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A New Surgical Approach in the Treatment of Chronic Anal Fissure

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Aim: to improve the surgical treatment outcomes for patients with chronic anal fissure through the new surgical approach application.

Materials and methods. A prospective study including 33 patients with chronic anal fissure undergoing a new surgical approach treatment was conducted. This approach involved the dissection of the internal and external anal sphincters, as well as the perianal tissues film from a thin, dense connective tissue film that envelops and fixes the latter structures, preventing the sphincter from fully relaxing and contracting. In 14 patients, the connective tissue film and surrounding tissues film were stained with aqueous dye — trypan blue 0.06 %, used in ophthalmic surgery for better fibrous tissue film identification. In 19 patients, the fissure was combined with a fistula originating from the fissure itself.

Results. The application of the new surgical approach in patients with chronic anal fissure results in complete sphincter's relaxation and its contractile function restoration, significantly reducing the intensity of anal pain in post-operative period and creating conditions for surgical wound healing within acceptable time frames.

Conclusion. The new surgical approach aiming isolation of the anal sphincters from the connective tissue film and scars fully leads to the restoration and preservation of the sphincter function, thus enabling the complete avoidance of sphincterotomy in such patients.

Keywords: anal fissure, chronic anal fissure, sphincterotomy, lateral internal sphincterotomy, surgical approach

Conflict of interest: the authors declare no conflict of interest.

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Новая хирургическая техника при оперативном лечении пациентов с хронической анальной трещиной

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Цель: улучшение результатов хирургического лечения пациентов с хронической анальной трещиной путем применения новой хирургической тактики.

Материал и методы. Исследование носило проспективный нерандомизированный характер и включало 33 пациентов с хронической анальной трещиной, у которых была применена новая хирургическая техника, направленная на выделение внутреннего, наружного сфинктеров, а также перианальных тканей от тонкой плотной соединительнотканной пленки, которая покрывает и фиксирует указанные структуры, не позволяя сфинктеру полноценно раскрываться и сокращаться. У 14 пациентов было проведено окрашивание этой соединительнотканной пленки и окружающих ее тканей водным красителем трипановый синий 0,06 %, применяемым в офтальмологии с целью лучшей визуализации фиброзной ткани. У 19 пациентов трещина сочеталась со свищем, исходящим из трещины.

Результаты. Применение новой хирургической техники у пациентов с хронической анальной трещиной позволило полноценно релаксировать сфинктер, восстановить его сократительную способность, значительно снизить интенсивность анальной боли в послеоперационном периоде и создать условия для ее заживления в приемлемые сроки.

Выводы. Новая хирургическая тактика, направленная на выделение анальных сфинктеров от соединительнотканной пленки и рубцов, приводит к восстановлению и сохранению полноценной функции сфинктерного аппарата прямой кишки, что позволяет полностью отказаться от выполнения сфинктеротомии у таких пациентов.

Ключевые слова: анальная трещина, хроническая анальная трещина, сфинктеротомия, боковая подкожная сфинктеротомия, хирургическая тактика

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Introduction

Anal fissure is a widespread disease, occurring in 20–23 individuals per 1000 adult population, and accounts for 10–15 % of all coloproctological diseases. The condition develops equally often in men and women, primarily in working-age individuals [1].

The primary link in the pathogenesis of anal fissure development is initially a temporary, and subsequently sustained, spasm of the internal anal sphincter [1, 2]. This condition leads to impaired blood supply to the area of the internal sphincter where the anodermal defect is localized, causing local tissue ischemia in the anal canal and preventing healing [1]. The continued impact of etiological factors results in the fissure not healing for a prolonged period, leading to chronicity of the process with the development of rough fibrous edges of the fissure, the formation of a fibrous polyp at its proximal edge on one side, and a sentinel pile on the other [1, 2]. Both conservative approaches and surgical methods have been proposed to relieve sphincter spasm. The complex of conservative measures involves using a group of drugs for so-called “chemical sphincterotomy” and includes the use of agents such as calcium channel blockers and botulinum toxin type A [3, 4]. However, the recurrence rate with conservative therapy reaches 50 % [3, 5]. In order to relieve sphincter spasm and create conditions for fissure epithelialization, S. Eisenhammer proposed lateral subcutaneous sphincterotomy as early as 1959 [6]. This stage of surgery remains the primary method in the surgical treatment of patients with chronic anal fissure worldwide [1, 5, 7–9]. However, the incidence of anal sphincter insufficiency reaches 44 %, and at follow-up periods exceeding 24 months, it remains at 15 % [10]. P. Garg et al., after analyzing 22 randomized studies on the treatment of patients with anal fissure by performing lateral subcutaneous sphincterotomy, concluded that 14 % of patients continue to experience symptoms of anal incontinence in the long-term follow-up [11].

Thus, one of the main directions in the treatment of chronic anal fissure is the relaxation of the internal anal sphincter. We noticed that after fissure excision, the anal canal remained rigid and did not open completely with an anal speculum,

while a thin, strong membrane was identified at the base of the postoperative wound. This membrane merged in color with the surrounding tissues, and upon its excision, the anal canal became easily distensible, which eliminated the need for a sphincterotomy. We have proposed a new method for relaxing the internal sphincter without incising it, which allows preserving the patient’s full continence function, relieving pain, and creating conditions for the healing of the anal fissure.

Aim of the study — improvement of surgical treatment outcomes for patients with chronic anal fissure by applying a new surgical technique.

Materials and methods

Study design

The study was a prospective, single-center, open-label, non-randomized study.

The study was performed by three coloproctologists from the Department of Coloproctology at the multidisciplinary clinic ООО “Medilux-TM” in Saint Petersburg. Histological examinations were conducted at the pathohistological laboratory ООО “Invitro” by one histopathologist, the head of the Histology Department.

The study included patients over 18 years of age with a confirmed diagnosis of chronic anal fissure, which is characterized by a fissure with fibrotic edges, a sentinel pile, and a fibrous polyp, as well as with fistulas originating from the fissure, for whom surgical intervention was planned.

Exclusion criteria for the study were: the presence of anal fissures developed due to Crohn’s disease and other inflammatory bowel diseases; previous anorectal surgery; and the presence of transsphincteric and extrasphincteric anorectal fistulas. Patients lost to follow-up; patients who refused further participation in the study; and patients for whom the planned surgery could not be performed were excluded from the study.

All patients provided written informed consent and could withdraw from the study without explanation.

Surgeries were performed using a laryngeal mask or intravenous anesthesia. The type of anesthetic support was always determined by the

anesthesiologist. For some patients, based on specific criteria, surgeries were performed under endotracheal anesthesia, i.e., muscle relaxants and strong painkillers such as fentanyl were administered intravenously.

The intensity of pain was assessed before surgery, on the first morning after it, and 2 or 3 weeks after surgery using the Visual Analogue Scale (VAS). The continence function of the sphincter apparatus was assessed using the Wexner Incontinence Score [12] at the second/third week after surgery.

All patients followed a diet and took biologically active supplements to ensure soft, loose, formed or semi-formed stools. Water was used for hygiene after defecation. An ointment stimulating reparative processes was applied to the postoperative wound with a finger twice daily until complete epithelialization.

Surgical technique

After inspecting the anal canal using an anal speculum, the first stage of the surgery involved excising the anal fissure together with the sentinel pile and the fibrotic polyp. The wound was extended onto the perianal skin in a “petal” shape. The next stage involved assessing the approximate boundaries of the connective tissue membrane covering the base of the postoperative wound. This thin membrane blends in color with the surrounding tissues and is poorly visualized by the naked eye (Fig. 1). The blue line on Figure 2 indicates the boundaries of the connective tissue membrane at the base of the wound. This membrane glares in the light of a headlight and becomes more contrasting and noticeable on a phone screen (Fig. 3). After visualization, it was excised from the outside inwards, off both the external and internal sphincters, across the entire wound area using surgical “vascular” scissors, as well as using an electrocautery unit with a handle attached to it and a needle electrode (Fig. 4). Fibrous tissue that was fixing the sphincters, if diagnosed, was also removed. Hemostasis was achieved using the electrocautery unit. After this, using an anal speculum, the opening of the anal canal was checked. If the anal canal opened and closed easily and freely upon spreading the blades of the anal speculum, this stage of the surgery was considered complete. Final hemostasis was performed. A gauze drain sponge, abundantly soaked in Vishnevsky ointment mixed with Levomekol ointment, was inserted into the anal canal.

If a fistula originating from the fissure was diagnosed during the operation, it was excised en bloc together with the anal fissure.

Fully understanding that the connective tissue membrane covering the base of the operative wound is poorly visualized during surgery, we set



Figure 1. A connective tissue film covering the base of the postoperative wound



Figure 2. The margins of the connective tissue film at the wound base



Figure 3. The connective tissue film reflecting the light from the surgical headlamp

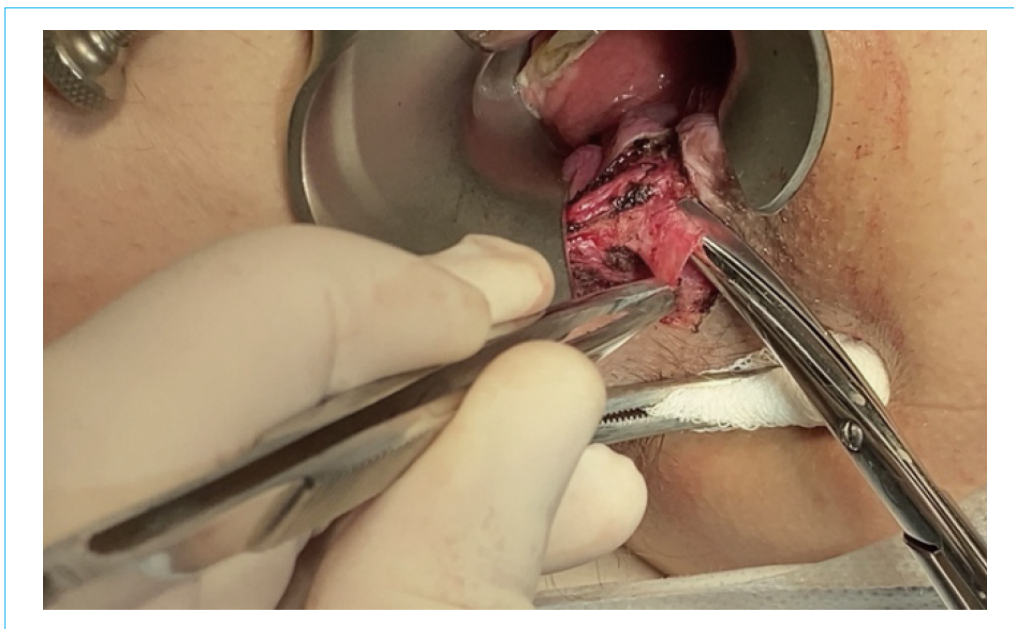


Figure 4. Dissection of the connective tissue film

ourselves the task of trying to find a way to stain this tissue in order to improve its visualization from the surrounding tissues. We tried using various dyes for this purpose, which are used for staining tissues in other fields of medicine. However, when using them, all tissues stained equally, and it was not possible to visualize the connective tissue membrane and fibrous tissue. Continuing the search, we turned our attention to dye used as an auxiliary staining agent in ophthalmic surgery for staining the anterior capsule and fibrous tissue, which contains trypan blue at a concentration of 0.06 % weight/volume, sodium chloride 0.85 % weight/volume on an isotonic basis (Fig. 5). The full characteristics of the dye are provided in the instructions included in each package.

After excision of the anal fissure, the entire surface of the operative wound was stained with the dye, which was applied to the tissues using an insulin syringe and needle. We waited for about 1 minute and washed off the excess dye with physiological sodium chloride solution. The connective tissue membrane and fibrous tissues stained blue and were clearly delineated (Fig. 6). This allowed for their more precise and complete removal across the entire wound area. After excising these tissues and freeing the anal sphincters from them, the latter became well-relaxed, and the anal canal opened easily with an anal speculum. This circumstance allowed us to completely abandon performing sphincterotomy in all patients.

In 6 patients, after excision of the anal fissure and removal of the connective tissue membrane, the internal anal sphincter was found to be fixed

to the underlying tissues by rough scars. In one of them, the anal sphincter was fixed in the shape of the letter V (Fig. 7). This necessitated extending the wound onto the perianal skin and removing the fibrous tissues. After this, the internal anal sphincter returned to its original anatomical position, and the anal canal opened easily with the help of an anal speculum.

The excised anal fissure and connective tissue film were sent to the pathohistological laboratory for examination.

Results

A total of 33 patients aged 25 to 68 years were included in the study. There were 21 (64 %) women and 12 (36 %) men. The duration of the



Figure 5. Bottle with the dye



Figure 6. The fibrosis connective tissue film stained with blue dye



Figure 7. The fixed external anal sphincter in the shape of the letter V

disease history ranged from 6 to 48 months or more. The first patient was enrolled in the study in January 2024, and the last in April 2025.

The localization of the fissure on the walls of the anal canal is presented in Table 1.

In 11 patients, chronic anal fissure was combined with incomplete intersphincteric fistulas, and in 8 patients, complete shallow transsphincteric fistulas were also diagnosed.

Table 1. Anal fissure localization on the anal canal wall

Localization of anal fissure on the walls of the anal canal	n (%)
Posterior wall	23 (69.7)
Anterior wall	8 (24.2)
Lateral wall	1 (3.0)
Anterior and posterior walls	1 (3.0)

Table 2. Conditions and surgical approaches associated with anal fissure

Anal canal diseases	Types of operations	n (%)
Anal fissure only	Fissure excision	14 (42.43)
Anal fissure + intersphincteric fistula	Excision of fissure and fistula as a single unit	11 (33.33)
Anal fissure + superficial transsphincteric fistula	Excision of fissure and fistula as a single unit	8 (24.24)
Total		33 (100)

The nature and type of operations performed on patients, depending on the nature of the disease, are presented in Table 2.

The surgery duration ranged from 15 to 75 minutes, with an average time of 40 minutes. Intraoperative blood loss was 5–15 mL. Patients stayed in the clinic for 1 day.

Anal continence assessment was performed using the fecal incontinence score in all 33 patients. The level of bowel content incontinence was 0. All patients had full control over the passage of intestinal gas, liquid, and solid stool, and could safely pass gas without fear of stool leakage. All patients could delay defecation for 15–20 minutes.

In 32 (97 %) patients, the postoperative wound healed with complete epithelialization within 8–12 weeks after surgery. After anal fissure excision, a recurrence was diagnosed in one patient. Initially, his postoperative wound healed within the expected timeframe. However, sometime after the passage of a large, hard fecal mass, a wound formed at the site of the postoperative scar. The patient underwent long-term complex conservative therapy aimed at regulating stool softness and stimulating reparative processes (ointments and suppositories). Tablet medications with antimicrobial and antibacterial action (Metronidazole) were also used. A PCR test of wound discharge was performed to identify sexually transmitted diseases, but no such changes were found. The patient had no complaints or concerns and experienced no discomfort in the anal canal. Eight months had passed since the surgery, but the wound had not healed. We invited the patient to the clinic for an examination 12 months after the surgery and confirmed that the postoperative wound had epithelialized. He had no complaints. A follow-up examination was conducted another 4 weeks later. No complaints, the wound is epithelialized.

Pathomorphological section

Tissue staining with trypan blue dye, for better visualization of the connective tissue membrane and fibrous tissue, was performed in 14 patients. A total of 21 examinations of the removed material were carried out. The histological findings were largely similar and presented as the morphological picture of a chronic anal fissure, connective tissue

with scar changes, or the morphological picture of a chronic anal fissure, rectal fistula, connective tissue with scar changes. The fragments of scar tissue were represented by fibrous and adipose tissue with focal mild sclerosis, mild edema, congestion, and focal mild lymphocytic infiltration.

Discussion

We have presented a new surgical technique for chronic anal fissure, aimed at excising and removing the connective tissue membrane and scar tissue that prevent the sphincter from functioning properly. The thin but strong connective tissue membrane, which covers the base of the anal fissure during the chronicity phase, subsequently spreads to the external sphincter and perianal tissues, fixing these structures and preventing the anal canal from opening fully. The formation of such a membrane at the base of the anal fissure likely explains the fact that as the process becomes chronic with the formation of rough, calloused fissure edges, a fibrous polyp, and a sentinel pile along its margins, patients note the cessation or reduction in pain intensity. Possibly, the thickness, strength, and extent of this membrane depend on several factors: the duration of the disease history, the early or late initiation of targeted conservative treatment, the type of therapy, the frequency of disease recurrences, complicated courses such as fistulas originating from the fissure, the nature of the stool, and some others. We noticed that the thickness and strength of this membrane were greater in the area of the fissure base. In those patients whose fissure was complicated by the presence of a fistula, coarse fibrous layers were noted on the perianal tissues. The use during surgery of a dye employed in ophthalmic surgery significantly helps to visualize this connective tissue membrane. The stained tissues become clearly visible, allowing for their precise and complete removal. Sometimes we performed repeated tissue staining to check the completeness of removal. This stage slightly increases the surgery duration but allows for the complete removal of fibrous tissues. Excision of the membrane in some patients allowed us to visualize the fixed

and altered internal sphincter and free it from scar tissue. This surgical technique created conditions for good sphincter relaxation and free, easy opening of the anal canal. Therefore, we were able to completely abandon performing the challenging operative stage of a graded sphincterotomy. All patients were able to maintain full control over the evacuation of bowel contents. Many noted an improved quality of bowel emptying, which is certainly associated with freeing the sphincters from scar tissue. Sphincter relaxation led to the relief or significant reduction in pain intensity as early as the day after surgery. All these circumstances led to the postoperative wound healing within an acceptable timeframe. Most often, wound epithelialization occurred between 8 and 10 weeks after surgery. We defined the healing period of 8–12 weeks post-operation as acceptable, observing how long wounds take to heal in patients after open hemorrhoidectomy. It should be noted that proper postoperative management of these patients is very important. It is necessary to follow a diet, regulate the softness of bowel contents by taking biologically active supplements throughout the entire treatment period, and maintain hygiene after defecation with a stream of room-temperature water directed at the wound through a hygiene shower head. During different phases of the wound healing process, various ointments and their combinations must be used. Starting

from the third week of the postoperative period, an ointment that stimulates reparative processes should be applied to the wound in the anal canal with a finger until complete epithelialization.

Limitations of the study

The limitations of this study primarily include the single-center nature of the study and the specific protocol for postoperative patient care, which may vary in different medical institutions. Furthermore, the small patient sample and the limited number of histopathological specimens studied do not allow for a definitive answer regarding the effectiveness of the applied surgical strategy. A multicenter, randomized study is needed to assess the reproducibility of this surgical technique.

Conclusions

The obtained data indicate that during the development of an anal fissure, a connective tissue membrane forms, which fixes the internal and external sphincters and the perianal tissues. Removal of the connective tissue membrane, fibrous tissue, and freeing the sphincters and perianal tissue from them is a necessary element of surgical intervention aimed at sphincter relaxation, which allows for the complete avoidance of sphincterotomy and preservation of full continence function. Sphincter relaxation and pain relief create conditions under which the postoperative wound heals within an acceptable timeframe.

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