



## A SYSTEMATIC REVIEW OF MODIFICATIONS IN PREPARATION OF KSHARASUTRA AND ITS APPLICATION TECHNIQUES IN PATIENTS OF BHAGANDARA (FISTULA-IN-ANO)

### Ayurveda

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### ABSTRACT

*Bhagandara* (Fistula-in-ano) is well known cause of morbidity in all ages, gender and socio-economic status which has a promising treatment available with Ayurvedic practice of *Ksharasutra* (medicated setons). This is proven to have relatively lower rates of complications and recurrences. The standardised form of *Apamarg Ksharasutra* (*Snuhi*, *Apamarg* and *Haridra churan*) is been used for long and still considered the gold standard. However, difficulty in procurement, non-perennial availability of few of its constituents and challenging technique especially in complex cases has always encouraged the practitioners and researchers to come up with trial of other ingredients as per old literature like *Sushruta Samhita* and to modify the application techniques. This is an endeavour to venture into literature and compile such promising efforts.

### KEYWORDS

*Ksharasutra*, *Bhagandara*, *Ksharasutra* preparation, Modified technique.

### INTRODUCTION

Sushruta – very aptly considered 'Father of Surgery' has authored his work in the form of *Sushruta Samhita*, which is the main source of knowledge about surgery in ancient India. It has mentioned *Bhagandara* as a disease wherein an abscess bursts open in anal region<sup>1</sup>. It is considered as *Ashta Mahagadas* (Eight grave disorders) which essentially means difficult to treat. It is a chronic abnormal communication between the two epithelialized surfaces of the anal canal, with internal and external opening. Pain, discharge and itching of variable extents occur and usually it is extended for long intervals causing morbidity for patients.

According to a recent study conducted on the prevalence of anal fistula in India by Indian Proctology Society in a defined population of some states, approximately varied from 17 to 20%.<sup>2</sup>

While a stigma is always related with this ano-rectal disease modern systems of surgery are found to be associated with higher rates of recurrences and incontinence. The *Kshara sutra* as a method to relieve patients of *Fistula-in-ano* and it has been approved by the Indian Council of Medical Research (ICMR).<sup>3</sup>

*Kshara sutra* is a scientifically validated treatment in the management of *Bhagandara*. The *Apamarga Kshara sutra* is a proven to be an effective treatment for it and has been standardized by Central Council for Research in Ayurvedic Sciences (CCRAS).<sup>4</sup>

Although the standard method of *Apamarg Ksharasutra* preparation and its application as primary and replacement threading is a time-tested treatment and is still the gold standard, there are few modifications that have been tried successfully by various researchers and institutions. Some of these do make the preparation easier while others make application less painful or may provide with better healing. This work essentially dwells on comprehensive search on such successful attempts and to understand the probable or proved mechanism of their action.

### Standardised Method Of *Apamarga Kshara Sutra* Preparation And Application –

**1. Preparation of Ash –** *Apamarga panchanga* is collected and dried completely (8 days). It is then burnt in an iron vessel and ashes are collected.<sup>5</sup>

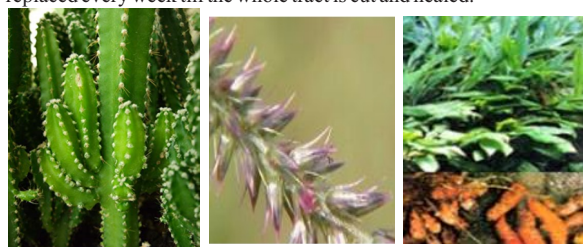
**2. Preparation of *Ksharajala* –** Water is added in ratio of 1:4. After manual mashing clear supernatant liquid is collected and filtered through three layered cotton cloth.<sup>5</sup>

**3. Preparation of *Kshara*–** The *Ksharajala* is heated to evaporate the water content and get *Kshara*.<sup>5</sup>

**4. Preparation of *Kshara Sutra* –** Surgical linen Barbour No-20 is used. 11 coatings of *Snuhi* latex (*Euphorbia neriifolia* – Fig. a), 7

coatings of *Snuhi* latex and *Apamarga Kshara* (*Achyranthes aspera* – Fig. b) and last 3 coatings of *Snuhi* latex and *Haridra* (Powder of *Curcuma longum* – Fig.c) are applied. *Ksharasutra* Cabinet (Fig. e) with Ultraviolet light is used for drying and sterilization<sup>6</sup>

**5. Application of *Kshara Sutra* –** Under local / Spinal / General Anaesthesia a malleable probe is introduced in the external opening and gently passed to appear at internal opening. *Ksharasutra* (Fig. f) is then placed in the groove and pulled back to appear back at the external opening. Both ends of the *Ksharasutra* are tied together. This is replaced every week till the whole tract is cut and healed.



a) *Euphorbia neriifolia*    b) *Achyranthes aspera*    c) *Curcuma longum*



d) *Ksharasutra* stand    e) *Ksharasutra* Cabinet    f) Packed *Ksharasutra*

**Modifications of *Ksharasutra* preparation –** *Ksharasutra* can be prepared using *Kshara* or latex from varieties of latex yielding plants (*ksheeree vrikshas*) and alkali (*ksharas*) having medicinal properties.

**1. *Ficus Racemosa* (*Udumbara KsharaSutra*) –** *Ficus racemosa* (Fig. g) is used for latex collection. It has a relatively cold potency (*sheeta veerya*).

**Method –** Stem bark is peeled off from tree, washed, weighed and dried under shade. This grinded manually and powder is passed through sieve no. 60 to obtain uniform coarse powder. 10 gm of it is taken and added to distil water. This was boiled on slow heat for 2 hours. It is then filtered through 8 layers of muslin cloth and centrifuged at 5000g for 10 minutes. The supernatant was collected and the procedure is

repeated after 6 hours. Supernatant is pooled together and concentrated to make volume 1/4<sup>th</sup>. It is autoclaved at 121°C and at 15 lbs pressure and stored at 4°C. This extract is mixed with distilled water in ratio of 1:2 to make thick paste and smeared over the thread with gauze piece. Eleven coatings are used<sup>7</sup>. Udumbar plant has multiple pharmacological activities that include anti-inflammatory, antibacterial, antioxidant and antipyretic affects<sup>7</sup>. Its use in preparing *Ksharasutra* has following differences against the standard form.

- Less irritant.
- Relatively lower unit cutting time.
- Less sticking ability.
- Relatively difficult to make knots after insertion<sup>7</sup>.

**2. Carica papaya** (Fig. H)–Here the fruit pulp of papaya fruit (papain powder – obtained by drying unripe fruit juice). Papain has strong proteolytic enzymes, which leads to fast debridement of necrosed tissue and early healing. On a 20 No.thread, 10 times smearing is given of the whole mixture of latex turmeric powder and *tankana kshara*, the ingredients of which are latex of papaya (*Carica papaya*), latex of snuhi (*Euphorbia neriifolia*) and *tankana bhasma* (borax). Following advantages are found with *Papaya Kshara Sutra*–

- Easy availability and preparation.
- Collection relatively unhazardous to eyes.
- Low unit cutting time.
- Lower pH than *Snuhi Kshara Sutra*.
- Lower incidences of pain and discomfort.<sup>10</sup>

**3. Commiphora wightii** (Guggulu – Fig i)–In this preparation solution of *Guggulu* is used replacing *snuhiksheer* in the standard preparation with similar coatings. It provides with good binding properties, non-bleeding nature. The effect of *Guggulu Chitraka Ksharasutra* was found better in pain, itching, pus, discharge, tenderness and burning sensation; and the rate of Unit Cutting Time is slightly higher as *Snuhi Apamarga KsharSutra*.<sup>11</sup>

Following differences advocates this modification –

- Less pain, bleeding and discharge.
- Better healing.
- Easy availability.
- Softening and loosening of *Ksharasutra* due to soapy nature.

**4. Hordeum vulgarelinn** (barley – Fig. j) – In this whole plant of Barley is burned and alkali is extracted. It has fibrinolytic, anti-inflammatory and hygroscopic actions. Whole *yava* plant and its seeds is dried and burned to get ash. This ash is dissolved in water and filtered with three folded cloth. *Yavakshara* is obtained by evaporating water content in rotating pain. This is utilised for coating. Difference from standard *Ksharasutra* –

- Less pain and burning sensation.
- Faster cutting rate.
- Non uniform thread.
- Stiff consistency, mechanical trauma during application.

**5. Aloe barbadensis miller** (aloe vera / *Ghritakumari* – Fig. k) –Pulp of aloe vera is used in place of *Snuhiksheer*. Although it acts synergistically along with *Apamarg Kshara* the role of aloe vera alone setons in treating fistula in animal models has been proved experimentally.<sup>12</sup> Aloe vera coated *Ksharasutra* (with *apamarg* and *haridra*) is also used successfully to treat patients with co-morbidities like diabetes and hepatitis B.<sup>13</sup> Differences from standard *Ksharasutra* –

- Better healing and tolerability.
- Non uniform beaded structure.

**6. Calotropis gigantea** (Arka – Fig. l) – In this modification *Apamarg* is replaced with *Arka* while the rest ingredients and procedure for preparation and application remains same. *Arka* is one among *Kshara* explained in *Kshara-paka Vidhi Adhyaya*.<sup>14</sup> When compared with standard *Ksharasutra* it is found to have –

- Marked reduction in irritation and pain.
- Economical for preparation.
- Lower unit cutting time.
- Better healing.<sup>14</sup>

**7. Butea monosperma** (Palash – Fig. m) - The method of preparation of *Palash Kshara sutra* was same as standard *Apamarga Kshara sutra* except the *Apamarg Kshara* has been replaced by *Palash Kshara*.<sup>15</sup> Lower pain and discharge with similar cutting rates is

observed when applied with similar technique in patients with fistula in ano.<sup>16</sup> Also it is found that *Palash* has better acceptability by the patients of *Kaphaj Bhagandar* where itching and pus discharges are prominent features.<sup>17</sup>

**8. Madhu Sutra**– This modification is to replace *Snuhi ksheera* with *Madhu* in the standard *Ksharasutra* preparations. The former is difficult to be collected and preserved. *Madhu* is known to have *Vranashodhana* (wound cleansing), *Vranaropana* (wound healing) and *Lekhana* (Scraping) properties to help. Moreover it is found to be less painful than standard *Ksharasutra* with faster healing and relief.<sup>17</sup>

**9. Azadirachta indica** (NimbKsharasutra – Fig. n) –In this modification *Apamargkshara* is essentially replaced with *Nimba*, *Snuhi* and *Haridra* remains same as ingredients. *Nimba* possesses *kandughna*, *krimighna* and *Vranaghna* properties by virtue of which it is found to have relatively better –

- Symptomatic relief.
- Early healing.
- Improvement of concealed tracks also.<sup>18,19</sup>

**10. Aragvadhadisutra**– This is one of the few modifications which is non caustic and non irritant in nature. In this the paste of *Agravadha* fruit pulp (Fig. o), *Madhu* and *ghrita* were smeared on the thread and dried for 7 times. Followed by same paste smearing for 3 days in wet condition, and the thread was spread over the *Haridra* and *Agurupowder*. It is found to have –

- Decrease in total duration of treatment.
- Relatively low pain during application and change of thread.
- Easier to prepare and preserve.
- Economical to patient.<sup>20</sup>

**11. Achyranthes fauriei** (Kanazawa Sutra) – It is composed of *Ficus carica* (Fig. p) latex, *Capsicum annum* (Fig. q) tincture, *Achyranthes fauriei* (Fig. r) *Kshara* (which is processed ash from the whole plant) and powdered *Curcuma longa* rhizome. The ingredients of *Kanazawa Sutra* are evaluated by measuring nitric oxide (NO) production in animal model. Also its cytotoxicity to rat skeletal muscle myoblasts is examined. This modification is successfully used in Japan for treatment of *Fistula in ano* and *pilonidal sinus*.<sup>21,22</sup>



G) *Ficus racemosa* H) *Carica papaya* I) *Commiphora wightii*



J) *Hordeum vulgare linn* K) *Aloe barbadensis miller* L) *Calotropis gigantea*



M) *Butea Monosperma* N) *Azadirachta Indica* O) *Andrographis Paniculata*



P) *Ficus carica* Q) *Capsicum annum* R) *Achyranthes fauriei*

**Modifications In The Techniques Of Application Of Ksharasutra – 1. IFTAK (Interception Of Fistulous Tract With Application Of Ksharasutra – Fig. t)** – Also known as BHU technique, this was



developed by Prof. M Sahu for complex Fistula in ano. It based on the basic principle that primary pathology lies with the infection in cryptoglandular region<sup>23</sup>, which essentially lies near internal opening. Conventional method has a few problems that were overcome with these modifications –

- When *Ksharasutra* is applied to long tracks recovery period is relatively more painful, long and requires higher number of follow ups even with considerable cutting capacities. Cosmetic disfigurement is not acceptable.
- Moreover, it is difficult to manoeuvre probes in long and curved tracts making things complicated and of low success rates. A relatively higher surgical skill is required for conventional methods in complex cases.

Procedure modification essentially includes making a small vertical incision in the midline posteriorly, and an extending it to the tract of the fistula at the inter sphincteric plane. Primary threading is done including the intercepting tract and the proximal part including the internal opening, also the granulation tissue is excised at external opening which is left to heal spontaneously.<sup>24</sup> This threading is repeated with dressing of wound in subsequent follow ups whereas the external opening is observed for spontaneous healing.

**2. Beaded Ksharasutra And Double Ksharasutra** – This clinical trial for modification is done and published by Dr. Danish Javed et al<sup>25</sup> wherein rest of the procedure regarding making of Kshara Sutra and primary threading remains same but secondary threading is as follows –

- Beaded *Ksharasutra* – Simple knots were tied at regular gap of 1cm in standard thread along its whole length giving it a beaded appearance.
- Double *Ksharasutra*. Both of these are considered better than standard *Ksharasutra* because of increased cross-sectional area of the thread, which in turn increases the cumulative volume of absorbed liquid by capillary action and its benefits. Medicated oil, which is applied by patient in track for its antibacterial media and soothing affects.

The added benefits are increase in the durability of thread which in standard type may degenerate and break even before a follow up for replacing thread is scheduled. It improves drainage of track, improves cutting rate, increased availability of drug in the track and hence increased half-life of *Ksharasutra*. It is also not required to tie the knot very tight and hence decrease patient's agony post threading.

In addition to the above-mentioned advantages due to increase of cross-sectional area some exclusive benefits for beaded threads are – patients may be asked to rotate the thread at certain intervals producing more cutting. Moreover, beaded *Ksharasutra* can be tied loosely as it cuts the track not by pressure effects but due to roughening and scrubbing action of beads.

**3) Use of Infant feeding tube to insert Ksharasutra** – This technique is used to decrease pain and discomfort caused due to use of metallic probe<sup>26</sup>. This method also decreases chances of iatrogenic fistulous tract, better sphincteric tone post procedure. It also decreases the requirement for general anaesthesia.

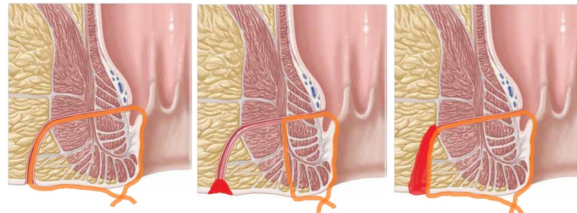
Procedure modification essentially is the use of infant feeding tube no. 5 / 6, which is used under copious amount of 2% xylocaine jelly. A partial cut 1-2 cm distal to the tip is made to make an indentation and the tube is passed from the external opening to the internal opening in left lateral position. Once it appears at the internal opening *Ksharasutra* is tied to it and pulled to insert it in the track.

**4) Pratisarniya Kshara** – This is done for *Pittaja Bhagandra* (Low anal Fistula-in-ano). After infiltration anaesthesia with 2% lignocaine, malleable copper probe was introduced from external opening and emerged at internal opening. Complete fistulous tract is excised and a wound is created. After *Chedana Karma* (fistulectomy), *Mridu Pratisarniya Aragvadh Kshara* is applied on the wound evenly with spatula and is washed with lemon juice after approximately 2 minutes. *Kshara* is repeated every day for 7 days covered with sterile pad<sup>27</sup>.

**5) Kshara Sutra Varti**– *Varti* is prepared by mixing the powders of *Aragvadh*, *Haridra*, *Kala (Aguru)* with *Madhu* and *Ghrita*. In this technique Plain thread is used instead of *Ksharasutra* and a *Ksharavarti* is applied by pushing it gradually into the tract through the external opening. It is found to be less painful than standard method,

moreover the drugs required for it is known to be easily collected and preserved<sup>28</sup>.

**6) Ksharasutra with partial fistulectomy** (Fig. u)– In this modification the part of fistula distal to external sphincter is completely removed with partial fistulectomy. A guggulu based *Ksharasutra* is now introduced tied and replaced weekly till the cut through and healing of remaining proximal tract occurs, while the distal part is left to heal with secondary intention. It is found better than standardised technique in terms of early relief from pain, discharge and itching and early cutting as well as healing.<sup>29</sup>



S) Standard procedure T) IFTAK U) Partial fistulectomy with *Ksharasutra*

## CONCLUSION

Classical Samhitas have described the method of preparation of *Ksharasutra* and its application on patient. As there is a lot of development in Ayurveda due to the growth of research and documentation, a number of adaptations have been made in the methodology of preparation and application of *Kshara* sutra. In this article an effort has been made to bring all such modifications and adaptations together.

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