *Jalaukavacharana*, *Lepa*, *Swedana*, *Basti*, and *Vrana Chikitsa* may have supportive applications in selected patients, but their use should follow proper identification of the underlying vascular disorder.

The available Ayurvedic evidence is mainly based on case reports, small clinical studies, and limited comparative research. Among the parasurgical approaches, medicinal leech therapy has a more clearly recognized modern application in selected postoperative venous congestion, particularly in reconstructive surgery. Future research should combine Ayurvedic clinical assessment with measurable vascular and wound outcomes such as ABI, duplex findings, ulcer dimensions, healing duration, recurrence, pain, and quality of life.

Keywords: Peripheral vascular disease, *Shalyatantra*, *Siragata Vata*, *Siraja Granthi*, *Raktavaha Srotas*, *Siravedha*, *Jalaukavacharana*, varicose veins, peripheral artery disease, venous ulcer.

INTRODUCTION

Diseases affecting circulation in the limbs constitute an important clinical problem in both surgical and general medical practice. The burden is particularly relevant in people with diabetes, hypertension, smoking history, dyslipidemia, obesity, advanced age, and reduced physical activity. Depending on the vessels involved, the clinical picture may be predominantly arterial, venous, or lymphatic.

Arterial disease of the lower limb is commonly associated with atherosclerotic narrowing of peripheral arteries. Some patients remain relatively asymptomatic, whereas others develop exertional leg discomfort, rest pain, tissue ulceration, or gangrene. Current vascular guidelines recognize different clinical presentations of lower-extremity peripheral artery disease, ranging from asymptomatic disease to chronic limb-threatening ischemia and acute limb ischemia. The ankle-brachial index remains an important initial physiological test when PAD is suspected.²

Venous disorders have a different clinical pattern. Failure of normal venous return, often due to reflux, obstruction, or a combination of both, can result in varicosities, dependent edema, pigmentation, skin thickening, itching, and chronic ulceration.

Ayurvedic surgical literature gives considerable attention to vascular structures and their disorders. Concepts involving *Sira*, *Dhamani*, *Rakta*, and *Raktavaha Srotas* occur at several places in the classical literature. However, these structures should not be mechanically equated with modern anatomical arteries or veins. Ayurvedic terminology belongs to a different physiological and pathological framework.

Therefore, an appropriate clinical correlation should focus on similarities in symptoms, physical findings, disease progression, and therapeutic principles rather than claiming direct anatomical equivalence. The present review examines this area from the perspective of *Shalyatantra* and discusses the possible place of selected Ayurvedic procedures in contemporary vascular care.

AIM

To examine classical Ayurvedic descriptions relevant to peripheral vascular disorders and discuss their possible clinical relationship with contemporary arterial and venous diseases.

OBJECTIVES

1. To review the classical concepts of *Sira*, *Dhamani*, and *Raktavaha Srotas*.
2. To examine the clinical features described under *Siragata Vata*, *Siraja Granthi*, *Shopha*, and *Vrana*.
3. To summarize the major clinical presentations of peripheral arterial and venous disease.
4. To discuss the possible applications and limitations of *Siravedha* and *Jalaukavacharana*.
5. To review Ayurvedic principles applicable to chronic vascular wounds.
6. To identify important safety issues in parasurgical management.
7. To propose areas for future Ayurvedic vascular research.

MATERIALS AND METHODS

A narrative review was undertaken using classical Ayurvedic texts and contemporary vascular literature.

The classical review included *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*. Particular attention was given to descriptions of *Sira*, *Dhamani*, *Raktavaha Srotas*, *Vatavyadhi*, *Raktamokshana*, *Siravedha*, *Jalaukavacharana*, *Granthi*, and *Vrana*.

For the modern component, relevant publications were identified through PubMed, Scopus, Google Scholar, and established vascular guidelines. Search terms included peripheral artery disease, chronic limb-threatening ischemia, acute limb ischemia, chronic venous disease, varicose veins, venous ulcer, ankle-brachial index, duplex ultrasonography, hirudotherapy, and therapeutic bloodletting.

The comparisons presented in this article are conceptual and clinical. They are not intended to establish that an Ayurvedic disease entity is anatomically or pathologically identical to a modern vascular diagnosis.

CLASSICAL VIEW OF VASCULAR STRUCTURES

Sira and Dhamani

The classical Ayurvedic texts describe *Sira* and *Dhamani* as important channels distributed throughout the body. Their descriptions include aspects related to circulation, movement, pulsation,

injury, obstruction, and the transport of bodily substances.

Although the words *Sira* and *Dhamani* are sometimes translated simply as vein and artery, such translations can be misleading. Their descriptions in Ayurveda extend beyond the modern anatomical classification of blood vessels.

From the viewpoint of *Shalyatantra*, these classical descriptions are important because injury or pathological alteration of vascular structures can influence pain, tissue nourishment, swelling, bleeding, and wound healing.

Raktavaha Srotas

Raktavaha Srotas are described in relation to the formation, maintenance, and distribution of *Rakta Dhatu*. Disturbance of these channels is associated with different manifestations involving colour, inflammation, bleeding, tissue nourishment, and local pathology.

A disturbance in blood supply or venous drainage in modern vascular disease can similarly produce changes in the skin and underlying tissues. This provides an area for comparative discussion. However, *Raktavaha Srotas* should not be regarded as a direct anatomical substitute for the modern vascular system.

SIRAGATA VATA: A CLASSICAL BASIS FOR CLINICAL COMPARISON

The description of *Siragata Vata* is of particular interest when discussing vascular symptoms. Classical manifestations include pain, swelling, altered pulsation, wasting, numbness, and changes involving the vessels.¹

Some of these manifestations can be placed alongside findings encountered in vascular disorders.

Classical description	Possible modern clinical counterpart
<i>Ruja</i>	Limb or vascular pain
<i>Shopha</i>	Limb edema or swelling
Abnormal pulsation	Altered peripheral arterial pulse
<i>Supti</i>	Numbness or sensory disturbance
<i>Shosha</i>	Tissue or muscle wasting
Alteration in <i>Sira</i>	Change in vessel calibre or appearance

This table represents a clinical comparison rather than a diagnostic equivalence. For example, pain and numbness may occur in several neurological, musculoskeletal, metabolic, and vascular conditions. Modern vascular investigations are therefore necessary before assigning a specific diagnosis.

IMPORTANT PERIPHERAL VASCULAR CONDITIONS

Peripheral Artery Disease

Peripheral artery disease usually results from narrowing or obstruction of arteries supplying the lower extremities. Atherosclerosis is the commonest underlying mechanism. Diabetes, tobacco exposure, hypertension, dyslipidemia, chronic kidney disease, and increasing age are important associated factors.

A patient may initially notice discomfort in the calf, thigh, or buttock after walking for a certain distance. The discomfort generally settles after stopping activity. With progression, pain can occur even at rest, particularly at night, and skin ulceration or tissue loss may develop.

The 2024 ACC/AHA multisociety guideline recognizes asymptomatic PAD, chronic symptomatic PAD, chronic limb-threatening ischemia, and acute limb ischemia as important clinical presentations. Resting ABI is recommended as a useful diagnostic test when the history or examination raises suspicion of PAD.²

Chronic Limb-Threatening Ischemia

Chronic limb-threatening ischemia represents advanced arterial insufficiency in which patients may develop ischemic rest pain, non-healing wounds, or gangrene.

Such patients require prompt vascular assessment. Depending on the anatomical and clinical findings, revascularization may be required to preserve viable tissue and reduce the risk of major limb loss.

This has direct relevance for *Shalyatantra*. An ulcer with poor arterial supply should not be treated merely as a local wound. The adequacy of arterial circulation must first be assessed.

Acute Limb Ischemia

Acute limb ischemia develops when arterial perfusion is suddenly reduced. It can occur because of embolism, thrombosis, or other acute arterial events.

The classical clinical warning signs are commonly remembered as the **6 Ps**:

- Pain
- Pallor
- Pulselessness
- Paresthesia
- Paralysis
- Poikilothermia

This is an emergency situation. Delayed treatment may lead to irreversible muscle and nerve injury and eventually threaten limb viability.

CHRONIC VENOUS DISEASE

Chronic venous disease develops when blood cannot return efficiently from the lower extremities. Venous valve dysfunction and venous obstruction are important mechanisms.

Patients may complain of heaviness, aching, swelling, itching, burning, or tiredness of the legs. Visible varicosities may develop over time. With chronic disease, pigmentation, eczema, induration of subcutaneous tissue, and ulcer formation can occur.

Duplex ultrasonography is commonly used to assess venous reflux and obstruction and can help in planning treatment.

SIRAJA GRANTHI AND VARICOSE VEINS

Varicose veins are characterized by enlarged, elongated, and tortuous superficial veins. They most commonly involve the lower limbs and are frequently related to venous valve incompetence.

Patients may experience aching, heaviness, itching, burning, night cramps, and dependent swelling. Some remain asymptomatic despite prominent visible veins.

The appearance of enlarged and tortuous vessels provides a reasonable basis for comparing varicose veins with the classical description of *Siraja Granthi*. However, the two terms should not be treated as exact equivalents because their underlying pathological explanations arise from different medical systems.

Before selecting any intervention for varicose veins, the extent and pattern of venous reflux should be assessed clinically and, where indicated, by duplex examination.

CHRONIC VASCULAR WOUNDS AND DUSHTA VRANA

Chronic vascular ulcers represent a major clinical challenge. Their appearance depends on the underlying arterial or venous pathology.

Venous ulcers are commonly associated with edema, pigmentation, skin inflammation, and chronic venous hypertension. Arterial ulcers are more likely to occur in areas exposed to pressure or distal parts of the foot and may be associated with poor perfusion and severe pain.

The Ayurvedic description of *Dushta Vrana* includes abnormalities such as unpleasant discharge, altered colour, pain, and delayed healing. Some of these features can be observed in chronic vascular wounds.

However, identifying the cause of an ulcer is more important than merely describing its local appearance.

Clinical feature	Arterial ulcer	Venous ulcer
Usual location	Foot or distal limb	Lower leg, commonly gaiter area
Pain	Frequently prominent	Variable
Limb temperature	May be reduced	Usually maintained
Peripheral pulses	Reduced or absent when arterial disease is significant	Usually palpable
Edema	Usually less prominent	Common
Skin appearance	Pale, thin, shiny	Pigmentation and thickening may occur
Ulcer margin	May be sharply demarcated	Often irregular
Major mechanism	Reduced arterial perfusion	Venous hypertension

This distinction is particularly important before performing local procedures, *Lepa*, blood-letting, or other interventions.

ROLE OF RAKTAMOKSHANA AND SIRAVEDHA

Raktamokshana occupies an important place among the parasurgical procedures described in Ayurveda. Classical methods include *Siravedha* and *Jalaukavacharana*, along with other approaches selected according to the clinical situation.

Siravedha involves controlled removal of blood from a selected vein. In modern physiological terms, the procedure produces blood loss and a temporary change in intravascular volume.

Its use therefore requires careful patient selection. Individuals with anemia, hypotension, bleeding disorders, significant anticoagulant exposure, or severe vascular compromise require particular caution.

It is also important to distinguish venesection from treatment of an arterial obstruction. Removal of blood cannot mechanically reopen an occluded peripheral artery. Consequently, *Siravedha* should not be presented as an alternative to appropriate vascular assessment or revascularization.

JALAUKAVACHARANA

Jalaukavacharana is a classical parasurgical procedure involving the application of medicinal leeches. Ayurvedic texts discuss selection of suitable *Jalauka*, application technique, removal, and subsequent care.

Modern medicine has retained a limited but well-defined role for medicinal leeches. Their most established contemporary application is in selected cases of postoperative venous congestion, especially following reconstructive procedures and tissue replantation.³⁻⁵

A leech can provide temporary external drainage of congested venous blood. Substances present in leech saliva, including anticoagulant and other biologically active components, contribute to continued bleeding after attachment.³

The evidence is therefore more relevant to **venous congestion** than to major arterial obstruction. It should not be assumed that leech application can replace arterial revascularization or correction of significant venous obstruction.

JALAUKAVACHARANA IN VARICOSITIES AND VENOUS ULCERS

Several Ayurvedic reports and small clinical studies have examined *Jalaukavacharana* in patients with varicose veins and chronic venous ulcers. Improvements in symptoms such as heaviness, pain, burning, and swelling have been reported in some studies.⁶⁻⁹

However, the available literature has important limitations. Many studies involve relatively small

numbers of participants, lack long-term follow-up, or do not include detailed vascular investigations.

Future studies should therefore use measurable outcomes such as:

- ulcer surface area,
- percentage reduction in wound size,
- time to complete healing,
- pain score,
- limb edema,
- duplex findings,
- recurrence,
- and quality of life.

This would allow the effect of *Jalaukavacharana* to be evaluated more objectively.

OTHER AYURVEDIC SUPPORTIVE MEASURES

Lepa

Topical preparations may be considered for selected local symptoms such as discomfort, swelling, or inflammatory changes. Their use should remain supportive because a topical application cannot be expected to remove a significant arterial blockage or correct incompetent venous valves.

Swedana

Swedana may provide symptomatic benefit in selected musculoskeletal or stiffness-related complaints. Excessive heating should be avoided in patients with marked ischemia, sensory impairment, diabetic neuropathy, or active infection.

Abhyanga

Gentle *Abhyanga* may be considered for muscular discomfort or a feeling of limb heaviness in appropriately selected patients. Vigorous massage should be avoided where acute DVT, thrombophlebitis, or another condition in which manipulation may be harmful is suspected.

Basti

Basti may be selected according to the patient's overall *Dosha* and clinical assessment where a *Vata*-dominant presentation is considered. Case-based Ayurvedic literature has described its use in vascular inflammatory disorders such as Takayasu arteritis.¹⁰ Such reports, however, do not provide sufficient evidence to establish treatment efficacy. Systemic

vasculitis requires appropriate specialist assessment and monitoring.

CLINICAL APPROACH TO A PATIENT WITH POSSIBLE VASCULAR DISEASE

An Ayurvedic physician encountering a patient with persistent limb pain, swelling, prominent veins, skin changes, or a chronic ulcer should first determine whether a vascular disorder is present.

History

Relevant questions include:

- Is the pain related to walking?
- Does pain occur at rest or at night?
- Is there swelling that increases on standing?
- Are there visible dilated veins?
- Has the skin colour changed?
- Is there numbness or coldness?
- Is there an ulcer or tissue loss?
- Is there a previous history of DVT?
- Does the patient have diabetes, hypertension, smoking exposure, or dyslipidemia?
- Is prolonged standing or immobility present?

Physical examination

The examination should include:

- peripheral pulse assessment,
- limb temperature,
- capillary refill,
- edema,
- skin colour,
- varicosities,
- ulcer location and appearance,
- sensory changes,
- and signs of infection.

Modern investigations

The choice of investigation depends on the suspected pathology. These may include:

- ankle-brachial index,
- toe pressure,
- duplex ultrasonography,
- CT angiography,
- or MR angiography.²

Ayurvedic assessment

After appropriate vascular assessment, the Ayurvedic examination may include evaluation of:

- *Dosha*,
- *Dushya*,
- *Srotas*,
- *Agni*,
- *Ama*,
- and local wound characteristics.

This combined approach helps prevent potentially serious vascular disease from being managed only according to superficial symptoms.

SAFETY ISSUES

Parasurgical procedures require proper indication, patient selection, aseptic technique, and monitoring.

Particular caution is required in patients with:

- significant anemia,
- bleeding disorders,
- increased anticoagulant-related bleeding risk,
- hemodynamic instability,
- severe arterial insufficiency,
- acute limb ischemia,
- active local infection,
- or major tissue loss.

Medicinal leech application can result in prolonged bleeding and may contribute to anemia. Infection is another recognized complication, including infection associated with *Aeromonas* species. Appropriate infection-control practices and clinical monitoring are therefore essential.^{4,5}

A patient with acute ischemia, gangrene, chronic limb-threatening ischemia, suspected major arterial obstruction, or other limb-threatening pathology requires urgent vascular evaluation. Parasurgical procedures should never delay definitive management.

POSSIBLE AYURVEDIC–MODERN CLINICAL CORRELATIONS

Modern presentation	Ayurvedic concept for discussion	Type of relationship
Peripheral artery disease	<i>Siragata Vata</i> , <i>Srotodushti</i>	Conceptual
Claudication	<i>Siragata Vata</i>	Symptom-based comparison
Varicose veins	<i>Siraja Granthi</i>	Clinical similarity
Venous edema	<i>Shopha</i>	Symptom-based

Chronic venous ulcer	<i>Dushta Vrana</i>	Clinical and wound-based comparison
Arterial ulcer	<i>Vrana</i> with vascular involvement	Underlying vascular pathology must be established
Acute limb ischemia	No definite direct classical equivalent	Modern emergency diagnosis
DVT	No established one-to-one equivalent	Modern diagnostic assessment required
Vasculitis	<i>Siragata Vata</i> as an interpretative framework	Limited evidence

- duration required for healing,
- pain score,
- edema,
- recurrence,
- infection,
- quality of life,
- and requirement for additional treatment.

Objective vascular outcome

- duplex assessment of venous reflux or other relevant vascular parameters.

Such a design would provide more useful evidence than relying only on subjective improvement.

CRITICAL APPRAISAL

Ayurvedic literature contains several concepts that can be meaningfully discussed in relation to vascular manifestations, particularly *Sira*, *Dhamani*, *Raktavaha Srotas*, *Siragata Vata*, *Siraja Granthi*, *Shopha*, and *Vrana*. However, conceptual similarity should not be mistaken for diagnostic equivalence.

The clinical evidence supporting specific Ayurvedic interventions in peripheral vascular disorders remains limited. Research involving *Jalaukavacharana* includes case reports and small clinical studies, while objective vascular measurements have not been consistently incorporated.⁶⁻⁹

A major limitation is the lack of standardized outcome assessment. Parameters such as ABI, duplex findings, wound dimensions, recurrence, and validated quality-of-life scores should become routine components of future trials.

The existing evidence therefore provides a basis for further research rather than sufficient justification for replacing established vascular treatment.

FUTURE DIRECTIONS

The development of evidence-based vascular *Shalyatantra* requires cooperation between Ayurvedic physicians and modern vascular specialists.

Future studies should preferably include:

- clearly defined vascular diagnoses,
- ABI measurements where arterial disease is suspected,
- duplex ultrasonography,
- standardized wound photography and digital wound measurement,

RESEARCH OPPORTUNITIES IN SHALYATANTRA

Peripheral vascular disease provides several possible areas for systematic Ayurvedic research. Among them, chronic venous disease and vascular wounds may be relatively practical areas for initial investigation because clinical outcomes can be measured repeatedly.

Potential research questions include:

1. Effect of standardized *Jalaukavacharana* as an adjunct in selected chronic venous disease.
2. Role of Ayurvedic wound-care measures alongside established compression therapy.
3. Evaluation of *Vimlapana Karma* in chronic venous ulcer.
4. Effect of Ayurvedic interventions on pain, edema, and patient-reported quality of life.
5. Changes in objective venous parameters following treatment.

A clinical study on chronic venous ulcer could compare standard wound management alone with standard management supplemented by a predefined Ayurvedic intervention.

Suggested outcome measures

Primary outcome

- Change in ulcer area from baseline.

Secondary outcomes

- complete wound closure,

- validated pain and quality-of-life instruments,
- predefined treatment protocols,
- adequate sample size,
- appropriate control groups,
- and long-term follow-up.

The research emphasis should gradually move from isolated case reports toward well-designed comparative clinical studies.

Particular attention should be given to chronic venous ulcers, postoperative venous congestion, and supportive wound management, where objective outcomes can be monitored.

CONCLUSION

Peripheral vascular disease represents a relevant area for contemporary *Shalyatantra*, particularly because vascular abnormalities frequently influence wound healing, tissue viability, pain, swelling, and limb function.

Ayurveda does not provide a single classical disease entity that can be directly identified with modern peripheral vascular disease. Nevertheless, descriptions of *Sira*, *Dhamani*, *Raktavaha Srotas*, *Siragata Vata*, *Siraja Granthi*, *Shopha*, and *Vrana* provide useful concepts for discussing vascular manifestations.

The features described under *Siragata Vata*, such as pain, swelling, sensory changes, altered pulsation, and wasting, can be compared with selected clinical findings seen in vascular disorders. Similarly, the appearance of enlarged and tortuous vessels in *Siraja Granthi* offers a possible basis for discussing varicose veins. These comparisons remain interpretative and should not be used to establish a modern diagnosis.

Among the classical parasurgical procedures, *Jalaukavacharana* has particular contemporary relevance in selected situations involving venous congestion. Modern literature provides its clearest support in carefully selected postoperative reconstructive cases, whereas evidence for chronic peripheral vascular disease remains limited.^{3–5}

The future development of vascular *Shalyatantra* should therefore emphasize accurate diagnosis, patient safety, objective assessment, and evidence-based integration. Investigations such as ABI, duplex ultrasonography, wound measurement, and quality-of-life assessment can help bridge classical clinical observations with modern research standards.

Ayurvedic procedures may have a supportive role in appropriately selected patients, but conditions such as acute limb ischemia, critical arterial insufficiency, major thrombosis, gangrene, and limb-threatening vascular disease require timely modern vascular evaluation and definitive management.

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