A Review of Various Surgical Managements and their Outcome of Fistula-in-Ano

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Abstract

Treatment for fistula in ano (FIA) has been tricky for most surgeons. Fistula-in-ano is an abnormal epithelial-lined tract which connects anal canal to perianal skin. Fistulas in ano can have numerous causes but most commonly caused by perianal abscess. The prevalence in men is about 12 cases for 1 lakh population whereas in women its 6 cases for 1 lakh population. The only treatment available for fistula in ano is surgery which includes various procedures like fistulectomy, fistulotomy, VAAFT, LIFT, SETON. Complications like Fecal incontinence, persistent discharge, fistula recurrence may seen in post-surgery. Therefore, to avoid these complications sphincter saving surgeries like LIFT, VAAFT are practiced these days.

Keywords: Fistula in Ano (FIA); Ligature of Intersphincteric Fistula Tract (LIFT), Video Assisted Anal Fistula Treatment (VAAFT)

Introduction

Fistula means reed, pipe or flute in latin. Fistula in ano is characterized as small tunnel with an internal opening in the anal canal and an external opening in the skin near the anal opening, which causes chronic inflammation. Fistula develops when an anal abscesses doesn't heal completely after draining. Fistula in ano most commonly presents with perianal seropurulent discharge.

Fistula in ano arises from anal glands, which are seen in the sub-epithelial layer of anal canal at dentate line level. Each duct of a gland directly opens into anal crypt called as morgagnis crypt. Internal anal sphincter acts as competent barrier against bacteria, which leads to chronic infection of the anal gland which can cause perianal abscess or fistula when extended into inter sphincteric plane.

Glands get blocked secondary to fecal material, foreign bodies or trauma which may results in stasis, infection and abscess can form which can eventually leads to skin surface to form fistula tract. Recurrence can occur if fistula seals over due to reaccumulating of pus, when it comes to surface process recurs.

Anal fistulae can cause persistent pain or irritation due to the pus draining through it. There are chances of formed stools passing through fistula. Spread of infection can occur with recurrent abscess formation and results in morbidity like pain and persistent discharge. Surgery is important for abscesses drainage and to stop the spread of infection. fistula in ano is not a life-threatening condition, can be done as an elective procedure to relieve patients discomfort, and complications associated with it.

Clinical features of fistula may present with pain, purulent or bloody discharge, pruritis-ani (itching sensation in perianal region), bleeding per rectum, diarrhoea and skin excoriation. If the abscess gets infected systemic manifestations can occur. Fistula can present with abdominal pain, weight loss, change in bowel habits, when related with the accompanying illnesses like IBD, diverticulitis, HIV infection, TB, steroid treatment or past radiation introduction, thus related disease probability to be assessed and precluded before giving conclusive therapy. At the point when a patient present with active infection, we should give anti-microbial treatment before definitive treatment. Surgical treatment is the main definitive therapy for complete cure of fistula in ano. Treatment of fistula in ano is considered troublesome due anatomical site of fistula, there to be expected danger of sepsis related difficulties, recurrence rate and post-surgery fecal incontinence.

The principle objective is to get the fistula tract heal properly and lower the morbidity caused by disease. Incorporating careful treatment strategies like fistulectomy, fistulotomy, endorectal advancement flap, LIFT, VAAFT, seton method, fibrin paste and fibrin plug has a major role. Success of treating fistula in ano depends upon the exclusion of sepsis and maintenance of continence. Carefully picking suitable surgical procedure strategy is important for treatment of fistula in ano. This study focuses on types and time patterns for treatment of fistula-in-ano (fia).

Review of Literature

Fistula in ano is one of the earliest known disease of humanity. Its evident by its existence which was described in early biblical literature about the treatment of fistula in ano in 220BC. Throughout surgical history Fistula-in-ano has been a troublesome pathology to both patient and doctor.

Sushruta: Sushruta (12th -13th century) “The father of Surgery’ mentioned Kshar-sutra (Alkaline Ayurvedic Medicine thread) for the first time in the book ‘SUSHRUT - SAMHITA for the treatment of Bhagandara=fistula-in-ano, Arsha =Piles=, NadiVrana=sinus, Arbuda=Excision of small benign tumour. Kshar-sutra procedure is one of the most effective para-surgical procedure of Ayurveda. This technique provides a good result in the variety of all ano-rectal diseases like Anal Fistula, Pilo-nidal sinus (nadivrana), Chronic Anal Fissure (Parikartika), Anal Condyloma and Rectal Polyp etc.

a. It is a medicated thread prepared by 21 coatings of different medicines.

b. 11 coatings of latex of Euphorbia Nerrifolia (SNUHI-KSHEER)- it has binding and cutting properties.

c. 7 coatings of KSAR, gathered by the burning various herbs acts as a which is made powdered which acts as antimicrobial and Cutting properties.

d. 3 coating of Haridra which is Turmeric powder helps in healing.

e. The chemical action of the drugs coated and mechanical action of the thread, helps in curetting, draining cutting, cleaning and promotes wound healing in the ano-rectal diseases. The antiseptic properties and fibrotic agent of this method induces healing which starts from deeper tissues and travels towards periphery.
Benefits of the ksharsutra includes:

a. Patient requires 6 - 7 hours hospital stay and with only 1 - 2 days bed rest.

b. Patient doesn’t need top line antibiotics IV fluids, Blood transfusions and dressings” [1-4].

John Arden: John Arden (1307-1390), wrote the book - ‘Treatises of Fistula in Ano, Haemorrhoids and Clysters’. In this book, “he described the treatment for fistula in ano. He was the first surgeon who practiced Fistulotomy. The patient in a lithotomy position, 4 threads were taken through the fistula and ends taken out through the anus then threads were knotted to stop bleeding. Grooved instrument was pushed inside through the fistula into rectum, till it comes in contact with another instrument then the segment was removed by him. Hot sponge was used to stop bleeding between the ligatures. He expertised in demonstrating the fistula in anosurgical techniques” [5].

Charles Felix in 1686, treated Louis XIV of France (1638 - 1715): The Sun King - developed a perianal abscess that after a series of failed treatment attempts, including with the use of a red-hot iron, developed into an anal fistula. The doctors were powerless, and after several months of cogitation the king underwent surgery that proved successful. At the time, surgeons were subordinate to physicians, but with the king’s help their working conditions improved and their prestige rose. After persistent efforts by later outstanding French surgeons and with royal support, the Académie Royale de Chirurgie (the Royal Academy of Surgery) was established in 1731. Medical training in France was later reorganised, with the establishment of institutions that merged training in internal medicine and surgery” [6].
Frederik Salmon: Frederik Salmon (1835) founded Saint Marks Hospital, London for primarily treatment of anal fistula. "He recommended pioneer technique to make the fistula tract triangular and laid open, so the mucosal wound inside heals earlier then skin wound. He operated Charles Dickens (1812-1870) for fistula in ano which was successful. Dickens wrote a letter to a friend in a gratitude 'last Friday morning, (I)was obliged to submit to a cruel operation, cutting out root, branch of the disease caused by working over much which has been gathering it seems for many years" [7].


Buchanan., et al: "In British Journal of Surgery, commented about success rate of seton technique which falls over a time period in high fistulae" [9].

Strittmatter B: "German, in Wein Med Wochenschr, commented on different forms of fistulae and single most important factor in achieving cure from the disease to know the course of the tract" [10].

Malouf AJ., et al: "In Colorectal Disease, commented that previous fistula surgery is a major risk factor for sphincter incontinence during repeat surgery" [11].

Duinslaeger M: "In ActaChir Belgium, explained the principles of fistulotomy and recommended the use of endoanal flaps and setons in complex fistulas and suggested etiology of the fistula is the most important factor in curing the disease" [13].

Knoefel WT., et al: "In Digest of Surgery, suggested that a preliminary fistulotomy in cases of anorectal abscesses as this approach significantly reduces the number of recurrences as compared to a simple Incision and drainage" [14].

Adams D, Kovalcik PJ: In 1981 "did an eight year retrospective review study of 133 patients with fistula-in-ano, found the majority to be of crypto glandular causation" [15].

Park's., et al: "Described Fistulas usually falls under 4 main anatomic categories" [18]. "He refined the classification system that is still in wide spread use. Over the last 30 years, many authors have presented new techniques and case series in an effort to minimize recurrence rates and incontinence complications. Despite 2500 years of experience, fistula-in-ano remains a perplexing surgical disease" [19].

James P.S Thomson, David C. Sabiston Jr: "Did a comprehensive review of literature as reported that fibrin glue injection results a broad range of successful fistula closure up to 60% this review included a randomized controlled trail of fibrin glue compared with standard treatment of fistulas. The only difference was that fibrin glue patients returned to work earlier than the conventionally treated patients" [20].

Anal plug: The "Anal plug is to fill the tract with rod of fibrin to avoid gutter and preserve anal sphincter function, by which fibroblastic activity eliminates the fistula tract by forming a collagen matrix in the fistula" [21].

Bioprosthetic plugs: The "Bioprosthetic plugs for complex anal fistulas an early experience. The main goal in the treatment of anal fistulas is to eliminate the fistula without causing incontinence. Treatment include Fistulotomy, use of setons, fibrin sealant, and advancement flaps. bioprosthetic fistula plug has been described recently. No single technique exists that is appropriate for the treatment of all fistulas. The purpose of this study is to report the author’s early experience with the bioprosthetic fistula plug and to compare the results of bioprosthetic plug closure of complex anal fistulas with those achieved with advancement flap repair. A retrospective analysis of pro-
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spectively collected data was performed for patients treated with an anal fistula. Data collected included age, gender, fistula anatomy and etiology, previous repairs, comorbidities, procedure performed, pain scores and fistula recurrence" [23].

**Adipose derived stem cells:** The "Adipose derived stem cells used in treatment of complex anal fistula. On comparison with fibrin glue, the results include recurrence rate of 17% at one year follow-up" [30].

**Mucosal advancement flap:** The "Mucosal Advancement Flap is a sphincter sparing procedure where endorectal/ endoanal flaps are advanced to close the internal ring with or without closure of the tract. Healing rate varies from 77 - 100%. Recurrence rate was noted to be 23%" [22].

**Van Koperen., et al:** "Used the setons to drain the tracts followed by flap advancement with good results. Combining fibrin glue in conjugation with advancement flap in a study conducted by Ellis and Clarke. The "Long term functional outcome and risk factors for recurrence after surgical treatment from low and high peri-anal fistulas of crypto-glandular origin. Three hundred ten consecutive patients were surgically treated for perianal fistulas. After exclusion of patients with inflammatory bowel disease or HIV, 179 patients remained. Patients were divided into two groups: those who received fistulotomy for low perianal fistulas and those who received rectal advancement flap for high perianal fistulas. Time to fistula recurrence was the main outcome and Cox proportional hazard models were used to assess the importance of various risk factors. Functional outcome was assessed using the Vaizey and colorectal functional outcome (COREFO) questionnaires" [33].

**Miligan and Morgan, Goodsall, Miles and Thompson:** "In 19th and early 20th centuries made contribution in understanding the treatment of anal fistulae. If the surgeon got the opportunity to treat his patient initially is the one most likely to establish cure, limit morbidity and minimize disability The "history of recurrent abscess that ruptured spontaneously or was surgically drained, there may be a pink or red elevation exuding pus or it may have healed. The main reason for recurrence is undiagnosed fistula present at the time of abscess drainage, the incidence of about 18 to 95 percent. The primary determinant of successive treatment of fistulas involves accurate identification of the internal opening and course of the fistulous tract" [34].

**Lockhart Mummery:** Postulated “a fistula operation is not a major operation, but it is far from being a minor one. The Man has always feared for the operation and worried about cure for fistula in ano. Its because not only is the patient not cured of his disease, but a greater affliction comforts him in the form of anal incontinence due to poor surgical management” [35].

**Review of embryology**

- “At the dentate line, endoderm derived tissues face with the ectoderm derived pro ectoderm or in growth form the anal pit.
- Distal rectal development is complex.
- The cloaca is the specialised area of the primitive distal rectum composed of endoderm and ectoderm derived tissues.
- This area is incorporated into the anal transition zone, which surrounds the dentate line in the adult.

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- The cloaca exists in the continuum with the hindgut but, at approximately the sixth week, it begins to divide and differentiate into anterior anogenital and 14 posterior anal and sphincter elements; simultaneously the urogenital and GI tracts are separated by caudal migration of the urogenital sphincter.

- During the 10th week of the development, the external anal sphincter is formed from the posterior cloaca or the descent of the urogenital sphincter becomes complete.

- The internal anal sphincter is formed by the 12th week from enlarged circular muscle layers of the rectum” [37].

**Anatomy of anal canal**

Anal canal "extends from anorectal ring at the most distal aspect of rectum to the skin of anal verge measuring about 2 - 5 cms in length, lined by stratified squamous epithelium shorter in women than in men. The dentate or pectinate line is defined by anal valves, which is situated in the middle of the canal.

The anal glands located in submucosa through internal sphincter reaches intersphincteric space where it opens into the crypts above the valves. At the dentate line, squamous epithelium transitions to columnar epithelium referred as transitional zone which has a high sensory innervations and play a role in continence and normal defaecation.

The anal canal lined by two sphincter muscles:

1. Thickened circular muscle layer of the bowel wall continues as smooth internal sphincter.

2. The circular external sphincter merges with puborectalis above, which forms a sling behind uppermost part of anal canal and attaches to pubic bones. The puborectalis is the lowermost part of funnel shaped levator ani muscles, which separate perineum from pelvic cavity” [38-40].

![Figure 2: Anatomy of anal canal.](image-url)
Review of physiology

Mechanism of anorectal continence

The anorectal continence is maintained by a series of mechanisms “The three theories of anorectal continence, put forth by various authors are Pressure zone theory, Flutter valve theory and sling theory”.

- Pressure zone theory: The intraluminal pressure within the rectum is less than 20 mm Hg while that within the anal canal is 20 - 120 mm Hg. This difference in pressures is one mechanism for continence.

- Flutter valve theory: The levator ani muscle at the anorectal junction is thought to act like a flutter valve and maintain continence.

- Sling theory: The puborectalis muscle as explained above, forming a sling around the ano rectal junction forms the most important mechanism of continence.

Primary mechanism

The puborectalis sling forming the ano rectal ring, cants the rectum anteriorly and plays the most crucial role in maintaining continence. The secondary mechanisms are, the intrinsic tone in the internal sphincter ani muscle, the voluntary contraction of the external sphincter ani muscle and the compression of ischiorectal and ischio anal fat by the gluteus maximus muscle. which in turn keeps the anal canal and the rectum, which it surrounds in a collapsed state.

Clinical features
The incidence of fistula in ano is more common in middle aged men.

Symptoms: The chief complaint is intermittent or constant drainage or discharge. There is usually a history of previous pain, swelling and recurrent abscess that ruptured spontaneously or was surgically drained. There may be a pink or red elevation exuding pus, or it may have healed. In Crohn's disease or tuberculosis, the margins may be violaceous and the discharge watery.

Signs and symptoms (in order of prevalence)
- Perianal discharge: The discharge consists of blood mixed with pus, at times feculent smelling. This is because, the mouth of the fistula closes after discharging the contents, only to open up again when pressure builds up inside due to stasis.
- Pain Fistula as such, is a painless condition, but the recurrent abscess associated with it causes recurrent pain. The build up of purulent material within the fistula, against a closed mouth (external opening) results in severe pain, only to relent, when the contents are discharged externally. This can at times be associated with systemic symptoms of fever, malaise etc.
  - Swelling.
  - Bleeding.
  - Diarrhoea.
  - Pruritis ani.

Physical examination
Physical examination findings remain the main stay of diagnosis.
The examiner should observe the entire perineum.

Inspection
- On inspection, a single or multiple opening will be seen.
- If numerous openings are present, a watering can perineum can result.
- The mouth of the external opening may be covered with a sprout of unhealthy granulation tissue or may discharge foul smelling, thick, creamy pus.
- Peri anal skin may be red and inflamed, due to pruritis ani.

Palpation
- By digital palpation, with one finger in the anal canal and the other over the peri anal skin, the tract of the fistula, can be marked by the induration felt.
- High level fistula tract cannot be felt in its entirety.
- A single horse shoe fistula can be palpated at the level of the ano rectal junction with a finger inside the anal canal. But if double, the horse shoe fistula cannot be appreciated as there is no normal side for comparison.
- It is important to mark the level of the internal opening of a fistula in relation to the ano rectal junction by asking the patient to, voluntarily contract the sphincters.
Probing

Probing is done, with utmost gentleness, after first ascertaining the direction of the tract, by palpation. With one hand probing the external opening, the finger of the other hand feels for the tip of the probe within the anal canal. The direction and obliquity of the probe indicate the level of the fistula. If the probe passes vertically, the fistula is probably of high level. Conversely, if the probe passes horizontally, the fistula is of low level type. Usually Allingham's medium sized probe is employed, with tip of the probe bent into a slight curve. For straight type of fistula tract, with an anterior external opening, St. Mark's type of probe is sufficient.

Investigation

Routine:

1. Blood: Hemoglobin, bleeding time, clotting time, ESR, Fasting blood sugar, blood urea level, serum creatinine.
2. Urine: Urine routine:
   a. Sugar
   b. Albumin
   c. Microscope examination
   d. Bile salts/Bile pigments.

Figure 4: Probing technique.
3. ECG in all leads.
5. Pus cultures and sensitivity: To know the organism and antibiotic sensitivity pattern. Sometimes scraping of granulation tissue from the tract of the sinus may yield specimen, suggestive of a specific cause like tuberculosis.

**Imaging studies:** They are not performed for routine fistula evaluation. They can be helpful when the primary opening is difficult to identify or in the case of recurrent or multiple fistulae to identify secondary tracts or missed openings.

**Fistulogram**

“Lipiodol can be injected into the fistulous tract and x-rays taken to delineate the fistulous tract. Useful especially for high level fistula, fistulae with multiple secondary tracts and recurrent fistulae to plan treatment. Hydrogen per oxide can be used instead of lipiodol, at the time of surgery, to delineate the tract. Alternatively, methylene blue can be used” [55].

![Figure 5: X-ray photograph of fistulogram.](image)

**Endo anal/endorectal ultrasound**

- This is a new, potentially promising technique for localizing fistula tracks and associated abscesses in the perianal region.
- “These studies involve passage of 7 or 10 MHz transducer into anal canal to help define muscular anatomy differentiating intersphincteric from transphincteric lesions.
- A standard water filled balloon transducer can help evaluate the rectal wall for any suprasphincteric extension.
- These studies are reported to be 50% better than physical examination.
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- alone to help find internal opening of fistulas can be accurately localized and a concomitant intersphincteric abscess may be identified.

- In recurrent or complex fistula-in-ano, endo anal ultrasound proved more accurate for detecting primary tracks and internal openings than for detecting extensions. Hydrogen peroxide improved conspicuity of some tracks and internal openings and so may be helpful in difficult cases, although no overall diagnostic benefit was demonstrated.

- Others concur that this technique is an accurate and minimally invasive method for delineating the relationship between fistula tracts and the anal sphincter mechanism as well as identifying deeper areas of sepsis [53,54].

**Magnetic resonance imaging (MRI)**

- Magnetic Resonance Imaging (MRI) is "useful in identifying primary and secondary tracts. High concordance rates (80-90%) between MRI and operative findings have been reported [21].

- MRI is becoming the study of choice when evaluating complex fistulae It has been shown to improve recurrence rates by providing information on otherwise unknown extensions.

- Digital subtraction MR-fistulography is a new, promising, non-invasive imaging technique for the detection of perianal fistulas and abscesses [53].

*Figure 6: MRI of peri anal fistula.*
Computerized tomography scan (CT scan)

The use of "computed tomography in the evaluation of anal fistulas is limited due to poor visualization of the levators and sphincter complex. The role of CT in anal sepsis and fistula is thus limited to the assessment of associated pelvic pathology in patients with supralevator abscesses and in patients with some complex anal fistulas" [52].

A barium enema/small bowel series: "This is useful for patients with multiple fistulae or recurrent disease to help rule out inflammatory bowel disease" [51].

Fistuloscopy: Anorectal fistuloscopy using flexible ureteroscopes has been recently described [24]. This is a potentially useful intraoperative technique to identify primary fistula openings, multiple or complex tracts and iatrogenic tracts. Modified flexible ureteroscopes are in the early development stages [23].

Other tests
Anorectal monometry
"Measures based (resting) and maximal (squeeze) pressures. The anal canal lumen is a Zone of high pressure i.e. 25 - 120 mm Hg as against a rectal intra luminal pressure of 5 - 20 mm Hg. 20% of this high pressure is contributed by the external sphincter, But the maximal squeeze pressure is entirely contributed by the external sphincter and to some extent gluteus maximus muscle. It is found that in anal fissures. The resting pressure is raised above basal levels, but the maximal pressure is normal" [50].

Sigmoidoscopy and colonoscopy
Sigmoidoscopy should be performed in all patients with anorectal pathology. The presence of associated pathology such as neoplasms, inflammatory bowel disease, or associated secondary tracts in the rectum must be sought. Such findings may dictate the need for full colonoscopic evaluation.

Review of treatment
Surgery is the only reliable and accepted mode of treating a fistula in ano. Conservative methods mostly do not work. These types of operations are mainly performed for this condition:

- Fistulectomy:
  - I Stage method
  - II Stage method
  - III stage method.
- Fistulotomy.
- LIFT (ligature of intershincteric fistula tract).
- VAAFT (video assisted anal fistula treatment).
- Seton technique.
- Fibrin glue and plug.
The principles of surgery mainly focus on eliminating the fistula, prevent recurrence and preserve sphincteric function.

**Fistulectomy**

This is done by coring or excising the entire fistulous tract. This procedure is done in a single stage, two stage or three stage procedure.

**Single stage core fistulectomy**

This is done for a low level fistula, as an alternate procedure to Fistulotomy.

**Two stage fistulectomy**

“This method is useful in high level trans-sphincteric or supra-sphincteric fistula. A Lockhart mummery probe is passed through the external fistula and the fistula tract is laid open up to the pectinate line by cutting over the probe. Then a seton is passed through the remaining tract up to the internal opening in the anal canal and then brought out through the anal orifice externally and two ends are tied together.

After six weeks when fibrosis has set around the fistula, the tract is excised completely at a second sitting without fear of incontinence, as the fibrosed tissue prevents muscle gaping. This method is called Gabriel’s two stage fistulectomy.

**Three stage fistulectomy**

This is rerouting the fistulous tract by staged operation.

**First stage:** The fistula tract is cored out up to a point on the external sphincter by introducing a seton and holding on its one end and the assistant holding other end. The external sphincter muscle is then divided and the intersphincteric space is opened. The cored out tract is passed into the intersphincteric plane and the cut external sphincter is closed with sutures. The two ends of the seton are now tied.

**Second stage:** After four to six week, when external wound is healed, in a second sitting, the fistula tract is transposed into the submucous plane, by division and immediate repair of the internal sphincter. The healed external sphincter now act as a splint and the wound does not give.

**Third stage:** After four weeks the entire tract in the submucous plane is cored out. Usually high level fistulae are secondary to some other pathology such as carcinoma rectum, inflammatory bowel disease, tuberculosis. In these cases, treatment should address the primary pathology and may require an abdomino-perineal resection for carcinoma rectum or total proctocolectomy for inflammatory bowel disease. Fistulae which are secondary to tuberculosis, are diagnosed, when they fail to heal with surgery or recur soon after surgery. Fistulae which are secondary to rare causes such as actinomycosis, LGV, and bilharziasis, are first treated with specific chemotherapy and later surgical excision if not healed by then” [30].

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Fistulotomy

Fistulotomy means laying open of or unroofing of the fistulous tract.

Steps

- Under general anaesthesia in lithotomy position where buttocks are well parted and they are made well projecting outside the edge of the table by keeping sandbags. Some surgeons prefer the jack knife and prone position.
- "A gentle probing and bimanual examination is done to note the level of the fistula and direction of the tract.
- If the fistula is below the anorectal ring, the tissues can be cut open over the probe and fistula tract laid open entirely. The laid open tract is now curetted and sample sent for histopathological examination.
- The tract of the laid open fistula is now carefully inspected and palpated for any secondary openings, and if none is found the tissues in the vicinity of the fistulous tract is cut to produce a peer shaped (oval) wound, with its apex is directed upwards and inwards [48].

LIFT (Ligature of intersphincteric fistula tract)

LIFT procedure is "ligation of the inter sphincteric fistula tract and its based on removal of infected cryptoglandular tissue and closure of the internal opening through the intersphincteric approach. The procedure was developed by Thai colorectal surgeon, Arun Rojanasakul, Colorectal Division Department of Surgery, Chulalongkorn University, in Bangkok, Thailand in 2007."
Two major differences between LIFT and previously described techniques:

- Ligation of fistulous tract is more secure and
- Removal of infected glandular tissue by curettage is less time consuming and more practical.

Surgical techniques of LIFT procedures:

- Identifying the internal opening
- Incision at the intersphincteric groove
- Dissection through intersphincteric plane and identify intersphincteric fistula tract
- Secure ligation of intersphincteric fistula tract
- Remove the fistula tract and Curette fistula tract from external opening” [31].
Figure 9: Internal opening identification.

Figure 10: Lift surgery technique.
VAAFT (Video assisted anal fistula treatment)

VAAFT technique is used in the treatment of recurrent and complex fistulas. It involves two phases that includes one is diagnostic and the other is operative phases. It involves visualization and localization of internal fistula, this technique includes closure of internal opening from inside of tract. As sphincter damages are avoided, surgical wounds in the perianal region and faecal incontinence is less compared with other techniques.

The technique involves a Fistuloscope, unipolar cautery, fistula brush, semicircular or linear stapler and forceps attached to it. 0.5 ml of synthetic cyanoacrylate which is placed in tiny catheter attached to fistuloscope.

The fistuloscope has an optical channel, a working channel and an irrigation channel. Average working length of about 18 cm and effective manipulation occurs around 14 cm from target site.

The patient placed in lithotomy position, under spinal anaesthesia and the fistuloscope is introduced to the fistulous opening with optimal solution (5000 cc glycine and mannitol 1% solution).

Phases of VAAFT

- The diagnostic phase
- The operative phase

Figure 11: Vaaft procedure.
The diagnostic phase

The diagnostic phase is used in localising the opening of the internal fistula. The fistuloscope is entered via the external fistula opening and space is created with washing solution (glycine 1% and mannitol 1%). It opens the entire fistulous tract including the secondary tract. If the tract is blocked, the tissue which is blocking is removed using 2 mm forceps to facilitate the insertion of the fistuloscope. The direction of the telescope is positioned by the location of obturator and directed according to it. The movements include both slow left-right and up-down movements. The fistuloscope is guided according to transanally placed finger and reached up to the opening under spinal anaesthesia. The continuous flow of glycine-mannitol solution facilitates identification of the internal opening. Anal canal is retracted and internal opening is identified by the presence of light of the telescope which is visualised in the rectum or anal canal. Thus, the internal opening is clearly identified. When the opening is reached, the rectal mucosa can be visualised on the screen. If the internal opening is narrowed or if it is not viewed properly, then the rectal mucosa behind the light of fistuloscope is marked and suture stitches taken opposite direction of the internal opening and used as a guide and to perform the procedure. Then fistula is operated from within and started from internal opening to exterior aspect.

The operative phase

The entire Fistula opening is closed and tract is destroyed from inside using fistuloscope.

After washing and removal of waste debris fistula is destroyed. Its under vision procedure using a unipolar electrode which is introduced with the help of the operative channel of the fistuloscope. The procedure is started by coagulating all fragments of the whitish material from the fistulous tract which is adherent to the fistula wall and all granulation tissue removed from the path. The movement is usually from inside to outside in a slow, steady manner and necrotic material removed completely using fistula brush along with fistuloscope. The stapler is inserted through the base of the internal opening which is lifted with forceps about 2 cm and then cutting and suturing done with stapler. Hermetic closure of the internal fistula opening can be accomplished using a linear stapler where suture will be vertical when semicircular stapler is used, the suture will be horizontal. If the internal opening is rigid and sclerotic and the passage of stapler is difficult Cutaneous mucosal flap is raised. Hence fistulous tract removed completely. Then synthetic cyanoacrylate is instilled inside to reinforce suture. Entire procedure is carried under vision. Fistulous opening is open to allow the secretions to drain completely.

The benefits of the procedure includes a perfect excision and a hermetic closure of the internal fistula opening to prevent the risk of fecal passage. Tangential placement of sphincter helps in relieving postoperative pain and also facilitates healing easily.

The advantages of the VAAFT technique includes no surgical wounds in the buttocks or perianal region, perfect localisation of the internal opening is possible under direct vision and removal of fistula completely from the inside. There is no need to classify the fistula as trans-sphincteric, extra-sphincteric or high anal fistula, as the procedure is carried out from inside and no damage is caused to the sphincters” [28]. There is reduced risk of post-operative faecal incontinence, pain, no medications and resuming work easily.

Seton

A “Seton (latin) means “bristle”. It is a thin wire of stainless steel or a strong monofilament material like Prolene. It is useful in treating high level fistula. This is passed through the external opening of the high level fistula and brought out through the anal canal and the 2 ends are knotted outside. The lower part of the fistula tract is laid open as in a conventional Fistulotomy. After 2 weeks the Seton is gradu-
ally tightened, so to cut through the internal musculature progressively. It encourages fibrosis, so that when the Seton is tightened and
cuts through gradually, the muscles do not gape and subsequently there is no incontinence the tract cut by the Seton undergoes fibrosis
with resultant healing of the fistula.

Two types of Setons are present: Loose Setons are used mainly to drain for long period in recurrent or post-operative fistula and
specific causes like Crohn’s disease. There is no tension in Seton. Cutting Setons are used when enclosed muscle is needed to cut (cheese
wiring through effect) by placing it tight” [31].

**Mucosal advancement flap**

This procedure is indicated for patients with “high trans-sphincteric or supra sphincteric fistulae or patients with inflammatory bowel
disease with complicated fistulae.

- Prior to surgery antibiotic bowel preparation done.
- The fistula tract is identified with a probe.
- The internal opening is identified and excised and closed with an absorbable suture. The tract is either curetted/excised with an
  advancement flap. Consistency of rectal mucosa, submucosa with a part of internal sphincter is dissected, and advanced beyond
  the original internal opening and sutured to the anal canal distal to the opening. The base of the flap is twice the width of the
  apex to ensure good blood supply to prevent ischemic necrosis of the flap. Post operatively i.v fluid therapy or clear liquids for
  1 - 5 days orally is advised to ensure adequate healing of flap and then regular diet is begun” [12].

**Figure 12: Seton technique.**
Fibrin plug and glue

Anal fistula plug

The anal fistula plug is a “composed of lyophilized porcine-derived small intestinal submucosa. It is a strong pliable tissue denuded of cells, that provides a scaffold for host fibroblasts to promote tissue healing and repair damaged tissue. This material was initially intended for bridging large tissue defects in the abdominal and chest walls. Interestingly, a group of surgeons rolled it into a cone and inserted it into anal fistula in the attempt to achieve closure. Surgisis is a biocompatible material and has been documented to have an inherent resistance to infections in contaminated abdominal wounds in 2 series.

The technique of plug deployment is as follows: the tract is gently debrided with a curette and irrigated with hydrogen peroxide. The tapered end of the fistula plug is then tied to a probe and dragged through from the internal opening to the external. It is then pulled out to fit to the tract and anchored to the mucosa/submucosa and the internal sphincter at the primary opening with a “figure of 8” stitch to be eventually incorporated with the mucosa of anorectum and closure of the internal opening.

Early implant extrusion has been reported as one of the most consistent reasons for failure. It is also of crucial importance for such a procedure using biomaterials, that adequate removal of any chronic granulation or septic tissue lining the fistula tract is carried out, to initiate the healing process and allow migration of fibroblasts and endothelial cells.

Figure 13: Anal fistula fibrin plug.

A fibrin plug is a treatment option that involves a collagen matrix used to block or plug the internal opening of the fistula tract. The treatment is appealing as it does not involve dissection or division of the sphincter complex and therefore, should not contribute to incontinence. Unfortunately, the treatment is less than 50% successful in the treatment of fistula-in-ano” [23].

Anal fibrin glue

Initial studies on fibrin glue injection for the management of complex anal fistulae were promising. The “first of these was published in 1991 by Hjortrup, et al. was the result of a pioneering series of treatments for perianal fistulae with fibrin glue. The mode of action is...
thought to be by stimulating the growth of fibroblasts and pluripotent endothelial cells into the fistula tract to seal it off. These cells then lay collagen and an extracellular matrix during the process of wound healing. Early results were encouraging, but further data showed a very wide range of success from as low as 14% to as high as 74%” [47]. As Lindsey, et al. “showed in a randomized comparative trial, patients treated with fibrin glue didn’t suffer any form of incontinence whilst the group treated with conventional surgical techniques did, but at post-operative MRI scan review, showed non-eradicated septic collections that potentially leads to secondary tracts. It still has a role in reinforcing suture closure of the internal opening in other procedures such as VAAFT.

Similarly, fibrin glue has also been trialed to promote the healing of fistula tracts. This also preserves sphincter function but has low success rates varying from 14% to 69%. Both have been initially discarded as ineffective, but more recent studies have involved a combination of surgical fistula treatment in combination with fibrin plugs and fibrin glue” [46].

Discussion

Fistula-in-ano is an abnormal epithelial-lined tract which connects anal canal to perianal skin. These originate from anal glands located at the sub-epithelial layer of anal canal. Fistulas in ano can have many causes but most commonly it is caused by perianal abscess in our patients.

Milligon and Morgon classified fistula into high and low fistulas based on internal opening [34].

Park classified fistula into submucosal, intersphincteric, suprasphincteric and extra sphincteric [18].
Types of fistula

- Fistula are classified into simple and complex. In my study about 80% cases have simple fistula whereas complex fistulas constitute about 20%.

- Anal fistulas can be categorized either simple (or) complex. A Simple anal fistula include low transsphincteric and intersphincteric fistulas that cross the external sphincter whereas complex fistula are, if primary tract includes high trans sphincteric fistulas with or without a high blind tract. Suprasphincteric, and extra-sphincteric fistulas, horseshoe fistulas, multiple tracts, anterior lying.

- My study constitutes 88.5% of intersphincteric fistula which is most common.

- My study constitutes of 8.5% trans-sphincteric fistula. Here the fistula connects the intersphincteric plane with ischiorectal fossa by perforating external sphincter.

- Horse shoe fistulas incidence is 2.8% in my study. In this the fistulous tract goes from one ischiorectal fossa to contralateral one through posterior rectum.

- Fistula with multiple openings constitute 6%.

- Anterior Fistula 17.14%.

Age and sex

In my study male are predominantly affected with fistula in ano its about - 82.8% out of total cases. Most common age group effected with fistula in ano is between 30 - 50 yrs. It constitutes of 55% in total number. The recurrence of fistulas are more common in patients with comorbidities like diabetes and hypertension.

Clinical features

Patient presented to OPD with most common complaint discharge from perianal region which constitute about 80% followed by pain, swelling in perianal region, itching, bleeding PR, Constipation and fever.

Co-morbid conditions

The patients had co-morbid conditions like Diabetes, hypertension and cardiac disease, etc.

Diabetes - 23% Hypertension - 23% Cardiac disease -8% no illness -46%

Type of procedure

In my study the percentage of surgeries done were

- Fistulectomy - 54%
- Fistulotomy - 31%
- VAAFT - 6%
- LIFT - 6%
- SETON - 3%.

Fistulotomy was done most commonly which constitutes 54.2% and also it showed good recovery with minimal recurrence over fistulotomy-31%.

**Seton technique**

- It was done in Suprasphincteric fistula and high trans-sphincteric fistulas.
- Seton Technique is done for 1 case in my study.
- This case had high intersphincteric fistula.

**Advantage**

- No recurrence is seen.
- Post-operative hospital stay about 7 days in this technique.

**Disadvantage**

- Frequent follow up is require for seton tightening.
- Post-operative complications comparatively more when compared to other modalities
- Wound healing comparatively slow and less.

**VAAFT (Video assisted anal fistula technique)**

It was mainly done for complex Fistulas. It consists of diagnostic and operative phase.

About 35 cases of Fistula in Ano have been operated for fistula in ano in our institution.

- 6% cases underwent VAAFT.
- 2 complex fistula patients underwent this procedure.
- Post-operative recovery was very good with average Length of stay in hospital is 7 days.
- Patients compliance better with no recurrence.

**LIFT (Ligation of intersphincteric fistulous tract)**

It is based on secure closure of internal opening and removal of infected granulation tissue. It is sphincter sparing surgery.

- This procedure is done in 2 cases about 6%.
- Its mainly done for Intersphincteric fistula.
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- Wound healing is better post-operatively and pain is less.
- The mean period of stay is about 5 days and 1 patient had recurrence who was later treated with fistulectomy.
- Post-operative period.
- Mean period of stay 4 - 6 days for all surgeries
- All patients were treated with antibiotics, sitz bath, analgesics (pain was the major concern post operatively) and taken care of symptomatically.

Recurrence
- Found in 3 cases (7%).
- Recurrence is seen fistulectomy, fistulotomy and lift one patient each.
- The mean average period of recurrence is about 3 months after surgery.
- Mostly patients are associated with co morbidities like diabetes and hypertension who had recurrence.

Conclusion
1. In my study Incidence of Fistula in ano in men is more common that is 82.8%.
2. Patients who are low socio-economic group are effected more with fistula in ano.
3. Most common age group is between 30 - 50 yrs contains about -55%.
4. In our study most common fistulas are intersphincteric type, in which simple fistulas are 80%, complex fistulas 20%.
5. Etiology of fistula in ano is most common due to inadequately treated pyogenic abscess.
6. Posterior sited internal opening and low level fistula are more common and Fistula with 1 external opening is more common in our patients.
7. Discharge is the commonest presenting symptom in our patients.
8. To assess the variety and relation to anorectal ring the digital rectal examination is preferred.
9. Most commonly performed surgery is fistulectomy which showed good recovery.
10. Comorbidities like Hypertension and diabetes constitutes about 23%. recurrence is most common in this group.
11. Surgery is the treatment of choice for fistula in ano. conservative management is not advised.
12. Operative morbidity is low/minimal for fistula in ano.
13. Post-operative complications are mild and minimal in nature.
14. Recent techniques like LIFT, VAAFT were also performed in our hospital.
15. Mean period of stay in out institution is 4-8 days.
16. Wound healing in many cases happens with in 2-3 weeks with proper post operative wound care like sitz bath and antibiotics.

17. Fistula in ano can be prevented in many cases by proper and adequate treatment of perianal abscess and anorectal suppuration and by proper patient education about sequel of disease and care should be taken.

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