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ANATOMO-PHYSIOLOGICAL FEATURES OF THE FORMATION OF ANAL FISSURES AND WAYS OF THEIR CORRECTION

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ABOUT ARTICLE

Key words: anal fissure, anatomy, physiology, treatment, prevention.

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Abstract: This article analyzes the underlying anatomo-physiological reasons for the development of one of the most common coloproctological diseases as anal fissures. Among proctological patients, patients with anal fissure are in second place. Women almost 2 times more often suffer from anal fissure than men, especially those of working age, which undoubtedly represents a socio-economic problem of public health. To date, questions of etiopathogenesis of anal fissures remain.

The main purpose of the work is to consider the predispositions of people to the development of anal fissures, as well as the role of variant anatomy in the mechanisms of prevention and mitigation of the course of the disease, analysis of statistical data on the incidence of the disease in Russia and Uzbekistan and their systematization depending on the lesion of a certain area of the anal part of the rectum. At the same time, the probability of occurrence of the disease in individuals is also estimated, the results of questionnaire survey of people with

coloproctological problems are given in order to draw attention to the problems of not following the correct diet, body position in space during physical activity, perineal hygiene, timely preventive measures and visits to specialists in case of suspicion of problems in the rectum area. The rates of acute and chronic anal fissures among people of child, young and middle age who have high occupational risks of pathology development and prophylactic measures to prevent the consequences of this problem are studied. The study reveals the role of anatomo-physiological aspects in the development of anal fissures and identifies methods of preventing the pathology.

ANUS YORIQLARI SHAKLLANISHINING ANATOMIK-FIZIOLOGIK XUSUSIYATLARI VA ULARNI TUZATISH USULLARI

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MAQOLA HAQIDA

Kalit so‘zlar: Anus yoriqlari, anatomiya, fiziologiya, davolash, profilaktika.

Annotatsiya: Ushbu maqolada eng keng tarqalgan koloproktologik kasalliklardan biri bo‘lgan anus yoriqlarining shakllanishidagi asosiy anatomik-fiziologik sabablar tahlil qilinadi. Proktologik bemorlar orasida anus yoriqlariga chalinganlar ikkinchi o‘rinda turadi. Ayollar erkaklarga nisbatan deyarli 2 baravar ko‘proq anus yoriqlariga chalinadi, ayniqsa mehnatga layoqatli yoshdagilar, bu esa jamoat salomatligi uchun albatta ijtimoiy-iqtisodiy muammo hisoblanadi. Hozirgi kungacha anus yoriqlarining etiopatogenezi bo‘yicha bir qator savollar ochiq qolmoqda. Ishning asosiy maqsadi — insonlarning anus yoriqlariga moyilligini, shuningdek, variant anatomiyaning kasallikning oldini olish va kechishini yengillashtirish mexanizmlaridagi

rolini ko‘rib chiqish, Rossiya va O‘zbekiston bo‘yicha kasallik tarqalish statistik ma’lumotlarini tahlil qilish va ularni anal qismining ma’lum bir hududining shikastlanishiga qarab sistemalashtirishdir. Shu bilan birga, kasallikning shaxsiy yuzaga kelish ehtimoli ham baholanadi, koloproktologik muammolari bo‘lgan odamlar orasida so‘rovnoma natijalari keltiriladi, to‘g‘ri ovqatlanmaslik, jismoniy faollik vaqtida tana holati, perineal gigiyena, profilaktik choralarni o‘z vaqtida qo‘llash va shubhali holatlarda mutaxassislarga murojaat qilish muammolariga e’tibor qaratish maqsad qilingan. Bolalik, yosh va mehnatga layoqatli o‘rta yoshdagilar orasida yuqori kasallik xavfi bo‘lganlar orasida og‘ir va surunkali anus yoriqlari darajalari va ushbu muammo oqibatlarini oldini olish bo‘yicha profilaktik chora-tadbirlar o‘rganildi. Tadqiqot anus yoriqlarining rivojlanishida anatomik-fiziologik jihatlarning rolini ochib beradi va patologiyani oldini olish usullarini aniqlaydi..

АНАТОМО-ФИЗИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ФОРМИРОВАНИЯ АНАЛЬНЫХ ТРЕЩИН И МЕТОДЫ ИХ КОРРЕКЦИИ

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О СТАТЬЕ

Ключевые слова: анальная трещина, анатомия, физиология, лечение, профилактика.

Аннотация: В данной статье анализируются основные анатомо-физиологические причины развития одной из самых распространённых колопроктологических патологий — анальных трещин. Среди проктологических пациентов на втором месте находятся пациенты с анальными трещинами. Женщины страдают анальными трещинами почти в 2 раза чаще,

чем мужчины, особенно трудоспособного возраста, что, безусловно, представляет собой социально-экономическую проблему общественного здравоохранения. На сегодняшний день вопросы этиопатогенеза анальных трещин остаются актуальными. Основная цель работы — рассмотреть предрасположенность людей к развитию анальных трещин, а также роль вариантов анатомии в механизмах профилактики и смягчения течения заболевания, провести анализ статистических данных о заболеваемости в России и Узбекистане и систематизировать их в зависимости от поражения определённой области анальной части прямой кишки. При этом оценивается вероятность возникновения заболевания у отдельных лиц, приводятся результаты анкетирования людей с колопроктологическими проблемами с целью привлечения внимания к проблемам несоблюдения правильного питания, положения тела в пространстве во время физической активности, перинеальной гигиены, своевременных профилактических мер и посещения специалистов при подозрении на патологию в области прямой кишки. Исследуются показатели острой и хронической анальной трещины у детей, молодых и людей среднего возраста с высоким профессиональным риском развития патологии, а также профилактические меры по предотвращению последствий данной проблемы. Исследование выявляет роль анатомо-физиологических аспектов в развитии анальных трещин и определяет методы предотвращения патологии.

Introduction. One of the most common diseases that affect colon is anal fissure (AF) – torturous pathology that occupies the 3rd place (11-15%) in terms of the frequency of occurrence. The disease develops in 20% of the adult population [1] and has association with gender: it affects women more than 60% more often, 20% of which are of working age [8]. Among the patients of the coloproctology department, patients with anal fissure account for 12% [10]. In the vast majority of cases, anal fissure occurs between the ages of 20 and 45 years [2]. This shows the significance of the problem.To date, many aspects of the etiopathogenesis of the disease remain unresolved. There are many theories of crack occurrence: mechanical, infectious, toxic, psychosomatic,

vascular, polyethological, etc. [3]. Many experts consider mechanical damage to the anoderm by solid feces to be the main cause of crack development. However, not all constipated individuals develop a crack. It was noted that anal fissure in elderly and senile people suffering from constipation is less common than in younger people [5]. In many patients anal fissure is a concomitant disease of other conditions such as irritable bowel syndrome, pancreatitis, gastric and duodenal peptic ulcers, ulcerative colitis, Crohn's disease, hemorrhoids, proctitis, cryptitis [4]. At the same time, during the chronization of the pathological process in the area of linea pectinea a linear ulcer is formed with calloused edges and a "sentinel pile". This means that a chronic anal fissure (CAF) is developed. A number of researchers have shown that before the visible appearance of a crack, there is an increasement in the tone of the anal sphincter, which may indicate the presence of a chronic process in the anoderm [7]. In the vast majority of cases, an anal fissure forms along the posterior wall of the anal canal, in the pectinea zone in the Mirano triangle. This localization is related to anatomy and physiology and associated with the peculiarities of the direction of the muscle bundles of the superficial layer of the external sphincter in the form of the letter "U" (the concept of the "Blaisdell buckle"), with a deeper location of the crypts and less stretching of the muscles in the anterior-posterior direction, which is predetermined by a worse blood supply [6].

It is believed that for the successful treatment of anal fissure, it is necessary to interrupt the pathological cycle, in which the following occurs: as a result of constipation, solid fecal masses are formed, which mechanically damage the most vulnerable part – the posterior wall of the anal canal, which leads to severe pain syndrome and a significant increase in the tone of the sphincter, which results in ischemia and the necrobiotic state of the anoderm [9]. Severe pain causes psychosomatics, more often phobia of stools, which, in turn, leads to delayed defecation and constipation [3]. To date, a large number of different methods of treating patients with anal fissure have been proposed. Most experts believe that a chronic anal fissure (CAF) is an indication for surgical treatment, which consists in excision of a crack with lateral subcutaneous or posterior transanal metered sphincterotomy.

The purpose of the study: To study the anatomical and physiological features, clinical and morphological characteristics of anal fissures, to identify the most common causes and predispositions of their development and to consider methods of treatment and prevention of coloproctological problems. To evaluate the effectiveness of complex surgical treatment of patients with chronic anal fissure by a differentiated choice of surgical treatment method.

Materials and methods. The object of the study were patients with anal fissure: 12 children, 87 mature, 24 elderly and 42 women who consult a proctologist after childbirth. Comparative surgical treatment was performed depending on the cause of the disease and the

indications of basal pressure of the anal sphincter. Further research included the identification of morphological features of these people, their lifestyle, nutrition, diet, hygiene. The results were correlated with the complaints of the examined persons. A survey was conducted among the selected group of people, the results of which allowed us to draw conclusions about the occurrence of individual clinical manifestations of the disease, summarize the available information regarding the anatomical and physiological causes of certain symptoms, identify patterns of development of AAF and CAF and identify the main preventive measures. The method of analyzing scientific literature and statistical data was also used in the work. All studies were conducted in compliance with the basic requirements in the field of human rights and current legislation of Russia and Uzbekistan. The results of the examination and treatment of 120 patients with chronic anal fissure who were treated at the polyclinic of the FSEI HPE BSMU clinic for 7 years were also analyzed. 96 women and 24 men had CAF. The average age was 42 years. All patients were diagnosed with a chronic anal fissure, the presence of fibrous scarring changes in the edges of the crack and "sentinel pile". The posterior CAF was established in 88 patients, the anterior in 24, the anterior and posterior simultaneously in 8. In addition to general clinical studies, all of them underwent special instrumental research methods, including anoscopy, rectoromanoscopy, pre- and postoperative anorectal manometry (using a sphinctrometer from MSM ProMedia.) Histological studies (staining of the samples was carried out with hematoxylin-eosin) were performed on tissues of excised anal fissures and biopsies of the anoderm at 3 or 9 o'clock. Histological studies of biopsies from anoderma were also performed in 15 individuals who did not suffer from diseases of the digestive tract and anal fissure. A statistical analysis of the results of the study was carried out.

Research results and discussion: In accordance with the literature data and on the basis of clinical and instrumental research methods, we have identified two forms of CAF. In the first form, the crack is initially formed in the area of the linea pectinea as the result of pectenosis, in the second - somewhat proximal to the white Hilton line as a result of rupture of the anoderm by solid feces. In the first form, the fibers of the internal sphincter are the bottom of the crack, in the second case, subcutaneous tissue in the distal part, and fibers of the internal sphincter in the proximal part. The first form of CAF was detected in 67% of patients, the second in 25%. It was found that all patients with CAF had various diseases of the digestive tract. With the first form of CAF, 43% of patients showed symptoms of cryptitis in the form of hyperemia and swelling in the crypts and serous-purulent discharge. The phenomena of cryptitis were especially distinct on the posterior wall (next to the crack) of the anal canal. Papillitis was found in 11% of these patients. In 23% of patients with the 2nd form of CAF suffering from persistent constipation, the crack was initially formed in the area of the Hilton line. A sphincterometric examination of basal pressure in the anal

canal was performed in 32 patients with the first form of CAF, 19 patients with the 2nd form of CAF and 15 controls. In patients with the 1st form of CAF, an increase in basal pressure was found.

Thus, sphincterospasm is observed in all patients: in patients with the 1st form of CAF, it was more pronounced ($p< 0.05$). When examining the basal tone of the anal sphincter in 26 patients with the 1st form of CAF suffering from irritable bowel syndrome, it was found that during the period of relief of clinical manifestations of the disease and epithelialization of the crack, basal pressure remained elevated. Analysis of the results of histological samples taken after surgical excision in patients with the first form of CAF in the area of the linea pectinea showed that the bottom of the crack is covered with granulation tissue, and there are pronounced fibroinflammatory changes along the edges of the crack, accompanied by the formation of scar tissue. Also, during histological examination of biopsy material taken from the same patients from the side walls (at 3 or 9 o'clock), the presence of fibroinflammatory changes in the anoderm was noted. Anoscopic and finger examination revealed a seal of the anoderm in the area of the linea pectinea, which was accompanied by a circular narrowing of the anal canal. In 12% of patients with the 1st form of CAF, a histological examination of the excised edges of the crack also revealed scarring. Examination of tissue samples from the lateral walls of the anal canal revealed no pronounced inflammatory changes. During anoscopic examination, there was no pronounced densification of the anoderm and narrowing of the lumen of the anal canal. Based on the results of the conducted studies, we have considered the effectiveness of differentiated complex surgical treatment of patients with CAT, depending on its form and localization of pathological development, and undoubtedly the anatomical and physiological aspect of the etiopathogenesis of the disease plays a role.

It has been established that an anal fissure is a linear rupture of the mucous membrane of the anus. This defect is mainly formed in the middle of the posterior semicircle of the anal passage, in 10% of cases it can be located on the anterior wall (in women) and practically does not occur on the side walls. Following the terminology of proctologists, cracks are most often located at 6 and 12 o'clock [6].

There are several reasons for this, the main one is related to anatomy — the posterior wall of the anal passage (due to its close connection with the coccyx) and the anterior wall in women (due to their connection with the vagina) are practically motionless during the act of defecation, whereas the side walls are able to move down and come back.

Our study also includes surgical treatment, which was performed in 92 patients with CAF - this is the traditional excision of a crack with suturing the edges of the wound to the bottom (according to the Parkes method). Surgical treatment was completed with a posterior transanal

sphincterotomy. In the postoperative period, these patients were bandaged daily: at the initial stage – with the use of “Levosin” ointment until the appearance of pronounced granulation tissue. Subsequently - with the use of methyluracyl ointment. 16 patients underwent suturing of the wound edges by applying a modified suture. That suture allowed the edges of the wound to be evenly brought closer to the bottom along the perimeter of the wound, which contributed to complete hemostasis from the edges of the wound and healing of the postoperative wound from the bottom. The “trinitrolong” plates were attached in the area of the Hilton white line. In all patients, the use of the “trinitrolong” plate contributed to a decrease in sphincter tone and a significant reduction in pain in the postoperative period, which was determined by a visual analog scale.

There is evidence in the literature on the use of "colost", which significantly improves the healing of cracks and reduces pain in patients with chronic anal fissure. In our study, "colost" was also used[7]. The group receiving the "colost" showed a faster healing time of the crack compared to the group receiving traditional treatment. In addition, patients who received “colost” noted a decrease in pain intensity and an improvement in the quality of life in general.

Undoubtedly, preoperative preparation in the form of instrumental studies is important:

anoscopy (additional examination using fingers), irrigoscopy (to determine intestinal damage), retroscopy (to exclude diseases of the rectum), ultrasound.

To date, the defect of the mucous membrane of the anal passage is removed using classical surgical methods (excision of the anal fissure with lateral sphincterotomy, partial dissection of the internal sphincter, etc.) and modern minimally invasive technologies (radio wave or laser surgery, ultrasound).

The main advantage of the classical operation is the possibility of excision of anal fissures in the absence of specialized equipment, i.e. in the conditions of a conventional surgical department.

Therefore, in modern proctological practice in the treatment regimens of chronic anal fissure standard surgery is increasingly being replaced by alternative methods[4].

The "melting" of cracks by radio waves is performed on the “Surgitron” apparatus. This method is widely implemented in clinical practice, it is highly effective and comfortable both during manipulation and in the recovery process.

Ultrasound exposure is the most painless and least traumatic. Other advantages of the technique include the possibility of application in both the acute and chronic stages of the process, as well as rapid healing (the wound is completely healed after one to one and a half weeks).

Another effective, safe and comfortable modern method for excision of chronic anal fissures is laser surgery. In this case, the destruction of the mucosal defect is carried out using a thin beam of high-intensity laser beams "light scalpel". This operation is bloodless, does not injure

adjacent tissues, and is well tolerated at any age. The "laser scalpel" not only perfectly copes with the main tasks, but also has a bactericidal effect. Due to this, the risk of infection of the anal area is minimal[9].

In parallel with any method of excision of the crack, a partial dissection of the anal sphincter can be performed – a sphincterotomy. This allows you to relieve spasm of the muscles of the anus, which provokes damage to the mucous membrane of the rectum and prevents wound healing.

One of the methods of conservative treatment of anal fissures is botulotherapy or botulinum toxin (BT) injections. The method is used for spasms and severe pain syndrome, which is important, since this causes the main discomfort and a decrease in the quality of life[9].

So, according to the literature and the conducted questionnaire, anal fissure prevention methods include fighting against physical inactivity, proper nutrition with sufficient fiber, timely visiting a doctor if any unpleasant symptoms appear. The prevention of constipation is of the utmost importance, since straining often leads to the appearance of a crack, which is a violation of the anatomical and physiological constants of the structure and development of this area. Inflammatory changes in the intestinal mucosa as the result of proctitis, diarrhea, dysbiosis, and helminthic invasion can also manifest as cracks, which in this case will be only one of the symptoms of the underlying pathology.

During surgical treatment, excision of the defect is performed: one of the parts of the anal sphincter is dissected (sphincterotomy). As a result, the sphincter relaxes, the pain disappears and the conditions for successful wound healing are created. Such an operation does not require a prolonged stay in the hospital, and dissection of the muscle does not lead to undesirable consequences, that is, fecal retention or basic anatomical and physiological functional ability is not impaired.

Since the crack of the passage is a long defect in the back, therefore, in this part the mucous membrane seems to be torn by several millimeters. Moreover, a crack can form either on the back or on the front wall, due to the minimal biomechanical ability of the tissues. Most often, a crack on the anterior wall of the passage appears in women due to the characteristics of the body associated with the borderline location of the organs of the reproductive system. The disease can be both acute and chronic. One of the ways to get rid of the problem is to remove the anal fissure or colovaginal fissures.

Since the pressure in the anal canal is greatest, due to the restriction of a large group of muscles during the act of defecation, these muscles relax and at the moment of injury to the mucous membrane causes severe pain. When pain occurs, the muscles locking the anal canal contract reflexively, which can increase the damage. An injury to the mucous membrane of the anal canal

or anoderm is not an anal fissure. Further repeated injuries to the area of damaged anoderm cause muscle spasm due to pain. This spasm becomes permanent with frequent traumatizations of the injury area, for example, with constipation. This repeated changes contribute to slowing down the healing process of the mucosal defect and lead to the formation of an anal fissure and subsequently complications if not promptly diagnosed and treated. This is the main mechanism of anal fissure development. Conservative treatment of anal fissure is aimed at improving mucosal healing, relieving spasm of the sphincter and normalizing contractility of the muscle layer and subsequently regeneration of damaged structures.

Therefore, the main task of surgical treatment for anal fissure is to create conditions for successful self–healing of the wound defect[10]. In chronic pathology, healing is hindered by rough edges and granulations at the bottom of the wound. Therefore, the edges of the crack are excised and granulation is removed, transforming an old wound into a fresh one.

So, an anal fissure is a defect that occurs on the mucous membrane of the anus, that is, thinning and the formation of fibrous thickening.

It is known that the risk of anal fissures is highest during certain periods of life [7]:

- during childbirth in women (severe straining occurs);

- in infancy (6 months-2 years);

- in old age.

It has been established that the following types of cracks are distinguished by localization:

- anterior - occur more often in women, which is due to the peculiarities of the anatomical structure;

- posterior - formed in the area where the muscle fibers of the anus sphincter intersect;

- multiple - often located opposite each other.

If conservative treatment does not give results and the disease continues to progress, then surgical intervention is prescribed[3].

Conclusions. A condition in which there is a sudden rupture of the mucous membrane in the anal canal is called an anal fissure. If you look at the statistics of patients' visits to coloproctologists, then anal fissure ranks third among other causes. And adults of both sexes face the problem more often than others, but cracks appear more common in women.

Many patients find similar symptoms of anal fissure and hemorrhoids. Often both of these diseases occur in the same person.

Women of childbearing age suffer most often from anal fissures, since pregnancy, childbirth and hormonal fluctuations are among the risk factors for the development of the disease.

In addition to standard methods of surgical treatment of anal fissures, minimally invasive ones are used, which have found wide application in modern medicine both in Russia and abroad.

Excision with modern equipment accelerates the patient's recovery process and in 95% of cases completely eliminates the problem. Also, thanks to modern methods of surgery, the risk of infection of damaged tissues is minimized.

It was found that, compared with the traditional method of complex surgical treatment, the use of a "blind" suture and a developed modified suture that evenly heals the wound from the bottom, in combination with chemical sphincterotomy, significantly accelerates the healing of a postoperative wound and reduces the number of complications.

This is, first of all, an active inflammatory process that can spread higher up the rectum, capture the tissue located around it (paraproctitis). Men have a risk of infection of the prostate gland with the development of prostatitis. In advanced cases, the removal of a crack almost always involves surgery. If treatment is not carried out on time, serious complications may develop that significantly worsen the quality of daily life, especially of working age.

Preoperative clinical and instrumental studies, including anoscopy, rectoromanoscopy and sphincterometry, make it possible to establish the etiopathogenesis of the development of chronic anal fissure in a timely and more qualitative manner, depending on which to determine the differentiated tactics of surgical treatment.

With a moderate increase in the tone of the anal sphincter, "deaf" suturing of the postoperative wound, the use of chemical sphincterotomy, which allows to shorten the treatment period in the postoperative period, is optimal.

Suturing the edges of the wound after excision of the crack according to the technique developed by us and chemical sphincterotomy also make it possible to shorten the treatment time of patients and reduce the number of complications.

The use of wound healing drugs can improve the results of complex treatment of patients with chronic anal fissure.

It was found that, compared with the traditional method of complex surgical treatment, the use of a "blind" suture and a developed modified suture that evenly heals the wound from the bottom, in combination with chemical sphincterotomy, significantly accelerates the healing of a postoperative wound and reduces the number of complications.

References:

1. Abritsova M.V., Non-surgical treatment of chronic anal fissure. Abritsova M.V., Torchua N.R., Bogdanova E.M., Markina M.A. Hospital-replacing technologies: Outpatient surgery, 2022. p.90-96

2. Nekhrikova S.V., Titov A.Yu., Kashnikov V.N. et al. Outpatient treatment of patients with diseases of the anal canal and perianal area. Evidence-based gastroenterology. 2019; 8(3): 27–37.

3. Tkalich O.V., Zharkov E.E., Ponomarenko A.A. et al. Modern methods of drug relaxation of the internal sphincter in patients with chronic anal fissure. Surgeon. 2019; 3(8): 26–42.

4. Tkalich O.V., Ponomarenko A.A., Fomenko O.Yu. et al. Immediate results of complex treatment of chronic anal fissure using botulinum toxin type A (ISRCTN97413456). Coloproctology. 2020; 19(1): 80–99.

5. Khryukin R.Yu., Kostarev I.V., Arslanbekova K.I. et al. Botulinum toxin type A and lateral subcutaneous sphincterotomy in the treatment of chronic anal fissure with sphincter spasm. What to choose? (systematic literature review and meta-analysis). Coloproctology. 2020; 19(2):113–128.

6. Shelygin Yu.A., Fomenko O.Yu., Titov A.Yu. et al. Sphincterometric indicators in the anal canal are normal. Coloproctology. 2016; 2:32–36.

7. Arroyo A, Montes E, Calderon T, et al. Treatment algorithm for anal fissure. Consensus document of the Spanish Association of Coloproctology and the Coloproctology Division of the Spanish Association of Surgeons. Cir Esp. 2018; 96(5): 260–267.

8. Bahrami, HR, Hamedi S, Salari R, et al. Herbal Medicines for the Management of Irritable Bowel Syndrome: A Systematic Review. Electron Physician. 2016; 8(8): 2719–2725.

9. Murad-Regadas SM, Fernandes GO, Regadas FS, et al. How much of the internal sphincter may be divided during lateral sphincterotomy for chronic anal fissure in women? Morphologic and functional evaluation after sphincterotomy. Dis Colon Rectum. 2013; 56:645–651.

10. Sahebally SM, Meshkat B, Walsh SR, et al. Botulinum toxin injection vs topical nitrates for chronic anal fissure: an updated systematic review and meta-analysis of randomized controlled trials. Colorectal Dis. 2018; 20(1):6–15.