

CLINICAL GUIDELINES THE ANAL FISTULA

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LIST OF ABBREVIATIONS

CD - Crohn's disease

CI - coincidence interval

AS - anal sphincter

MRI - magnetic resonance imaging

CT - computed tomography

RCT - randomized controlled trial

AF - anal fistula

US - ultrasound

TERMS AND DEFINITIONS

Sphincter preservation procedure - is an operation in which there is no injury to the anal sphincter of the rectum or the affect on the sphincter is minimal and does not lead to a clinically significant violation of the continence.

Non-healing fistula is the preservation or reappearance of the connection of the rectal lumen with a wound or fistula after surgery for a fistula (as a rule, this term is used for sphincter-preserving treatment, when the fistula may not be completely excised, and the internal fistula opening is closed by one of the surgical methods).

This term differs from the concept of “relapse” in that the wound or fistula does not have time to fully heal before establishing their connection with the rectal lumen.

Fistula relapse is the reappearance of a rectal fistula some time after surgery, accompanied by a positive result, i.e. complete healing of the fistula tract (provided that the internal fistula opening is localized in the same place as before the surgery).

1. SUMMARY OF THE DISEASE OR CONDITION (GROUP OF DISEASES OR CONDITIONS)

1.1 Definition of the disease or condition (group of diseases or conditions)

The AF is a pathological tract between the anal canal and the surrounding tissues and / or organs and / or the perianal skin.

In this case, the internal opening of the fistula is an inflamed anal crypt, which means that fistulas of crypto glandular origin are considered to be AF without specification.

In other cases, the etiology of AF is further clarified (post-traumatic fistula, post-radiation, etc.).

The external fistula opening is most often located on the skin of the perianal area, perineum and buttock.

Much less often, the fistula opens into the vagina, urethra, and other pelvic organs.

Also, the AF may be incomplete internal, i.e. it ends blindly in soft tissues [1,2].

1.2 Etiology and pathogenesis of the disease or condition (group of diseases or conditions)

The AF formation is associated with the peculiarities of the spread and persistence of the purulent-inflammatory process from the anal crypts along the anal glands. Approximately 95% of rectal fistulas are associated with acute perianal abscess.

The main number of anal glands (about 80%) ends blindly in the submucosal layer, about 20% penetrates the intersphincter space and very rarely they pass through the external sphincter [3].

During the AF formation in the area of the affected anal crypt, an internal fistula opening is formed, which is the gate of infection that supports the chronic inflammatory process.

In this case, the purulent tract is surrounded by fibrous tissue from the outside – thus, a fistula is formed. Along the fistula tract the inflammatory mass, additional tracts and purulent cavities may form as a consequence of insufficient drainage [2].

1.3 Epidemiology of the disease or condition (group of diseases or conditions)

AF is formed in 30-50% of cases as an outcome of acute perianal abscess [4-5].

The AF incidence is 1.2-2.8 cases per 10 thousand people per year.

Most often, the disease develops at the age of 20-50 years old, which determines the social significance of this disease.

Men suffer slightly more often than women [6-8].

1.4 Features of coding the disease or condition (group of diseases or conditions) according to the International statistical classification of diseases and health-related problems

ICD codes -10

Class - Diseases of the digestion system (XI):

C60.3 - AF

1.5 Classification of the disease or condition (group of diseases or conditions)

The AF may be:

- complete (there are an internal and external fistula openings)
- incomplete internal (no external opening, only internal)

By localization of the internal opening in the anal canal:

- posterior (from 4 to 8 o'clock of the conventional dial)
- anterior (from 10 to 2 o'clock of the conventional dial)
- lateral (from 8 to 10 o'clock of the conventional dial and from 2 to 4 o'clock of the conventional dial)

Depending on the fistula location in relation to the external anal sphincter, there are:

- intrasphincter
- transsphincteric
- extrasphincteric

Extrasphincteric fistulas are divided into 4 degrees of complexity:

- **the first degree of complexity:** the internal opening is narrow, without scars around it, there are no ulcers and inflammatory mass along the fistula;
- **the second degree of complexity:** there are scars in the area of the internal opening, but there are no inflammatory changes in the fiber;
- **the third degree of complexity:** the internal opening is narrow without scars around, but there is a purulent-inflammatory process in the fiber;
- **the fourth degree of complexity:** the internal opening is wide, surrounded by scars, and there are inflammatory mass or purulent cavities in the tissues surrounding the fistula.

1.6. Clinical picture of the disease or condition (group of diseases or conditions)

The main clinical manifestations of AF include:

- the presence of an external fistula opening on the skin of the perianal area, perineum or buttock area;
- serous, purulent or pus discharge from the external fistula opening;
- periodically occurring painful inflammatory mass in the perianal area, perineum, most often located in the area of the external fistula opening;
- discomfort, pain in the anus.

With an exacerbation of the chronic purulent-inflammatory process in the perirectal tissue, general inflammatory symptoms may appear, such as an increase in body temperature, fever.

2. DIAGNOSIS OF THE DISEASE OR CONDITION (GROUPS OF DISEASES OR CONDITIONS), MEDICAL INDICATIONS AND CONTRAINDICATIONS TO THE USE OF DIAGNOSTIC METHODS

Criteria for establishing the diagnosis/condition - based on pathognomonic data:

1) clinical examination;

2) instrumental examination.

Diagnostics of AF involves solving several tasks:

1. Definition of fistula etiopathogenesis;

2. Localization of internal and external fistula openings;

3. Topographic and anatomical characteristics of the fistula (the direction of its tract, the location of the tract in relation to the external sphincter, the presence of congestion);

4. Assessment of the severity and prevalence of the inflammatory process (presence of inflammatory mass, purulent cavities, involvement of neighboring organs);

5. Assessment of the AS function.

Differential diagnostics is performed to exclude inflammatory diseases of the skin and soft tissues that are not associated with the anal canal and rectum [9].

In addition, the differential diagnosis is performed:

- with inflammatory bowel diseases with perianal complications (Crohn's disease, ulcerative colitis);
- with fistulas of traumatic origin;
- with specific infections (tuberculosis, actinomycosis);
- with fistulas draining purulent pelvic cavities caused by other diseases (complicated tumors, perforated diverticulitis, etc.);
- with pilonidal disease;
- with fistulas draining caudal teratomas;
- with chronic osteomyelitis of the pelvic bones.

With tuberculosis of the lungs or intestine, banal cryptoglandular AF cannot be excluded. Suspicion of a specific process is caused by cases when liquid pus is abundantly released from fistulas, and numerous merging granulomas with caseous necrosis are found during histological examination.

It is extremely rare, but there is a malignancy of the AF, while the discharge from it becomes bloody with an admixture of mucus.

A reliable diagnostic method is cytological examination of the fistula scrape, and it is better to do the scraping from the deep part of the tract, rather than from the area of the external opening [10].

Principles of forming the diagnosis

In formulating the diagnosis of AF should reflect the localization of the internal fistula opening (posterior, anterior, lateral), the location of the fistula tract in relation to the external anal sphincter (intrasphincteric, transsphincteric, extrasphincteric), the presence or absence of the external fistula opening (complete or incomplete fistula) and the presence or absence of additional cavities and tracts.

In extrasphincteric fistulas, the degree of complexity of the fistula is additionally determined (see classification).

Examples of diagnosis statements are given below:

1. "The anteriorintrasphincteric AF".
2. "The posterior transsphincteric AF with ischiorectal streaks".
3. "Lateral incomplete internal transsphincteric AF".
4. "Posterior extrasphincteric AF of the 3rd degree of complexity".

2.1 Complaints and history

Typical complaints: serous, purulent or pus discharge from the external fistula opening and / or anus, discomfort, pain in the anus, the presence of inflammatory infiltration in the soft tissues of the perianal area, perineum or buttock area.

In the disease history, there may be: a single or multiple opening of acute perianal abscess, hypothermia, the presence of trauma to the perianal area, the presence of anal and rectal pain, spontaneous opening of an abscess in the anus, purulent discharge from the anus.

2.2 Physical examination

All patients with suspected AF are strongly recommended to conduct a physical examination to confirm the diagnosis [1,2,11,12,20]:

- inspection of the perianal area;
- finger examination of the rectum;
- probing the fistula tract;
- the sample with the dye.

Grade A (level of evidence - 1).

Comment. *Examination of the perianal area is aimed at detecting an external fistula opening, identifying signs of inflammation, its severity and prevalence.*

The anal reflex is also checked.

During finger examination, attention should be paid to the internal fistula opening (localization, width and shape, presence of inflammation and scars), concomitant diseases of the anal canal and the low rectum (hemorrhoids, anal fissure, tumor process, etc.).

Probing of the fistula tract is carried out to assess topographic and anatomic features of the fistula tract in relation to the AS, the rectal wall, the tract direction, the presence of cavities along the fistula tract.

Probing is performed with a button-shaped probe from the side of the external opening for complete fistulas and the internal opening for incomplete internal fistulas. Do not forcibly probe the fistula tract if there are obstacles due to the risk of forming a false tract.

A dye test is performed to verify the connection of the external fistula opening with the anal canal, and to color additional fistula tracts and cavities.

To perform the test, you need to insert a gauze cloth into the anus (marker), then inject the dye (a solution of methylene blue or iodine) into the fistula tract through the external opening, then carefully, without scrolling the marker around the axis, remove it from the anus.

According to the mark color on the marker, you can judge the connection between the external and internal fistula openings.

If the patient complains of discomfort or pain, the dye sample test should be stopped.

The dye sample test is of greater diagnostic value during the surgery, rather than at the diagnosis stage.

It should be noted that the accuracy of physical examination in AF is lower than that of endoanal ultrasound and MRI.

2.3 Laboratory diagnostic tests

There is currently no specific laboratory diagnosis of AF.

Laboratory diagnostic tests should be performed in patients during the preparation and planning of surgeries to exclude comorbidities.

If there is no complete epithelization on the 45th day after the surgery, it is advisable to conduct a microbiological (culture) study of the wound discharge for all patients who have undergone surgical treatment for AF.

In the absence of complete epithelization up to the 45th day after surgery, the wounds can be considered long-term non-healing.

2.4 Instrumental diagnostic studies

- Anoscopy is **recommended** for all patients to assess the condition of the anal canal and distal rectum for visualization of the internal fistula opening [2,13].

Grade C (level of evidence - 5).

Comment. *This mandatory study is carried out in order to accurately determine the localization, assess the width and shape of the internal fistula opening, the presence or absence of scars in the walls of the anal canal and rectum, and assess the presence of concomitant diseases of the anal canal.*

- **Proctoscopy is recommended** for all patients to diagnose concomitant diseases of the rectum and the distal third of the sigmoid colon [2,13].

Grade C (level of evidence - 5).

- Colonoscopy is **recommended** to examine all parts of the large intestine and the terminal ileum [2, 3].

Grade C (level of evidence - 5).

Comment. *The study is performed as an additional method of examination to assess the presence or absence of concomitant changes in the colon, inflammatory changes characteristic of Crohn's disease and ulcerative colitis. Colonoscopy is indicated to exclude colon neoplasms in all patients aged over 45 years.*

- Pelvic MRI and/or endoanal US is **recommended** for all patients with AF to assess the location of the fistula tract in relation to the anal sphincter, to clarify the localization of the internal fistula opening, to diagnose purulent congestion, and to detect additional fistulas.

The both methods are comparable in terms of diagnostic value [14-25].

Grade A (level of evidence - 1).

Comment. *MRI and endoanal US are the methods of choice for topographic and anatomical assessment of the fistula.*

Endoanal US is quite simple to perform, inexpensive, short in duration, can be performed by a coloproctologist on his/her own, can be supplemented with contrasting the fistula tract.

The disadvantage of this method is the operator dependency.

MRI of the pelvis demonstrates a high level of detail, requires no contrast, is operator-independent study.

At the same time, MRI is an expensive study, requires the involvement of a radiologist and takes more time.

The both methods have similar sensitivity and specificity in the diagnosis of AF.

- In preparation for surgery in patients with initial dysfunction of the anal sphincter, previously operated on for the AF, in patients who are going to have surgery for transsphincteric fistula involving over 30% of the sphincter, and for extrasphincteric fistulas, it is **recommended** to study the AS function to identify incontinence, including subclinical forms [26].

Grade C (level of evidence - 4).

- Fistulography is **not recommended** for examination of the patient, due to low sensitivity and specificity [14].

Grade B (level of evidence - 3).

- Pelvic CT is **not recommended** for examination of the patient due to low sensitivity and specificity [14].

Grade B (level of evidence - 3).

2.5 Other diagnostic tests

Additional instrumental and laboratory tests are performed for the purpose of differential diagnosis.

- It is **recommended** that patients with AF, when suspected to have a fungal infection, tuberculosis, or tumor process, should undergo microbiological, cytological, or biopsy of the fistula wall or perianal infiltration with pathoanatomic examination of the biopsy (surgical) specimen using immunohistochemical methods [13].

Grade C (level of evidence - 5).

3. TREATMENT, INCLUDING MEDICATION AND NON-MEDICATION THERAPY, DIET THERAPY, ANESTHESIA, MEDICAL INDICATIONS AND CONTRAINDICATIONS TO THE USE OF TREATMENT MODALITIES

3.1 General treatment principles for AF

The main treatment method for AF is surgical [2].

Spontaneous healing of the fistula is extremely rare.

Conservative measures as an independent method of AF treatment are not effective and are aimed at reducing the severity and prevalence of the inflammatory process.

The choice of surgical treatment modality is determined by a number of factors:

- the location of the fistula in relation to the external sphincter;
- the severity and prevalence of the inflammatory process;
- the presence of additional fistula tracts and cavities;
- the severity and prevalence of scarring, primarily in the area of the internal fistula opening;
- the AS condition and anal sphincter function.

The purpose of surgery is to eliminate the fistula tract with maximum preservation of the AS structures and the anal sphincter function. The choice of the optimal method of surgical treatment is determined by the ratio of the risk assessment of the AF relapse and the anal incontinence development.

The most sparing attitude to the AS structural elements largely determines the functional result of treatment.

When deciding whether to use a particular method, it is necessary to explain to the patient the advantages and disadvantages of each of the surgical options to choose the most appropriate in a specific clinical situation.

Contraindications to surgical treatment are severe comorbidities in the decompensation stage. If it is possible to achieve an improvement in the condition after the treatment, then the surgery becomes possible.

The timing of radical surgery is determined mainly by the clinical course of the disease. Most patients undergo elective surgery. In case of exacerbation of chronic inflammation with the abscess formation, the surgery is performed, as in acute perianal abscess as a matter of urgency.

It is not advisable to postpone radical treatment for a long time, because the exacerbation may recur, the inflammatory process with subsequent scarring of the anal canal wall, sphincter and perianal tissues may lead to deformation of the anal canal and perineum, the development of anal sphincter incontinence.

3.2. Treatment of intrasphincteric and transsphincteric fistulas involving less than 30% of the external sphincter

Treatment by fistulotomy or fistulectomy

- It is **recommended** for patients with intrasphincteric and transsphincteric fistulas that involve the distal 1/3 of the external sphincter, surgical technique of dissection or excision of the fistula into the lumen to achieve a cure and improve the quality of life [14,27-31].

Grade A (level of evidence - 2).

Comment. *The operation of fistulotomy / fistulectomy is performed as follows: the fistula is dissected or excised into the lumen on the probe. The wound is not closed or the edges of the wound are sewn to the bottom.*

When comparing the method of the AF excision into the anal canal lumen and dissection of the, it was found that after excision of the fistula, the healing of wounds was longer, postoperative wounds were large in size, the risk of anal sphincter incontinence was higher.

The incidence of relapses does not differ significantly when comparing these two approaches [32,33].

To date, there is no clear answer to the question of how much of the muscle structures can be dissected during surgery for AF.

The surgery efficiency of dissection or excision of the is quite high and ranges from 92 to 97% [27,28].

Violation of the anal sphincter function after excision of the fistula is 0-45% [26-41]. A wide range of data is associated with different approaches to the assessment of the AS function disorders and the timing of follow-up of patients in the postoperative period. Risk factors for the anal incontinence development after dissection or excision of the fistula are: the presence of anal incontinence before surgery, the

recurrent nature of the fistula, female gender, fistulas that involve over 30% of the external sphincter, as well as previous surgeries for diseases of the anus, rectum, pelvis and perineum [27,29-31].

- Suturing the wound edges to the bottom after fistula elimination can be **recommended** to reduce the risk of bleeding in the postoperative period and improve the wound healing process (average healing time is 4 weeks) [42,43].

Grade A (level of evidence - 2).

Treatment by inserting the fibrin glue into the fistula

- Patients with intrasphincteric and transsphincteric fistulas that involve the distal 1/3 of the external sphincter, in the absence of additional tracts and pronounced scarring in the area of the internal opening, as well as a high risk of developing anal incontinence or already existing anal incontinence, we **recommend** the method of injecting the fibrin glue into the fistula [44-53].

Grade A (level of evidence - 2).

Comment. *The method is performed as follows. Under anesthesia, after cleansing of the fistula tract in order to remove epithelial elements and necrotic tissues (using a brush, a Folkman spoon, electrocoagulation, etc.), a thin flexible tube is inserted into the external opening of the fistula to the internal fistula opening under the control of the finger.*

Using a syringe, make the injection of the fibrin glue.

Without stopping injecting the glue, gradually remove the tube from the external fistula opening, thus filling the entire fistula tract.

The effectiveness of the described method is 40-78% in this category of patients [44-53]. Its efficiency is much lower than excision of the fistula into the intestine lumen. However, this method has several advantages: a simple technique of intervention, its low-impact nature, no damaging effects on AS, recovery time is significantly shorter.

With the development of fistula recurrence, the method of injecting the fibrin glue into the fistula does not exclude its repeated use and does not create unfavorable conditions for the implementation of more effective methods.

Treatment of fistulas using bioplastic material (bioplastic sealing tampons, bioplastic implants)

- It is **recommended** for patients with transsphincteric fistulas, involving the distal 1/3 of the external sphincter technique using absorbable collagen (bioplastic sealing tampons, bioplastic implants), after removing necrotic tissues with a brush or a Folkman spoon, in order to close the internal fistula opening and seal the fistula bed [54-60].

Grade C (level of evidence - 3).

Comment. *The method is recommended for patients with a fistula length of at least 3 cm, with no additional tracts.*

In preparation for the implementation of the method of fistulas treatment with the use of bioplastic sealing tampons, it is desirable to drain the fistula by conducting a drainage Seton for a period of 4-8 weeks.

Sealing tampons made of bioplastic material and bioplastic collagen implants (submucosal base of the pig intestine, intercellular matrix and collagen from the pig's dermis, biologically compatible artificial materials-polyglycolic acid) are used.

The biological or biocompatible material from which the implant is made serves as the basis for fistula obliteration [54,55].

The method is performed as follows: after cleansing of the fistula with a brush or a Folkman spoon in order to maximize the removal of necrotic tissue and granulation, a sealing bioplastic material in the form of a cone-shaped tampon is inserted into the fistula, completely filling the fistula.

The distal end of the tampon is removed through the external fistula opening. The expanded part of the sealing tampon located in the area of the internal fistula opening, for more reliable fixation, is sewn with several stitches to the edges of the mucous membrane from the lumen of the anal canal and rectum.

According to the literature data, the technique is effective in 70-100% of cases in patients with fistulas that involve less than 1/3 of the external sphincter [54-57].

The AF treatment modality using the fistula laser thermoablation

- It is **recommended** for patients with intrasphincteric and transsphincteric AF treatment modality using the fistula laser thermoablation [61-63].

Grade C (level of evidence - 4).

Comment. *Laser thermoablation surgery is performed when a fistula is formed or after use of a draining latex seton in the fistula for a period of 6-8 weeks, which contributes to the formation of a “straight” fistula with fibrous walls and significantly reduces the risk of preserving cavities and additional tracts along the fistula.*

The method consists of laser coagulation of the walls of the fistula tract with a diode laser (wavelength 1,470-1,560 Nm), using a light probe that provides radial radiation.

The surgery is performed under anesthesia. A diode laser light probe is inserted into the external opening along the conductor, which is removed through the internal fistula opening. When the light probe is gradually extracted at a speed of 1 mm/s, laser coagulation of the fistula walls is performed, which leads to its obliteration [61-63].

In order to ensure adequate drainage, the distal part of the fistula tract in the area of the external fistula opening is excised.

The internal fistula opening after laser procedure of the fistula tract is sutured with separate nodal sutures.

A positive side of this technique is the absence of damaging effects on the AS, which is the prevention of the anal incontinence.

According to the studies evaluating the effectiveness of this surgery, fistula healing occurs on average in 64.5% (40.0-88.2%) of cases with an average follow-up period of 15 to 20 months [61-63].

3.3 Treatment of transsphincteric fistulas that involve over 30% of the sphincter and extrasphincteric fistulas

Excision of the fistula and endorectal advancement flap

- It is **recommended** for patients with transsphincteric fistulas that involve over 1/3 of the external sphincter and extrasphincteric fistulas to excise the fistula and to use endorectal advancement flap in order to close the internal fistula opening [27,64-73].

Grade B (level of evidence - 2).

Comment. *The surgery is performed under anesthesia. The fistula is excised from the external opening to the rectal wall. At the next step, receding 0.5-1 cm more distal to the internal fistula opening, is performed semi lunar incision of the anal canal wall, which occupies about 1/4-1/3 of the circumference. The flap is mobilized in the proximal direction for 2-4 cm.*

Depending on the method option, the flap can be mucosal-submucosal, mucosal-muscular or full-walled. Under the flap, the internal fistula opening is sutured with 1-2 separate stitches.

Then the flap is lowered in the distal direction and its edge is fixed to the underlying muscle structures of the anal canal wall and/or perianal skin without stretching.

The procedure with endorectal advancement flap is sphincter preserving, since it does not lead to damage to the external sphincter. The method efficiency is 44-87% [64-70].

The technique is not indicated for severe and prolonged scar-inflammatory changes in the wall of the anal canal and the low rectum, which prevent the mobilization and lowering of the flap [27,65,67-70].

Despite the fact that this method is not accompanied by damage to the internal sphincter, in 7-38% of cases after surgery, there are phenomena of minor or moderate anal incontinence, which is confirmed by the data of anorectal manometry in the postoperative period (a decrease in pressure in the anal canal at rest and with volitional contraction) [67,71-73].

This is due to the fact that the composition of the endorectal advancement flap, as a rule, includes elements of the sphincter, and the flap itself leads to a displacement of the mucosa of the rectum, causing wetness and mucus secretion.

To increase the effectiveness of the technique in the presence of additional tracts, this surgery should be performed in the second stage after the installation of a draining latex seton for the period when the inflammation subsides.

Method of treatment of fistulas by The ligation of the intersphincteric fistula tract (LIFT)

- It is **recommended** for patients primarily with transsphincteric fistulas and, to a lesser extent, with extrasphincteric fistulas, the method of the ligation of the intersphincteric fistula tract to eliminate the fistula [74-77].

Grade A (level of evidence - 2).

Comment. *The surgery is performed when a fistula is formed or after pre-installation of a draining latex seton in the fistula for a period of 6-8 weeks, which contributes to the formation of a “straight” fistula with fibrous walls and significantly reduces the risk of preserving the cavities or additional tracts along the fistula.*

In principle, the method consists of ligating and crossing the part of the fistula that passes in the intersphincter space [74-77].

The fistula is excised from the external opening to the external sphincter or the external fistula is expanded. Then, in the projection of the fistula, an incision is made in the intersphincter furrow, the intersphincter space identifies the fistula, and mobilizes it from all sides.

At the borders of the external and internal sphincters, the fistula tract is crossed and ligated, and the wound in the intersphincter furrow is sutured.

The LIFT surgery has many modifications that do not fundamentally change the essence of the method. Wound healing occurs when this method is performed faster than when the surgery is performed to lower the flap of the rectum wall. Healing of the fistula occurs on average in 70%, while the phenomena of incontinence develop significantly less frequently than in the surgery of endorectal advancement flap with a comparable recurrence rate [74-77].

Excision of the fistula with suturing of the sphincter

- Patients with high recurrent transsphincteric and extrasphincteric fistulas in the presence of scar replacement of the sphincter in the area of the fistula location, as well as if it is impossible to effectively and safely perform other sphincter-sparing procedures, we **recommend** excision of the fistula with suturing of the sphincter to eliminate the fistula tract [78-81].

Grade B (level of evidence - 3).

Comment. *This method consists of excision of the fistula tract with the dissection of the part of the sphincter through which the fistula passes and subsequent suturing of the ends of the dissected part of the AS.*

The effectiveness of the method is, on average, 54-97% and is comparable to the effectiveness of other surgical methods [78-81].

Violation of the anal sphincter function after surgery is observed in 4-32%. Divergence of the edges of the sutured sphincter or suppuration of the wound significantly increases the risk of anal incontinence, especially in patients with extrasphincteric fistulas [79].

Excision of the fistula with seton

- Patients with recurrent transsphincteric fistulas that involve over 1/3 of the external sphincter and extrasphincteric AFs in the presence of scar replacement of the sphincter in the area of the fistula location, as well as if it is impossible to effectively and safely perform other sphincter-sparing surgeries, excision of the fistula with suturing of the sphincter to eliminate the fistula tract, as well as if the patient refuses to repeat complex plastic surgery, it is **recommended** to excise the fistula with seton to close the internal fistula opening [50, 82-91].

Grade B (level of evidence - 2).

Comments. *The method of using a dissecting seton in the AF treatment is not sphincter-sparing and is often performed when the other methods are ineffective.*

Seton (silk or latex) is carried out through the fistula tract in order to gradually dissect the fistula and the sphincter fibers by periodically tightening the seton.

The slow dissecting of the muscle fibers of the sphincter with seton prevents their divergence.

The deterioration of the AS function when using the seton method reaches 54% [82-87].

The literature data differ significantly [50,88-91].

Treatment of fistulas by inserting the fibrin glue and other bioplastic materials into the fistula

Patients with transsphincteric fistulas that involve over 1/3 of the external sphincter and extrasphincteric fistulas can undergo this method due to the safety and low incidence of complications, but its effectiveness does not exceed 50%, and the data in the literature are based on the use of the method in heterogeneous small groups [92].

Grade C (level of evidence - 4).

3.4. Treatment of AF associated with Crohn's disease (CD)

- It is **recommended** to start treatment of the AF against the CD background with conservative measures against the background therapy of the main disease in patients. Immunosuppressant's are used to improve the condition of the fistula [93-96].

Grade B (level of evidence - 3).

Comment. *Perianal lesions in CD occur in 40-80% of cases. Choosing a treatment modality for AF in Crohn's disease is a complex task and requires an individual approach. As a rule, the treatment of fistulas against the CD background begins with conservative measures against the background therapy of the main disease. In 90% of cases, the use of antibacterial drugs, metronidazole** reduces the severity of perianal lesions [97,98].*

*Use of infliximab** and other drugs of monoclonal antibodies to the tumor necrosis factor, which contributes to the healing of the AFs, on average, in 46% of cases [95].*

Despite the good results of conservative treatment of CD with perianal lesions, the choice of treatment modality for each patient is individual, depending on the severity of the underlying disease and the severity of symptoms.

The method of choice for treatment in patients with severe inflammatory activity in the perianal region with the fistula formation against the background of acute CD is the formation of a permanent stoma or surgery accompanied by the removal of the affected rectum [96-100].

- Surgical procedure for the AF without any clinical manifestations is **not recommended** in patients with CD [100, 101].

Grade C (level of evidence - 5).

Comment. *The AF on the CD background can be "secondary", i.e. associated with the main disease.*

Ulcerative defects with torn edges, localized in the anal canal and rectum, often mimic fistulas and can be identified as fistulas, streaks with instrumental methods of examination.

Fistulas can also be associated with an inflammatory process in the cryptoglandular zone.

Regardless of the etiology of fistula, in the absence of any of its manifestations, i.e., an asymptomatic course, the absence of an inflammatory process, surgical procedure is not required [100,101].

In such cases, fistula for a long time may not give any symptoms, but patients should be warned about the possibility of performing surgery for fistula in the future.

Taking into account the chronic course of the disease and the high probability of recurrence, the maximum preservation of the muscle structures of the AS is required during the surgery.

In this regard, before performing the surgery, a number of factors should be taken into account: the activity of the inflammatory process in the rectum, the functional state of the AS, the presence of previous surgeries on the rectum and perineum, the frequency and consistency of the stool.

With careful selection of patients, good results in this surgery are noted in 56-100% of cases.

The incidence of moderately expressed violations of function of holding the intestinal content is 6-12% [63,72,102,103].

- In the case of treatment of AF in patients with transsphincteric fistulas that involve over 1/3 of the external sphincter and extrasphincteric AFs against the CD background, as the first stage it is **recommended** to install a drainage seton for a period of 6 or more weeks in order to adequately drain the purulent cavity and prevent the closure of the external fistula opening [97-99].

Grade C (level of evidence - 4).

Comment. *The use of a draining seton over a long period of time can significantly improve the results of surgical correction of high transsphincteric and extrasphincteric fistulas.*

However, despite this surgery, on average, 20-40% of patients periodically experience an exacerbation of the inflammatory process in the perianal tissue [82,104,105].

- As the second stage for such patients it is **recommended** to eliminate the fistula, and in each case, this issue is resolved individually.

Any of the above methods can be used [44,68,106].

Grade C (level of evidence - 4).

Comment. *The analysis of direct results showed the effectiveness of this surgery in 64-75% of patients [44,68,106].*

The recurrence rate of AF increases slightly with an increase in the follow-up period for operated patients [99,107].

3.5. Prevention of infectious wound complications after plastic surgery (excision of the fistula with suturing of the sphincter, endorectal advancement flap) and in the presence of a active inflammatory process in the perianal tissues and the rectum wall

- It is **recommended** to prevent infectious wound complications after plastic surgery (excision of the fistula with suturing of the sphincter, the flap lowering of the rectum wall) and in the presence of a pronounced inflammatory process in the pararectal tissues and the rectum wall. Antibacterial and antimicrobial drugs acting on the intestinal flora and soft tissues are also used (beta-lactam antibiotics such as penicillin, cephalosporins, fluoroquinolones, antiprotozoal drugs) [108].

Grade C (level of evidence - 4).

Comment. *Drugs can be administered parenterally or orally.*

Certain data on the need for the use of antibacterial drugs in the postoperative period is not yet available.

3.6 Anesthesia

If an acute or chronic pain syndrome occurs, the patient is anaesthetized according to the existing anesthesia protocols (see the relevant clinical recommendations for chronic pain, clinical recommendations for anesthesiology), including indications with the use of narcotic and psychotropic drugs.

4. MEDICAL REHABILITATION, MEDICAL INDICATIONS AND CONTRAINDICATIONS TO THE USE OF REHABILITATION METHODS

- It is **recommended** that in the postoperative period, all the patients who have undergone surgery for an AF regularly get bandaging consisting of cleaning wounds with antiseptic solutions and applying water-soluble ointment bases (Dioxomethyltetrahydropyrimidine + Chloramphenicol) to reduce the risks of inflammatory complications [2].

Grade C (level of evidence - 5).

- In the postoperative period, it is **recommended** not to use routine antibacterial therapy [108].

Grade B (level of evidence - 3).

Comment. *Antibacterial therapy is advisable after plastic surgery for the AF (the endorectal advancement flap, excision of the fistula with suturing of the sphincter), as well as in the presence of a active inflammatory process in the perianal tissues and the rectal wall in order to accelerate its relief.*

- It is **recommended** that after discharge from the hospital, for the period of wound healing, all the patients should be observed by a coloproctologist or a surgeon at the residence place to prevent recurrence and complications [2].

Grade C (level of evidence - 5).

- It is **recommended** for patients after plastic surgery for the AF to prevent recurrence regulation of stool by diet and laxatives [2].

Grade C (level of evidence - 5).

5. PREVENTION AND MEDICAL OBSERVATION, MEDICAL INDICATIONS AND CONTRAINDICATIONS TO THE USE OF PREVENTION METHODS

- All patients are **recommended** to undergo timely surgical treatment of acute perianal abscess with adequate drainage of the purulent cavity and subsequent monitoring of wound healing to prevent fistula formation [8,13].

- **Grade C (level of evidence - 5).**

Comment. *Patients after opening of acute abscess should have a clear idea about the possibility of incomplete wound healing with the subsequent formation of a fistula or recurrence of purulent-inflammatory process in pararectal tissue and to present the importance of timely notification of the physician of the appearance of any clinical manifestations [8].*

A possible measure to prevent the development of the disease is the timely treatment of concomitant diseases of the anorectal zone (hemorrhoids, anal fissure, cryptitis).

- 7-10 day courses of antibiotic therapy with ciprofloxacin and metronidazole are **recommended** to prevent the development of AF after opening and draining acute perianal abscess[109].

- **Grade B (level of evidence - 2).**

Comment. *Prevention of acute perianal abscess also consists of general strengthening the body measures aimed at eliminating the etiological factors of the disease.*

All patients are recommended:

- *support and strengthening of local and humoral immunity;*
- *treatment and rehabilitation of foci of acute and chronic infection;*
- *correction of chronic diseases – diabetes, atherosclerosis;*
- *correction of functional disorders of the intestine;*
- *timely treatment of concomitant proctological diseases.*

- It is **recommended** for patients after the end of treatment and wound healing to remain under dynamic observation by a coloproctologist during the first year at least once every 6 months for timely detection of relapse [2].

- **Grade C (level of evidence - 5).**

6. ORGANIZATION OF MEDICAL CARE

- Treatment of patients with AF can be performed both in outpatient condition and in a coloproctological unit;

- Medical care to patients with AF is provided by coloproctologists;

- Before elective hospitalization, a full examination should be performed to exclude risk factors and comorbidities;

- Hospitalization of patients is carried out as elective.

Indications for elective hospitalization:

- If treatment correction is necessary or it is impossible to carry out medical measures in outpatient conditions;

- The inability to perform diagnostic or therapeutic procedures in out-patient conditions;

- Inefficiency of outpatient treatment in frequently and long-term ill patients;

- The need for surgical treatment.

Indications for patient discharge:

- Uncomplicated course of the early postoperative period;

- Absence of infectious complications of the wound;

- Controlled pain syndrome with the possibility of relieving it with oral medications in an outpatient setting;

- Possibility of normal defecation;

- The ability of the patient (for patients with disabilities) to independently continue the course of conservative therapy in an outpatient setting under the supervision of a regional coloproctologist.

7. ADDITIONAL INFORMATION (INCLUDING FACTORS THAT AFFECT THE OUTCOME OF THE DISEASE OR CONDITION)

Negatively affect the outcome of treatment:

1. infectious complications;
2. diarrhea or constipation;
3. failure to comply with patient restrictions of physical activity and exercise.

THE AUTHORS DECLARE NO CONFLICT OF INTERESTS.

REFERENCES

1. Philip H. Gordon, Santhat Nivatvongs. Principles and Practice of Surgery for the Colon, Rectum, and Anus. Second Edition. Quality Medical Publishing, Inc. St. Louis, Missouri. 1999; 10:242-286.
2. Shelygin Yu.A., Blagodarny L.A. Handbook of Coloproctology. Geotar-Media, 2014. (in Russ.).
3. Jeremy Sugrue, Johan Nordenstam. Pathogenesis and persistence of cryptoglandular anal fistula: a systematic review. *Tech Coloproctol.* 2017
4. Herold A. et al. Coloproctology, European Manual of Medicine. Springer, 2017; 59-74.
5. Dultsev Yu.V., Salamov K.N. Paraproctitis. M., 1981. (in Russ.).
6. Zanotti C, Martinez-Puente C, Pascual I, et al. An assessment of the incidence of fistula-in-ano in four countries of the European Union. *Int J Colorectal Dis.* 2007;22:1459–1462.
7. Richard L, Herand Abcarian. Anal Fistula: Principles and Management Springer, 2014; 1-199.
8. Sainio P. Fistula-in-ano in a defined population. Incidence and epidemiological aspects. *Ann Chir Gynaecol.* 1984; 73:219–224.
9. Nelson J, Billingham R. Pilonidal disease and hidradenitis suppurativa. In: Wolff B.G., Fleshman J.W., Beck D.E., Pemberton J.H., Wexner S.D., eds. The ASCRS Textbook of Colon and Rectal Surgery. New York: Springer; 2007:228–235.
10. Gaertner WB, Hagerman GF, Finne CO, et al. Fistula-associated anal adenocarcinoma: good results with aggressive therapy. *Dis Colon Rectum.* 2008; 51:1061–1067.
11. Schwartz DA, Wiersema MJ, Dudiak KM, et al. A comparison of endoscopic ultrasound, magnetic resonance imaging, and exam under anesthesia for evaluation of Crohn's perianal fistulas. *Gastroenterology.* 2001; 121:1064–1072.
12. Gonzalez-Ruiz C, Kaiser A.M, Vukasin P, et al. Intraoperative physical diagnosis in the management of anal fistula. *Am Surg.* 2006; 72:11–15.
13. Steele S, Hull TL. et al. The ASCRS Manual of Colon and Rectal Surgery. Springer. 2019; 189-201.
14. de Groof EJ, Cabral VN, Buskens CJ. Systematic review of evidence and consensus on perianal fistula: an analysis of national and international guidelines. *Colorectal Disease.* 2016; 18:119–134.
15. Bussen D, Sailer M, Wening S, et al. Wertigkeit der analen Endosonographie in der Diagnostik anorektaler Fisteln. *Zentralbl Chir.* 2004; 129:404–407.
16. Lengyel AJ, Hurst NG, Williams JG. Pre-operative assessment of anal fistulas using endoanal ultrasound. *Colorectal Dis.* 2002; 4:436–440.
17. Maor Y, Chowers Y, Koller M, et al. Endosonographic evaluation of perianal fistulas and abscesses: comparison of two instruments and assessment of the role of hydrogen peroxide injection. *J Clin Ultrasound.* 2005; 33:226–232.
18. Ratto C, Grillo E, Parello A, et al. Endoanal ultrasound-guided surgery for anal fistula. *Endoscopy.* 2005; 37:722–728.
19. Toyonaga T, Matsushima M, Tanaka Y, et al. Microbiological analysis and endoanal ultrasonography for diagnosis of anal fistula in acute anorectal sepsis. *Int J Colorectal Dis.* 2007; 22:209–213.
20. Toyonaga T, Tanaka Y, Song JF, et al. Comparison of accuracy of physical examination and endoanal ultrasonography for preoperative assessment in patients with acute and chronic anal fistula. *Tech Coloproctol.* 2008; 12:217–223.
21. Buchanan GN, Halligan S, Bartram CI, et al. Clinical examination, endosonography, and MR imaging in preoperative assessment of fistula in ano: comparison with outcome-based reference standard. *Radiology.* 2004; 233:674–681.
22. Sahni VA, Ahmad R, Burling D. Which method is best for imaging of perianal fistula? *Abdom Imaging.* 2008; 33:26–30.
23. Schaefer O, Lohrmann C, Langer M. Assessment of anal fistulas with high-resolution subtraction MR-fistulography: comparison with surgical findings. *J Magn Reson Imaging.* 2004; 19:91–98.
24. Guillaumin E, Jeffrey RB Jr., Shea WJ, et al. Perirectal inflammatory disease: CT findings. *Radiology.* 1986; 161:153–157.
25. Yousem DM, Fishman EK, Jones B. Crohn disease: perianal and perirectal findings at CT. *Radiology.* 1988; 167:331–334.
26. Bokhari S, Lindsey I. Incontinence following sphincter division for treatment of anal fistula. *Colorectal Dis.* 2010; 12:135–139.
27. Garcia-Aguilar J, Belmonte C, Wong WD, et al. Anal fistula surgery: factors associated with recurrence and incontinence. *Dis Colon Rectum.* 1996; 39:723–729.
28. Davies M, Harris D, Lohana P. et al. The surgical management of fistula-in-ano in a specialist colorectal unit. *Int J Colorectal Dis.* 2008; 23:833–838.

29. Jorda'n J, Roig JV, García-Armengol J, et al. Risk factors for recurrence and incontinence after anal fistula surgery. *Colorectal Dis.* 2010; 12(3):254-260.
30. van Koperen PJ, Wind J, Bemelman WA, et al. Long-term functional outcome and risk factors for recurrence after surgical treatment for low and high perianal fistulas of cryptoglandular origin. *Dis Colon Rectum.* 2008; 51:1475–1481.
31. Van Tets WF, Kuijpers HC. Continence disorders after anal fistulotomy. *Dis Colon Rectum.* 1994; 37:1194–1197.
32. Kronborg O. To lay open or excise a fistula-in-ano: a randomized trial. *Br J Surg.* 1985; 72:970.
33. Belmonte Montes C, Ruiz Galindo GH, Montes Villalobos JL, et al. Fistulotomy vs fistulectomy: ultrasonographic evaluation of lesion of the anal sphincter function. *Rev Gastroenterol Mex.* 1999; 64:167–170.
34. Stelzner F, Dietl H, Hahne H. Ergebnisse bei Radikaloperationen von 143 Analfisteln (Kritik der einzeitigen Sphinktertrennung bei ein- oder mehrzeitigen Fisteloperationen). *Chirurg.* 1956; 27:158–162.
35. van der Hagen SJ, Baeten CG, Soeters PB, et al. Long-term outcome following mucosal advancement flap for high perianal fistulas and fistulotomy for low perianal fistulas: recurrent perianal fistulas: failure of treatment or recurrent patient disease? *Int J Colorectal Dis.* 2006; 21:784–790.
36. Parks AG, Stitz RW. The treatment of high fistula-in-ano. *Dis Colon Rectum.* 1976; 19:487–499.
37. Van Tets WF, Kuijpers HC. Continence disorders after anal fistulotomy. *Dis Colon Rectum.* 1994; 37:1194–1197.
38. Mylonakis E, Katsios C, Godevenos D, et al. Quality of life of patients after surgical treatment of anal fistula; the role of anal manometry. *Colorectal Dis.* 2001; 3:417–421.
39. Westerterp M, Volkers NA, Poolman RW, et al. Anal fistulotomy between Skylla and Charybdis. *Colorectal Dis.* 2003; 5:549–551.
40. van Koperen PJ, Wind J, Bemelman WA, et al. Long-term functional outcome and risk factors for recurrence after surgical treatment for low and high perianal fistulas of cryptoglandular origin. *Dis Colon Rectum.* 2008; 51:1475–1481.
41. Toyonaga T, Matsushima M, Tanaka Y, et al. Non-sphincter splitting fistulectomy vs conventional fistulotomy for high trans-sphincteric fistula-in-ano: a prospective functional and manometric study. *Int J Colorectal Dis.* 2007; 22:1097–1102.
42. Pescatori M, Ayabaca SM, Cafaro D, et al. Marsupialization of fistulotomy and fistulectomy wounds improves healing and decreases bleeding: a randomized controlled trial. *Colorectal Dis.* 2006; 8:11–14.
43. Ho YH, Tan M, Leong AF, et al. Marsupialization of fistulotomy wounds improves healing: a randomized controlled trial. *Br J Surg.* 1998; 85:105–107.
44. Adams T, Yang J, Kondylis LA, et al. Long-term outlook after successful fibrin glue ablation of cryptoglandular transsphincteric fistula-in-ano. *Dis Colon Rectum.* 2008; 51:1488–1490.
45. Sentovich SM. Fibrin glue for anal fistulas: long-term results. *Dis Colon Rectum.* 2003; 46:498–450.
46. Swinscoe MT, Ventakasubramaniam AK, Jayne DG. Fibrin glue for fistula-in-ano: the evidence reviewed. *Tech Coloproctol.* 2005; 9:89–94.
47. Yeung JM, Simpson JA, Tang SW, et al. Fibrin glue for the treatment of fistulae-in-ano: a method worth sticking to? 2010; 12(4):363–366.
48. Cintron JR, Park JJ, Orsay CP, et al. Repair of fistulas-in-ano using fibrin adhesive: long-term follow-up. *Dis Colon Rectum.* 2000; 43:944–949.
49. Park JJ, Cintron JR, Orsay CP, et al. Repair of chronic anorectal fistulae using commercial fibrin sealant. *Arch Surg.* 2000; 135:166–169.
50. Lindsey I, Smilgin-Humphreys MM, Cunningham C, et al. A randomized, controlled trial of fibrin glue vs. conventional treatment for anal fistula. *Dis Colon Rectum.* 2002; 45:1608–1615.
51. Ellis CN, Clark S. Fibrin glue as an adjunct to flap repair of anal fistulas: a randomized, controlled study. *Dis Colon Rectum.* 2006; 49:1736–1740.
52. Hammond TM, Grahn MF, Lunniss PJ. Fibrin glue in the management of anal fistulae. *Colorectal Dis.* 2004; 6:308–319.
53. de Parades V, Far HS, Etienney I, Zeitoun J.D., et al. Seton drainage and fibrin glue injection for complex anal fistulas. *Colorectal Dis.* 2010; 12(5):459–463.
54. Ky AJ, Sylla P, Steinhagen R, et al. Collagen fistula plug for the treatment of anal fistulas. *Dis Colon Rectum.* 2008; 51:838–843.
55. Ellis CN, Rostas JW, Greiner FG. Long-term outcomes with the use of bioprosthetic plugs for the management of complex anal fistulas. *Dis Colon Rectum.* 2010; 53:798–802.
56. Zubaidi A, AL-Obeed O. Anal fistula plug in high fistula-in ano: an early Saudi experience. *Dis Colon Rectum.* 2009; 52:1584–1588.
57. Song WL, Wang ZJ, Zheng Y, et al. An anorectal fistula treatment with acellular extracellular matrix: a new technique. *World J Gastroenterol.* 2008; 14:4791–4794.
58. Schwandner O, Stadler F, Dietl O, et al. Initial experience on efficacy in closure of cryptoglandular and Crohn's transsphincteric fistulas by the use of the anal fistula plug. *Int J Colorectal Dis.* 2008; 23:319–324.
59. Safar B, Jobanputra S, Sands D, et al. Anal fistula plug: initial experience and outcomes. *Dis Colon Rectum.* 2009; 52:248–252.
60. Christoforidis D, Etzioni DA, Goldberg SM, et al. Treatment of complex anal fistulas with the collagen fistula plug. *Dis Colon Rectum.* 2008; 51:1482–1487.

61. Matinyan A.V., Kostarev I.V., Blagodarny L.A., Titov A.Yu., Shelygin Yu.A. Fistula laser ablation for anal fistulas (systematic review). *Koloproktologia*. 2019; v.18,no.3(69), pp.7-19. <https://doi.org/10.33878/2073-7556-2019-18-3-7-19>. (in Russ.).
62. Mustafa CT, Cihan A. et al. Closing Perianal Fistulas Using a Laser: Long-Term Results in 103 Patients. *Dis Colon Rectum*. 2018; 61:5:00–00. DOI: 10.1097/DCR.0000000000001038.
63. Wilhelm A, Fiebig A, Krawezak M. Five years of experience with the FiLaC laser for fistula-in-ano management long-term followup from a single institution. *Tech Coloproctol*. 2017. DOI 10.1007/s10151-017-1599-7.
64. Van Koperen PJ, Wind J, Bemelman WA, Slors JF. Fibrin glue and transanal rectal advancement flap for high transsphincteric perianal fistulas: is there any advantage? *Int J Colorectal Dis*. 2008; 23:697–701.
65. Mizrahi N, Wexner SD, Zmora O, et al. Endorectal advancement flap: are there predictors of failure? *Dis Colon Rectum*. 2002; 45:1616–1621.
66. Mitalas LE, Gosselink MP, Zimmerman DD, Schouten WR. Repeat transanal advancement flap repair: impact on the overall healing rate of high transsphincteric fistulas and on fecal continence. *Dis Colon Rectum*. 2007; 50:1508–1511.
67. Schouten WR, Zimmerman DD, Briel JW. Transanal advancement flap repair of transsphincteric fistulas. *Dis Colon Rectum*. 1999; 42:1419–1422.
68. Zimmerman DD, Briel JW, Gosselink MP, Schouten WR. Anocutaneous advancement flap repair of transsphincteric fistulas. *Dis Colon Rectum*. 2001; 44:1474–1480.
69. Jones IT, Fazio VW, Jagelman DG. The use of transanal rectal advancement flaps in the management of fistulas involving the anorectum. *Dis Colon Rectum*. 1987; 30:919–923.
70. Sonoda T, Hull T, Piedmonte MR, Fazio VW. Outcomes of primary repair of anorectal and rectovaginal fistulas using the endorectal advancement flap. *Dis Colon Rectum*. 2002; 45:1622–1628.
71. Athanasiadis S, Helmes C, Yazigi R, Koehler A. The direct closure of the internal fistula opening without advancement flap for transsphincteric fistulas-in-ano. *Dis Colon Rectum*. 2004; 47:1174–1180.
72. Perez F, Arroyo A, Serrano P, Sánchez A, et al. Randomized clinical and manometric study of advancement flap versus fistulotomy with sphincter reconstruction in the management of complex fistula-in-ano. *Am J Surg*. 2006; 192:34–40.
73. Uribe N, Millán M, Minguéz M, et al. Clinical and manometric results of endorectal advancement flaps for complex anal fistula. *Int J Colorectal Dis*. 2007; 22:259–264.
74. Bleier JL, Moloo H, Goldberg SM. Ligation of the intersphincteric fistula tract: an effective new technique for complex fistulas. *Dis Colon Rectum*. 2010; 53:43–46.
75. Shanwani A, Nor AM, Amri N. Ligation of the intersphincteric fistula tract (LIFT): a sphincter-saving technique for fistula-in-ano. *Dis Colon Rectum*. 2010; 53:39–42.
76. Rojanasakul A, Pattanaarun J, Sahakitrungruang C, Tantiplachiva K. Total anal sphincter saving technique for fistula-in-ano: the ligation of the intersphincteric fistula tract. *J Med Assoc Thai*. 2007; 90:581–586.
77. Stellingwerf ME, van Praag EM. Systematic review and meta-analysis of endorectal advancement flap and ligation of the intersphincteric fistula tract for cryptoglandular and Crohn's high perianal fistulas. *BJS Open*. 2019 Jun; 3(3): 231–241.
78. Perez F, Arroyo A, Serrano P, et al. Fistulotomy with primary sphincter reconstruction in the management of complex fistula-in-ano: prospective study of clinical and manometric results. *J Am Coll Surg*. 2005; 200:897–903.
79. Jordan J, Roig JV, Garcia-Armengol J, et al. Risk factors for recurrence and incontinence after anal fistula surgery. *Colorectal Dis*. 2010; 12:254–260.
80. Kraemer M, Picke D. Fistelspaltung und primäre Sphinkterrekonstruktion zur Behandlung von Analfisteln. *Coloproctology*. 2011; 33:104–108.
81. Gemsenjager E. Results with a new therapy concept in anal fistula: suture of the anal sphincter. *Schweiz Med Wochenschr*. 1996; 126:2021–2025.
82. Williams JG, MacLeod CA, Rothenberger DA, Goldberg SM. Seton treatment of high anal fistulae. *Br J Surg*. 1991; 78:1159–1161.
83. Isbister WH, Al Sanea N. The cutting seton: an experience at King Faisal Specialist Hospital. *Dis Colon Rectum*. 2001; 44:722–727.
84. Mentés BB, Oktemer S, Tezcaner T, et al. Elastic one-stage cutting seton for the treatment of high anal fistulas: preliminary results. *Tech Coloproctol*. 2004; 8:159–162.
85. Eitan A, Koliada M, Bickel A. The use of the loose seton technique as a definitive treatment for recurrent and persistent high trans-sphincteric anal fistulas: a long-term outcome. *J Gastrointest Surg*. 2009; 13(6):1116–1119.
86. Theerapol A, So BY, Ngoi SS. Routine use of setons for the treatment of anal fistulae. *Singapore Med J*. 2002; 43:305–307.
87. Chuang-Wei C, Chang-Chieh W, Cheng-Wen H, et al. Cutting seton for complex anal fistulas. *Surgeon*. 2008; 6:185–188.
88. Zbar AP, Ramesh J, Beer-Gabel M, et al. Conventional cutting vs. internal anal sphincter-preserving seton for high trans-sphincteric fistula: a prospective randomized manometric and clinical trial. *Tech Coloproctol*. 2003; 7:89–94.
89. Shukla N. Multicentric randomized controlled clinical trial of Kshaarasootra (Ayurvedic medicated thread) in the management of fistula-in-ano. Indian Council of Medical Research. *Indian J Med Res*. 1991; 94:177–185.
90. Ho KS, Tsang C, Seow-Choen F, et al. Prospective randomized trial comparing ayurvedic cutting seton and fistulotomy for low fistula-in-ano. *Tech Coloproctol*. 2001; 5:137–141.

91. Tyler KM, Aarons CB, Sentovich SM. Successful sphinctersparing surgery for all anal fistulas. *Dis Colon Rectum*. 2007; 50:1535–1539.
92. Loungnarath R, Dietz DW, Mutch MG, et al. Fibrin glue treatment of complex anal fistulas has low success rate. *Dis Colon Rectum*. 2004; 47:432–436.
93. Sandborn WJ, Present DH, Isaacs KL, et al. Tacrolimus for the treatment of fistulas in patients with Crohn's disease: a randomized, placebo-controlled trial. *Gastroenterology*. 2003; 125:380–388.
94. Present DH, Lichtiger S. Efficacy of cyclosporine in treatment of fistula of Crohn's disease. *Dig Dis Sci*. 1994; 39:374–380.
95. Present DH, Rutgeerts P, Targan S, et al. Infliximab for the treatment of fistulas in patients with Crohn's disease. *N Engl J Med*. 1999; 340:1398–1405.
96. Gaertner WB, Decanini A, Mellgren A, et al. Does infliximab infusion impact results of operative treatment for Crohn's perianal fistulas? *Dis Colon Rectum*. 2007; 50:1754–1760.
97. McKee RF, Keenan RA. Perianal Crohn's disease: is it all bad news? *Dis Colon Rectum*. 1996; 39:136–142.
98. Yamamoto T, Allan RN, Keighley MR. Effect of fecal diversion alone on perianal Crohn's disease. *World J Surg*. 2000; 24:1258–1262.
99. Galandiuk S, Kimberling J, Al-Mishlab TG, Stromberg AJ. Perianal Crohn disease: predictors of need for permanent diversion. *Ann Surg*. 2005; 241:796–801.
100. Löffler T, Welsch T, Mühl S, Hinz U, et al. Long-term success rate after surgical treatment of anorectal and rectovaginal fistulas in Crohn's disease. *Int J Colorectal Dis*. 2009; 24(5):521–526.
101. Solomon MJ. Fistulae and abscesses in symptomatic perineal Crohn's disease. *Int J Colorectal Dis*. 1996; 11:222–226.
102. Mardini HE, Schwartz DA. Treatment of perianal fistula and abscess: Crohn's and non-Crohn's. *Curr Treat Options Gastroenterol*. 2007; 10:211–220.
103. Williamson PR, Hellinger MD, Larach SW, Ferrara A. Twentyyear review of the surgical management of perianal Crohn's disease. *Dis Colon Rectum*. 1995; 38:389–392.
104. Pescatori M, Interisano A, Basso L, et al. Management of perianal Crohn's disease: results of a multicenter study in Italy. *Dis Colon Rectum*. 1995; 38:121–124.
105. Galis-Rozen E, Tulchinsky H, Rosen A, et al. Long-term outcome of loose-seton for complex anal fistula: a two-centre study of patients with and without Crohn's disease. *Colorectal Dis*. 2010; 12(4):358–362.
106. Takesue Y, Ohge H, Yokoyama T, et al. Long-term results of seton drainage on complex anal fistulae in patients with Crohn's disease. *J Gastroenterol*. 2002; 37:912–915.
107. Hull TL, Fazio VW. Surgical approaches to low anovaginal fistula in Crohn's disease. *Am J Surg*. 1997; 173:95–98.
108. Ozuner G, Hull TL, Cartmill J, Fazio VW. Long-term analysis of the use of transanal rectal advancement flaps for complicated anorectal/vaginal fistulas. *Dis Colon Rectum*. 1996; 39:10–14.
109. Leila Ghahramani, a Mohammad Reza Minaie Antibiotic therapy for prevention of fistula in-ano after incision and drainage of simple perianal abscess: A randomized single blind clinical trial. *Surgery*. 2017.