

Review Article

ISSN: 3048-5630

“PILONIDAL SINUS: KSHARA SUTRA AND MINIMALLY INVASIVE APPROACHES IN THE LIGHT OF MODERN MANAGEMENT”

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FUNDING INFORMATION:

Not Applicable

How to cite this article:

Jalpa Gandhi, “Pilonidal sinus: Kshara Sutra and minimally invasive approaches in the light of modern management” *Frontiers of Shalya and Shalakya Chikitsa*. 2026;3(1):11-15.
Sri. 2026.1005.fssc.01.03

ABSTRACT

Background: Pilonidal sinus disease is a chronic inflammatory condition of the sacrococcygeal region that mainly affects young adults. Conventional excision surgery often involves long healing times, prolonged absence from work and high recurrence rates. Ayurveda describes chronic sinuses as Nadi Vrana and treats them with Kshara Sutra, a medicated seton that gradually cuts and heals the tract. **Objective:** To review the modern understanding and management of pilonidal sinus, the classical basis of Kshara Sutra in Nadi Vrana, and the evidence for Kshara Sutra and other minimally invasive approaches. **Methods:** Narrative review of Sushruta Samhita, surgical guidelines, meta-analyses, Cochrane reviews and clinical reports. **Results:** Pilonidal disease is now understood as an acquired condition caused by penetration of loose hairs into the skin of the natal cleft. Treatment options include excision with open healing or midline closure, off-midline flap procedures, and minimally invasive approaches such as pit picking, phenol injection and endoscopic treatment. A large meta-analysis found substantial differences in recurrence between procedures, with off-midline techniques performing better than midline closure. Sushruta recommends Kshara Sutra for sinuses in patients who are weak, fearful or at delicate sites. Case reports and a small case series of Kshara Sutra in pilonidal sinus reported healing in about four weeks with no recurrence over follow-up. **Conclusion:** Kshara Sutra is a promising minimally invasive option for selected pilonidal sinuses, particularly simple tracts. Evidence is limited to case reports and small series; comparative trials against modern minimally invasive techniques are needed.

KEYWORDS: pilonidal sinus; Nadi Vrana; Kshara Sutra; minimally invasive surgery; pit picking; recurrence

INTRODUCTION

Pilonidal sinus disease affects the skin of the natal cleft, typically presenting with pain, swelling, abscess or chronic discharge from one or more midline pits. It is most common in young men, particularly those who are hirsute, overweight or sit for long periods^[1,2]. The term “pilonidal”, meaning “nest of hairs”, was introduced in the nineteenth century^[3].

Although pilonidal disease is benign, its treatment can be burdensome. Wide excision with open healing may take weeks to months to heal and requires prolonged wound care. Midline closure heals faster but has higher recurrence. Off-midline flap procedures reduce recurrence but are more complex^[4-6]. Recurrence after any procedure is a major problem, and many patients undergo multiple operations.

Minimally invasive approaches, such as pit picking, phenol injection and endoscopic treatment, aim to reduce tissue loss, healing time and time off work^[1,4,7]. Kshara Sutra, used widely in India for fistula-in-ano, has also been applied to pilonidal sinus tracts. This review summarises modern understanding and management of pilonidal disease and evaluates Kshara Sutra in this context.

METHODS

The classical source was Sushruta Samhita, Chikitsa Sthana 17 (Nadi Vrana)^[8]. Modern literature was identified through PubMed, the Cochrane Library and Google Scholar using pilonidal sinus, pilonidal disease, recurrence, flap, pit picking, phenol, endoscopic pilonidal sinus treatment, Kshara Sutra and Nadi Vrana. This is a narrative review.

MODERN UNDERSTANDING

Pathogenesis

Pilonidal disease was once considered congenital, but it is now widely accepted to be acquired. Karydakakis proposed that loose hairs are driven into the skin of the natal cleft by friction and suction during movement, creating a foreign-body reaction and sinus^[9]. Bascom emphasised the role of enlarged hair follicles in the midline pits as the starting point of the disease^[10]. These concepts underpin modern techniques that aim to remove the midline pits and flatten the natal cleft.

Risk factors

Recognised risk factors include male sex, young

age, hirsutism, deep natal cleft, obesity, prolonged sitting and family history^[1,2].

Clinical presentation

Patients present with an acute abscess, a chronic discharging sinus or recurrent disease after previous surgery. Examination shows midline pits, often with lateral openings. Complex disease may involve multiple tracts and extensive scarring.

MODERN MANAGEMENT

Acute abscess

Acute pilonidal abscess is treated by incision and drainage, ideally off the midline, with definitive treatment of the sinus after the acute inflammation settles^[1].

Excision procedures

- **Excision with open healing:** low recurrence in some series, but long healing time and prolonged wound care.
- **Excision with midline primary closure:** faster healing but higher recurrence and wound breakdown.
- **Off-midline closure and flap procedures:** such as the Karydakakis flap, Bascom cleft lift and Limberg (rhomboid) flap, which flatten the natal cleft and move the scar away from the midline^[9,10].

A Cochrane review comparing healing by primary versus secondary intention found that open healing took longer, and that off-midline closure should be preferred when primary closure is chosen^[5]. A large meta-analysis and merged data analysis of recurrence after common procedures found considerable differences between techniques, with off-midline procedures such as the Karydakakis and Limberg flaps having lower recurrence than midline closure, and recurrence continuing to rise over long-term follow-up^[6].

Minimally invasive procedures

- **Pit picking (Bascom or Gips procedure):** excision of the midline pits with small incisions, removal of hair and debris, and drainage through a lateral incision^[10].
- **Phenol injection:** crystallised or liquid phenol is introduced into the cleaned sinus to destroy the epithelial lining and promote healing; series report acceptable healing and recurrence with rapid return to work^[11].
- **Endoscopic pilonidal sinus treatment (EPSiT):**

a fistuloscope is used to visualise, clean and ablate the sinus tract through a small opening, with minimal tissue loss^[7].

- **Laser ablation** of the tract is another emerging option.

Guidelines suggest that minimally invasive methods are reasonable for simple disease, with flap procedures reserved for complex or recurrent disease^[1,4].

CLASSICAL BASIS OF KSHARA SUTRA IN NADI VRANA

Sushruta describes Nadi Vrana (sinus) as a tract that forms when a pus-filled lesion is neglected and the pus burrows into deeper tissues^[8]. He classifies sinuses by Dosha and cause, including Shalyaja Nadi Vrana, a sinus caused by a foreign body. This category is notable because pilonidal sinus is now understood as a foreign-body (hair) reaction.

For treatment, Sushruta recommends surgical excision of the tract when feasible. However, for patients who are weak, fearful or emaciated, and for sinuses at delicate sites, he recommends passing a Kshara-coated thread through the tract and tying it, so that the thread gradually cuts through the tract^[8]. This is the classical origin of Kshara Sutra treatment for sinuses.

KSHARA SUTRA IN PILONIDAL SINUS

Technique

After cleaning the sinus and removing hair and debris, a probe is passed from the midline pit through the tract to a secondary opening, or a counter-incision is made at the end of the tract. A standard Kshara Sutra (coated with Snuhi latex, Apamarga Kshara and Haridra) is drawn through and tied. The thread is changed weekly, gradually cutting through the tract while healing occurs from the base. Hair around the area is removed regularly, and the patient is advised on hygiene.

Evidence

A case report in an Ayurveda research journal described successful treatment of pilonidal sinus with Kshara Sutra as a minimally invasive approach^[12]. A case series of five male patients with pilonidal sinus treated with Kshara Sutra at a tertiary care centre reported a median of 23 days for the tract to be cut through and 29 days to complete healing, with the thread changed two to three times, no postoperative complications and no recurrence over

a median follow-up of about 20 months^[13]. The authors described the results as encouraging but noted that a larger sample and a randomised trial were needed. Other case reports have described Kshara Sutra in infected and recurrent pilonidal sinus.

Potential advantages

- Ambulatory treatment with minimal hospital stay.
- Minimal tissue loss compared with wide excision.
- Gradual cutting with simultaneous healing, avoiding a large open wound.
- Low cost and simple equipment.
- Chemical debridement of the tract lining by the alkaline coating, which may destroy the epithelialised lining that sustains the sinus.

Limitations and uncertainties

- Evidence is limited to case reports and a small case series.
- Complex disease with multiple tracts, extensive scarring or deep lateral extensions may be less suitable.
- Kshara Sutra does not flatten the natal cleft, which is the goal of off-midline flap procedures; whether recurrence will be higher in patients with a deep cleft is unknown.
- Weekly visits are required during treatment.

PATIENT SELECTION FOR KSHARA SUTRA

Based on the limited evidence and general surgical principles, Kshara Sutra is most likely to be suitable for:

- Primary (first-time) pilonidal sinus with a single tract or a midline pit and one lateral opening.
- Tracts that can be fully probed from end to end.
- Patients who wish to avoid excision surgery, cannot take prolonged time off work, or have medical conditions that increase surgical risk.
- Recurrent sinuses with a well-defined single tract after previous surgery.

It is less likely to be suitable for:

- Acute abscesses, which need drainage first.
- Extensive disease with multiple branching tracts, large cavities or wide lateral extensions.
- Patients with very deep natal clefts and recurrent disease, in whom cleft-flattening procedures may be more appropriate.
- Patients unable to attend weekly follow-up.

Before treatment, the extent of disease should be assessed clinically and, in complex or recurrent cases,

with ultrasound or MRI. Diabetes and obesity should be addressed, as both impair healing.

PATIENT-CENTRED OUTCOMES

For young adults with pilonidal disease, outcomes such as pain, time to return to work or study, cosmetic result and quality of life are as important as recurrence. Wide excision with open healing often requires weeks of dressings and time away from work, which has driven the shift towards

minimally invasive surgery. The Kshara Sutra case series reported complete healing in about four weeks with treatment on an outpatient basis^[13], which compares favourably with open excision. Future studies of Kshara Sutra should report time to return to normal activities, pain scores, wound care burden and patient satisfaction, alongside recurrence, to allow meaningful comparison with other techniques.

COMPARISON OF APPROACHES

Table 1: Comparison of approaches to pilonidal sinus

Approach	Tissue loss	Healing time	Recurrence	Evidence level
Excision with open healing	Large	Long	Variable; moderate	Meta-analysis, Cochrane ^[5,6]
Excision with midline closure	Moderate	Shorter	Higher	Meta-analysis ^[6]
Off-midline flaps (Karydakis, Limberg, cleft lift)	Moderate	Moderate	Lower	Meta-analysis ^[6]
Pit picking	Minimal	Short	Moderate	Case series and cohorts ^[10]
Phenol injection	Minimal	Short	Moderate	Case series ^[11]
EPSiT	Minimal	Short	Emerging data	Case series ^[7]
Kshara Sutra	Minimal	About 4 weeks in small series	Unknown (none in small series)	Case reports and small series ^[12,13]

PERIOPERATIVE CARE AND PREVENTION OF RECURRENCE

Regardless of the method, measures to prevent recurrence include removal of hair around the natal cleft (by shaving, depilatory creams or laser epilation), hygiene, weight control and avoidance of prolonged sitting where possible^[1,4]. In Ayurvedic practice, wound care after Kshara Sutra includes cleaning with Panchavalkala or Triphala decoction, application of Jatyadi Taila, and oral formulations such as Triphala Guggulu.

RESEARCH PRIORITIES

1. Prospective cohort studies of Kshara Sutra in pilonidal sinus with standardised outcomes, including time to healing, pain, time off work, patient satisfaction and recurrence at one, two and five years.
2. Randomised trials comparing Kshara Sutra with pit picking, phenol injection or EPSiT in simple disease.
3. Studies in recurrent and complex disease, possibly combining Kshara Sutra with cleft-flattening approaches.
4. Cost-effectiveness analyses, given the low cost.

DISCUSSION

Pilonidal disease remains a surgical challenge because traditional excision procedures cause substantial morbidity and recurrence. The trend in modern surgery is towards minimally invasive treatment for simple disease. Kshara Sutra fits within this trend. Its classical basis in Sushruta's treatment of sinuses, including foreign-body sinuses, is striking, and its mechanism of gradual cutting with chemical debridement is plausible.

However, the evidence for Kshara Sutra in pilonidal disease is very limited. Small case series cannot establish recurrence rates, which in pilonidal disease continue to accumulate for years. Well-designed comparative studies with long follow-up are needed.

CONCLUSION

Kshara Sutra, derived from Sushruta's treatment of Nadi Vrana, is a low-cost, minimally invasive option for selected pilonidal sinuses, with encouraging results in small case series. Modern management offers a range of options from minimally invasive procedures to off-midline flaps. Comparative trials of Kshara Sutra against established minimally invasive techniques, with long-term follow-up for recurrence,

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