



PARASURGICAL PROCEDURES OF AYURVEDA AS MINIMALLY INVASIVE ALTERNATIVES IN MODERN SURGERY

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ABSTRACT

The evolution of modern surgical practice has witnessed a profound shift from radical, open-access procedures toward Minimally Invasive Surgery (MIS). While this is often viewed as a contemporary advancement, the foundations of such philosophy were articulated thousands of years ago in the *Sushruta Samhita*. Acharya Sushruta described *Anushastra Karma* or parasurgical procedures—including *Kshara Karma* (chemical cautery), *Agnikarma* (thermal cautery), and *Jalaukavacharana* (leech therapy)—as techniques that achieve surgical goals without the extensive use of sharp instruments. These procedures prioritize tissue preservation, localized action, and minimal systemic disruption. This article provides a comprehensive academic review of these parasurgical interventions, analyzing their biochemical mechanisms and clinical efficacy in comparison to modern surgical techniques. By evaluating contemporary research and classical literature, the study demonstrates that *Anushastra Karma* offers cost-effective, office-based, and highly successful alternatives for managing chronic conditions like fistula-in-ano, musculoskeletal disorders, and peripheral vascular congestion, with significantly lower recurrence rates than conventional methods.

KEYWORDS: Anushastra Karma, Kshara Sutra, Agnikarma, Jalaukavacharana, Minimally Invasive Surgery, Shalya Tantra, Surgical Alternatives.

1. INTRODUCTION

The historical development of surgery is a testament to the human endeavor to treat disease through physical intervention. In the Ayurvedic tradition, surgery is categorized as *Shalya Tantra*, a discipline that reached its zenith under the tutelage of Acharya Sushruta, the "Father of Surgery." While the *Sushruta Samhita* details over 100 sharp instruments (*Shastras*), it places equal emphasis on *Anushastra Karma* (parasurgical procedures). These are defined as therapeutic maneuvers that possess surgical properties—such as excision (*Chhedana*), incision (*Bhedana*), and scraping (*Lekhana*)—but are performed using alkaline substances, heat, or biological agents instead of traditional steel blades.

In the contemporary medical landscape, Minimally Invasive Surgery (MIS) has become the gold standard, aiming to reduce post-operative pain, shorten hospital stays, and minimize scarring. However, modern MIS often involves high-cost equipment like laparoscopes, robots, and lasers. In contrast, Ayurvedic parasurgical procedures offer a "Minimal Access" philosophy through biological and chemical means, making them accessible and affordable. Techniques such as *Kshara Sutra* for fistula-in-ano have already been internationally recognized for their superiority over conventional fistulectomy. This article explores the descriptive nuances of these procedures, correlating ancient wisdom with modern pathophysiological principles to advocate for their integration into mainstream surgical practice.

2. Need of the Study

To evaluate Ayurvedic parasurgical procedures as scientifically validated, cost-effective, and minimally invasive alternatives to modern surgical interventions for chronic, recurrent, and high-risk surgical pathologies.

3. Materials and Methods / Review of Literature

The methodology for this academic review involves a descriptive analysis of classical Ayurvedic texts, including the *Sushruta Samhita*, *Charaka Samhita*, and *Ashtanga Hridaya*, synthesized with modern surgical research. A systematic search was conducted across databases such as PubMed, Scopus, and the AYUSH Research Portal to identify clinical trials and biochemical studies pertaining to *Kshara Sutra*, *Agnikarma*, and *Jalaukavacharana*.

3.1 Kshara Karma: The Chemical Excision

Kshara Karma is a unique Ayurvedic surgical modality involving the application of alkaline substances derived from the ash of medicinal plants, primarily *Apamarga* (*Achyranthes aspera*). This alkaline paste or solution acts as a chemical cauterant, capable of performing tissue debridement and excision without the use of a scalpel.^[1]

The most clinically significant application of this technique is the *Kshara Sutra* (medicated cautery thread). This thread is prepared by repeatedly coating a surgical linen thread with *Snuhi Ksheera* (latex of *Euphorbia neriifolia*), *Apamarga Kshara*, and *Haridra* (turmeric powder) over a period of several weeks.^[2]

The *Snuhi* latex acts as a proteolytic enzyme and a binding agent, the *Kshara* provides the alkaline pH necessary for chemical cauterization, and the *Haridra* serves as an anti-inflammatory and antiseptic agent. When applied to a fistula-in-ano, the *Kshara Sutra* works by simultaneous cutting and healing. It dissolves the fibrotic walls of the fistula tract while its antimicrobial properties prevent the formation of abscesses. Unlike a conventional fistulectomy, which involves wide excision of tissue and carries a risk of anal incontinence, the *Kshara Sutra* is a gradual process that allows the anal sphincter to heal as the thread moves through the tissue, ensuring anatomical and functional preservation.^[3]

3.2 Agnikarma: The Therapeutic Cautery

Agnikarma involves the intentional application of heat to the skin or deeper tissues using specialized metallic instruments known as *Dahanopakarana*, such as the *Panchadhātu Shalaka* (a probe made of gold, silver, copper, iron, and tin). This procedure is based on the principle that diseases treated by heat do not recur, as thermal energy penetrates deep into the tissues to eliminate localized pathology.^[4]

From a modern physiological perspective, *Agnikarma* functions through the modulation of pain receptors and

the enhancement of local blood flow. The application of heat at specific points (often correlating with "trigger points" or *Marma* points) stimulates the Gate Control Theory of pain. By activating large-diameter A-beta nerve fibers, the thermal stimulus inhibits the transmission of pain signals from smaller C-fibers at the dorsal horn of the spinal cord.^[5]

Furthermore, the localized hyperthermia induces vasodilation, which increases the supply of oxygen and nutrients while accelerating the removal of metabolic waste products like bradykinin and prostaglandins. This makes *Agnikarma* an exceptionally effective minimally invasive treatment for chronic pain conditions such as calcaneal spurs, sciatica, osteoarthritis, and tennis elbow.^[6]

3.3 Jalaukavacharana: Bio-Surgical Hirudotherapy

Jalaukavacharana, or medicinal leech therapy, is a form of *Raktamokshana* (bloodletting) used for the management of diseases caused by vitiated blood (*Dushta Rakta*). This procedure is particularly indicated in inflammatory conditions, skin diseases, and venous congestion.^[7]

The therapeutic efficacy of the leech is not merely in the volume of blood it extracts, but in the complex cocktail of bioactive proteins it injects during the process. The saliva of *Hirudo medicinalis* contains over 100 biologically active substances. *Hirudin* is a potent direct thrombin inhibitor that prevents blood clotting more effectively than systemic heparin in localized areas. *Calin* prevents collagen-induced platelet aggregation, while *Hyaluronidase* facilitates the deep penetration of these therapeutic proteins into the surrounding tissue.^[8]

Additionally, vasodilators like histamine-like substances improve regional microcirculation. In modern reconstructive surgery, leeches are used to salvage compromised skin grafts and flaps where venous congestion threatens tissue death. The leech acts as a biological "vent," providing a continuous drainage system until new venous connections can form naturally.^[9]

3.4 Siravyadha: Therapeutic Phlebotomy

Siravyadha, or venesection, involves the controlled puncturing of a specific vein to release blood. In the Ayurvedic surgical hierarchy, *Siravyadha* is considered the most potent form of *Raktamokshana*, often termed as "half of all surgical treatments" because of its ability to provide immediate systemic relief in inflammatory and vascular conditions.¹⁰ It is theorized that by removing a specific volume of blood, the internal pressure on the microvasculature is reduced, and circulating inflammatory cytokines are diminished, thereby resetting the local tissue environment.

Table 1: Comparison of Parasurgical and Modern Surgical Approaches.

Feature	Modern Conventional Surgery	Ayurvedic Parasurgical (<i>Anushastra</i>)
Primary Tool	Steel Scalpels / Electrocautery	<i>Kshara</i> (Alkali), <i>Agni</i> (Heat), <i>Jalauka</i> (Leech)
Anesthesia	General or Regional (Spinal)	Local or No Anesthesia Required
Hospitalization	Often requires 3–7 days	Day-care / OPD-based procedure
Tissue Impact	Macroscopic excision and scarring	Microscopic debridement and minimal scarring
Recurrence (Fistula)	7% – 15%	Less than 4%
Cost	High (Theater fees, ICU, Drugs)	Minimal (Materials and basic setup)

4. Statistical Analysis

Multiple clinical trials and observational studies have validated the efficacy of these procedures. A landmark study conducted by the Indian Council of Medical Research (ICMR) involved a multicentric randomized controlled trial comparing *Kshara Sutra* with conventional surgery for fistula-in-ano. The results indicated that the recurrence rate for *Kshara Sutra* was significantly lower (3.33%) compared to fistulectomy (11.1%).^[11]

In a study regarding *Agnikarma* in the management of *Gridhrasi* (Sciatica), 80% of participants reported a reduction of more than 75% in the Visual Analogue Scale (VAS) for pain within three sessions.^[12]

Furthermore, data from plastic surgery units globally acknowledge that leech therapy increases the survival rate of congested skin flaps by approximately 65% when pharmaceutical anticoagulants fail. These statistics highlight that the "minimal" approach of Ayurveda often yields "maximal" clinical results.

5. DISCUSSION

5.1 Philosophical Alignment with MIS

The defining goal of Minimally Invasive Surgery is to achieve the therapeutic objective with the least possible disruption to the patient's physiology. Ayurvedic parasurgery aligns perfectly with this paradigm. While modern MIS focuses on reducing the size of the incision through technology (lasers, laparoscopes), *Anushastra Karma* focuses on the biological and chemical manipulation of tissue. For example, *Kshara Sutra* provides a continuous, slow-motion debridement of a fistula tract, which is far less traumatic than the sudden, wide excision of a fistulectomy. This gradual nature is what prevents the loss of sphincter control, a complication that remains a major challenge in modern proctology.^[13]

5.2 Biochemical and Thermal Precision

The precision of *Anushastra* is observed at the cellular level. The alkalinity of *Kshara* creates a pH environment that is lethal to most pathogenic bacteria, including antibiotic-resistant strains. This chemical precision ensures that only unhealthy, necrotic tissue is liquefied, while the healthy underlying layers are stimulated to regenerate.^[14]

Similarly, *Agnikarma* provides a localized thermal shock that "resets" the nociceptive pathways. Modern radiofrequency ablation and cryosurgery are based on similar principles of using temperature extremes to induce therapeutic tissue modification, yet *Agnikarma* remains significantly more accessible and requires no complex electrical infrastructure.

5.3 Managing the Global Burden of Surgery

One of the most pressing issues in global health is the lack of access to safe surgery due to high costs and the need for specialized equipment. Ayurvedic parasurgical procedures offer a solution to this crisis. Because these procedures are predominantly OPD-based and do not require general anesthesia, they eliminate the risks associated with intubation and the high costs of operating theater time. *Kshara Sutra* and *Agnikarma* allow patients to remain ambulatory, maintaining their livelihood while undergoing treatment—a factor that is crucial in low-to-middle-income countries.^[15]

5.4 Integration and Standardisation

Despite their efficacy, the global adoption of *Anushastra Karma* faces hurdles related to standardization. The preparation of *Kshara Sutra* must be standardized to ensure consistent pH and coating thickness. Similarly, the "dosage" of heat in *Agnikarma* (the duration and depth of the burn) requires expert training to avoid iatrogenic injuries. There is a profound need for an integrated surgical model where modern diagnostic tools (like MRI defecography for fistula) are used to map the pathology, while Ayurvedic parasurgical tools are used for the actual intervention.^[16]

5.5 Safety Profile

The safety of these procedures is one of their most attractive features. Since *Jalaukavacharana* uses biological organisms, the primary risk is localized infection from the leech's symbiotic gut bacteria (*Aeromonas hydrophila*). However, this is easily managed with prophylactic antibiotics or by using laboratory-bred medicinal leeches.^[17]

Similarly, the localized nature of *Kshara* and *Agni* ensures that there is no systemic toxicity, making these procedures ideal for patients with co-morbidities like diabetes, heart disease, or those on long-term anticoagulants who might be poor candidates for major surgery.

Table 2: Bioactive Mechanisms of Parasurgical Components.

Component	Active Mechanism	Clinical Benefit
Snuhi Latex	Proteolytic Enzymes (Euphorbain)	Debridement of necrotic tissue
Apamarga Kshara	Alkaline pH (9.5–10.5)	Chemical cauterization & bactericidal action
Leech Saliva	Hirudin, Bdelin, Eglin	Anticoagulation & anti-inflammatory
Thermal Probe	Therapeutic Hyperthermia	Analgesia via Gate Control Theory
Haridra	Curcuminoids	Wound healing & antimicrobial

6. CONCLUSION

The parasurgical procedures of Ayurveda—*Kshara Karma*, *Agnikarma*, and *Jalaukavacharana*—represent an ancient yet highly advanced form of minimally invasive therapy. These techniques offer a unique synergy of chemical, thermal, and biological actions that address the root of various surgical pathologies without the morbidity associated with large-scale operative surgery.

The evidence suggests that for specific conditions like fistula-in-ano, *Kshara Sutra* is not merely an alternative but is superior to modern conventional methods due to its low recurrence and preservation of continence. Similarly, *Agnikarma* and *Jalaukavacharana* provide potent, localized treatments for pain and vascular congestion that bypass the systemic side effects of modern pharmaceuticals.

As the world moves toward more sustainable and patient-centric healthcare, the integration of Ayurvedic *Anushastra Karma* into the modern surgical curriculum is essential. By combining the diagnostic precision of modern medicine with the therapeutic minimalism of Ayurveda, the medical community can offer a more holistic, effective, and affordable surgical care system for all.

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