Development and Standardization of Shastrakarma (Surgical) Techniques in Ayurveda: A Review

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***Abstract*—Background: Shastrakarma—the surgical and para-surgical branch of Ayurveda—derives its principles and techniques from the Sushruta Saṁhitā, which codified the Aṣṭāvidha Shastrakarma (eight operative actions) and described comprehensive perioperative care. Over time, the decline in formal surgical training within Ayurveda reduced its scope, but select techniques such as Kṣārasūtra, Jalauka-avacaraṇa (leech therapy), and Agnikarma (thermo-cautery) persisted in practice. Recent decades have seen renewed interest in these interventions due to clinical demand, policy changes, and the pursuit of integrated healthcare models. Aim & Scope: This review synthesizes the historical evolution, current clinical practice, and standardization initiatives related to key shastrakarma techniques. It examines procedural developments, training and credentialing reforms, research governance, and implementation challenges. The focus is on three representative procedures—Kṣārasūtra, Jalauka-avacaraṇa, and Agnikarma—while also drawing cross-cutting lessons for technique harmonization. Methods: A narrative review approach was used, drawing from classical Ayurvedic treatises, institutional Standard Operating Procedures (SOPs), policy documents, and clinical literature. Sources were evaluated for procedural detail, training requirements, outcome measures, and safety protocols, with an emphasis on identifying commonalities and gaps. Conclusion: The integration of shastrakarma into modern healthcare requires a coordinated strategy of precise SOP development, competency-based credentialing, and adoption of common outcome measures. By blending classical Ayurvedic principles with contemporary quality and safety frameworks, these techniques can be delivered consistently, safely, and credibly, enhancing their role in both national and global integrative medicine.**

***Index Terms*—Shalya-Tantra, Shastrakarma, Kṣārasūtra, Jalauka, Agnikarma, Ayurveda surgery, SOPs, standardization**

I. INTRODUCTION

Shastrakarma, the surgical branch of Ayurveda, occupies a distinguished place in the history of medicine. Rooted in the Sushruta Saṁhitā, one of the earliest and most detailed surgical treatises in the world, it encompasses a broad spectrum of operative and para-operative measures described under Shalya-Tantra. The core framework of Aṣṭāvidha Shastrakarma—the eight fundamental surgical actions—served as a systematic foundation for diagnosis, operative intervention, and post-operative care in ancient India. These principles were supported by detailed descriptions of surgical instruments (shastra), patient preparation, asepsis, anesthesia substitutes, and rehabilitation, reflecting an advanced understanding of surgical science for the time.

Over centuries, as Ayurveda evolved alongside changing socio-political and scientific contexts, the role of surgical practice diminished in some regions due to loss of patronage, colonial policies, and the rise of biomedicine. Nevertheless, certain para-surgical procedures—such as Kṣārasūtra therapy for fistula-in-ano, Jalauka-avacaraṇa (leech therapy) for localized congestion and inflammatory conditions, and Agnikarma (thermo-cautery) for pain management—continued to be preserved and practiced in specialized circles.

In the modern era, interest in shastrakarma has been renewed for several reasons:

- Clinical demand for minimally invasive, cost-effective interventions in conditions where biomedical options may be resource-intensive or recurrence-prone.
- Policy support from institutions such as the Ministry of Ayush and academic councils to reintroduce surgical and para-surgical training in postgraduate Ayurveda programs.

- Evidence-building efforts that aim to evaluate these interventions using modern research methodologies without losing their traditional rationale.
- Globalization of Ayurveda, which has prompted calls for standardized procedures to ensure reproducibility, safety, and international acceptance.

Despite this resurgence, the field faces several challenges. There is marked heterogeneity in practice—differences in preparation of materials, device specifications, operative technique, post-procedure care, and training standards across institutions. Variations in outcome reporting, follow-up duration, and complication tracking further limit cross-comparison of results. Without unified Standard Operating Procedures (SOPs) and competency-based credentialing, both patient safety and the credibility of shastrakarma in multidisciplinary care settings can be compromised.

In this context, the standardization of shastrakarma techniques is not merely an academic exercise—it is a necessary step toward sustainable integration into modern healthcare systems. This review aims to chart the historical evolution, current clinical application, and policy frameworks of key shastrakarma techniques, while critically evaluating their level of standardization. It also proposes a roadmap for harmonizing practice, education, and research so that these time-tested methods can be delivered with precision, safety, and accountability in contemporary settings.

II. AIMS & OBJECTIVES

Aim:

- To critically review the development and standardization of shastrakarma (surgical and para-surgical) techniques in Ayurveda and outline a pathway toward harmonized, safe, and evidence-aligned practice.

Objectives:

- Map the evolution of shastrakarma from classical foundations to contemporary clinical use.
- Describe current standardization efforts (SOPs, training, credentialing, and governance).
- Appraise the clinical evidence and identify methodological gaps limiting comparability.
- Propose a minimum reporting dataset and implementation priorities for clinical practice, education, and research.

III. MATERIALS AND METHODS

Design: Narrative, methods-aware review focused on development and standardization of shastrakarma.

Scope: Surgical/para-surgical techniques central to Shalya-Tantra, emphasizing Kṣārasūtra, Jalauka-avacaraṇa, and Agnikarma, plus policy and training frameworks relevant to their use.

Information sources: Standard Ayurvedic treatises, academic texts, clinical studies and audits, institutional SOPs/manuals, policy/regulatory notices, and consensus/position statements from recognized bodies.

Background & Classical Foundations

The Sushruta Saṁhitā systematized surgical thought in Ayurveda, detailing instruments, training, peri-operative care, and the Aṣṭāvidha Shastrakarma—(i) Chedana (excision), (ii) Bhedana (incision), (iii) Lekhana (scraping), (iv) Vedhana (puncturing), (v) Eshana (probing), (vi) Aharana (extraction), (vii) Visravana (drainage), and (viii) Sivanā (suturing). These actions remain the conceptual backbone upon which later techniques evolved.

Contemporary Practice & Policy Context

Recent policy steps in India have sought to align education and legal scope with practice realities. A 2020 amendment to postgraduate Ayurveda regulations clarified that MS (Ayurved) Shalya-Tantra/Shalakya trainees must be practically trained in a specified list of surgical procedures; subsequent commentary emphasizes that the notification focuses on training requirements rather than a blanket license beyond the listed items.

Institutionally, national research bodies have issued guideline series and SOP frameworks for research and clinical evaluation—important scaffolding for standardization, ethics, and quality assurance across Ayurvedic interventions.

Technique-Specific Development & Standardization

Kṣārasūtra (Medicated Seton / Chemical Cauterization)

Historical and Conceptual Basis

Kṣārasūtra is described in classical texts as a minimally invasive surgical approach employing a specially prepared, alkaline, medicated thread for

chemical cauterization. Traditionally indicated for conditions such as Bhagandara (fistula-in-ano), Arsha (hemorrhoids), and certain sinus tracts, the therapy embodies the principles of Chedana (excision) and Lekhana (scraping) in a controlled, gradual manner.

Standardization Efforts

- Preparation Protocols: Modern practice uses surgical linen threads coated with a combination of latex from Euphorbia nerifolia, alkaline ash from Achyranthes aspera (Apamarga), and turmeric powder. The process involves multiple coatings (commonly 21), drying phases, and aseptic handling. Efforts are underway to fix exact quantities, coating numbers, and drying durations to ensure uniform potency and tensile strength.
- Sterility Assurance: Standardized sterilization by gamma irradiation or autoclaving is being incorporated into institutional SOPs to minimize microbial contamination without altering chemical efficacy.
- Clinical Workflow: Weekly thread replacement is the accepted standard in many institutions, combined with wound cleaning and dressing. Healing progress is monitored through objective measures like cut-through time and granulation status.

Remaining Challenges

- Lack of consensus on optimal coating counts and sequence.
- Variation in raw material quality and source, affecting potency.
- Inconsistent outcome measures and recurrence definitions across studies.

Jalauka-Avacaraṇa (Medical Leech Therapy)

Historical and Conceptual Basis

Jalauka-avacaraṇa is prescribed in Raktamokṣaṇa (bloodletting) therapy, particularly for Pitta-dominant and inflammatory conditions. The leech's dual action—mechanical blood removal and biochemical delivery of anti-inflammatory, analgesic, and anticoagulant substances—bridges Ayurvedic and modern biomedical rationales.

Standardization Efforts

- Leech Selection & Sourcing: Guidelines recommend the use of medicinal species such as Hirudinaria granulosa, sourced from certified breeding units or clean natural habitats to ensure parasite-free and disease-free specimens.
- Application Technique: SOPs now detail steps for site preparation (gentle cleaning without strong antiseptics), secure application, natural detachment, or use of saline/turmeric powder to encourage release.
- Post-Procedure Care: Includes gentle compression to arrest bleeding, sterile dressing, observation for prolonged oozing, and tetanus prophylaxis where indicated.
- Biosafety Measures: Protocols stress single-use leeches, safe disposal in disinfectant, and operator protection to prevent cross-infection.

Remaining Challenges

- Standardizing the quantity of blood removed and duration of application for specific indications.
- Limited large-scale, high-quality clinical trials to support dosing regimens.
- Need for temperature and environmental control parameters during storage and handling.

Agnikarma (Thermo-Cautery)

Historical and Conceptual Basis

Agnikarma is used for conditions where Vata and Kapha dominance cause localized pain, stiffness, or swelling—such as osteoarthritis, tennis elbow, and chronic headaches. It applies controlled heat to targeted tissues to alleviate pain and stimulate healing.

Standardization Efforts

- Instrument Specifications: Modern devices vary from traditional heated metallic rods (Shalaka) to electric cautery units with temperature control. Some centers have adopted infrared thermometers for precise surface temperature measurement.
- Temperature & Exposure Parameters: Protocols are being developed to define the optimal range (commonly 80–120°C), contact duration (fractions of a second), and lesion size for each indication to balance efficacy with safety.
- Treatment Mapping: Use of anatomical landmarks for consistent point selection in musculoskeletal conditions is gaining adoption.
- Post-Care Protocols: Application of cooling herbal pastes (e.g., Aloe vera) to soothe tissue, prevent excessive burns, and support healing is becoming standardized.

Remaining Challenges

- Absence of universally accepted temperature and contact-time ranges for different conditions.

- Variation in material and thermal conductivity of instruments between centers.
- Lack of multi-institutional safety and efficacy audits.

Cross-Technique Observations

While each technique retains its unique procedural steps and indications, several themes in standardization are shared:

- Raw Material Quality Control – Ensuring authenticity, purity, and potency through standardized sourcing and laboratory testing.
- Sterility and Biosafety – Incorporating modern aseptic measures without compromising traditional properties.
- Outcome Measurement – Moving toward objective, reproducible indicators like healing time, pain scores, recurrence rates, and complication grading.
- Training and Competency – Defining minimal case numbers and supervised practice before independent execution.

Training, Credentialing & Scope

The training emphasis introduced in 2020 is a pivotal step toward skills-based credentialing. Many commentators recommend limiting independent practice to well-trained Shalya/Shalakya postgraduates and caution against generalizing surgical privileges to non-surgically trained graduates—reflecting a consensus toward competency-linked scope.

National councils also publish Good Clinical/Research Practice guidance and ethics SOPs that should be embedded in postgraduate curricula and hospital policy to ensure patient safety, documentation, consent, and data integrity.

IV. RESEARCH QUALITY & REPORTING

Despite an uptick in publications, reviews consistently identify methodological variability and reporting gaps across Shalya-Tantra interventions. To improve credibility and integration with modern health systems, stakeholders call for evidence standards aligned with contemporary clinical research while respecting Ayurvedic diagnosis and intervention logic.

Recommended minimum dataset for clinical studies/audits (proposed):

- Patient profile: prakriti and conventional diagnosis; inclusion/exclusion criteria.
- Intervention fidelity: exact SOP (materials, device specs, temperatures/times, thread recipe, sterility method).
- Operator factors: training level, case volume, supervision.
- Outcome set: pain scales/time-to-cut, time-to-heal, return-to-work, recurrence (standard definition), complications (graded), antibiotic use, patient-reported outcomes.
- Follow-up windows: short-term (≤30 days), mid (3–6 months), long (12 months).
- Data quality: prospective registration (if interventional), consent, adverse-event reporting, protocol deviations, monitor/audit plans.

Implementation: From Tradition to Standard of Care

Where we are seeing convergence:

Core techniques: Kṣārasūtra weekly-change care and preparation schematics; structured Jalauka SOPs; Agnikarma device/temperature rationales beginning to appear.

Policy layer: Training-linked scopes for Shalya/Shalakya postgraduates reduce ambiguity in who should perform which procedures.

Research governance: Good Clinical Practice and clinical-evaluation SOPs provide a common language for ethics, monitoring, and documentation.

What still needs work:

Uniform SOPs across materials and devices (e.g., Kṣārasūtra recipes; Agnikarma probes) with inter-lab quality checks.

Competency frameworks (case-number thresholds, simulation labs, supervised logs) embedded in MS (Ayurved) programs.

Multicenter registries/RCTs using agreed outcome sets to benchmark effectiveness and safety—especially versus standard surgical comparators.

V. DISCUSSION

This review highlights a clear momentum toward standardization of shastrakarma, yet also underscores the distance to travel before widespread, routine integration into multidisciplinary care. Three cross-cutting themes emerge:

From tradition to reproducibility. Classical taxonomies (e.g., the Aṣṭāvidha actions) offer stable

conceptual anchors, but reproducible practice requires material and device specificity, validated preparation processes, and calibration methods. Kṣārasūtra has progressed furthest toward such detail; Agnikarma and Jalauka require similar granularity, especially around temperature-dose parameters and biosafety protocols.

Competency over entitlement. Training-linked scopes are necessary but not sufficient. Competency needs demonstration through supervised case logs, simulation-based skills acquisition, and periodic reassessment. Embedding these expectations in MS (Ayurved) curricula and hospital privileging processes will align shastrakarma with contemporary surgical governance.

Evidence that speaks across systems. To be persuasive for policy makers and collaborators in biomedicine, outcome sets must include both Ayurvedic descriptors (e.g., prakriti) and universally understood endpoints (time-to-heal, return-to-work, graded complications, recurrence). Prospective registries using standardized definitions can rapidly improve signal quality and enable multicenter studies.

Implementation challenges include supply-chain quality for traditional materials, variability in device manufacture, and uneven infrastructure across institutions. Opportunities involve low-cost innovation (e.g., validated temperature probes and sterile, pre-standardized threads), digital registries for real-time outcomes tracking, and interprofessional collaborations for peri-operative care, anesthesia, and infection control.

Ultimately, the path forward blends heritage, human factors (training and credentialing), and health-systems design (SOPs, audit, and feedback). With these elements, shastrakarma can mature into a reliably deliverable set of interventions that complement modern surgical care.

VI. CONCLUSION

Shastrakarma, as envisioned in the Sushruta Saṁhitā, represents one of humanity's earliest structured surgical sciences—combining precise operative classifications, carefully designed instruments, and an emphasis on patient preparation and aftercare. Today, as Ayurveda finds renewed clinical relevance, these classical surgical and para-surgical techniques are emerging as viable, patient-centered options for specific conditions. This review shows that meaningful progress has been made toward standardization: Kṣārasūtra therapy now benefits from increasingly uniform preparation protocols and aftercare schedules; Jalauka-avacaraṇa is supported by structured application and biosafety guidelines; and Agnikarma is beginning to incorporate measurable temperature and exposure parameters into its practice. Policy-level advances—such as training-linked scopes of practice and postgraduate curricular reforms—are helping to clarify who should perform these procedures and under what competencies. However, challenges remain. Variability in materials, devices, and procedural steps continues to hinder reproducibility. Training is uneven across institutions, and competency assessment is often underdeveloped. Research output is growing, but methodological rigor and standardized outcome reporting still need improvement to satisfy both internal quality benchmarks and external scrutiny from multidisciplinary healthcare systems.

REFERENCES

[1] Sushruta. Sushruta Samhita with Nibandhasangraha Commentary of Dalhana. Varanasi: Chaukhamba Surbharati Prakashan; 2008.

[2] Bhishagratna KK. The Sushruta Samhita. 2nd ed. Calcutta: Bose Brothers; 1907.

[3] Sharma PV. Shalya Tantra. Varanasi: Chaukhamba Orientalia; 2010.

[4] Tripathi KD, Sharma A. Principles and practice of Shalyatantra. New Delhi: Chaukhamba Sanskrit Series; 2015.

[5] Dwivedi V, Dwivedi S. History of medicine: Sushruta – the clinician–teacher par excellence. Indian J Chest Dis Allied Sci. 2007;49(4):243–244.

[6] Kumar A, Sahu A, Jha BK. Ksharasutra therapy in fistula-in-ano: A clinical review. Ayu. 2014;35(3):318–323.

[7] Deshpande PJ, Sharma KR, Bhatt N, Sharma RK. Standardization of Ksharasutra preparation: A study. Ayu. 1991;12(1):45–49.

[8] Singh R, Singh A, Goyal S. Modified Ksharasutra therapy for fistula-in-ano: An observational study. J Ayurveda Integr Med. 2018;9(4):282–286.

[9] Sharma M, Sharma SK. Role of Apamarga Ksharasutra in management of hemorrhoids. Ayu. 2012;33(4):569–572.
[10] Central Council for Research in Ayurvedic Sciences. SOP for preparation and application of Ksharasutra. New Delhi: CCRAS; 2016.
[11] Choudhary S, Kumar V, Yadav R. Jalaukavacharana: Traditional leech therapy in modern practice. Int J Ayurveda Res. 2010;1(1):41–47.
[12] Siddiqui MA, Ahmed S. Hirudotherapy: Modern relevance of leech application. Anc Sci Life. 2012;31(4):181–186.
[13] Singh S, Singh A. Jalaukavacharana in the management of venous congestion: A case series. J Ayurveda Integr Med. 2019;10(3):211–215.
[14] National Research Institute of Ayurveda. Guidelines for medicinal leech therapy. New Delhi: Ministry of Ayush; 2018.
[15] Mishra A, Gupta S. Agnikarma: A review on its procedure and clinical importance. Ayu. 2010;31(2):240–243.
[16] Gupta R, Kumar D. Clinical efficacy of Agnikarma in knee osteoarthritis. J Ayurveda Integr Med. 2017;8(4):224–228.
[17] Patel V, Sharma M, Verma N. Role of Agnikarma in tennis elbow: A comparative study. Ayu. 2013;34(3):283–286.
[18] Sharma S, Singh R. Agnikarma for plantar fasciitis: A case report. Ayu. 2020;41(1):72–75.
[19] Central Council for Research in Ayurvedic Sciences. Good Clinical Practice Guidelines for Ayurveda, Siddha, Unani Research. New Delhi: CCRAS; 2013.
[20] Ministry of Ayush. Postgraduate Ayurveda education regulations (Amendment). Gazette of India; 2020.
[21] National Ayurveda Research Institute. SOP for leech therapy in inflammatory disorders. Pune: NARI; 2017.
[22] Singh A, Yadav R. Comparative study of Ksharasutra therapy and fistulectomy. Ayu. 2011;32(2):225–229.
[23] Sen S, Choudhary A. Standardization in Ayurveda: Need for harmonization of traditional and modern protocols. J Ayurveda Integr Med. 2015;6(2):89–94.
[24] Patwardhan B. Bridging Ayurveda with evidence-based scientific approaches. J Ayurveda Integr Med. 2010;1(1):1–2.
[25] Sharma RK, Dash B. Charaka Samhita. Varanasi: Chowkhamba Sanskrit Series; 2012.
[26] Taneja A, Singh P. Sterility and shelf-life studies of Ksharasutra. Anc Sci Life. 2011;30(4):92–97.
[27] Rathi B, Singh R. Ayurveda Shalya Tantra: Historical perspectives and modern applicability. Ayu. 2014;35(4):348–353.
[28] Sharma A, Sharma AK. Role of leech therapy in non-healing ulcers. Ayu. 2013;34(1):79–83.
[29] Kumar N, Mehta N. Agnikarma and its role in musculoskeletal disorders: A clinical review. J Ayurveda Integr Med. 2019;10(4):273–278.
[30] Singh R, Tripathi R. Comparative efficacy of different Ksharasutra preparations in fistula-in-ano. Ayu. 2015;36(3):271–276.