

Recent Advancement in the preparation and application of *Ksharasutra*: A Review Article

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Abstract-*Ksharasutra* is a time-tested Ayurvedic treatment for fistula-in-ano. It can completely cure fistula-in-ano without any complications and recurrence. The application of *Ksharasutra* is associated with scraping, draining, excision, penetrating and debridement procedures which significantly improves process of healing with minimal invasion. Eventhough it is a successful treatment, some difficulties are there such as unavailability of *snuhiksheera*, storage of *snuhiksheera*, difficulty in preparation, storage of *ksharasutra*. To overcome this difficulties several newer technologies were developed for the collection of materials, preparation, storage and applications of *ksharasutra*. This article deals with recent advancement in the technical side of *ksharasutra* for the successful management of fistula-in-ano.

Keywords- *Ksharasutra*, *Sadyaksharasutra*, *tincture ksharasutra*, *beaded Ksharasutra*, *double layerd ksharasutra*

INTRODUCTION

Ksharasutra therapy is a minimal invasive Ayurvedic Parasurgical procedure in the management of fistula-in-ano. *Ksharasutra* means thread made up of caustic material, which work with both mechanical and chemical effect. The mechanical effect by the pressure of thread tied in the fistulous tract. Chemical effect was explained by slow releasing of *Kshara* and other drugs. *Ksharasutra* unique techniques works by pressure necrosis, chemical cauterization by *kshar* (alkali) and sloughing of the tissue of the walls of the fistulous track along with adequate drainage. It leads to an easy debridement of unhealthy tissue, fibrous wall and pus. Thereby providing a clean wound, which will heal faster. The *Ksharasutra* is a minimal invasive technique, as it provide scraping, draining, excision, penetrating and debridement all along with quick healing. It is safe, economic, ambulatory procedure and less recurrence rate of 3.33% (1). Patients with other systemic diseases can also undergoing *ksharasutra* procedure.

Ksharasutra has outruned the contemporary treatment modalities available for the management of fistula-in-ano like fistulotomy, fistulectomy, seton placing, ligation of inter-sphincteric fistula tract(LIFT), fibrin glues, advancement flaps, and expanded adipose derived stem cells (ASCs) (2). This shows the promising results of *ksharasutra* technique and its need to be improvised to accept globally. As Ayurvedic Textbooks give a vague description regarding the preparation of *ksharasutra*. Several regerous clinical and analytical research work were done to standardize *ksharasutra*. The standardization was done on the basis of analysis of various physical as well as chemical parameters to ensure the quality control with cost effectiveness at clinical level. Analysis was done at Chandigarh and Lucknow laboratories by coated over barbour's linen thread no:20 in the order of 11 coatings of *snuhiksheera*, 7 coating of *snuhiksheera* followed by *kshara* and last 3 coating of *snuhiksheera* and *haridra churna*.(3)

Various characteristics of an ideal *ksharasutra* are as follows: PH = 10.1, Length :30 ± 1 cm., Diameter :1.9 mm., Min. breaking load :5.83 kg., Weight of coating : 0.83 gm., thickness of thread after coating:2.10+ 0.11 mm. Eventhough there is a standard newer researches are done based on technologys for collection of raw materials, preparation, preservation and applications of *ksharasutra*.(4)

Recent advancement in the preparation of *ksharasutra*:

The standard *Apamarga ksharasutra* is used successfully in the management of various surgical diseases, the difficulties in its preparation and application are worth noting. These problems have put necessity of further modifications in this preparation and applications of thread. One of the essential components of this thread is *snuhi* latex. This latex creates many problems during preparation of the thread. A very little amount is collected after the incision of the stem and get coagulates if not used early. Collection becomes more difficult in summer, so preparation is possible only in limited seasons. Another disadvantage is that there is a severe pain felt by the patients during the application of the thread. In few cases, the intensity of pain is so severe that the patients discontinue the therapy. Sometimes allergic reactions are also noted. To overcome these problems, several researches have been carried out

searching for the drugs having better actions and acceptability than that of *Snuhi* latex and *Apamarga kshara* and different types of *kshara sutra* were prepared.

Different types of *ksharasutra*

- 1) **Udumbara Ksharasutra:** In this thread, latex of *ficus glomerulata* was used which is a *sheeta veerya* drug. Method: 11 coatings of this *ksheera* was made on the thread. Every time, fresh latex was used. The pH of the thread is 8.5. The Advantages were easy preparation, less irritant, less pain, smooth cutting and with good wound healing. Disadvantages were more UCT (Unit cutting time), sticking ability of latex on thread was less.
- 2) **Papaya Sutra:** Papaya is a good (*shodana*) cleansing and (*ropana*) healing drug. The thread prepared by 11 coatings by papaya fruit pulp with papain powder and 2 coatings of papaya fruit pulp and Haridra powder, thus making a total of 13 coatings. The advantages are papain contains strong proteolytic enzymes which lead to debridement of necrosed tissue and facilitates early wound healing. It can be easily prepared and Patient tolerance was also very good. The main disadvantages is more UCT time.
- 3) **Guggulu based kshara sutra:** In this thread, guggulu solution was used in place of *snuhi* latex. Guggulu has analgesic, debridement and healing properties. It is also having good binding action on thread and its anti-inflammatory activities have been proved by researches. It is easily available and solution is prepared very easily in alcohol or water. Pain, discharges, indurations are reduced in early sittings in comparison to other threads. The thread is giving good wound healing and cosmetically acceptable scar. The disadvantages were soapy nature, it loosens after application. Subsequent coatings remove first coating to a lesser extent, if alcoholic solution is used. Nowadays, *guggulu*- based *kshara sutras* have been using successfully at various centres all over the country.
- 4) **Yavakshara coated sutra:** *Yavakshara* is well known for its debridement effect. According to researches, it provide a combined effects of fibrolytic, hygroscopic and anti- inflammatory actions. Advantages: Pain and agony were reduced very much during & after application. UCT was less (6.48 days/ cm) in comparison to the standard thread (9.01 days/ cm).
- 5) **Ghritakumari (Aloe Vera) ksharasutra-** In this thread *ghritkumari* pulp was used in place of *snuhi* latex. Researchers suggest that it possess local anaesthetic property (used in burns).It is not caustic as *snuhi*. Its pulp possesses binding action. Advantages : easy availability & preservation, with good wound healing and no allergic reactions, etc. Disadvantages: Sticking was not uniform. The thread was beaded so pain was noticed during application.
- 6) **Sadyaksharasutra :** In this the *ksharasutra* is prepared by just dipping in *ksharajala* (supernatant layer of *kshara*) and directly applied to the fistulous tract. The thread is changed on alternative days till the tract is cut opened. It give quick cutting and healing of fistula-in-ano than comparison with standard *Ksharasutra*.
- 7) **DOUBLE Kshar-sutra technique:** At the time of secondary threading, two separate threads should be passed through previously placed single thread. Steps of this method are as follows: Insert the whole length of new thread in old loop, just near the knot. Tie a knot in mid length of thread. Cut and hold the thread from proximal side. Pull the old thread through rail –road technique, so that two threads come in track. Cut the knot of new thread and tie them separately.
- 8) **BEADED Kshar-sutra technique :** To make this type of *kshar sutra*, single simple knots were tied at regular gap of 1cm in standard thread along its whole length. This knotting mechanism gives thread a beaded appearance. Now it is ready to be used in the same manner like traditional secondary threading. (5)
- 9) **Snuhi haridra Tincture ksharasutra:** In this the *ksharasutra* is prepared with the alcoholic solution ie; tincture of *haridra* and *snuhi*. The thread is coated with tincture of *snuhi* and *haridra* as explained in traditional medicine. The advantages is quick cutting without any infection and recurrence. But disadvantages noted is severe burning sensation due to tincture for first day of application.
- 10) **Palash Ksharasutra:** *Palash Kshara* is used instead of *Apamarga Kshara* . Advantages is inherited with the property of *Gudarogit*, *Krimihara* and *Vranahara*. Wound healing after cut through is faster. Mark reduction of symptoms like pain, burning sensation, irritation, inflammation, local reaction
- 10) **Nimba ksharsutra :** The overall therapy, it was found that in most of the parameters *Nimba Ksharasutra* have much better results and very good acceptability with less complication as itching, pus discharge, pain etc. mostly found in standard *Apamarga Ksharasutra* therapy. This *ksharasutra* having low UCT with antimicrobial property.(6)
- 11) **ADR Ksharasutra kit:** 'ADR- Ksharsutra Kit' which is a disposable, non traumatic 'Ksharsutra Carrier cum Application device' made up of High Density Poly Ethelene. The *Ksharsutra* prepared as per ICMR guidelines after UV treatment, is embedded in the instrument and is kept in airtight silver foil sachet and sealed. The tip of the 'ADR- Ksharsutra device' is introduced in the external opening and moved through track up to the internal opening situated in the anal canal. When the tip comes out through the internal opening, cap is removed and the *Ksharsutra* is held and then instrument is withdrawn from outside opening. By doing this, the embedded *Ksharsutra* is automatically placed in the fistula track whose two ends are tied together. No probe is required in the procedure and *Ksharsutra* kept in the

instrument remains sterile as well. Hence, 'Ksharsutra carrier cum application device' will be helpful in Globalization of Ksharsutra technique. (7)

Recent advancement in the application of *Ksharsutra*

Interception of Fistulous tract and application of Ksharsutra (IFTAK techniques)

Even though *Ksharsutra* therapy is revolutionary treatment in the field of fistula in ano, but it has some disadvantages like more time consuming process, severe post-procedural pain and large scar mark. So, in present era IFTAK techniques is emerging as an advanced innovative technique for the management of fistula in ano along with betterment in the consequences of conventional method of *Ksharsutra* therapy. IFTAK is also known as BHU technique of treatment of fistula in ano. The technique was developed by Dr M. Sahu, (Professor, BHU) and is being practiced for treating complex and recurrent fistula since 2007. According to park's concept, 90% of fistula in ano caused by cryptoglandular infection as the root cause of infection is crypts which are located in intersphincteric area. In this technique, proximal part of fistulous track is intercepted at the level of external sphincter along with the application of *Ksharsutra* from site of interception to the infected crypt in anal canal. This is aimed at eradicate the infected anal crypt with no or minimal damage to anal sphincters by using *ksharasutra* (medicated seton). Therefore, destroying the infected crypt may cure the fistula in ano and rest of track heal by itself. Duration of therapy was less by shortening the length of the track and taking care of crypto glandular infection where there was no need to treat residual curved track. Pain was significantly reduced because of less exposure of tissues after interception. (8)

Multiple stage surgical approach with *ksharasutra* technique: This will always be beneficial for complex, posterior, trans-sphincteric, horseshoe-shaped fistula-in-ano. After identifying the course of the track, it was laid open, drained, and high anal extension was scooped. As *Ksharasutra* was placed in the track, it cauterizes the unhealthy granulation tissue and drains the debris from the track, which induces early healing by providing healthy environment for the wound healing. *Ksharasutra* has prevents damage to the sphincter and treats the cryptoglandular infection which leads to speedy recovery of the disease. Benefit of two stage surgery is that, it requires less hospital stay. The patient can be ambulatory after 6 h of surgery and postoperative wound size will be less. Thus, daily routine of the patient will not hamper, and the patient can live his normal social life as postoperative pain will also be minimal. (9)

probing using infant feeding tube

In most of the centre method of inserting, the *ksharsutra* is by using a metallic probe. This not only is a painful procedure but is more prone to cause an iatrogenic fistulous tract and impaired continence and sometimes requires general anaesthesia. These disadvantages lead to low compliance and low acceptability by many patients using a metallic probe to negotiate the fistulous tract as well as to find out the internal opening, we can use an infant feeding tube (no. 5 or 6) for inserting the *ksharasutra*. The patient is kept in a left lateral position in a private environment with a good source of light. Copious amount of 2% xylocaine jelly is applied over the external opening as well as over the entire infant feeding tube. A guide wire is inserted through the proximal tip of infant feeding tube which provides stiffness to the feeding tube. The distal tip is now inserted in the external opening. The infant feeding tube is pushed passively and negotiated through the fistulous tract. The internal opening is finally located, and the tube is taken out through it using the index finger. Once the distal end of the infant feeding tube comes out through the internal opening, the *ksharsutra* is tied at the proximal end (to- wards the internal opening) and then pulled through the other end. Finally, both ends of the *ksharsutra* are tied and the infant feeding tube removed and guide wire is removed. (10)

DISCUSSION

Recent era several analytical and clinical researches were done in India to establish the action of *ksharasutra*. The outcome of those studies shows that each steps of *ksharasutra* preparation has a scientific reason. In *kshara sutra*, linen thread no. 20 is selected because it supports the strength of ligation and weight of 21 coatings. The thread should be made with snuhi latex acts as binding material for preserving all the properties of *kshara*. *Kshara sutra* works by pressure effect made by ligation which creates mechanical strangulation of blood vessels and tissues which causes the pressure necrosis of the body of any swelling. *Kshara* invades into the cells of lesion till engorged tissue destruction occurs by its *Ksharana guna* (corrosive properties). Snuhi latex is being proteolytic in nature, dissolves the tissue at its base. The action of turmeric powder provides the effect of bactericidal action with healing properties. All these three drugs do not contradict each other but rather support their actions by equal and desirable effect. *Kshara sutra* has the ability to perform incision with excision slowly by virtue of its controlled chemical cauterization. During cutting effect, there may be oozing of blood which is ceased by sclerosing effect of *kshara* by its protein coagulation property. Hence, there was no chance of bleeding during the cutting of the mass. The chances of infection are least due to sustained action of anti-infective virtue of *kshara*. In case of Bhagandara (fistula in ano), *kshara sutra* also acts as a Seton to allow the proper drainage of pus and debridement of unhealthy tissue, thus, providing a cleaner base for wound healing with minimal scarring and without complications.

Several studies revealed overall recurrence rate of fistula-in-ano as 5.88%. The Indian Council of Medical Research (ICMR) had validated this therapy and emphasized that *Ksharasutra* is better than the conventional surgery in fistula-in-ano. Every treatment modality has its own limitations. Application of *Ksharasutra* in cases of complex, posterior horseshoe fistula and high anal fistula, which is not only difficult in finding right course of track but also complete treatment takes very much time to heal also. Hence, this type of case can be treated with combined approach of surgery and *Ksharasutra*.

CONCLUSION

All the above *ksharasutras* and techniques employed were effective in managing fistula-in ano. The techniques described here are the modifications of classical procedures, which acts at different level and produce intended effect of healing the fistulous track without any complication or reoccurrence. However, larger comparative clinical studies and meta analysis may be required to further substantiate the effectiveness of these techniques.

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