



ANALYSIS OF EFFICIENCY AND PAIN LEVEL IN THE MANAGEMENT OF FISTULA-IN-ANO WITH SLIDING *KSHARASUTRA* TECHNIQUE - A PILOT STUDY.

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ABSTRACT:

Introduction: *Ksharasutra* therapy is an ancient Ayurvedic treatment utilized in the management of Fistula-in-Ano. This study explores the efficiency of a novel sliding *Ksharasutra* technique to enhance the effectiveness of the treatment and patient comfort. **Methodology:** The square knot of the *Ksharasutra* is replaced with a sliding knot which allow easier adjustments in the tension of the thread. This method was applied to seven patients with fistula in Ano. The cutting rate was assessed in centimeters and pain levels were measured using the Visual Analogue Scale (VAS). **Results:** This methodology demonstrated a remarkable increase in the cutting rate, up to 1.98 cm per week, when compared to the conventional method. Additionally, the novel sliding technique was able to substantially reduce the pain during thread changes. **Discussion:** The results suggest that the sliding *Ksharasutra* technique can accelerates the cutting rate as well as improves the patient comfort by reducing the pain during the course of treatment. This approach offers a potential superior alternative to the conventional methods.

Keywords: *Ksharasutra*, fistula in Ano, sliding knot, Bhagandara.

INTRODUCTION

Fistula-in-Ano is chronic anorectal condition often arises from an anal abscess that fails to heal completely. It results in a persistent, abnormal connection between the epithelialized surface of the anal canal and the perianal skin. It poses significant challenges to both patients and healthcare providers due to its high recurrence rate and potential complications like incontinence, pain, and infection. Conventional surgical methods, including fistulotomy and fistulectomy, aim to eliminate the fistulous tract but can lead to complications such as sphincter damage and prolonged healing times. In this context, *Ksharasutra* therapy emerges as a viable and advantageous alternative.

Ksharasutra therapy, an ancient Ayurvedic treatment, has gained significant attention for its effectiveness in managing Fistula-in-Ano.[1] The term "*Ksharasutra*" is derived from Sanskrit, where "*Kshara*" means 'alkaline' or 'caustic' and "*Sutra*" means 'thread'. Thus, *Ksharasutra* refers to a medicated thread prepared using a combination of alkaline substances. The preparation of *Ksharasutra* involves coating a surgical linen thread with multiple layers of medicinal plant extracts, predominantly from plants like *Achyranthes aspera* (*Apamarga*), latex of *Euphorbia neriifolia* (*Snuhi*) etc.[2] The thread is repeatedly coated and dried until it achieves the desired potency, creating a durable and medicinally active thread.

The therapeutic action of *Ksharasutra* is multifaceted. When inserted into the fistulous tract, the *Ksharasutra* exerts a sustained caustic

effect, gradually debriding the unhealthy tissue and promoting granulation and healing from within. This process involves the thread being tied tightly around the fistula, allowing it to cut through the tissue while simultaneously releasing its medicinal compounds. It offers a promising alternative to conventional surgical procedures, known for their recurrence rates and postoperative complications, by providing a minimally invasive, cost-effective, and patient-friendly approach.

Ksharasutra is inserted through the fistula tract and tied using a square knot. The caustic medicinal properties as well as the mechanical tension aid in the cutting of the tissues in between. The average cutting rate of *Ksharasutra* is found to be 0.5 to 1 cm per week.[3] Nevertheless there are variations from individual to individual, type of fistula and other patient factors. Quite often with this cutting rate, by the third or fourth day itself, the thread would have cut through the tissues and would be lying loosely through the tract. In order to tighten the *Ksharasutra*, a tedious process of untying the square knot and putting a knot with smaller loop is required. But the knot maybe adhered together due to various reasons including the discharge from fistula which dries up on the thread. This makes it difficult to unravel the knot. Any unintended pull can cause tension and induce pain or other discomforts. Thus, it might have to be replaced with a new thread altogether if the *Ksharasutra* has to be kept tight. This study attempts to overcome these hurdles by replacing the square knot with a sliding knot, and explore the pros and cons of the novel method.

AIMS AND OBJECTIVES

To analyze the efficiency and level of pain in the management of fistula in Ano with novel sliding *ksharasutra* technique

MATERIALS AND METHODS

Selection of patients: seven patients diagnosed with *Bhagandara* (Fistula in Ano) from OPD and IPD of department of salyatantra, Government ayurveda college Thiruvananthapuram were selected for the study.

Inclusion criteria:

Patients diagnosed with fistula in Ano in the age group of 18 to 50 years.

Exclusion criteria:

Patients with uncontrolled diabetes mellitus and other systemic disorders.

Patients with debilitating diseases.

Extra sphincteric and sub mucous fistula.

Investigations:

MRI fistulogram, hematological investigations such as complete blood picture, clotting time, bleeding time etc. were done. Other investigations to rule out presence of venereal diseases were also performed

Selection of treatment

All seven subjects were administered internal medication, *triphal* sitz bath and daily cleaning and dressing with *jatyadi ghritam*. (table 1) *Apamarga ksharasutra*[2] was selected for the application in the fistula tract.

Table 1: Medicines

Sl.No.	Route	Medicine	Dose	Time
1	Internal medicine	Gugguluthiktakam kashaya	15ml kashayam + 45 ml water	twice daily
2		Kaishoraguggulu tab	1 tablet	twice daily with kashaya 1
3		Guggulu panchapala choorna	5gm	Twice daily with hone after food
4		Brhath thriphala choorna	5gm	once daily, bed time with hot water
5	External medicines	Thriphala kashaya sitz bath		twice daily
6		Jathyadi grutha dressing		once daily

Application of sliding *Ksharasutra* technique:

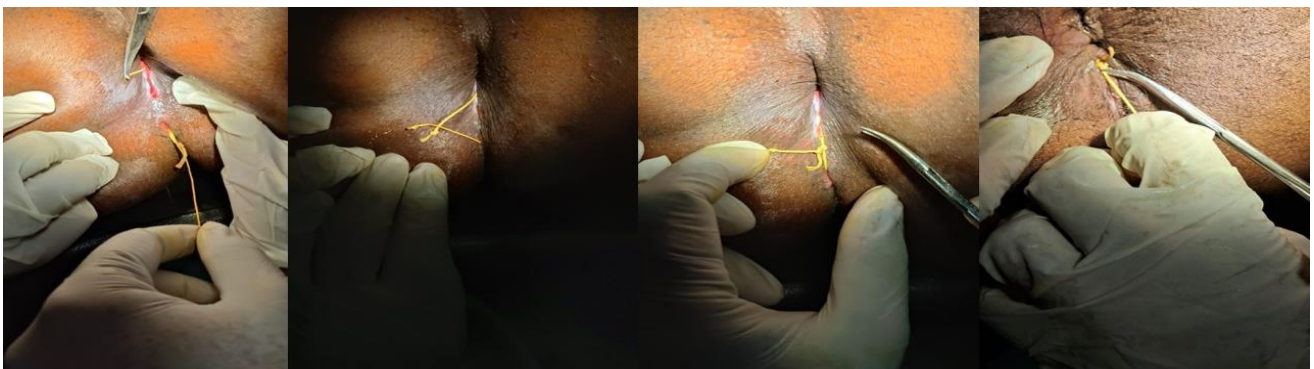


Figure 1: Application of Sliding *ksharasutra* knot in fistula in ano

While tying the *Ksharasutra*, the conventionally used reef knot or square knot is replaced with a sliding knot. There is a plethora of sliding knots in surgical practice, mostly used in laparoscopic or arthroscopic surgeries.[4] The Roeder's knot is widely used for extracorporeal tying in laparoscopic surgery.[5] The Meltzer knot and Mishra's knot are the modification of the Roeder's knot. Apart from these, there are Duncan loop,

Nicky's knot, Tennessee slider, Weston knot, Samsung medical center knot, tayside knot etc. Even the square knot can be converted in to a sliding knot by using Sezabo technique.[6] Nevertheless most of them were not suitable for *ksharasutra* due to a hurdle that arises during thread change and a new sliding knot ideal for *Ksharasutra* therapy was developed (figure 2).

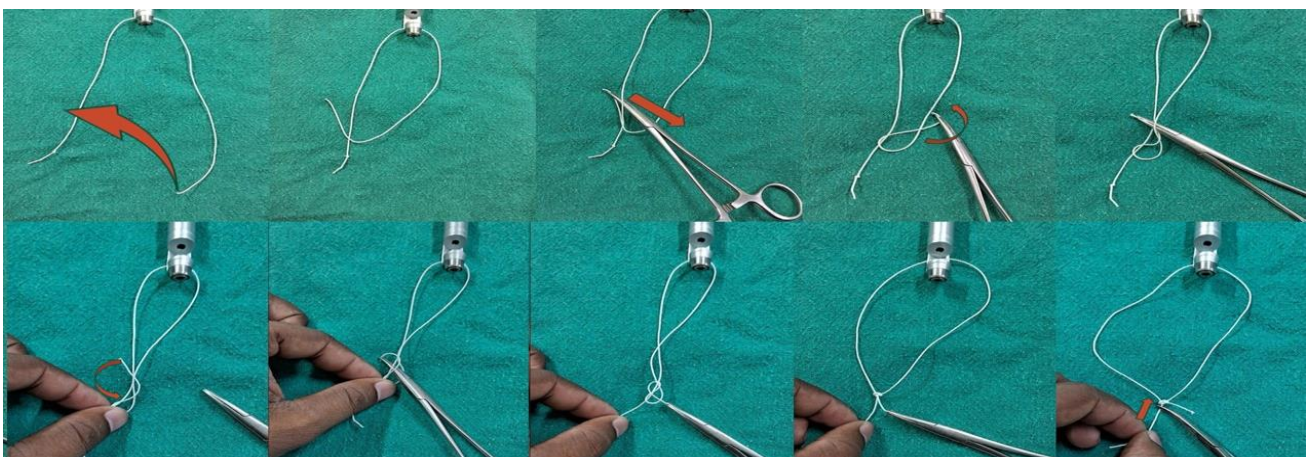


Figure 2: steps of application of Sliding knot in a Knot tying model

After the *ksharasutra* is placed in the fistula tract there will be two limbs. The right limb is placed over the left limb and is taken under the left limb through the loop by holding the tip of the right limb using a forceps. It is further taken over and

under the right limb then over and under the left limb. Now, the tip is taken through the distal loop forming the sliding knot. This knot can slide forward and backward on the left limb. (figure 2)



Figure 3: steps of application of Stay knot



Figure 4: steps to tighten the Stay knot

All of these knots alone are incapable of preventing knot slippage, thus reverse half hitches on alternating posts are applied following to it, to secure the knots. In *Ksharasutra*, instead of locking it to one point, only prevention of the knot from sliding backwards is necessary, which would make the loops circumference bigger. Thus, when the *Ksharasutra* have cut through the tissues in few days, the knot can be slid forward, further tightening the thread and reducing the loop circumference. For this purpose, an overhand throw on a single limb which is used as the pull limb is made and a stay knot is placed at the base of the sliding knot (figure 3). When the sliding knot is tightened after few days another stay knot is placed at its base, at the new position (figure 4). Thus, the *Ksharasutra* can provide a substantial tension throughout the week.

Changing the *Ksharasutra* :

Conventionally the *Ksharasutra* is changed on weakly basis.[7] A new thread of required length is tied to old one between the knot and the external opening. The old thread is clamped between the

knot and the internal opening and cut in between the knot and the clamp. The knot of the previous *Ksharasutra* will keep the new thread from falling off while being pulled through the tract.

The thread change does induce pain and the peak pain occurs when the knots pass through the tract. In the novel method the additional stay knots would have become into a bulky cluster by the end of the week. This bulky knot can produce immense pain when passed through the tract. This hurdle can be overcome since the stay knots are on the pull limb it can be pulled out after the old thread is cut between the knot and the clamp (figure 5). But when the pull limb is removed most sliding knots unravel it, leaving the new thread unguarded from slipping off. Only Duncan loop is capable of withholding a knot even after the pull limb is removed. The Duncan loop leaves a bulky knot which may cause discomfort to the patient when it passes through the tract. Thus, the new sliding knot was developed, which leaves a minimal knot in the end and was selected for this new method of *Ksharasutra* application.



Figure 5: steps during thread change, removal of the limb with stay knots

The new method of sliding *Ksharasutra* was applied in 7 patients with fistula in Ano. Out of which for 2 patients the sliding *Ksharasutra* technique was applied on the first thread change

and for the remaining 5 it was applied on the 3rd or 4th thread change [3rd change (3), 4th change (2)].

Instruction video : <https://youtu.be/2AQ0nxn1nXM>

General Observations:

Seven male patients with in the age group of 18 to 50 years with no known co morbidities presented with discharge of pus from the perianal region having the duration of less than one year (chart 2). On examination mild discharge of pus was present and probing through the external opening revealed patent fistula tract (chart 2). *Ksharasutra* with ample length is applied in the fistula tract and during the first thread change, the circumferential length of the *ksharasutra* is measured (table 2) to assess the extent of the tract.

Table 2: Circumferential length of ksharasutra in fistula in Ano tract.

Participant	initial length (in cm)
1	6.5
2	13.9
3	10.2
4	7
5	8.5
6	6
7	5.2

Chart 1: Type of fistula.

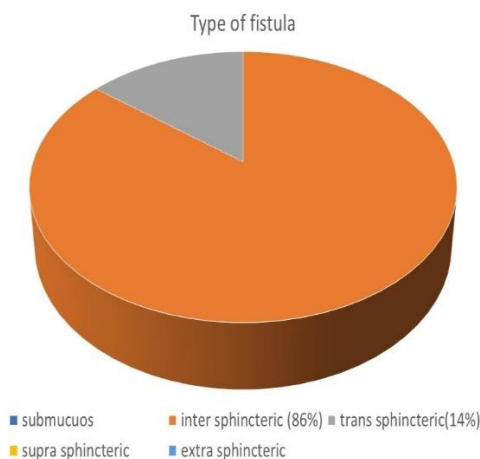
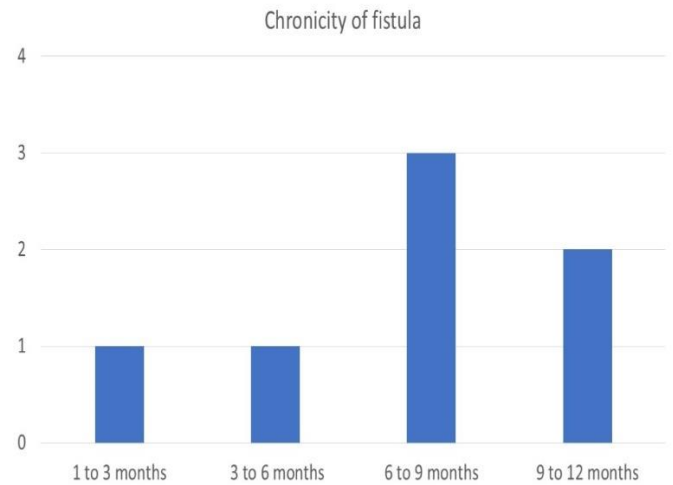


Chart 2: Chronicity of fistula



RESULTS

Cutting rate

The net cutting rate of ksharasutra is the average of the difference in the measurement of the thread in centimeters (table 3). The conventional *Ksharasutra* therapy can bring about a cutting rate of 0.5 to 1 cm per week. In the patients with fistula in Ano treated with *Apamarga Ksharasutra* in our institution, the cutting rate in the conventional tying method was found to be ranging from 0.5 to 1.2 cm. Among the chosen participants, 5 of them who underwent conventional method for a few weeks before the application of the sliding *Ksharasutra* technique, had an average cutting rate of 1.1 cm per week. After the application of the sliding *Ksharasutra* technique the average cutting rate was increased to 1.88 cm per week. The average cutting rate of the total 7 participants was found to be 1.98 cm per week.

Table 3: Net cutting rate

Partici pants	Net cutting rate - conventional method	Net cutting rate - sliding ksharasutra technique
1	1.2	2.8
2	0.7	1.3
3	1.0	1.5
4	1.1	1.4
5	1.5	2.4
6	-	2.1
7	-	2.4

Pain

Apart from the procedure of application of *Ksharasutra* in fistula in Ano, during the course of the treatment the most amount of pain occurs on the day of thread change. First and foremost, the pain is induced when the *Ksharasutra* along with the knot and new thread passes through the tract and secondly when the new thread is secured with a square knot with required amount of tension. The pain is associated with a burning sensation which can be attributed to the *kshara* properties of the medicated thread, which gradually subsides but the pain may persist up to 12 to 24 hours after the thread change.

The pain was measured using Visual Analogue scale (VAS). The pain while changing the thread in conventional method was found to be 0.875 while in the novel method it is found to be 0.11. The pain when the knot is tied is 2.47 in the conventional method whereas it is 0.56 in the sliding *Ksharasutra* technique. Moreover, the pain following the thread change subsided after 3-4 hours in all participants.

DISCUSSION

From the results it is evident that there is significant increase in the cutting rate with the novel sliding *Ksharasutra* technique. There is an increase of 55 to 80 percentage when compared to the conventional method, which can be credited to the fact that the thread can be tightened when it has cut through the tissues, thus maintaining the required mechanical tension throughout the week. Even though there is remarkable increase in the cutting rate, keen observation on the healing rate should also be done to attain proper healing.

An additional benefit of the sliding *Ksharasutra* technique is its impact on pain. In the traditional method, changing the *Ksharasutra* involves cutting the old thread and introducing a new one. This process creates a knot with two tails and a cut end, which must pass through the tract. However, with the novel technique, the removal of the pull limb along with the stay knots, results in a simpler half hitch knot. This knot is perceivably smaller than a square knot and leaves only a single tail, potentially reducing the pain experienced during the thread change (figure 6).

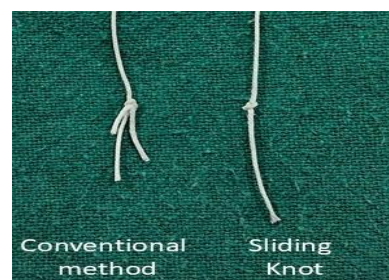


Figure 6: Comparison of knot passing through tract during thread change

When tying the *Ksharasutra* using the conventional square knot method, often a tolerable amount of

tension intended to last the entire week is applied, which can lead to increased pain in the initial days. In contrast, the sliding *Ksharasutra* technique allows the adjustment of the loop size, enabling the tightening of the thread as needed, even on a daily basis. On the day of thread change, patients typically experience some discomfort as the thread passes through the tract, accompanied by a burning sensation. Therefore, it's unnecessary to apply excessive tension on the first day. Instead, the loop can be kept at a minimal size, providing sufficient yet easily tolerable tension on day one, with gradual tightening on subsequent days.

After placing the initial stay knots, while trying to tighten the *Ksharasutra* in the succeeding days, the sliding knot can be adjusted to a comfortable tension and it can maintain on its own without a stay knot for 3-4 hours. Thus, the loop loosens up to the prior tolerable tension, providing comfort for the rest of the day. After few days, a stay knot can be applied after the *Ksharasutra* has cut through the tissues and when there is sufficient length between the original stay knot. This approach significantly reduces pain due to mechanical tension. Despite providing only the minimum required and easily tolerable tension, the cutting rate was higher than the conventional method.

CONCLUSION

The novel sliding *Ksharasutra* technique presents a significant advancement over the traditional method in the management of Fistula-in-Ano. This method not only improves the cutting rate of the *Ksharasutra*, with an observed increase of 45 to 65

percent, but also enhances patient comfort by significantly reducing pain during thread changes and tightening procedures. The ability to adjust the tension gradually throughout the week allows for a more controlled and patient-friendly experience. The sliding *Ksharasutra* technique provides a durable and effective approach that maintains necessary mechanical tension without causing undue discomfort. This method could potentially transform the standard of care for patients suffering from this challenging condition, offering a more efficient and less painful alternative to conventional surgical methods. Further studies and long-term follow-ups are recommended to fully establish the benefits and limitations of this innovative technique in diverse patient populations.

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