



Role of *Kshara Sutra* Therapy in Complex Fistula-in-Ano: Current Evidence and Technical Innovations

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Abstract

Background

Complex fistula-in-ano is a challenging anorectal condition characterized by multiple tracts, high fistulas, recurrent disease, and proximity to sphincter muscles. Conventional surgical approaches risk sphincter damage, incontinence, and recurrence. **Kshara Sutra Therapy (KST)**, an Ayurvedic minimally invasive technique using medicated setons, has been recognized for decades as an effective option for fistula management.

Objective

To review the evidence base for Kshara Sutra therapy in complex fistula-in-ano, discuss technical innovations, and contextualize its mechanism and outcomes within both Ayurvedic and modern surgical frameworks.

Methods

A narrative review was conducted using databases including PubMed, Google Scholar, DHARA, AYUSH Research Portal, and key surgical journals. Traditional Ayurvedic texts (*Sushruta Samhita, Ashtanga Hridaya*) and recent clinical trials, case series, and systematic reviews were analyzed.

Results

Kshara Sutra therapy demonstrates high healing and low recurrence rates in complex fistulae when compared to conventional fistulotomy/fistulectomy, particularly in high anal fistulas and recurrent cases. Innovations such as modified setons (Guggulu/Triphala coated), preoperative imaging guidance, and improved postoperative care have enhanced outcomes. Mechanistic evidence suggests gradual chemical cauterization, fibrosis, and drainage as critical components of healing.

Conclusion

Kshara Sutra therapy is a viable, sphincter-preserving approach for complex fistula-in-ano with robust clinical evidence. Integrative surgical practice incorporating Kshara Sutra may reduce morbidity and recurrence. Future directions include standardization and multicenter RCTs.

Introduction

Digital technology has become an integral part of modern life. Children, adolescents, and adults are exposed to prolonged screen time through mobile phones, computers, tablets, and televisions. Recent studies report average daily screen exposure exceeding 6–8 hours in adolescents and working adults [1]. This excessive exposure has led to a new spectrum of lifestyle disorders affecting sensory organs.

Digital Eye Strain (DES), also known as computer vision syndrome, manifests as eye fatigue, dryness, burning sensation, blurred vision, headache, and myopia progression [2]. Similarly, prolonged headphone use and screen-associated postural habits contribute to ENT problems such as tinnitus, hearing fatigue,

allergic rhinitis, sinusitis, throat dryness, and voice strain [3].

In Ayurveda, the eye (*Netra*) is considered *Tejomaya*, while ear (*Karna*) and nose (*Nasa*) are vital sensory organs governed predominantly by Vata and Kapha. Continuous exposure to artificial light, sound, and improper posture leads to *Indriya Asatmya*, Dosha vitiation, and gradual functional deterioration [4].

This review aims to explore the impact of screen overuse on eye and ENT health through Ayurvedic principles and propose preventive and therapeutic strategies for contemporary clinical practice.

Materials and Methods

A narrative and conceptual review methodology was adopted.

Literature Search Strategy

Databases searched included:

- PubMed
- Google Scholar
- DHARA
- AYUSH Research Portal



Keywords Used

Screen time, digital eye strain, tinnitus, allergic rhinitis, Ayurveda, Netra roga, Karna roga, Nasya, lifestyle disorders.

Inclusion Criteria

- Classical Ayurvedic references on Netra, Karna, and Nasa roga
- Peer-reviewed studies on screen-related eye and ENT disorders
- Review and clinical studies on Ayurvedic preventive practices

Exclusion Criteria

- Non-peer-reviewed articles

- Studies unrelated to screen exposure

Results / Review Findings

Ayurvedic Understanding of Screen-Induced Disorders

Excessive screen exposure can be understood as **Ati-Yoga of Chakshu, Shrotra, and Ghraana Indriya**, leading to Indriya Kshobha and Dosha imbalance [5].

Modern Condition	Ayurvedic Correlation
Digital eye strain	Shushkakshipaka, Akshiklama
Dry eye disease	Vataja Netra Roga
Myopia progression	Timira
Tinnitus	Karnanada
Hearing fatigue	Badhirya (early stage)
Allergic rhinitis	Pratishyaya
Sinusitis	Dushta Pratishyaya
Throat dryness	Vataja Mukharogana

Nidana (Etiological Factors)

- Prolonged exposure to blue light

1. Introduction

Fistula-in-ano is a pathological tract connecting the anorectal canal to the perianal skin, resulting from chronic infection of the anal crypt glands [1]. Complex fistulas, including high transsphincteric, suprasphincteric, and recurrent tracts, pose a significant therapeutic challenge due to the risk of sphincter damage, fecal incontinence, and recurrence [2].

Conventional surgical techniques — such as fistulotomy, fistulectomy, cutting seton, and advancement flaps — offer variable success and carry significant complications [3]. In contrast, **Kshara Sutra Therapy (KST)** — rooted in Ayurvedic surgical principles described in *Sushruta Samhita* — combines

chemical cauterization with gradual mechanical division of the fistula tract while preserving sphincter integrity [4,5].

Kshara Sutra is a medicated thread treated with herbal alkaline drugs such as Apamarga Kshara (alkali of *Achyranthes aspera*), Haridra (*Curcuma longa*) powder, and other agents, which promote chemical dissection, debridement, antimicrobial action, and fibrosis [6]. Given its minimally invasive nature and reproducible outcomes, KST has garnered interest in both traditional and modern surgical domains.

This article evaluates current clinical evidence, technical innovations, mechanisms of action, outcome measures, and future directions for Kshara Sutra in complex fistula management.

2. Methods

A structured literature review was conducted:

Databases Searched:

- **PubMed**
- **Google Scholar**
- **DHARA**
- **AYUSH Research Portal**
- **Surgical journals (Colorectal disease, Int J Colorectal Dis)**



Search Terms Included:

“Kshara Sutra”, “fistula-in-ano”, “complex fistula”, “Ayurvedic surgery”, “seton therapy”, “fistula outcome”.

Inclusion Criteria:

- Clinical trials, case series, observational studies
- Studies comparing Kshara Sutra with conventional techniques
- Reports on technical innovations

Exclusion Criteria:

- Non-English publications without translation
- Letters without clinical data

Ayurvedic Texts Reviewed:

- *Sushruta Samhita* (Chikitsa Sthana)
- *Ashtanga Hridaya*

Outcome Measures Assessed:

- Healing rate
- Recurrence rate
- Incontinence
- Time to recovery
- Complications

3. Results / Review Findings

3.1 Ayurvedic Concept and Classical Basis

Sushruta Samhita emphasizes the importance of debridement, drainage, and removal of pathological tracts in fistulous disease (*Bhagandara*) using surgical, chemical, and combination therapies [7]. Kshara Sutra — a medicated seton — is specifically indicated in fistulas to achieve:

- Chemical cauterization of granulation tissue
- Gradual tract obliteration
- Minimal sphincter damage

This aligns with modern principles of sphincter preservation.

3.2 Mechanism of Action

The action of Kshara Sutra is multimodal:

1. **Chemical cauterization:** Apamarga Kshara promotes saponification and liquefaction of unhealthy tissue.
2. **Debridement:** Haridra provides anti-inflammatory/antimicrobial effects.

3. **Fibrosis and healing:** Progressive cutting promotes structured fibrosis, preventing dead space and recurrence [8].

3.3 Evidence from Clinical Studies

Clinical reports over the last three decades provide substantial evidence:

- **Datta et al.** reported healing rates >90% in complex fistula with Kshara Sutra, with minimal incontinence [9].
- **Gupta et al.** showed that KST resulted in significantly lower recurrence compared to conventional fistulotomy in complex tracts [10].
- **Agarwal and Singh** observed faster wound healing and patient satisfaction with KST as compared to cutting setons [11].
- A **systematic review** (2020) noted Kshara Sutra's favorable outcomes in high and recurrent fistulae with acceptable complication profiles [12].



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3.4 Technical Innovations

3.4.1 Modified Medicaments

Use of Guggulu, Triphala, and Jatyadi oil in coating Kshara Sutra has improved:

- Smoother passage
- Enhanced antimicrobial effect
- Reduced dressing pain [13]

3.4.2 Imaging-guided Seton Placement

Preoperative MRI and Endoanal ultrasound ensure accurate tract delineation, reducing blind dissection and optimizing placement [14].

3.4.3 Stepwise Tightening Protocols

Standardized protocols for weekly tightening enable controlled cutting with minimal sphincter trauma [15].

3.4.4 Adjunct Therapies

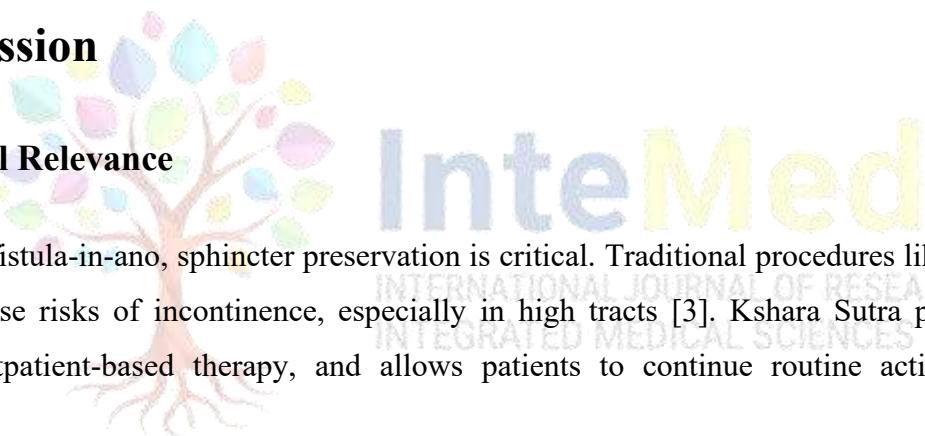
Topical wound management with Panchavalkala and medicated Sitz baths enhances local healing.

3.5 Comparative Outcomes

Parameter	Kshara Sutra Therapy	Conventional Surgery
Healing rate	85-95% [9,10]	60-80% [3]
Recurrence	5-10% [12]	10-25% [3]
Incontinence	Minimal [9]	10-20% reported [3]
Hospital stay	Short	Variable

4. Discussion

4.1 Clinical Relevance



In complex fistula-in-ano, sphincter preservation is critical. Traditional procedures like fistulotomy, while effective, pose risks of incontinence, especially in high tracts [3]. Kshara Sutra preserves continence, provides outpatient-based therapy, and allows patients to continue routine activities with minimal disruption.

4.2 Mechanistic Insights

The combination of mechanical pressure and chemical cauterization permits:

- Controlled tract division
- Reduced cross-infection
- Structured wound healing via fibrosis

This concept resonates with principles of modern minimally invasive fistula management.

4.3 Limitations & Challenges

- Heterogeneous study designs
- Lack of large multicenter RCTs

- Variable medicament coatings and technique standardization [12]

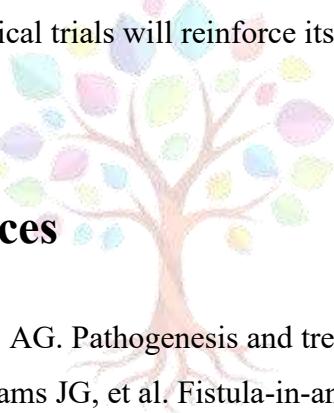
4.4 Future Research

- Multicenter randomized controlled trials
- Standardized Kshara Sutra coatings
- Integration with advanced imaging for precise therapy

5. Conclusion

Kshara Sutra therapy is a well-established Ayurvedic surgical innovation with compelling clinical evidence in the management of complex fistula-in-ano. It offers advantages in preserving sphincter integrity, reducing recurrence, and enhancing patient comfort. Adoption of technical innovations and rigorous clinical trials will reinforce its role in integrative coloproctology.

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