



A Review on Mechanism of Action of Ksharsutra in Wound Healing and Tissue Debridement.

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ABSTRACT

From ancient times Ayurveda is serving mankind with its enormous knowledge. Ayurvedic clinic procedures like Ksharsutra have become widely accepted in clinical settings for treating a variety of surgical conditions, especially tissue debridement and wound healing in diseases like Fistula-in-Ano and Pilonidal sinus etc. Primarily made from herbal alkaline ingredients such as Apamarga Kshara, Snuhi latex, and Haridra, the Ksharsutra works in a number of ways, such as chemical cauterization, antibacterial activity, and granulation tissue stimulation. This review article explores the traditional underpinnings and contemporary scientific knowledge of the processes through which Ksharsutra promotes efficient tissue debridement and wound healing.

Keywords: *Ksharsutra, Wound Healing, Debridement, Apamarga Kshara, Ayurvedic Surgery, Chronic wounds.*

INTRODUCTION

Ksharsutra is one of gift given by Ayurveda to the mankind. The Ksharsutra is a specific type of medicated thread that facilitates the healing process by dissolving the skin and cleansing the devitalized tissue with minimal invasion and also decreased recurrence.

Acharya Sushrut explains guna-karma of kshar as:

Ksharsutra is a specific Ayurvedic treatment method for the efficient treatment of chronic wounds, sinus tracts, and especially fistula-in-ano that is mentioned in ancient texts like the Sushruta Samhita² and Charaka Samhita³ etc. The process of preparing Ksharsutra was initially described by Acharya Chakrapani in his text Chakradatta⁴, followed by Acharya Vangsen⁵ and Rasatarangini⁶, Rasa Kamdhenu⁷, and others, even though Brihatrayi has continued to use it.

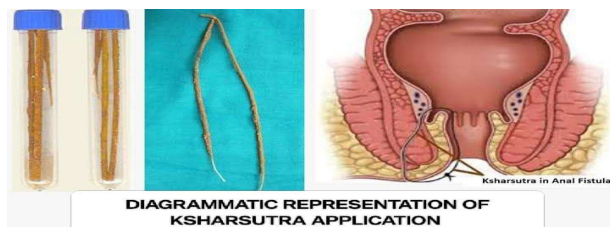
Ksharsutra, which consists of a surgical linen thread covered in several layers of herbal alkaline preparations, acts on the afflicted tissues repeatedly through mechanical and chemical means. Scientific research showing this therapy's multifactorial effectiveness in tissue debridement and wound healing has contributed to its rise in popularity in modern times. Even Western surgeons are trusting Ksharsutra in the form of setons because of its less invasion and low recurrent rate.⁸

COMPOSITION OF KSHARSUTRA

Ksharsutra prepared now a days are different from those described in the ancient Ayurvedic texts. After several experiments and research API has designed standard Ksharsutra with 21 coatings in three distinct phases⁹:

1. Snuhi Ksheer (Euphorbia neriifolia latex): Used in the first 11 coatings, it provides an adhesive base and possesses antimicrobial and anti-inflammatory properties.
2. Apamarga Kshara (alkaline ash of Achyranthes aspera): Applied in the next 7 coatings, it offers strong chemical cauterization and debridement.
3. Haridra (Turmeric, Curcuma longa): The final 3 coatings involve turmeric powder for its anti-inflammatory and wound healing properties.

This specific combination gives Ksharsutra its potent therapeutic profile, effective in both ano-rectal and non-ano-rectal conditions. Also, various researches are undergoing to provide alternatives to the classical drugs used for Ksharsutra preparation. For example, Palash Kshar, Chitrak Kshar, Naktamal kshar, Guggulu, Gomutra, Madhu, Tankan etc.



MECHANISM OF ACTION^{10,11,12}**• Chemical Cauterization and Debridement**

The alkaline properties of Apamarga Kshara cause necrotic and infected tissue to be chemically cauterized under controlled conditions. It promotes autolytic debridement and softens the slough. By consistently eliminating devitalized tissue, a healthy wound bed that supports granulation is maintained and infection is avoided.

• Antimicrobial Activity

Both Haridra and Snuhi Ksheer (latex) have been shown to have antimicrobial qualities. Curcumin, the active ingredient in haridra, exhibits antiviral, antifungal, and antibacterial properties. These compounds lower the risk of secondary infections by preventing microbial colonization and biofilm formation in chronic wounds.

• Anti-inflammatory and Analgesic Effect

Through its ability to alter inflammatory mediators like prostaglandins and cytokines, haridra helps to alleviate erythema, edema, and local pain. The natural analgesic properties of Snuhi latex contribute to increased patient compliance, particularly in long-term treatment regimens.

• Promotion of Granulation Tissue Formation

The alkaline and herbal components of Ksharsutra cause a mild, long-lasting irritation that promotes angiogenesis and fibroblast proliferation. This leads to increased granulation tissue formation, epithelialization, and collagen deposition, which speeds up wound closure.

• Controlled Mechanical Cutting and Drainage

Ksharsutra guarantees constant mechanical pressure on the wound bed or tract. It permits both wound healing and cutting through the diseased tissue at the same time in the case of fistulous tracts. The thread's creation of a drainage channel helps to continuously remove exudates and prevents abscesses from forming.

• MODERN SCIENTIFIC CORRELATION

Contemporary research also supports the efficacy of Ksharsutra therapy:

- At the application site, histological investigations show elevated fibroblast activity and neovascularization.
- According to in vitro tests, Ksharsutra prevents the growth of both Gram-positive and Gram-negative bacteria, such as *Escherichia coli* and *Staphylococcus aureus*.¹³

- Clinical studies show that fistula treated with Ksharsutra have greater tensile strength and faster wound contraction than wounds treated with traditional techniques.¹⁴

- **CLINICAL APPLICATIONS**

While originally indicated for Bhagandara and Pilonidal sinus, Ksharsutra has now been successfully employed in managing:

- Chronic non-healing ulcers¹⁵
- Infected sinus tracts
- Venous and trophic ulcers
- Nasal polyp¹⁶



- **ADVANTAGES**

- Minimally invasive
- Cost-effective and accessible
- Simultaneous debridement and healing
- Reduced recurrence rates in fistula cases

- **LIMITATIONS**

- Requires regular follow-ups and weekly thread changes
- Possibility of local irritation or discomfort
- Not ideal for acute infective conditions with cellulitis

CONCLUSION

Ksharsutra therapy is situated at the nexus of contemporary science and conventional wisdom. It is a special and efficient wound healing technique because of its complex mechanism, which includes chemical debridement, antimicrobial action, anti-inflammatory effects, and tissue regeneration promotion. It will be easier to incorporate this traditional therapy into common surgical and wound care procedures if more research is done on standardization, dosage optimization, and multi-center trials. Also finding alternative drugs can help in reducing treatment time and decrease risk of complications. Less invasion and less hospitalization make it advantageous over conventional treatments like Fistulectomy etc.

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