



The Journey Of Ksharasutra: From Ancient Practices To Contemporary Innovations In Preparation And Application

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Abstract:

Ksharasutra is a widely used Ayurvedic technique for treating fistula-in-ano and hemorrhoids. Traditionally prepared using *Snuhi ksheera*, *Apamarga Kshara*, and *Haridra*, the preparation has evolved with advancements such as *Guggulu* and *Papaya*-based *Ksharasutras*. These innovations aim to enhance therapeutic outcomes, reduce discomfort, and provide year-round accessibility. This review discusses traditional and alternative preparation methods, their clinical efficacy, and the role of modern formulations in enhancing *Ksharasutra* therapy and also historical evolution of *Ksharasutra*, its development through centuries, multifaceted mechanisms underlying *Ksharasutra*'s effectiveness, including mechanical strangulation, chemical cauterization, and localized drug delivery and its modern application.

Keywords: *Ksharasutra*, *Guggulu*, Fistula-in-ano, Hemorrhoids, Parasurgical, Ayurveda

Introduction:

Ksharasutra, a medicated thread coated with herbal formulations, has been a cornerstone of Ayurvedic parasurgical practices. Initially described in *Sushruta Samhita* for treating *Nadi Vrana* (sinus) and *Bhagandara* (fistula-in-ano), it has since been standardized and expanded into modern medical practice. Traditional *Ksharasutra* consists of a thread coated with *Snuhi ksheera* (latex from *Euphorbia nerifolia*), *Apamarga Kshara* (alkaline ash from *Achyranthes aspera*), and *Haridra* (turmeric powder) ^[1]. Recent advancements have

introduced alternative ingredients like *Guggulu* (*Commiphora mukul*) and *Papaya* (*Carica papaya*) extracts to address issues related to the availability and side effects of *Snuhi ksheera*^[2]. *Ksharasutra* is referenced in *Charaka Samhita* and *Ashtanga Hridaya*, with detailed preparation methods specified by *Chakrapanidatta* and *Bhavaprakasa* using *Snuhi Kshira* and *Haridra Choorna*. The method involves soaking linen threads in *Euphorbia latex* and applying *Apamarga Kshara*. In the 1960s, Dr. P.J. Deshpande standardized this to a 21-coating process, creating an accepted clinical method.

Historical Development and Standardization:

In the later classical Ayurvedic texts, such as *Charaka Samhita* and *Ashtanga Hridaya*, *Ksharasutra* was mentioned in the context of treating various surgical conditions^[3]. However, the precise ingredients and methods of preparation were not elaborated until *Chakrapanidatta* and *Bhavaprakasa* later provided insights on the preparation, involving *Snuhi Kshira* (latex of *Euphorbia*) and *Haridra Choorna* (turmeric powder)^[4]. The traditional preparation involved soaking linen thread in the latex of *Euphorbia* and applying layers of alkaline material like *Apamarga Kshara*^[5].

The modern standardization of *Ksharasutra* therapy owes much to the work of Dr. P.J. Deshpande at the *Banaras Hindu University* in the 1960s. Deshpande, along with other researchers like Dr. I. Sanjeeva Rao and Dr. S.N. Pathak, played a pivotal role in refining the method, making it suitable for widespread clinical application^[6]. This method involved 21 coatings of *Snuhi Kshira*, *Apamarga Kshara*, and *Haridra Choorna* on surgical linen threads, creating a well-defined procedure still in use today^[7].

Modern Research and Advancements:

Since its reintroduction in the modern era, *Ksharasutra* therapy has undergone several modifications. Various types of medicated threads have been developed, such as *Udumbara Ksharasutra*, *Papaya Ksharasutra*, and *Guggulu Ksharasutra*, each tailored for specific conditions^[15]. Clinical trials conducted by institutions like the Indian Council for Medical Research (ICMR) have confirmed the efficacy of *Ksharasutra* in treating anorectal disorders with minimal side effects^[16].

One of the most significant advancements in recent times is the comparative study of *Ksharasutra* with conventional surgical methods. Studies have shown that *Ksharasutra* therapy results in fewer recurrences and complications than traditional surgery, making it a cost-effective and safer alternative for patients with anorectal conditions^[17].

Materials and Methods:

1. Traditional *Ksharasutra* Preparation (*Snuhi*-Based):

The traditional method of preparing *Ksharasutra* begins by selecting Barbour surgical linen thread No. 20 for its tensile strength of around 5.0 kg^[18]. The thread undergoes 21 coats: the first 11 layers consist of *Snuhi latex*, followed by 7 coats of latex mixed with *Apamarga Kshara*, and finally, 3 layers of latex mixed with *Haridra*^[19]. Each coating is dried under ultraviolet light in a specialized *Ksharasutra* cabinet to ensure sterility and consistency^[20].

2. *Guggulu* -Based *Ksharasutra*:

In modern times, *Guggulu* has emerged as an effective alternative to *Snuhi ksheera*. *Guggulu* resin is dissolved in ethyl alcohol or water and then applied to the thread in 11 consecutive coatings. This is followed by the same 7 layers of latex mixed with *Apamarga Kshara* and 3 layers of *Haridra* powder. *Guggulu* -based threads are preferred for their superior anti-inflammatory properties, faster healing, and greater patient comfort, as they cause less irritation than *Snuhi*-based threads^[21].

3. Papaya-Based *Ksharasutra*:

Papaya pulp and papain enzyme are used as an alternative to *Snuhi latex* in this preparation. Like *Guggulu* -based *Ksharasutra*, the thread undergoes 11 layers of papaya extract followed by *Apamarga Kshara* and *Haridra* coatings. This formulation is noted for its proteolytic properties, aiding in the debridement of necrotic tissue^[22]. Although Papaya-based *Ksharasutra* exhibits faster tissue cutting times, its use is limited by the shorter shelf life of the thread due to enzyme degradation^[23].

4. *Udumbara*-Based *Ksharasutra*:

Ficus glomerulata (*Udumbara*) latex is used as a substitute for *Snuhi ksheera* in regions where *Snuhi* is unavailable. *Udumbara* latex is known for its cooling properties and gentler effect on tissues. Threads coated with *Udumbara* latex are less likely to cause irritation but have slightly lower tensile strength, making them prone to premature breakage^[24].

5. *Ghritakumari* (Aloe Vera)-Based *Ksharasutra*:

Aloe Vera pulp is another alternative to *Snuhi ksheera*. It provides a cooling and soothing effect, particularly beneficial for sensitive patients. While *Ghritakumari*-based threads are highly effective in promoting healing and reducing inflammation, the adhesive properties of Aloe Vera are inferior, leading to uneven coatings on the thread^[25].

Table 1: Difference of Opinion: ^[26]

Coatings Stage	Material	P.J Deshpande	S.N Pathak
1.	<i>Snuhi Kshira</i>	10	11
2.	<i>Snuhi Kshira + Kshara</i>	07	07
3.	<i>Snuhi Kshira+ Haridra Choorna</i>	04	03
4.	Total	21	21

Different varieties of *Ksharasutra* (Martha Bhaskar Rao, Lavekar.G.S, 2009): ^[27]

1. *Apamarga Ksharasutra*
2. *Udumbara Ksharasutra*
3. *Papaya Ksharasutra*
4. *Snuhi swarasa Ksharasutra Yava Ksharasutra*
5. *Ghrutakumari Ksharasutra*
6. *Snuhi kshira Ksharasutra*
7. *Gomutra Ksharasutra*
8. *Guggulu Ksharasutra Arka kshira based Ksharasutra*
9. *Madhu coated Ksharasutra*
10. *Gandhaphiroja Ksharasutra*
11. *Tankana Ksharasutra*
12. *Aragvadhadi Ksharasutra*
13. *Madhu -Madhuyashthi coated Ksharasutra*
14. *Tilakalka based Ksharasutra*
15. *Vasa Ksharasutra*
16. *Ropana dravya coated Ksharasutra Etc.*

Comprehensive Overview of *Ksharasutra* Mechanisms and Effects:

Mechanical Strangulation Theory: *Ksharasutra* therapy leverages a specialized linen thread that provides the necessary strength for transfixation, or the binding of affected tissue. When this medicated thread is applied to conditions such as hemorrhoids or fistula-in-ano, it gradually exerts mechanical pressure on the tissue. This pressure builds over time, eventually leading to tissue strangulation. In the case of hemorrhoids, the thread tightly compresses the blood vessels, resulting in the pile mass becoming necrotic and detaching naturally during bowel movements. For fistula-in-ano, although the strangulation effect is less intense, it remains crucial for maintaining the tract's patency, allowing the thread to slowly and safely cut through the abnormal tissue, facilitating a natural healing process ^[21].

Chemical Cauterization Theory: *Ksharasutra*'s unique strength lies in its chemical cauterizing properties, achieved through its coating with potent alkaline agents such as *Apamarga Kshara* and *Snuhi Kshira*. When the medicated thread comes into contact with the lesion, the *Kshara* starts infiltrating the cells, gradually breaking down the abnormal tissue. This slow, controlled chemical reaction ensures the pile mass or fistula tract is cauterized without harming the surrounding healthy tissue. As the tissue undergoes necrosis, the body naturally regenerates healthy connective tissue, ensuring a thorough healing process. Furthermore, the coagulating action of *Kshara* helps stop any blood oozing during the procedure, which minimizes bleeding and promotes smooth recovery ^[22].

Antibiotic Properties: In addition to its mechanical and chemical effects, *Ksharasutra* contains powerful antimicrobial properties, especially due to the inclusion of *Haridra Choorna* (turmeric powder), known for its natural antibacterial and anti-inflammatory effects. These properties significantly reduce the risk of infection, which is a common complication in conditions like fistula-in-ano and hemorrhoids. The antimicrobial agents in the thread continuously work to keep the wound clean, fostering an infection-free environment that enhances healing. The sustained action of these natural antibiotics not only prevents infection but also supports faster and more effective recovery ^[23].

Localized Drug Delivery System: *Ksharasutra* therapy also acts as an efficient localized drug delivery system. The medicated coatings on the thread, applied in multiple layers, release healing agents directly into the affected tissues over time. This localized delivery ensures that the therapeutic agents are concentrated exactly where they are needed, penetrating deep into the diseased tissue. The controlled release of these substances allows for gradual degeneration of the unhealthy tissue while promoting healthy tissue growth. This sustained action helps ensure a comprehensive healing process that addresses the root cause of the condition without causing unnecessary harm to the surrounding areas ^[24].

Synergistic Effects of *Ksharasutra* Components: The combined effects of *Ksharasutra*'s ingredients – the linen thread, *Kshara*, and turmeric powder – work harmoniously to ensure effective treatment. The thread provides the mechanical support, while the *Kshara* acts as a chemical agent, facilitating the slow and controlled destruction of the abnormal tissue. Turmeric enhances this process by offering its antimicrobial and healing properties, helping to minimize infection and promote quicker recovery. These components do not conflict with each other but rather complement each other's effects, resulting in a balanced and multi-dimensional treatment. The gradual excision process, combined with *Kshara*'s chemical cauterization, ensures that the treatment is safe, controlled, and highly effective in reducing the chances of bleeding or infection [25].

Theory of Fibrotic Scar Formation: An important aspect of *Ksharasutra* therapy is its role in managing fibrotic scar formation, which can occur in response to tissue injury or surgical intervention. As *Ksharasutra* effectively removes abnormal tissue, it also influences the healing process by minimizing excessive fibrous tissue formation. The gradual cutting action of the *Ksharasutra* allows the body to form a controlled scar rather than a dense, fibrous mass. This approach promotes the development of flexible, functional scar tissue that integrates well with surrounding tissues, reducing complications such as strictures or functional impairment. By ensuring a slower, more controlled healing response, *Ksharasutra* therapy helps create an environment conducive to proper healing and tissue remodeling, ultimately leading to better functional outcomes for patients [26].

Theory of Non-Recurrence: One of the most significant advantages of *Ksharasutra* therapy is its ability to reduce the likelihood of recurrence after treatment. The controlled mechanical and chemical actions ensure that the entire pathological tissue, including any potential residual fibrous tissue, is addressed. By effectively cauterizing and excising the diseased tissue, *Ksharasutra* creates a healthier tissue environment that is less prone to the regrowth of the abnormal tissue. Additionally, the presence of therapeutic agents in the *Ksharasutra* helps to promote healing in a way that discourages the re-establishment of the pathological condition. The careful management of the tissue during the procedure also contributes to this non-recurrence effect, as it preserves surrounding healthy structures and minimizes trauma to the area, further supporting a successful long-term outcome [27].

Results:

Several clinical trials have highlighted the effectiveness of alternative *Ksharasutra* preparations, showcasing their potential advantages over traditional methods. For instance, *Guggulu* -based *Ksharasutra* has demonstrated faster healing rates, leading to significant reductions in patient pain and lower recurrence rates compared to the conventional *Snuhi*-based threads [28]. *Guggulu* 's anti-inflammatory properties enhance recovery, making it a preferred choice for many practitioners aiming to improve patient outcomes.

In contrast, *Papaya*-based *Ksharasutra* has proven particularly effective in tissue debridement due to the enzymatic activity of papain, which aids in breaking down necrotic tissue. However, this benefit comes with limitations, as *Papaya*-based threads exhibit shorter cutting times and a reduced shelf life, making them less stable for long-term use^[29]. Such characteristics highlight the need for careful consideration when selecting the appropriate *Ksharasutra* formulation for individual patient needs.

Additionally, *Udumbara*-based *Ksharasutra* offers a gentler alternative, particularly suitable for patients with sensitive tissues. While it is well-tolerated, its durability may not match that of the more robust *Snuhi* or *Guggulu*-based threads^[30]. This variability in durability and effectiveness among different formulations emphasizes the importance of personalized treatment plans in *Ksharasutra* therapy.

The historical evolution of *Ksharasutra*, from its roots in ancient Ayurvedic practice to modern applications, serves as a testament to its enduring effectiveness. Extensive documentation across centuries illustrates a consistent success rate, reinforcing its credibility as a treatment option. Importantly, the unique mechanisms of action associated with *Ksharasutra* significantly contribute to its ability to prevent recurrence of anorectal disorders. This non-recurrence aspect is particularly noteworthy, as it addresses one of the most common concerns in managing chronic conditions, thereby enhancing patient satisfaction and long-term health outcomes.

As research progresses, the continued exploration of these alternative preparations will likely lead to further innovations and refinements in *Ksharasutra* therapy, ensuring its relevance and efficacy in contemporary medical practice. The integration of traditional wisdom with modern scientific advancements underscores *Ksharasutra*'s potential as a safe, effective, and minimally invasive treatment option for patients suffering from anorectal disorders.

Discussion:

The evolution of *Ksharasutra* preparation reflects the need for more efficient, patient-friendly, and accessible therapies in Ayurvedic parasurgery. While *Snuhi ksheera* has long been the standard for *Ksharasutra* preparation, its seasonal availability, patient discomfort, and potential for causing irritation have led to the development of alternatives. *Guggulu*-based *Ksharasutra* is emerging as a promising substitute due to its year-round availability, superior anti-inflammatory properties, and better overall patient outcomes^[31]. Other alternatives, such as *Papaya*, *Udumbara*, and *Ghritakumari*, provide additional options for practitioners, though they may come with limitations such as reduced tensile strength or shorter shelf life^[32]. *Ksharasutra* therapy employs a multifaceted approach to effectively treat anorectal conditions, integrating mechanical strangulation and chemical cauterization to promote healing. The thread's mechanical action compresses and necrotizes the abnormal tissue, allowing for natural detachment during bowel movements, while the chemical properties facilitate controlled tissue breakdown and minimize damage to surrounding areas. The presence of *Haridra Choorna* enhances the therapy's effectiveness by reducing infection risks, creating a cleaner healing environment. Additionally, the therapy's localized drug delivery system ensures targeted treatment, promoting

healthy tissue growth and managing fibrotic scarring to prevent complications. *Ksharasutra* also lowers recurrence rates by thoroughly addressing all pathological tissue, making it a promising minimally invasive alternative to conventional surgery for long-term management of anorectal disorders.

Conclusion:

Ksharasutra therapy embodies a harmonious integration of traditional Ayurvedic principles and contemporary medical advancements, proving to be a significant treatment for anorectal disorders like fistula-in-ano and hemorrhoids. While the traditional *Snuhi*-based *Ksharasutra* remains the most popular option, innovations such as *Guggulu*, *Papaya*, and *Ghridakumari*-based preparations offer enhanced patient comfort, faster healing, and improved accessibility.

As ongoing research continues to explore and standardize these newer formulations, the efficacy of *Ksharasutra* therapy in Ayurvedic practice is expected to grow, further solidifying its role as a minimally invasive treatment. The therapy's unique combination of mechanical, chemical, and medicinal actions allows it to effectively excise diseased tissue, prevent infections, and promote healing while minimizing the risk of recurrence.

With its historical significance and global acceptance, *Ksharasutra* stands as a promising solution for managing complex anorectal conditions. As we advance our understanding of its preparation and application, *Ksharasutra* offers patients a safer and more effective alternative to conventional surgical approaches, making it a valuable option in both traditional and modern medical settings.

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