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## Anal fistula: A comprehensive review

**Sachin Bhusari, Kanchan Nikam and Pravin Wakte**

### Abstract

Anal fistula is a chronic abnormal communication between the epithelialised surface of the anal canal and the perianal skin. It commonly occurs in people with a history of anal abscesses. Generally, improper healing of anal abscesses leads to anal fistula. Other causes include Crohn's disease, Diverticulitis, Hidradenitis suppurativa, infection with TB, constipation causing injury and infection in the crypts glands etc. The true prevalence of anal fistula is unknown. Breakdown of the epithelial barrier and associated immune cells of the anal mucosa leads to the formation of anal fistula. There are various surgical procedures viz seton, fistulotomy, Kshara sutra and sphincter saving methods available for treatment of anal fistula. Along with surgical procedures, Ayurvedic and Homeopathic medicines are available for the treatment of anal fistula. Numerous medicinal plants are reported to be useful in the symptomatic treatment of anal fistula.

**Keywords:** Anal abscess, anal fistula, Crohn's disease, fistulotomy, Kshara sutra, Seton

### Introduction

A fistula is an abnormal opening between organs that connects two or more organs or spaces inside or outside the body. Fistula is more common in the pelvic area but can happen in different parts of the body <sup>[1]</sup>. An anal fistula is an abnormal tunnel between the rectum and the outer skin of anus. Symptoms include pain, abscess, discharge of pus and blood. About 50 % of anal abscess develops into fistula. It usually develops when an abscess has not been completely treated. Most of the anal fistulas require surgery because they rarely heal if they are not treated. Several surgical methods are available, depending on where the fistula is and whether it is simple or complex. An anal fistula may treat with surgical procedures like Seton, Fistulotomy, Proctology clip system and Sphincter saving methods. In Ayurveda Kshara sutra therapy is commonly used technique for treatment of anal fistula. Some homeopathic and Herbal remedies are also reported for treatment of anal fistula. Present article reviews the details of anal fistula covering its history, anatomy, symptoms, causes, pathogenesis and the available treatments like surgical procedures and the use of herbal materials.

### Human health

The word "health" generally refers to a state of complete emotional and physical well-being. Public health is "The science and art of preventing disease, prolonging life and promoting human health through the organized efforts and informed choices of society, organizations, public and private, communities and individuals <sup>[2]</sup>. "Health" takes into account physical, mental and social well-being and according to World Health Organization; it is not merely the absence of disease or infirmity <sup>[3]</sup>. Improvisation to influence health by personal hygiene practices to prevent infections and illness, such as bathing and washing hands with soap; brushing and flossing teeth; storing, preparing and handling food safely etc <sup>[4]</sup>. Human health depends upon day to day lifestyle of people.

### Habits spoilage

A habit is one of the major factors of today's lifestyle of the peoples. It is something people do almost without thinking. Healthy habits can improve quality of life significantly and also affects the life that depending on a person's individual. The habits directly affect the health of people. It includes eating junk food, alcoholism, smoking, lack of physical activity; work stress etc. can lead to the various common diseases. On the other hand, in today's modern lifestyle, laziness is becoming an integral part of life. Laziness itself can be treated as a disease. Laziness and the availability of handy electrical devices as an entertainment and or work instruments physical activities are getting minimal.

Combined effect of both laziness and minimal physical activities may leads to lifestyle diseases like diabetes and atherosclerosis. Lack of physical activities results in to poor digestion which ultimately leads to constipation and other gastrointestinal diseases. Poor eating habits and food choices greatly increase the risk of lifestyle diseases like diabetes, cancer, heart disease, and various other health conditions. Poor eating habits can include the over-consumption of certain foods, dietary deficiencies and excessive intake of saturated fats and refined or processed foods.

### Fistula

A fistula is a condition in which there is an abnormal connection between two hollow spaces such as blood vessels, intestines. Fistulas are usually caused by injury or surgery, but they can also result from an infection or inflammation. Fistulas can form between various parts of the body.<sup>5</sup> Fistulas may be caused by wounds, abscesses, vascular disease, congenital disorders, infection, or surgery. Tuberculosis may cause Broncho pleural fistulas or anal fistulas. In addition, anal fistulas sometimes occur as complications of serious bowel diseases, as in Crohn's disease. Symptoms of fistula vary depending on location. Fistula including the gastrointestinal tract, bladder, or vagina may shows symptoms of diarrhea, dehydration, bowel incontinence or abdominal pain. Symptoms of Broncho pleural fistulas include cough and the production of yellowish or greenish sputum. Arteriovenous fistula is associated with an aching pain in the area of the defect<sup>[6, 7]</sup>.

### Types of fistulas

Fistulas can form between various parts of the body and are classified as follows

- Metro peritoneal or utero peritoneal fistula: Between uterus and the peritoneal cavity.
- Arteriovenous fistula: Between artery and a vein.
- Broncho pleural fistula: Between bronchi and the pleural space of the lung.
- Enterovaginal fistula: Between intestines and the vagina.
- Vesicovaginal fistula: Between the urinary tract and the vagina.
- Gastric fistula: Between stomach and the skin surface.

Depending upon openings present anal fistula classified as

- Blind fistula: Open on one end only, but connects to two structures.
- Complete fistula: Has openings both outside and inside the body.
- Horseshoe fistula: Connects the anus to the surface of the skin after going around the rectum.
- Incomplete fistula: Tube from the skin that is closed on the inside and does not connect to any internal structure.

### Anal Fistula

An anal fistula commonly termed as fistula-in-ano. It occurs in up to 50% of patients with anal abscesses. Crohn's disease is also a common cause of anal fistula. Generally, anal fistulas are the result of an infection in an anal gland that spreads to the skin. Inside the anus, there are number of small glands. Blocking of one of these glands develops the tunnel that forms under the skin and connects the clogged infected glands to an abscess. A fistula can be present with or without an abscess. It may connect just to the skin of the buttocks near the anal opening as shown in Figure 1. It often drains pus or

liquid resulted due to infection. The true prevalence of anal fistula is unknown. The incidence of anal fistula in men and women is 12.3 and 5.6 per one lakh population respectively<sup>[8, 9]</sup>.

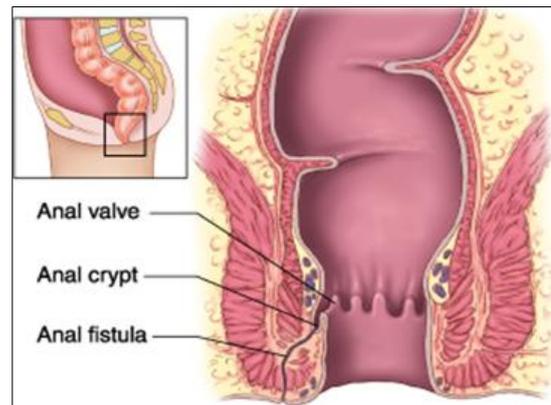


Fig 1: Anal fistula

### Origin of anal fistula

The recorded history of anal fistulas dates back to the Ancient Greeks. It was first reported in 1686. On January 15, 1686, Louis XIV noted anal pain and perianal swelling. On January 31, he specifically consulted the doctor, Antoined' Aquin, who diagnosed an anal abscess. His recommended treatment of poultice made with flour- based Arobas, beans, rye, barley, flaxseed, all boiled in oxycrat (mixture of water and vinegar) was applied four times a day but it was ineffective. The King's condition was worsened and he was unable to walk. The doctors and the king agreed to obtain the opinion of the barber-surgeon, the Charles-François Félix. Félix examined the King and suggested that some study and refinement of operation technique would be required to perfect an operation that would provide a chance for cure abscess. At 7:00 am, November 18, 1686, Félix performed the surgery. There was, of course, no anesthesia. Félix inserted his anal retractor, then guided his bistoury through the external opening of the fistula in to the anorectum and cut twice over the guide with lancet and then made eight cuts with scissors. Félix felt that the wound was healing unevenly and he debrided it twice. He performed another long operation on December 10. Operation was very successful and it became socially desirable to boast of having an identical operation. d'Aquin's diary indicates that at least 30 courtiers asked Félix to perform similar operations<sup>[10]</sup>.

### Classification of anal fistulae

Anal fistulae are classified into five main types as shown in Figure 2:

- Extrasphincteric fistulae: It forms at the rectum or lower part of the rectum and proceeds downward and open into the skin surrounding the anus. The causes of extrasphincteric fistulae could be from a rectal, pelvic or supralelevator origin, usually secondary to Crohn's disease or an inflammatory process such as appendiceal or diverticular abscesses<sup>[11, 12]</sup>.
- Suprasphincteric fistulae: It forms between the internal and external sphincter muscles, extend above and cross the puborectalis muscle, proceed downward between the puborectalis and levato rani muscles, and open an inch away from the anus<sup>[11, 12]</sup>.
- Transphincteric fistulae: This is sometimes termed a 'horseshoe fistula. It begins between the internal and

external sphincter muscles or behind the anus, cross the external sphincter muscle and open an inch or more away from the anus. These may form multiple external openings and take a 'U' shape <sup>[11, 12]</sup>.

- Intersphincteric fistulae: It passes through the internal sphincter muscle, and opens very close to the anus. It begins between the internal and external sphincter muscles <sup>[11, 12]</sup>.
- **Submucosal Fistulae:** It does not cross sphincter muscle, but passes superficially beneath the submucosa <sup>[12, 13]</sup>.

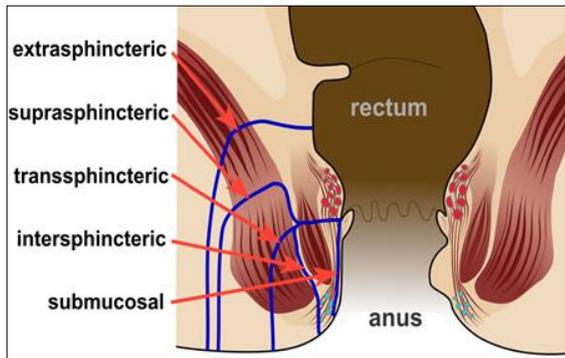


Fig 2: Different types of anal fistula

### Symptoms of anal fistulae

The most common symptoms of anal fistulae are

- Anorectal pain or constipation
- Swelling
- Redness of the skin
- Fever
- Pus formation
- Discharge of blood or pus

Patients with anal fistulas commonly have a history of a previously drained anal abscess <sup>[14]</sup>.

### Causes of anal fistula

An anal fistula usually results from an injury to the tissue lining the anal canal or an infection and the pus formation in that area. Less common causes of anal fistulas includes

- Crohn's disease – a long-term condition in which the digestive system becomes inflamed
- Diverticulitis – Infection of the small pouches diverticula can stick out of the side of the large intestine (colon)
- Hidradenitis suppurativa – It is a long-term skin condition that causes abscesses and scarring
- Infection with tuberculosis (TB) or HIV
- A complication of surgery near the anus
- Constipation causing injury
- Infection in the crypts glands lining the anal canal
- Abscess of the large intestine (very rare).

Most of the anal fistulae are developed after an anal abscess. Improper healing of anal abscess after drainage of pus may

lead to anal fistula. It is observed that out of four patients with an anal abscess, at least one will develop an anal fistula <sup>[15]</sup>.

### Anatomy of anal fistula

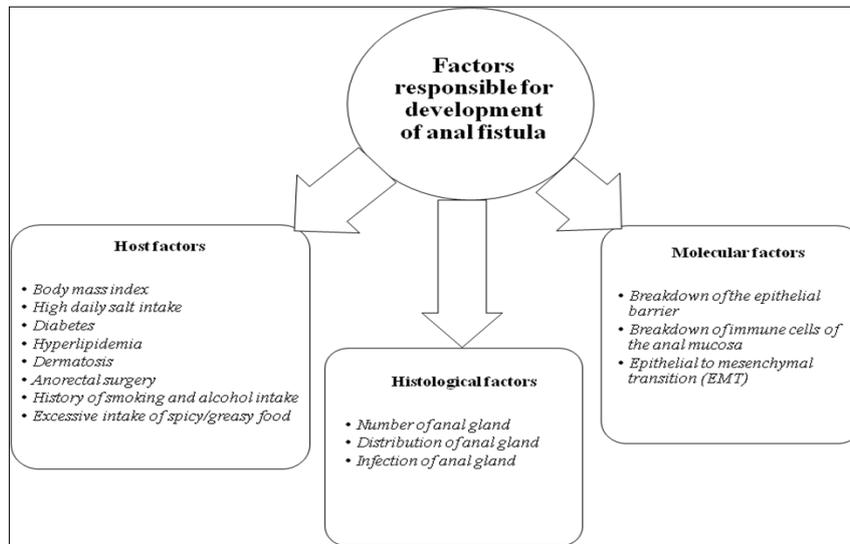
Anatomy of Anal fistula includes two sets of viscera, the alimentary and genito-urinary, pass through the pelvic hiatus. Being visceral structures, they contain only smooth muscle in their walls and are innervated by the autonomic system. As they pass through the hiatus, somatic muscles forming part of the muscular diaphragm are specially developed to form sphincters around them. In the anal region proper the visceral part consists of mucosa, circular muscle (the internal sphincter), and the longitudinal layer. These somatic muscles form a continuous layer, and the division in to separate parts is largely empirical. The anal mechanism may therefore be likened to two tubes one within the other; the visceral tube is surrounded (and controlled) by the somatic one. Fibrous septa occur in the somatic muscles in a haphazard fashion and are unreliable guides to the possible course of fistulous tracks. Somatic skin should theoretically cease at the anal margin, but in fact it is found, albeit in modified form, up to a point roughly half-way along the anal canal. The anal glands (or ducts) discharge into the zone of transition opening in to the base of the anal crypts. Around them the fibromuscular tissue of the submucosa is thickened, and is attached both to mucosa and to the internal sphincter to constitute "mucosal ligament". This forms a partial barrier in the submucosa separating the submucous space above (in which internal haemorrhoids are found) from the perianal or marginal space below. Somatic nerves supply the mucosa up to, and including, the zone of transition <sup>[16]</sup>.

### Mechanism of development of anal fistula

The mechanism of anal fistula includes obstruction of the anal crypt gland with inspissated debris leads to infection in these glands, which penetrate, into the anal complex in varying degrees and suppuration follows the path of the least resistance. As the abscess collects in anatomical spaces where the anal gland terminates and from there on follows in the perineal spaces. It needs to be emphasized that Anorectal abscess is an acute manifestation of the crypto-glandular infection and fistula is a chronic sequelae of this infection. Almost one third of the patients who undergo drainage of the Anorectal abscess develop the anal fistula. Any recurrent perineal abscess that occurs at the same site as the previous abscess is also a part of the continuation of the same old process and should be considered as a fistula. In 10% of the patients, the notable cause of the perineal sepsis is not the crypto-glandular infection but it could be inflammatory bowel disease, fungal infection, tubercular infection, neoplasm or trauma. Such fistulas are classified as secondary and known to have a complex nature, requiring non-standard methods of management <sup>[17]</sup>.

### Pathogenesis of anal fistula

There are several factors viz. host factors, histological factors and molecular factors which affect the pathogenesis of anal fistula. The graphical representation of pathogenesis of anal fistula is shown in Figure 3.



**Fig 3:** Pathogenesis of anal fistula

### Host factors

There is direct relationship between anorectal abscesses and fistulas. Patients with recurrent anorectal abscesses have an even higher chance of having a fistula. It is well-established fact that as compare to women, men are more prone to develop perianal abscess and fistulas. There are several independent factors like body mass, high daily salt intake, diabetes, hyperlipidemia, dermatitis, anorectal surgery, history of smoking and alcohol intake, sedentary lifestyle, excessive intake of spicy food, infrequent participation in sports, and prolonged sitting on the toilet for defecation which are found to cause anal fistula [18].

### Histological factors

In the normal anal canal, there are 3 to 10 anal glands that are distributed evenly and circumferentially at the level of the dentate line. The glands communicate with the anal canal through crypts or ducts. Eighty percent of anal glands are confined to the submucosa, and the remaining 20% may penetrate the internal sphincter, but rarely penetrate the external sphincter. Anal glands with their associated branching crypts are lined by a stratified columnar epithelium interspersed with mucus-secreting goblet cells. The anal glands and ducts are normally surrounded by a mild to moderate number of lymphocytes. Some cases of anal fistula may be caused by anal glands penetrating deep from the lower rectal mucous membrane into the perianal tissue. Scientific reports demonstrated that 90 % cases of anal fistula originate from infected anal glands [18].

### Molecular factors

Anal fistula is a tract that connects the anal canal to the perianal skin. Breakdown of the epithelial barrier and associated immune cells of the anal mucosa leads to formation of tract. There are physical barriers including tight junctions and mucin in addition to biological barriers including antimicrobial peptides, IgA antibodies, and mucosa-associated lymphoid tissue. When a pathogen is recognized by the immune system, a proinflammatory response is initiated by the host and mediated by cytokines and chemokines. The exact mechanism of the breakdown of the physical and immunologic barriers in the development of anal fistulas has yet to be determined, but there are clues that epithelial to mesenchymal transition (EMT), matrix

metalloproteinases, and cytokines may all play a role. Most of these clues come from preclinical studies of fistulas in the setting of Crohn's disease. This process of EMT has been described in wound healing, and it is thought that it allows intestinal epithelial cells to penetrate into the deep layers of the mucosa and gut wall causing localized tissue damage, tube formation, and connection to other organs. EMT has been shown to be triggered by bacterial remnants and can cause release of matrix metalloproteinases in Crohn's disease fistulas [18].

### Therapeutic management of anal fistula

#### Surgery

Various options are available for the management of anal fistula, but none is completely successful or without risk. Some key principles which have major role in the management of anal fistula are described by the acronym SNAP, which stands for sepsis, nutrition, anatomy, and procedure. Destruction of sepsis is the first step because fistula will not heal in presence of the infection. Selection of the appropriate procedure for surgery is key to successful management of anal fistula. Failure to treatment of anal fistula may lead to progression of the disease process. If left untreated, anal fistulas are at risk of recurrent formation of a perianal abscess intersperse [19]. The anorectal surgery is the most common practice or treatment which is carried out by physicians. But there is no complete healing of anal fistula by the use of surgery [20, 21].

There are different types of surgical techniques available for the management of anal fistula. These are as follows

#### Seton

A seton is a simple thread or a latex string placed through the anal fistula track. It forms a continuous ring between the internal and external openings of fistula. It can be tied tightly or loosely and with different materials. The primary application is in high trans-sphincteric fistula where division of greater than one third of the anal sphincter muscle risks incontinence. The thread is usually a non-absorbable one. The placement of a draining seton is usually the first step in treating a complex fistula. It reduces inflammation. Secondary treatment is required to close the track. The use of a cutting seton is another option for trans-sphincteric fistulas. This involves regular tightening of the seton to encourage gradual

cutting through of the sphincteric muscle with associated inflammation followed by fibrosis [22].

### **Fistulotomy**

Fistulotomy is the surgical opening of fistulous tract. It describes division of superficial tissue and thus laying open of a fistula track. It is the most effective method of dealing with a anal fistula and is the standard treatment for submucosal (low) fistulas because there is no risk to continence. It can be performed by excision of the tract and surrounding tissue, simple division of the tract, or gradual division and assisted drainage of the tract by means of a seton. It has a low recurrence ( $\approx 0.2\%$ ). Fistulotomy may be used in the treatment of simple perianal fistulas in cryptoglandular disease. The amount of sphincter that should be divided during fistulotomy is unclear [23].

### **Proctology clip system for anal fistula closure**

The OTSC<sup>®</sup> Proctology system is a new device for transanal Anorectal fistula closure, which consists of a clip and a clip applicator. It consist of opened clip, which is made of a super-elastic shape memory alloy (Nitinol), it retakes its originally closed shape after release and thus exerts a constant compression on the tissue between the jaws of the clip. The system is a modification of the endoscopic OTSC<sup>®</sup> clip, which is widely used in flexible endoscopy [24].

### **Sphincter saving methods**

#### **Fibrin glue**

Fibrin glue or fibrin sealant is a combination of freeze dried fibrinogen, thrombin, and calcium in a matrix. It is injected into the fistula track while the patient is under general anesthesia. It forms a clot at the site of the fistula and encourages the growth of collagen fibres and healthy tissue. Observational cohort studies report healing rates of 31-85% by using fibrin glue. Reasons for this wide variation include aspects of trial design such as length of follow-up, heterogeneity of patients and variable fistula anatomy included in the treatment and control arms [25, 27].

#### **Fistula plug**

The biological fistula plug is made up of a sub mucosa of the small intestine. It is the highly sophisticated absorbable material. It is resistant to infection, does not induce a foreign body reaction, and encourages host cells to populate it which ultimately fill the fistula track. The fistula plug is pulled through the fistula track and secured in place at the internal opening, then cut at the external opening, which is left open for drainage. It provides the scaffold over which body's collagen gets deposited and closes the fistula. The use of the fistula plugs having healing rates of 50–60 for the treatment of complex anal fistula. A recent review of 20 studies found that this technique resulted in fistula closure in 54% of patients; excluding those with Crohn's disease. Fistula Plug has been approved for clinical use by US FDA [28, 33].

#### **Anorectal advancement flap**

Anorectal advancement flap is traditionally used for the treatment of anal fistula. It covers the internal opening with disease-free anorectal wall and stops the fistula track communicating with the bowel. This procedure involves dissection of a thicker flap of the proximal rectal wall, which is then pushed forward on its pedicled blood supply to cover the previously excised internal opening. Modifications in flap

include curved incisions, rhomboid flaps, anorectal flaps with proximal advancement, and closure or dissection of the remaining fistula track. However, advancement flap procedures have limitations as it may harm to the sphincter mechanisms and dissection in scarred anorectum risks damage to the underlying sphincter. Accordingly, observational cohort studies report widely variable success rates ranging from 0 to 63% [34].

### **LIFT procedure**

Ligation of the intersphincteric fistula track (LIFT) technique is the novel modified approach first described in 2007. The procedure was developed by Thai colorectal surgeon, Arun Rojanasakul, Colorectal Division, Department of Surgery, Chulalongkorn University in Bangkok, Thailand. This procedure is based on the closure of the internal opening and removal of infected cryptoglandular tissue through the intersphincteric approach. A skin incision is made between the internal and external anal sphincters and the fistula track is exposed within the intersphincteric space followed by suturing of the defect at the external sphincter muscle. A Malaysian research group applied the technique in 45 patients from which five with recurrent fistulas. After a median follow-up of nine months, the healing rate with LIFT procedure was 82%. A North American cohort study found a 57% success rate at a median follow-up of 20 weeks. Recent modifications known as the Bio LIFT involve placing a biological mesh in the intersphincteric space to act as a barrier to refistulisation. However, a larger area of dissection is needed, and the introduction of foreign material increases the risk of infection [35, 38].

### **Use of Stem cells**

The use of stem cells is a novel treatment for anal fistula. Generally, mesenchymal stem cells are used for this purpose. In a comparative study of 49 patients with Crohn's related fistulas or cryptoglandular fistulas, the patient's own adipose tissue was processed and centrifuged to provide adipose derived stem cells. Stem cells were cultured and injected into the fistula track. A stem cell plus fibrin glue group was compared with a fibrin glue alone group and the healing rate was 71% versus 16%. The recurrence rate was 17.6% in the stem cell group at one year, with no recurrences in the control group [39, 41].

### **Defunctioning of bowel**

In some cases where anorectal abscess or anal sepsis is difficult to control and multiple tracks exist, the bowel may need to be defunctioned by bringing out the proximal colon as a colostomy. This deflects the bowel contents away from the anorectum, improves symptoms of perianal leaking and thus providing the optimum environment for sepsis resolution and reduces symptomatic anastomotic leakage. However, the operation involves entering the peritoneal cavity and establishing a stoma. Postoperative problems include bleeding, infection, thrombosis, ileus, leaks, and complications associated with colostomy. Therefore defunctioning is considered only as a last resort in non-healing anal fistula [39, 41].

### **Kshara sutra**

Kshara sutra therapy is Ayurvedic technique used in management of anorectal disorders. *Kshara sutra*, derived from Sanskrit word- *Kshara* means, to cut; *Sutra* means thread. It is

a safe and cost effective method of treatment for fistula-in-ano, haemorrhoids and other sinus diseases [42]. Kshara sutra therapy is a medicated cotton thread coated with Ayurvedic medicine. Application and follow-up of Kshara sutra are very easy, require lesser hospital stay, lesser pain, have very low rate of complications and most importantly cost of therapy is minimal [43, 45].

### Therapeutic agents

Anal fistula can be treated with therapeutic agents like antibiotics, some herbal preparation and homeopathic medication. There is no complete recovery of anal fistula by surgery but therapeutic agents helps to relieve the symptoms associated with anal fistula and also use in postoperative condition or after drainage of anal abscess.

### Antibiotics

In anal fistula or abscesses, use of antibiotics is a secondary method of treatment. Antibiotics are reserved as an adjuvant for the septic or immune-compromised patients. In elective fistula surgery with advancement flap, antibiotic prophylaxis is generally used and continued for several days postoperative. The role of continued postoperative antibiotic treatment after anal fistula surgery has not been studied and there is no evidence for a positive effect of preoperative local antibiotic application at the time of fistula surgery.<sup>46-48</sup> A clinical trial demonstrating use of amoxicillin-clavulanic acid combination against formation of fistulae was conducted. Patients who underwent abscess drainage in 3 major colorectal units between September 2005 and January 2008 were included. Previous anorectal surgery history, immunocompromised states, pregnancy, inflammatory bowel disease, antibiotic usage prior to surgery and the presence of an anal fistula at the time of surgery were the exclusion criteria. Patients were randomized and given either placebo or amoxicillin-clavulanic acid combination treatment for 10 days. Patients were followed one year for perianal fistulae formation; it was found that amoxicillin-clavulanic acid combination can be used for the management of anal fistula [49].

### Use of monoclonal antibodies

Infliximab, a monoclonal antibody against tumor necrosis factor (TNF), has won widespread use in the treatment of fistulous Crohn's disease, including perianal fistula. However, relapse after treatment is common and the median duration of response is 12 weeks after a three-dose induction regimen [50]. Infliximab has also been studied in a randomized controlled trial as a maintenance therapy for the fistulising Crohn's disease [51]. Approximately 70-75 % of patients who responded to the induction treatment had a complete response with absence of draining fistulas. After 54 weeks, 36 % of

patients randomized to infliximab maintenance every eight weeks had a complete response, compared with 19 % of patients randomized to placebo maintenance [52].

### Use of plants and plant materials

Since long, especially in India, there is consistent use of plants and or plant parts for the management of anal fistula. It is an evidence based practice performed by several Ayurvedacharyas, Vaidyas and Hakims but till date, there are no scientific reports of complete cure of anal fistula and the mechanism of action of anti-anal fistula activity of said plants or plant parts. Instead, there are reports of few plants which are used for treating some of the symptoms of anal fistula [53, 54]. The details of such plants are given in Table 1.

**Table 1:** List of the plants used for symptomatic treatment of anal fistula

| Sr. | Botanical name of plant             | Common name of the plant |
|-----|-------------------------------------|--------------------------|
| 1   | <i>Zingiber officinale</i>          | Ginger                   |
| 2   | <i>Curcuma longa</i>                | Haridra                  |
| 3   | <i>Commiphora mukul</i>             | Indian bdellium-tree     |
| 4   | <i>Terminalia Chebula</i>           | Yellow Myrobalan         |
| 5   | <i>Terminalia Belerica</i>          | Beleric                  |
| 6   | <i>Amorphophallus paeoniifolius</i> | Elephant foot yam        |
| 7   | <i>Mimosa pudica</i>                | Touch-me-not             |
| 8   | <i>Embllica Officinalis</i>         | Amla                     |
| 9   | <i>Jasminum officinale</i>          | Jasmine                  |
| 10  | <i>Azadirachta indica</i>           | Neem                     |
| 11  | <i>Berberis aristata</i>            | Indian barberry          |
| 12  | <i>Glycerrhiza glabra</i>           | Kashtimadh               |
| 13  | <i>Picrorrhiza kurroa</i>           | Kutki                    |
| 14  | <i>Acacia catechu</i>               | Black catechu            |
| 15  | <i>Argemone maxicana</i>            | Flowering thistle        |
| 16  | <i>Cassia tora</i>                  | Sickle Senna             |
| 17  | <i>Caesalpinia bonducella</i>       | Fever nut                |
| 18  | <i>Leucas cephalotes</i>            | Drona puspi              |
| 19  | <i>Swertia chirata</i>              | Chirayita                |
| 20  | <i>Rubbia cordifolia</i>            | Indian madder            |
| 21  | <i>Tinospora cordifolia</i>         | Giloy                    |
| 22  | <i>Sapindus muskorossi</i>          | Indian Soapberry         |
| 23  | <i>Cinnamomum camphora</i>          | Camphor tree             |
| 24  | <i>Daemonorops draco</i>            | Dragon's Blood           |
| 25  | <i>Melia azedarach</i>              | Chinaberry tree          |

There are some clinics in the India which offers herbal cure package for the effective management of anal fistula [55]. As per the offers, plant materials given in Table 2 are the key components of the said packages.

**Table 2:** Details of Herbal cure package for anal fistula

| Sr. | Details of Material     | Dose                      | Directions for use                 |
|-----|-------------------------|---------------------------|------------------------------------|
| 1   | Curcumin Capsules       | 2 capsules thrice a day   | 1 hr. after meals with plain water |
| 2   | Triphala Guggul Tablets | 2 tablets thrice a day    | 1 hr. after meals with plain water |
| 3   | Vara Churna             | 1 teaspoonful twice a day | 1 hr. after meals with plain water |
| 4   | Nirgundi Oil            | Apply locally twice a day | after defecation                   |

### Use of Homeopathic medicines

There are some reports of use of Homeopathic medicine for treatment of anal fistula and its symptoms [56]. The details of

the homeopathic medicines used in anal fistula are depicted in Table 3.

**Table 3:** Details of Homeopathic medicines for anal fistula

| Sr. | Name of Homeopathic medicine | Nature of the medicine               |
|-----|------------------------------|--------------------------------------|
| 1   | <i>Berberis vulgaris</i>     | Plant                                |
| 2   | Causticum                    | Chemical                             |
| 3   | Silicea terra                | Plant                                |
| 4   | Aurum mettalic               | Metallic Gold                        |
| 5   | Calcarea phos                | Combination of calcium and phosphate |
| 6   | Calcarea Sulphurica          | Sulphate of lime                     |
| 7   | Hepar sulph                  | Sulphur of lime                      |
| 8   | Myristica sebifera           | Plant                                |
| 9   | Paeonia officinalis          | Plant                                |
| 10  | Hydrastis canadensis         | Plant                                |
| 11  | Thuja occidentalis           | Plant                                |
| 12  | Hydrastis canadensis         | Plant                                |
| 13  | Nitric acid                  | Synthetic chemical                   |
| 14  | Lachesis mutus               | Plant                                |
| 15  | Collinsonia canadensis       | Plant                                |
| 16  | Carbo Veg                    | Vegetable charcoal                   |
| 17  | Calcarea Flourica            | Fluoride of lime                     |
| 18  | Calendula officinalis        | Plant                                |
| 19  | Apis mel                     | European honey bee                   |
| 20  | Graphites                    | Natural chemical                     |
| 21  | Capsicum annum               | Plant                                |

### Conclusion

Anal fistula is a chronic abnormal communication between the epithelialised surface of the anal canal and the perianal skin. It is more common in young and middle age generation with equal frequency in male and female. Exact etiology of anal fistula is still unknown but some factors like mass index greater than 25 kg/m<sup>2</sup>, high daily salt intake, diabetes, hyperlipidemia, dermatitis, anorectal surgery, history of smoking and alcohol intake, sedentary lifestyle, excessive intake of spicy/greasy food, infrequent participation in sports, and prolonged sitting on the toilet for defecation significantly associated with this condition. This review provides the details about anal fistula, its history, causes, anatomy, detailed mechanism about the origin of the anal fistula and various ways of anal fistula treatment. Among all, fistulotomy acquired two-third of the surgical treatment with minimal complications. There is availability of Ayurvedic and Homeopathic medicines for the treatment of anal fistula. Number of medicinal plants are claimed to possess anti-anal fistula activity and can be used for the symptomatic treatment of anal fistula.

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