



RESEARCH ARTICLE

SHOPHA AND INFLAMMATION: A COMPARATIVE REVIEW BRIDGING AYURVEDIC SHALYA TANTRA AND CONTEMPORARY PATHOPHYSIOLOGY

Dr. Anmol Mehrotra¹, Dr. Vishal Verma² and Dr. Sheetal Verma³

¹PG scholar, P.G. department of Shalya Tantra, Uttarakhand Ayurveda University, Rishikul Campus, Haridwar, Uttarakhand, India; ²Associate Professor P.G. department of Shalya Tantra, Uttarakhand Ayurveda University, Rishikul Campus, Haridwar, Uttarakhand, India; ³Associate Professor P.G. department of Samhita Siddhanta, Uttarakhand Ayurveda University, Gurukul Campus, Haridwar, Uttarakhand, India

ARTICLE INFO

Article History:

Received 17th April, 2026
Received in revised form
20th May, 2026
Accepted 27th June, 2026
Published online 30th July, 2026

Keywords:

2-Azetidinone, β -Lactam, Schiff Base, Cyclization, Chloroacetyl Chloride, Spectral Characterization, Antimicrobial Activity, Structure–Activity Relationship.

*Corresponding author:
Anmol Mehrotra

ABSTRACT

The synthesis Inflammation occupies a central position in both classical *Ayurvedic* surgical thought and modern pathology, yet the two systems describe the same biological phenomenon through different conceptual vocabularies. Ayurveda, particularly within the *Shalya Tantra* tradition codified by *Acharya Sushruta*, describes this phenomenon as *Shopha* — a localised aggregation of vitiated *Doshas* in the skin and underlying *Mamsa Dhatu*,¹ presenting with characteristic features that vary according to the *Dosha* predominantly involved. Contemporary pathology, by contrast, defines inflammation as a vascular and cellular response of living tissue to injury, characterised by haemodynamic alteration, increased vascular permeability, and leucocyte emigration. This article undertakes a detailed comparative review of *Shopha* as described in the *Sushruta Samhita* and inflammation as taught in modern pathology, examining classification, clinical features, staging, cellular and humoral mechanisms, systemic complications, and the principles of management in both systems. The review argues that the six-fold *Doshik* classification of *Shopha* and the cardinal signs of inflammation described by Celsus and Virchow are not merely parallel curiosities but reflect a shared clinical logic: that a stereotyped tissue response, observable across causes, follows a temporal evolution that mandates staged intervention. Recognising this convergence may help integrate the time-tested staging principles of *Ayurvedic* surgery with the cellular-level resolution offered by modern pathology, to the benefit of clinical decision-making in suppurative and inflammatory surgical conditions.

Copyright©2026, Anmol Mehrotra et al. 2026. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Dr. Anmol Mehrotra, Dr. Vishal Verma and Dr. Sheetal Verma. 2026. "Shopha and Inflammation: A Comparative Review Bridging Ayurvedic Shalya Tantra and Contemporary Pathophysiology". *International Journal of Current Research*, 18, (07), 37853-37857.

INTRODUCTION

Few clinical phenomena are as universally encountered in surgical practice as the swollen, painful, warm patch of tissue that announces the body's response to injury. *Ayurvedic* surgeons addressed this phenomenon more than two millennia ago under the heading of *Shopha*, devoting an entire chapter of the *Sushruta Samhita's Sutrasthana* (*Adhyaya* 17) to its definition, classification, staging, and management. Modern pathology arrived at a structurally similar description through the lens of vascular biology, defining inflammation as a protective response of vascularised tissue to injury or infection. Reading these two traditions side by side is instructive: both recognise a graded evolution of the lesion from an early, poorly defined stage to a mature, often suppurative stage, and both insist that the surgeon's clinical decision — to wait, to promote resolution, or to intervene surgically — must be matched to that stage.

This article reviews the classical *Ayurvedic* description of *Shopha*, the modern pathological description of inflammation, and the points at which the two frameworks meaningfully intersect.

Shopha in Classical Ayurvedic Literature

शोथसमुत्थाना ग्रन्थिबिद्रध्यलजीप्रभृतयः व्याधयश्चोभिहिता अनेकाकृतयः।

Sushruta Samhita, Sutrasthana 17/3

Acharya Sushruta defines *Shopha* as a localised aggregation of vitiated *Doshas* occurring in the skin and the underlying *Mamsa Dhatu* (muscle tissue), arising in one part of the body, which may be diffuse, nodular, even, or uneven in contour. He distinguishes it specifically from related surgical conditions such as *Granthi* (cystic swelling), *Vidradhi* (abscess), and *Alaji*, noting that although these conditions are often accompanied by swelling, true *Shopha* has its own

distinguishing characteristics of texture, distribution, and *Doshic* origin.

Classification According to *Dosha*³

Sushruta classifies *Shopha* into six varieties based on the *Dosha* or combination of factors responsible for its genesis:

स षड्विधो वातपित्तकफशोणितसन्निपातागन्तुनिमित्तः।

Sushruta Samhita, Sutrasthana 17/4

- *Vataja Shopha* — caused by vitiated *Vata*
- *Pittaja Shopha* — caused by vitiated *Pitta*
- *Kaphaja Shopha* — caused by vitiated *Kapha*
- *Raktaja Shopha* — caused by vitiated *Rakta* (blood)
- *Sannipataja Shopha* — caused by simultaneous vitiation of all three *Doshas*

Aagantuja Shopha — caused by external or traumatic factors

Clinical Features According to *Dosha*: Each *Doshic* variety of *Shopha* presents with a characteristic colour, consistency, and quality of pain, which the classical surgeon used as the primary diagnostic tool at the bedside, well before any instrument of examination existed:

Type	Colour	Consistency	Pain
<i>Vataja</i>	Blackish or reddish	Indurated and soft	Fleeting and pricking
<i>Pittaja</i>	Yellow or red	Soft, quick-spreading	Burning
<i>Kaphaja</i>	Pale or white	Indurated, cold, slow to suppurate	Mild pain and itching
<i>Raktaja</i>	Very black	As in <i>Pittaja</i>	As in <i>Pittaja</i>
<i>Sannipataja</i>	Mixed features of all <i>Doshas</i>	Mixed	Mixed
<i>Aagantuja</i>	<i>Lohita</i> (red)	As <i>Pitta</i> and <i>Shonita</i>	As <i>Pitta</i> and <i>Shonita</i>

These descriptions, recorded purely through inspection and palpation, anticipate in remarkable detail the modern recognition that the character of pain and the colour of the overlying skin carry diagnostic and even prognostic significance.

Staging of *Vranashopha*: Perhaps the most clinically valuable contribution of the *Sushruta Samhita* to surgical practice is its three-stage model of the evolution of a swelling, a model that anticipates the natural history of acute inflammation described in contemporary pathology by many centuries.

Aamavastha — The Unripe Stage⁴

तत्र, मन्दोष्मता त्वक्सवर्णता शीतशोफता स्वरर्थ्यं मन्दवेदनताल्पशोफता चामलक्षणमुद्दिष्टं।

Sushruta Samhita, Sutrasthana 17/7

In this earliest stage the affected part is only mildly warm, the overlying skin is of the same colour as the surrounding skin, the swelling feels cold to the touch, it is fixed in size, and pain is minimal. At this stage *Sushruta* recommends *Vimlapana* (resolving the swelling through gentle massage), *Avasechana* (blood-letting), and *Upamaha* (warm poultice or fomentation)—measures intended to abort the process before it progresses, a principle directly analogous to anti-inflammatory and resolution-promoting measures in modern practice.

***Pachyamanavastha* — The Inflammatory or Maturing Stage:** *Sushruta's* description of this stage is unusually vivid for a surgical text, conveying the lived intensity of the patient's pain through a series of similes: the pain is described as resembling the prick of needles, the bite of ants, cutting by a blade, piercing by a spear, beating with a stick, pressure of a hand, and the throbbing sensations of burning by fire or caustic alkali. Restlessness is such that the patient finds no relief in any posture, and the swelling becomes tense, as though distended like an inflated bladder.

- Pricking, cutting, and throbbing character of pain
- Progressive increase in size of the swelling
- Discoloration of the overlying skin
- Fever, burning sensation, and thirst
- Loss of appetite (*Bhaktaaruchi*)

This stage corresponds closely to the active phase of acute inflammation in modern pathology, in which vasodilation, oedema, and the chemical mediators of pain combine to produce the classical clinical picture of a tense, painful, enlarging swelling with systemic accompaniments.

***Pakvavastha* — The Suppurative Stage:** With maturation, the pain subsides, the swelling becomes pale, the overall size of the lesion decreases as it localises, and skin folds appear over its surface with a cracking quality. The classical surgeon assessed the underlying contents using two physical signs that remain in use today: a depression that persists momentarily on finger pressure, and a fluctuation test in which fluid can be felt to move beneath the examining fingers, likened by *Sushruta* to water moving inside an inflated bladder. Itching and an intermittent throbbing pain are also noted, along with resolution of associated systemic complications and return of appetite. It is only at this *Pakva* (ripe) stage that *Sushruta* sanctions the surgical procedures of *Patana* (incision), *Shodhana* (cleansing of the wound), *Ropana* (promotion of healing), and *Vaikritapaha* (correction of resultant scarring or deformity).

The Surgeon's Duty: Distinguishing *Pakva* from *Apakva Shopha*⁵

आमं विपच्यमानं च सम्यक् पक्वं च यो विषयः जानीयात् स भवेद्द्वैद्यः शेषास्तस्करवृत्तयः।

Sushruta Samhita, Sutrasthana 17/6

Sushruta places remarkable ethical weight on this single clinical judgement: only the physician who can confidently distinguish the unripe (*Aama*), maturing (*Vipachyamana*), and ripe (*Pakva*) stages of *Shopha* truly deserves to be called a *Vaidya*; all others, in his uncompromising phrase, behave like thieves (*Taskaravritti*) — a striking warning against premature or careless surgical intervention. The consequence of ignoring this principle is described with equal clarity. If a swelling that is in fact unripe is mistakenly incised (*Aamacheda*), the result is destruction of muscle, veins, ligaments, bone, and joints, excessive haemorrhage, the appearance of pain where there was none, tissue rupture, and the precipitation of numerous complications, including a traumatic abscess (*Kshataviradhi*). Conversely, if a surgeon, out of fear or misjudgement, mistakes a genuinely ripe swelling for an unripe one and continues to withhold intervention, the accumulated pus is forced to travel deeper into the tissues in search of an outlet, ultimately producing *Nadivrana* — a chronic, non-healing sinus tract that is difficult to cure. Both errors of timing, in

other words, carry serious consequences, and the entire staging system exists to prevent them.

Doshic Basis of Suppuration⁶

वातादृते नास्ति रुजा न पाकः पित्तादृते नास्ति कफाच्छूयः।

Sushruta Samhita, Sutrashtana 17/9

Sushruta offers a concise physiological model of suppuration: without *Vata* there is no pain anywhere in the body; without *Pitta* there is no *Paka* (maturation or 'cooking' of the lesion); and without *Kapha* there is no formation of Pus. He therefore concludes that the maturation of any *Shopha* is brought about by the combined action of all three *Doshas*. This *Tridoshic* model of suppuration maps with surprising fidelity onto the modern understanding that the cardinal signs of acute inflammation arise from the combined effects of vascular change (associated by later interpreters with *Pitta* and *Rakta*), the mechanical and neural component of pain and swelling (associated with *Vata*), and the formation of exudate or pus (associated with *Kapha*).

Systemic Complications (*Upadrava*) and Prognosis⁷

The *Sushruta Samhita* and the later *Sushruta Chikitsasthana* describe a set of life-threatening systemic complications that may accompany severe *Shopha*, underscoring that the condition was never regarded merely as a local surgical curiosity:

- *Shvasa* (dyspnoea)
- *Pipasa* (excessive thirst)
- *Daurbalya* (weakness)
- *Jvara* (fever)
- *Chhardi* (vomiting) and *Arochaka* (anorexia)
- *Hikka* (hiccup)
- *Atisara* (diarrhoea)
- *Kasa* (cough)

These features were considered capable of proving fatal to the patient suffering from *Shopha*, a recognition that parallels the modern clinical understanding of systemic inflammatory response and sepsis arising from an unresolved or neglected local focus of infection. On prognosis, *Sushruta* further notes that a swelling — whether small or large — that is allowed to mature into suppuration without any therapeutic intervention (*Aalepa* and related measures) tends to develop a wide base, an irregular shape, and a deeply situated focus of vitiated material, rendering it *Krichchhrasadhya*, that is, difficult to cure. This is a direct classical anticipation of the modern surgical teaching that deep-seated, neglected, or inadequately drained collections carry a worse prognosis than those identified and treated early.

The Seven Procedures (*Saptakriya*) in the Management of *Shopha*⁸

विम्लापनं कुर्याद्वितीयमवसेचनम्। तृतीयमुपनाहं तु चतुर्थी पाटनक्रियाम्।

Sushruta Samhita, Sutrashtana 17/22–23

Sushruta lays down seven sequential procedures, each indicated according to the stage of the *Shopha*, forming what

remains the conceptual backbone of *Ayurvedic* surgical management of inflammatory and suppurative swellings:

- *Vimlapana* — gentle dispersal of the swelling by massage with the fingers or a smooth rod, applicable in the *Aama* stage
- *Avasechana* — therapeutic blood-letting, to relieve local congestion of vitiated blood
- *Upahata* — warm poultice or fomentation, to hasten maturation when resolution is no longer possible
- *Patana Kriya* — surgical incision, performed only once the *Shopha* has reached the *Pakva* stage
- *Shodhana* — cleansing of the wound to remove residual vitiated *Doshas* and slough
- *Ropana* — promotion of healing and granulation
- *Vaikritapaha* — correction of any resultant scar, deformity, or altered tissue texture

Read together, this seven-step sequence is essentially a staged treatment algorithm: resolve where possible, mature what cannot be resolved, drain what has matured, and finally clean, heal, and correct the resultant defect — a logic immediately recognisable to any modern surgeon managing a soft-tissue abscess from presentation to scar revision.

Inflammation in Contemporary Pathology

Definition: Modern pathology defines inflammation as a complex, coordinated series of vascular and cellular events that occurs in vascularised living tissue in response to local injury or tissue damage. The purpose of this response is to dilute, neutralise, and contain the offending agent, to clear away cellular debris and infectious organisms, and to initiate the subsequent process of tissue repair. As in the *Ayurvedic* model, the modern description treats inflammation not as a disease in itself but as a protective, time-bound biological program with a recognisable onset, evolution, and resolution.

Cardinal Signs⁹: The Roman writer Aulus Cornelius Celsus, in the first century A.D., described four cardinal signs of inflammation — redness (*rubor*), heat (*calor*), swelling (*tumor*), and pain (*dolor*) — that remain the bedside hallmarks of an inflamed lesion today. In the nineteenth century, Rudolf Virchow added a fifth sign, loss of function (*functio laesa*), recognising that significant local inflammation commonly impairs the normal activity of the affected part.

Mapping Cardinal Signs to Underlying Pathophysiology

Sign	Associated <i>Dosha</i> (per comparative teaching)	Clinical Presentation	Pathophysiological Basis
Rubor (redness)	<i>Pitta</i> vitiation	Erythema due to capillary dilation	Increased local blood flow
Calor (heat)	<i>Rakta</i> vitiation	Warmth due to increased blood flow	Vasodilation
Tumor (swelling)	<i>Vata</i> vitiation	Oedema	Extravasation of fluid

Dolor (pain)	<i>Vata</i> vitiation	Pain due to local pressure	Mediator-driven sensitisation
Functio laesa	—	Alteration in function	Cumulative tissue and mediator effect

Acute Inflammation: Haemodynamic and Cellular Sequence

Haemodynamic Changes: The vascular response to injury begins with a transient vasoconstriction, an immediate response mediated chiefly by arterioles regardless of the nature of the injury — lasting only three to five seconds after mild injury, but up to three to five minutes after severe injury. This is rapidly superseded by a persistent and progressive vasodilatation, again mediated mainly by arterioles, that develops within the first half hour after injury and is responsible for the increased blood volume in the local microvascular bed, producing the clinically evident redness and warmth of the inflamed area. As vasodilatation progresses, local hydrostatic pressure rises, driving transudation of fluid into the extracellular space and producing visible swelling. The resulting rise in red cell concentration increases local blood viscosity, producing slowing and eventual stasis of flow. This sluggish flow permits leucocytic margination — the peripheral orientation of leucocytes, principally neutrophils, along the vascular endothelium, where they adhere to the vessel wall before migrating through inter-endothelial gaps into the extravascular space, a process known as emigration.

Altered Vascular Permeability: Oedema fluid accumulates in the interstitial compartment as plasma escapes through the endothelial wall of the peripheral vascular bed. In the earliest phase this escape of fluid is driven simply by vasodilatation and the resultant rise in hydrostatic pressure, producing a transudate. As the process continues, a more characteristic inflammatory oedema develops, driven by a genuine increase in the permeability of the microcirculation, producing an exudate rich in protein and cells. Five principal mechanisms underlie this increase in vascular permeability: contraction of endothelial cells, retraction of endothelial cells, direct injury to endothelial cells, endothelial injury mediated by leucocytes themselves, and a state of persistent leakiness associated with neo-vascularisation during repair.

Cellular Events

The cellular component of acute inflammation consists of two linked processes: the exudation of leucocytes from the vasculature into the tissue, and their subsequent phagocytic activity against the offending agent.

- **Margination and pavementing** — the central axial stream of leucocytes and red cells widens as the peripheral plasma zone narrows owing to fluid loss by exudation; neutrophils from the central column come to lie close to the vessel wall (pavementing)
- **Rolling and adhesion** — peripherally margined neutrophils roll slowly along the endothelial surface before forming progressively firmer adhesive bonds, mediated by selectins, integrins, and immunoglobulin-superfamily adhesion molecules
- **Emigration** — neutrophils that have adhered to the endothelium move along its surface and cross the basement membrane, damaging it locally with collagenases, to escape into the extravascular space; the corresponding passive escape of red cells through endothelial gaps is termed diapedesis
- **Chemotaxis** — directed migration of emigrated leucocytes toward the site of injury along a chemical gradient
- Once at the site of injury, the neutrophil or macrophage performs phagocytosis of the offending microbe or debris in three sequential steps: recognition and attachment to the

particle, engulfment of the particle within a phagosome, and finally killing and degradation of the ingested material.

Chronic Inflammation¹⁰

When the inciting injury or infective agent is not eliminated during the acute phase, the process may evolve into chronic inflammation — a state of prolonged duration, extending over weeks, months, or even years, in which active inflammation, ongoing tissue injury, and attempted healing all proceed simultaneously rather than in the clean sequence seen in acute inflammation. Causes include persistent infection, prolonged exposure to toxic or foreign material, and autoimmune or hypersensitivity reactions.

Chronic inflammation is broadly divided into non-specific and specific (granulomatous) types, the latter characterised by the formation of granulation tissue composed of proliferating capillaries, fibroblasts, and a mixed inflammatory infiltrate, which over time matures into fibrous scar tissue. Chronic inflammation may also produce systemic effects, including persistent low-grade fever, weight loss, anaemia, and elevation of acute-phase reactants, mediated by a characteristic population of chronic inflammatory cells — principally lymphocytes, plasma cells, and macrophages — and their associated chemical mediators.

Discussion: Points of Convergence Between Shopha and Inflammation

Placed side by side, the Ayurvedic and modern descriptions of localised tissue swelling display a degree of conceptual overlap that is unlikely to be coincidental, given that both arose from careful, repeated bedside observation of the same biological event.

- Both systems recognise a staged temporal evolution of the lesion: *Aama–Pachyamana–Pakva* in Ayurveda corresponds closely to the early vasodilatory phase, the active inflammatory phase, and the suppurative or resolving phase of modern pathology
- Both systems use the cardinal local signs — colour, warmth, swelling, and pain — as the principal bedside diagnostic tool, with Celsus's four signs mirroring the colour-consistency-pain triad used by *Sushruta* to characterise each *Doshic* variety of *Shopha*
- Both systems attribute the cause of pus formation to a combination of factors rather than a single agent: the *tridoshic* model of *Vata-Pitta-Kapha* in suppuration parallels the modern recognition that vascular change, mediator-driven maturation, and neutrophil-rich exudate together produce pus
- Both systems insist that the timing of surgical intervention must be matched precisely to the stage of the lesion, with premature incision in the *Ayurvedic Aama* stage producing complications analogous to those of incising an unresolved, non-fluctuant, cellulitic swelling in modern surgical teaching
- Both systems recognise that local inflammation, if neglected or allowed to progress unchecked, can produce *serious systemic complications and even threaten life*, whether described as *Upadrava* in Ayurveda or as the systemic inflammatory response and sepsis in modern medicine

These parallels suggest that the staging discipline taught in the *Sushruta Samhita*, refined over centuries of surgical practice without the aid of microscopy, retains genuine clinical value when read alongside the cellular and molecular detail now available through modern pathology. An integrative approach — using the *Doshic* and staging framework to guide bedside judgement on timing, supported by the mechanistic detail of modern pathology to refine pharmacological and surgical choices — may offer a richer clinical picture than either system used in isolation.

CONCLUSION

Shopha, as described by *Acharya Sushruta*, and inflammation, as taught in contemporary pathology, are best understood not as two unrelated subjects placed together for academic convenience, but as two historically distinct descriptions of a single, universal biological process. The *Ayurvedic* emphasis on careful staging — and the explicit warning against the surgeon who fails to distinguish ripe from unripe swelling — remains as clinically relevant today as it was when first set down, and continues to find support in the modern understanding of the haemodynamic and cellular sequence of acute inflammation. A surgical trainee equipped with both frameworks is better placed to recognise the stage of a swelling at the bedside, to anticipate its likely systemic consequences, and to time intervention so as to avoid the twin errors — premature incision and delayed drainage — that both traditions identify as the principal causes of avoidable complication.

REFERENCES

Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17 (Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia..

- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 3(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia..
- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 4(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia
- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 7(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia
- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 6(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia
- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 9(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia
- Pareek, A. (2020). *Shalya Tantra: A textbook of Ayurvedic surgery*. Chaukhambha Orientalia
- Sushruta. (1997). *Sushruta Samhita: Sutrasthana, Chapter 17, Shlokh 22-23(Shopha Nidana Adhyaya)* (Nibandhasangraha commentary by Dalhana, Vol. 1, Y. Trikamji, Ed.). Chaukhambha Orientalia
- Kumar, V., Abbas, A. K., & Aster, J. C. (2020). *Robbins and Cotran pathologic basis of disease* (10th ed.). Elsevier.
- Mohan, H. (2022). *Textbook of pathology* (9th ed.). Jaypee Brothers Medical Publishers.
