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## RESEARCH ARTICLE

### REVOLUTIONS IN THE MANAGEMENT OF BHAGANDARA (FISTULA IN ANO) - A SHORT REVIEW

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#### ABSTRACT

*Bhagandara* (Fistula in ano) is a troublesome surgical disease. Several techniques have been described from ancient age to till date for the management of fistula-in-ano, but every technique has its own limitations. These techniques also carry their own risks of recurrence and incontinence. Conventional fistula surgery techniques have their place, but new technologies such as Ano-rectal Advancement flap Repair, Dermal Island Flap Anoplasty, Fibrin Glue, Fistula Plug, LIFT Procedure, BioLIFT Procedure, Adipose-Derived Stem Cells, VAAFT, PERFECT and OTSC Fistula Closure provide promising alternatives to traditional methods of management, with very good success rates. This review summarizes the revolution in the management of fistula in ano, from ancient to modern age with the recent techniques available currently.

## INTRODUCTION

Fistula-in-ano always remains a troublesome unsolvable problem for the surgeons. Acharya Sushruta included *Bhagandara* in *Ashta Mahagada* (Sushruta) (eight grave disorders). Treatment of fistula-in-ano is still a challenging job because of its complexity and recurrences. Several surgical techniques have been described from ancient age to till date for the management of Fistula-in-ano. But every technique has its own limitations. No single technique is appropriate for all types of anal fistulae. Line of treatment differs from patient to patient as per the type of fistula, amount of involvement of anal sphincter and the underlying disease or pathogenesis of Fistula-in-ano, as well as familiarities of the surgeon with the anatomy of ano-rectal region and the surgeon's skill as well as experience. The goals in the surgical management of anal fistula are to eradicate the fistula, to preserve the anal sphincter, to prevent the recurrence and to return to normal routine activity as early as possible. Achieving all the above goals is really a challenge to the surgeons because many of the treatment modalities results in recurrence or bowel impairment or incontinence. Conventional Fistula surgeries like Fistulotomy, Fistulectomy and Seton placement definitely have their place with good success, but these modalities have an increased risk of post operative incontinence. The risk necessitated the development of newer technologies for the management of fistula in ano which don't involve cutting of the sphincter. Recent technologies including Ano-rectal Advancement flap Repair, Dermal Island Flap Anoplasty, Fibrin Glue, Fistula Plug, LIFT Procedure (Ligation of Inter-sphincteric

Fistula Tract), BioLIFT Procedure, Adipose-Derived Stem Cells (ASCs), VAAFT (Video Assisted Anal Fistula Treatment) and PERFECT (Proximal superficial cauterization, Emptying regularly fistula tracts and curettage of tracts) and OTSC Fistula Closure offer an alternative approach with very good success rate. Short review on the treatment modalities available for the management of fistula in ano from ancient age to till date is summarized in this article.

1. *Chhedana*<sup>(4)</sup> - Sushruta, the father of Indian Surgery included *Bhagandara* under the group of *Chedya Vyadhi* (diseases which require excision), He mentioned *Chhedana Shastrakarma* i.e. radical excision of fistulous tract for the surgical management of *Bhagandara*.

**Operative Procedure:** According to Sushruta, after the *Snehana* (soothing the body of patient by applying medicated oil), and *Swedana* (giving hot fomentation with warm water), the patient is laid on a bed with his hands and thighs bound with straps (Supine lithotomy position). The surgeon should examine as to where the opening of the fistula is directed, inward or outward and whether the fistula is situated, upward or downward. Then the entire cavity (sinus) should be raised up by inserting and advancing *Eshani* (probe) through the tract and it should be excised radically. In case of fistula having internal opening, the patient is asked to strain down to get the access. When the internal opening becomes visible from the outside, an incision should be made by directing *Eshani* through internal opening. Sushruta advised *Ksharkarma* or *Agnikarma* after the *Chhedana*.

**Kharsutra Therapy**<sup>(5, 6, 7)</sup>: *Ksharsutra* is an alkaline herbal medicated thread used for the management of *Bhagandara*. It is a unique method of drug delivery which is most appropriate for healing the fistula tract. *Ksharsutra* is prepared by using surgical linen thread of no. 20. on which 11 coatings of *Snuhi Ksheer* ( Latex of *Euphorbia neriifolia*), followed by 7 coatings of *Apamarga Kshar* (Alkaline extract of *Achyranthus aspera*) and lastly 3 coatings of *Haridra Churna* (Powder of *Curcuma longa* ) are applied. The alkalis coated on the thread are gradually and continuously released throughout the length of the track thereby penetrating cutting, curetting, draining, cleaning and healing the track. The cut through of the fistulous track occurs by pressure exerted on anorectal tissue by moderate tightly ligated *Ksharsutra* in the track. *Ksharsutra* curettes the tract from apex to periphery slowly and gradually, leaving no puss pockets. *Kshara* applied on the thread is anti-inflammatory, anti slough agents and in addition has property of chemical curetting. Antibacterial property of *Ksharsutra* doesn't allow the bacteria to multiply in its presence. The PH of *Ksharasutra* is towards alkaline side i.e. >9 and therefore does not allow the rectal pathogens to invade the cavity.

**Operative Procedure:** With all aseptic precautions and under appropriate anaesthesia with patient in Lithotomy position, fistula tract is traced out with the help of *Eshani* (probe), *Ksharsutra* is inserted into the fistula track through external opening by tying its tip to the eye of the probe and then taken out through internal opening, situated in anorectal canal. Two ends of the *Ksharsutra* are tied outside the tract and anal canal forming a loop. The therapeutic action of the *Ksharsutra* lasts for 5 to 7 days. Hence *Ksharsutra* is changed on every 7<sup>th</sup> day by rail & road method till complete healing of the track.

**Advantages:** It is technically easy, safe, simple & cost effective method with negligible recurrence rate as compared to other treatment modalities. It can be carried out in Out Patient Department, as most of the cases don't require any anaesthesia also.-The presence of *Ksharsutra* in the track does not allow the cavity to close from either ends allowing continuous drainage of pus. Impaired continence is transient and related to the stage of 'cutting through' the anal sphincter by *Ksharasutra*, which subsequently lead to complete recovery, during follow up. It can be performed in old age patients, or having other diseases or otherwise unfit for surgery. No systemic side effects with *Ksharsutra* therapy. Post operative tissue damage and scarring are minimal. Patient's social, psychological and economic status is not disturbed during the treatment.

**Disadvantages:** Though it is a gold standard treatment, total time period required for the healing of tract is longer. Continuously feeling of discomfort due to *Ksharsutra* to the patient while performing routine work .Transient infection and local tissue reaction may occur which rarely needs medication.

**FISTULOTOMY**<sup>(8)</sup>: Fistulotomy is regarded as the standard treatment for Inter-sphincteric and low trans-sphincteric fistulae and is the most widely-performed procedure. Fistulotomy was the first surgical technique performed by the modern surgeons for the management of fistula in ano. While in Ayurveda, Sushruta the father of ancient Indian surgery much earlier described *Chedana* i.e. excision of fistula tract (Fistulotomy/Fistulectomy) as treatment of choice. Operative Procedure: Under the all aseptic precautions and suitable anaesthesia with patient in lithotomy position, the external and

internal openings are identified. A probe is inserted into the tract, followed by division of the overlying tissue. The base of the wound is then curetted and left open to heal from within by secondary intention. Healing is assisted by frequent sitz baths, proper daily dressing and proper medication.

**Complete Fistulectomy**<sup>(8,9)</sup>: Fistulectomy is a surgical procedure where a fistulous tract is excised (cut out) radically and the wound is left open to heal from the base. It is also called "lay open technique."

**Operative Procedure:** Fistulectomy is performed under general or a spinal anaesthesia. The internal opening is not always visible until during the surgery. Ethylene blue dye is injected into the external opening to trace the fistula tract and internal opening. Fistulectomy consists of excision of all the 3 components of fistula i.e. internal opening, external opening and the tract, which is done by dividing the least amount of sphincter muscle as possible. The location of the internal opening will usually dictate how much of the sphincter muscle will be cut or divided. More the sphincter muscle is incised, there will be more risk of leakage or drainage after the wound has healed. Once the fistula has been excised, the groove or surgical wound is left open to heal from within. Some fistulas can be very complicated and may require more than one surgery. Fistulotomy and Fistulectomy both require prolonged period of painful dressings which may be extended from few weeks to several months. Also there is a chance of secondary infection in the post operative wide open wound .Proper wound care, pain management and suitable antibiotics are required after surgery. The post operative wound healing usually takes 4-6 weeks. Both fistulotomy and fistulectomy have long been accepted as the gold standard for simple fistulas. Although fistulotomy has been associated with more success rates, the procedure results in some form of incontinence even for simple fistula.

**Seton Placement or Staged Fistulotomy**<sup>(10)</sup>: Seton is nothing but a modern variation of *Ksharsutra*. Various types of setons including-Staged Drainage Seton, Infant Feeding Tube Seton, a Silastic Vessel Loop (Vascular Sling), Cutting Seton, Elastic Band Cutting Seton are used for the management of fistula in ano depending on the purpose. Seton placement is commonly preferred for complex anal fistulae including high trans-sphincteric fistula, supra-sphincteric fistula or extra-sphincteric fistula and has minimal risk of incontinence

**Cutting seton:** It is used for centuries and is still common. It has an ability to drain the region while preventing recurrent abscess. It promotes fibrosis around the seton during slow division. A seton is passed through the tract from external opening with a metallic probe after gauze curettage of the fistula tract and secured to itself externally. Meticulous care should be taken not to make an iatrogenic tract or opening due to forceful insertion. While using the cutting seton, it is initially placed loosely to allow drainage and control sepsis and then it is progressively tightened until it eventually cuts through the fistula tract .Cutting Seton requires post operative tightening or adjustment which is painful and not tolerated well by patient. Also break or fall off of the Seton may occur. A rubber band with a 5-mm width is also used as a cutting seton.

**Drainage seton:** It is used in case where only the drainage of the tract is expected. The seton is knotted loosely for drainage purpose.

**Elastic Band Seton:** It is a onetime treatment procedure. No post operative tightening or adjustment is required and risk of incontinence is minimal. If the muscle contained along the seton is bulky, a partial internal sphincterotomy is performed to reroute the seton. Then the internal opening of the fistula is closed with concomitant internal anal sphincter repair, resulting in a rerouting of the seton through the inter sphincteric space (combined operation), by using absorbable suture material. The internal muscle defect and inter sphincteric plane are closed with several interrupted sutures, at least two layers. For the fistulous abscess, drainage was performed via a radial stab incision made close to the anal verge. The rubber band is inserted through the incised wound to the internal opening which allowed all necrotic debris to be removed. Anal packing is not used for all patients for their convenience.

**Anorectal Advancement Flap Repair** <sup>(11, 12)</sup>: Advancement flaps have been used to close the internal opening in fistula since long. The procedure may be summarized as elevating a flap, coring out of an infected gland, as well as an epithelised internal opening, obliteration of the internal opening and leaving the tract and external opening to drain and heal secondarily while avoiding sphincter division. The first step is identification of the openings, followed by curettage of the tract. Any fibrous tissue around the internal opening is excised. The incision is begun distal to the internal opening. A segment of proximal healthy anorectal mucosa, submucosa, and some muscle is mobilized to allow tension-free coverage of the internal opening. The base of the flap should be twice the tip of the flap to maintain the blood supply. The distal tip harbouring the fistula opening is then excised.

**Dermal Island Flap Anoplasty** <sup>(13)</sup>: Although a mucosal flap has been used traditionally, recently a dermal island or coetaneous flap has been used for the same purpose. Compared with a mucosal advancement flap, these procedures may have advantages in terms of technical aspects because they may provide easier access for the operation. They also reduce mucosal ectropion and discharge. However, advancement flap procedures have limitations. They are technically-demanding procedures with a wide range of success rates and are not free from a risk of minor incontinence.

**Fibrin Glue** <sup>(14, 15)</sup>: It was introduced as a haemostatic agent during First World War and was subsequently used for fistula in ano by Hjortup and colleagues in 1992. It is a mixture of fibrinogen, thrombin and calcium ions. The action of Fibrin glue takes place via two mechanisms. As it is injected into the tract, fibrinogen, thrombin and calcium ions react with factor XIII to form a clot which immediately sterms the contamination of fistula tract with blood, pus, stool and mucous. Secondly proteins within the glue promote the proliferation of fibroblasts and pluripotent endothelial cells which then replace the glue with fibrous tissue. As the glue gets replaced, the tract gets sealed off with fibrous tissue with minimal damage to the sphincter and practically no risk of incontinence. The glue is currently available into two forms- an autologous preparation made from pooled human blood and a commercial preparation. The efficacy of both has shown the same.

**Operative Procedure:** The procedure starts with identification of the internal and external openings of the fistula tract. The tract is cleaned by debridement with a curette or gauze. Fibrin glue is slowly injected into the tract until it is seen exuding

from the internal opening. Time is usually given to allow the reaction to stabilize the clot.

**Advantages:** Fibrin glue is easy to use, avoids sphincter division, can be repeated with no risk of incontinence and does not stop the patient from getting any other treatment option.  
**Dis-advantages:** Though glue is easy to apply, it is not ideal for the treatment of Fistula because of its liquid consistency. Failure of treatment may occur due to several reasons including dislodgement of the glue, inadequate removal of unhealthy granulation tissue and abscess formation.

**Anal Fistula Plug** <sup>(16, 17)</sup>: It was first used in 2006 as a modification of the Surgisis (R) biocompatible material by Johnson et al. It is based on the fact that the internal opening of the fistula is closed by placing the anal fistula plug. The small intestinal sub mucosa is a natural biomaterial harvested from porcine small intestine and fabricated into a biomedical product of various shapes and thickness. It acts as a strong scaffold for growth of fibroblasts and promotes the ingrowth of native tissues. It has been demonstrably useful as a bio prosthetic material in infected fields, makes its application in fistula surgery quite reasonable. The anal fistula plug has a biological configuration suitable for fistula disease.

**Operative procedure:** The tract is explored, probed, and irrigated gently with hydrogen peroxide. Then, the apex of the plug is tied to the probe from the internal opening, and the plug is dragged through to the external opening. It is cut to fit and is secured in the internal opening by using a figure-of-eight suture, incorporating it with the mucosa of the anorectum to close the internal opening. The main limitation of application of the anal fistula plug in the treatment of anal fistulae is the high cost. The other limitation is the restrictive indication. It is probably suitable for a low trans- sphincteric fistula. The overall success rate is low.

**LIFT Procedure** <sup>(18, 19)</sup>: It is a novel new technique first described in Thailand. It is based on closing the internal opening and removing the infected crypto glandular tissue via the inter sphincteric plane. This technique prevents the entry of faecal material into the fistula tract and eliminates the formation of a septic nidus in inter- sphincteric space to allow healing of the anal fistula.

**Operative Procedure:** the location of internal opening is identified by injection of hydrogen peroxide or distilled water through the external opening or by gently probing the fistula tract. A 1.5 to 2.0 cm curvilinear incision is made at inter sphincteric groove overlying the fistula tract to open the inter-sphincteric space. The dissection is kept close to the external sphincter to avoid cutting through the internal sphincter and breaching the anal mucosa. The fistula tract is identified as it crosses from the internal to the external sphincter. It is clearly defined and ligated with a suture. This technique disconnects the internal and external openings, thus allowing for fibrosis of the tract without any damage to the anal sphincter. After removal of the correct fistulous tract has been confirmed, infected granulation tissues in the rest of the tract and cavity are thoroughly removed with curettage. The open defect at the external anal sphincter is sutured through inter- sphincteric wound. Finally, the incision wound is closed loosely.

**Advantages:** No patient reported any subjective compromise in continence after the procedure. The advantages of the LIFT

procedure may include preservation of the anal sphincter, minimal tissue injury, shorter healing time, and its being a procedure that is relatively easy to perform. Additionally, even if the fistula is not healed successfully, the LIFT procedure may convert a difficult to treat trans sphincteric fistula into an easier-to-manage inter- sphincteric fistula.

**Disadvantages:** the indication for the LIFT procedure is limited to the trans sphincteric fistula. The LIFT procedure for a high trans- sphincteric or supra sphincteric fistula may be technically difficult.

**Bio LIFT Procedure** <sup>(20)</sup>: The BIOLIFT technique is a variation of the LIFT technique in which a bioprosthesis is placed in the intersphincteric plane to reinforce the closure of the fistula tract. The bioprosthesis acts as a physical barrier in the intersphincteric space. Actually, the BioLIFT technique utilized a transection of the inter- sphincteric tract and closure of the fistula opening in the internal sphincter, instead of ligating the inter sphincteric tract.

**Disadvantages:** When compared to the LIFT, the BioLIFT technique has two potential disadvantages. First, it requires a more extensive dissection in the intersphincteric space because the bioprosthesis must overlap the closure of the fistula tract by at least 1 to 2 cm in all directions. The second disadvantage is the relatively high cost of the bioprosthesis materials.

**VAAFT** <sup>(21)</sup>: VAAFT is a new improved painless and minimally invasive procedure performed under direct visualization. It was first developed by Meinero and Mori in 2006. The surgery is performed under a subarachnoid block with the patient in the dorsal lithotomy position. In this technique, the internal opening is visualized with the aid of a fistuloscope, which navigates through the tract under vision. The tract is straightened by maneuvering the scope. All of the tracts accommodated the fistuloscope. The next step is visualization of the internal opening, which is identified by the exit of the fistuloscope through it. Narrow openings are identified as a beam of illumination through the rectal mucosa or the exit of irrigating fluid through them. The fistula is cauterized from within by passing a special electric current (Fulguration of fistulous tract) and the necrotic material is flushed with an endobrush and irrigation fluid. After the removal, the opening is closed by application of absorbable suture or with fibrin glue. It is a sphincter-saving procedure and offers many advantages to patients. The running glycine-mannitol solution helps to open the fistulous tract.

**Expanded Adipose-Derived Stem Cells (ASCs)** <sup>(22)</sup>: Adipose tissues are chosen as the source of stem cells because of its two biological properties: ability to suppress inflammation and its differentiation potential. The procedure includes tract identification, with special emphasis on the identification of the internal opening; tract curettage, with special emphasis on the inter-sphincteric tract; closure of the internal opening; injection of a cell suspension through a long fine needle into the tract walls; and lastly sealing of the tract with fibrin glue.

**Advantages:** An advantage of using stem cells to treat an anal fistula is that, as tract resection is not required, the treatment does not injure the anal sphincter. There are, nonetheless, some limitations of the ASCs-based therapy.

**Disadvantages:** The cost of treatment with ASCs is very high. Second, Securing closure of the internal opening and complete

injection of the cell suspension over the tract is technically complicated procedures. There are no reports on the long-term effects of using ASCs.

**PERFACT Procedure** <sup>(23)</sup>: PERFACT procedure (Proximal Superficial Cauterization, Emptying Regularly Fistula Tracts and Curettage of Tracts) is a new concept to treat highly complex anal fistula, effective even in fistula associated with abscess, supralelevator fistula-in-ano and where the internal opening is non-localizable. The procedure is performed under a saddle block (spinal anaesthesia) or a short general anaesthesia. With the patient in lithotomy or a prone jack-knife position, the internal opening is localized. This is facilitated by injecting saline, povidine iodine or hydrogen peroxide through the external opening. Three main steps to be performed in this technique are:

*Step 1-* Proximal superficial cauterization: Cauterizing the mucosa at and around the internal opening to make it fresh and de-epithelised by using electrocautery. The basic principle behind this cauterization is to close the internal opening permanently by granulation tissue and subsequently allowing the wound to heal by secondary intention.

*Step 2 –* Curettage of fistula tracts: All the tracts of the complex fistula are debrided by curetting the inner layer of unhealthy granulation tissue and fibrous tissue thoroughly with blunt curette.

*Step 3 –* Emptying regularly fistula tracts: After curetting, the tracts are allowed to remain empty by cleaning them regularly in the post operative period till it heal completely. Regularly cleaning keeps the tract wide open to drain off the serous fluid and promotes the healing of the tracts by formation of fresh granulation tissue. Cleaning is done by gentle rubbing of the wound by inserting the finger in anorectal canal. The emptying is done by a cotton swab mounted on an artery forceps. No povidone iodine, hydrogen peroxide or any liquid was injected in to the tract during the cleaning process as this would have prevented the internal opening from closing. The total length of the treatment period is generally 4 to 8 weeks, but it may extend even longer in some cases. Now a day, PERFACT procedure is becoming a first line definitive procedure for all types of complex fistulae including fistula associated with multiple tracts; horse shoe fistulas; recurrent fistulas; anterior fistula in females; fistula with long tracts (any tract length > 10 cm); fistula with supralelevator blind extension (not with high rectal opening); fistula where internal opening cannot be localized; and fistula associated with abscess/pus collections.

**OTSC Fistula Closure** <sup>(24)</sup>: Over-The-Scope-Clip (OTSC) is the newer innovative surgical device for anal fistula closure. It is a sphincter-preserving minimally invasive procedure with promising initial results and a high rate of patient satisfaction. It consists of a super-elastic nitinol clip and a clip applicator. The clip is placed with the aid of a transanal applicator on the internal fistula opening to achieve healing of the fistula track. Cryptoglandular anorectal fistula can be better treated by this technique.

**Operative Procedure:** In this procedure, fistulous track is debrided using a special brush and the clip is applied to the internal fistula opening. Post operatively, it takes nearly six months to heal the tract completely.

**Advantages:** No intra-operative technical or surgical complications. Postoperatively there is no intolerable discomfort or a sensation of a foreign body in the anal region.

**Disadvantage:** Rarely the clip may get spontaneously detached.

## RESULTS

Conventional surgery techniques for the management of Fistula-in-Ano have their place, but the advanced technologies such as Fibrin Glue, Anal Fistula Plugs, LIFT Procedure, BioLIFT Procedure, Adipose-Derived Stem Cells (ASCs), VAAFT (Video Assisted Anal Fistula) and PERFACT may offer an alternative approach in the terms of sphincter preservation and low risk of postoperative incontinence. Though they are technically much more complicated and needs expertisenes, they can be implemented with greater success.

## CONCLUSION

New technologies for the management of Fistula-in-Ano provide promising alternatives to the conventional methods of management.

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