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Research Progress on the Treatment of Anal Sphincter Recovery Using Chinese and Western Medicine

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Abstract: ***The anal sphincter is a muscular ring located at the end of the human digestive and intestinal system. It plays a crucial and irreplaceable role in the entire system, as well as in human physiological life. Whether under normal physiological conditions or pathological states, the function and condition of the anal sphincter may be impaired to varying degrees. In the domain of Traditional Chinese Medicine (TCM), a variety of approaches have been explored for functional restoration of the anal sphincter, including but not limited to electroacupuncture, mild moxibustion combined with mesenchymal stem cell transplantation, medicated thread therapy, thread-dragging combined with herbal sitz baths, thread-dragging with counter-drainage, TCM-based treatments for central anal sphincter paralysis, and the application of Coptis chinensis nanogel patches for wound repair following perianal abscess. Western medical treatments include sphincter-preserving approaches for low rectal cancer, anal fistula, and perianal abscess, as well as interventions such as artificial anus procedures.***

Keywords: Traditional Chinese Medicine treatment, Western medicine treatment, Restore, Anal sphincter**.**

1. Anal Sphincter: Physiological Structure and Function

1.1 Physiological Structure of the Anal Sphincter

The anal sphincter is located at the terminus of the rectum and encircles the anal canal. It is a group of columnar muscles surrounding the anal canal, composed of the internal anal sphincter and the external anal sphincter. The anal sphincter, together with the longitudinal muscles of the lower rectum and the levator ani muscle, forms a strong muscular ring around the anal canal. This structure plays a crucial role in closing the anal canal and assisting in the control and regulation of defecation.

1.2 Function

The core physiological function of the internal anal sphincter is to maintain anal closure and facilitate defecation. It typically remains in a contracted state, which helps to seal the anal canal, prevent the involuntary leakage of feces, liquids, and gases from the rectum, and maintain rectal tone. This sustained contraction can persist during defecation and is resistant to fatigue. The external anal sphincter not only is responsible for the function of sphincteringthe anus, but its structure also resembles three U-shaped rings, ensuring that the anal canal can close tightly. When the urge to defecate is sensed, if the external environment is not conducive to bowel movements, it can be controlled by sealing the anus and contracting the external sphincter muscle.

2. Traditional Chinese Medicine Treatment

2.1 Electroacupuncture Treatment

The team led by Professor Lu Jingen from Longhua Hospital, Shanghai University of Traditional Chinese Medicine, investigated the effects of electroacupuncture at the Zusanli (ST36) and Changqiang (GV1) acupoints on the physiological function of the anal sphincter in rats with neurogenic fecal incontinence and explored the underlying mechanisms. Additionally, the fecal characteristics of the rats were monitored. Upon completion of the experiment, relevant indicators of anal sphincter physiological function were subsequently measured. Histopathological changes in the internal and external anal sphincter tissues of rats from each group were observed using hematoxylin-eosin (HE) staining. The experimental results revealed that compared to the blank control group, the rats in the model group exhibited a significant decrease in anorectal pressure ($P<0.05$) and a marked reduction in the electromyographic activity of the external anal sphincter ($P<0.05$). Compared to the model group, the arrangement of muscle fibers in the electrostimulation group rats showed significant improvement, and an even more pronounced enhancement was observed in the electroacupuncture group. In conclusion, the findings indicate that this method can significantly ameliorate the condition of fecal incontinence in rats with neurogenic fecal incontinence. This mechanism is likely associated with increased anorectal pressure and enhanced electromyographic activity of the external anal sphincter [1].

2.2 Mild Moxibustion Combined with Mesenchymal Stem Cell Transplantation Therapy

The research team led by Professor Guo Xiutian from Shanghai University of Traditional Chinese Medicine investigated the effects of a combined intervention—gentle moxibustion therapy and bone marrow mesenchymal stem cell transplantation—on the repair of damaged anal sphincters in rats. Based on the experiment, they concluded that the combination of mild moxibustion and stem cell transplantation effectively stimulates muscle regeneration at

the site of sphincter injury in rats and facilitates the rapid recovery of anal pressure and electromyographic activity. This indicates that the combined use of mild moxibustion and stem cell transplantation can significantly aid in the restoration of both the structure and function of the damaged anal sphincter in rats [2].

Based on the aforementioned experiment, Jin Wenqi and colleagues from the same team proposed a further hypothesis: combined therapy involving mild moxibustion and BMSC transplantation can induce high expression of Wnt4, Wnt5A, and Wnt5B. Therefore, they speculated that the combined therapy of mild moxibustion and BMSC transplantation might accelerate the repair process of damaged anal sphincters in rats by activating the Wnt/β-catenin signaling pathway [3].

2.3 Herbal Cupping Therapy

Anal fistula is a common anorectal disorder characterized by a granulomatous connecting channel between the anorectal canal and the perianal skin [4]. For the treatment of anal fistula, surgery remains the primary and preferred method [5]. However, due to its complex structure, deep location, extensive involvement, and vulnerable position, complex anal fistula is prone to unfavorable conditions such as fecal contamination and poor drainage, which may result in difficult wound healing or recurrent infections [6]. Therefore, precise and efficient management of the wound following anal fistula surgery is crucial for the subsequent recovery process. The medicinal twist is an external preparation made from traditional Chinese medicine. It is primarily composed of paper-like materials, either externally coated or internally infused with medicinal substances, and is mostly shaped like a spiral thread [7].

In response to this issue, Li Huazhuan and their research team from Nanjing University of Chinese Medicine proposed that during the medicinal twist process, the herbal components used possess the ability to activate the local area, thereby inducing an inflammatory response in the body's immune system. Subsequently, fibroblasts begin to migrate and proliferate, forming adhesions and connections with the surrounding tissues. Stimulation of the fistula tract promotes the production of a large amount of fibrinogen, thereby achieving the effect of "promoting tissue regeneration" [8]. Mr. Zheng Gang [9] innovatively designed the internal opening resection combined with traditional Chinese medicine drainage therapy using medicinal twists for the treatment of complex anal fistula. By evaluating postoperative outcomes, he assessed "electromyographic analysis of the external anal sphincter and measurement of anorectal pressure," and found that this surgical approach differs from traditional incision and seton drainage. It offers significant advantages in preserving anal sphincter function while maintaining the aesthetic appearance of the anus. Further integrating modern technology, the medicinal twist was combined with the consistent Western medical principles of "minimally invasive and sphincter-preserving," pioneering new surgical techniques beneficial to patients, such as the tunnel-threading therapy [10], for treating anal fistula. This aims to protect the function of both the internal and external anal sphincters, thereby reducing recurrence rates, alleviating patient suffering, shortening the course of the disease, and improving patients' quality of life [11].

2.4 Thread Embedding Combined with Traditional Chinese Medicine Treatment

Dr. Chen Yu from the Hemorrhoid Department of Luodian Hospital in Baoshan District, Shanghai, conducted a study on the combined application of seton therapy and modified Galla Chinensis decoction sitz baths for the treatment of complex high anal fistula. It was found that this approach effectively shortens the wound healing period and accelerates the recovery process for patients. Dr. Chen Yu 's research methodology involved selecting 60 patients with complex high anal fistula as the study sample and dividing them, based on their time of consultation, into an observation group of 32 patients and a control group of 28 patients. The overall therapeutic outcomes of the two groups were compared and assessed using Visual Analogue Scale (VAS) scores, edema scores, wound exudation scores, wound healing time, anal sphincter function, and anal function [12].

Dr. Cao Xia from Jiangsu University employed traditional Chinese medicine seton therapy and counter-drainage to treat high anal fistula. We observed the effectiveness of this treatment, its impact on pain and stress responses, as well as its effects on anal sphincter function, and further investigated the underlying mechanisms. Dr. Cao Xia 's experimental approach involved randomly dividing 155 patients into two groups: the control group received traditional seton therapy, while the observation group was treated with a combination of seton therapy and counter-drainage. The clinical efficacy, surgery-related indicators, postoperative complications, recurrence rates, Visual Analogue Scale (VAS) scores for pain, and Wexner Fecal Incontinence Scores were compared between the two groups. Additionally, measurements were taken for the anal canal's longest contraction time (ALCT), maximum contraction pressure (AMCP), anal resting pressure (ARP), and rectal resting pressure (RRP). The study results indicate that the combined application of traditional Chinese medicine seton therapy and counter-drainage demonstrates significant efficacy in treating high anal fistula. It not only reduces trauma and pain but also promotes wound healing, while causing relatively minimal damage to anal sphincter function [13].

2.5 Traditional Chinese Medicine Treatment for Central Anal Sphincter Paralysis

Dr. Li Zhengyu from Taiwan stated: Currently, Western medicine lacks fully curative drugs for anal sphincter paralysis. Surgical intervention provides only temporary symptomatic relief, with minimal improvement in sphincter function. Oral medications, on the other hand, often come with numerous side effects that can cause neurological damage and may even inhibit the therapeutic effects of traditional Chinese medicine. Adjuvant treatment methods in traditional Chinese medicine contribute to repairing spinal nerves, promoting nerve growth, facilitating partial regeneration of spinal nerves, and slowing down demyelinating lesions.

2.6 Wound Healing

Currently, the medical community widely recognizes that treatment approaches for hemorrhoids primarily focus on two main areas: internal management and external management. External treatment methods encompass the use of topical medications and surgical procedures. In understanding and treating diseases, the core philosophy of Traditional Chinese Medicine (TCM) adopts a holistic perspective combined with pattern differentiation and treatment. Both TCM and Western medicine have demonstrated distinctive therapeutic approaches in the treatment and research of post-hemorrhoidectomy wound care. Dr. Yikun Li from Shanghai University of Traditional Chinese Medicine holds the view that TCM has undergone numerous clinical trials in aiding post-hemorrhoidectomy wound repair and has demonstrated its efficacy. However, the underlying mechanisms of TCM in promoting wound repair after hemorrhoid surgery still require further in-depth investigation. TCM has a solid foundation in promoting wound repair following hemorrhoid surgery. Therefore, while exploring the advantages of TCM in treating hemorrhoids, more in-depth research and interdisciplinary collaboration are also needed to better serve clinical practice [14].

The research team led by Professor Feng Wenzhe from Shaanxi University of Chinese Medicine observed the effects of a Huanglian (Coptis chinensis) nanogel patch on wound healing in perianal abscesses and its impact on serum inflammatory factors. Their aim was to evaluate whether this nanogel patch could promote rapid healing of perianal abscess wounds, thereby reducing wound inflammation and better protecting the anal sphincter. According to the experimental data, the cure rate in the treatment group after 21 days was significantly higher than that in the untreated control group ($P<0.05$). At the 7th and 14th days after treatment completion, the exudate volume scores and pain scores in both groups showed a significant decrease ($P<0.05$). When comparing between groups on the 7th and 14th days post-surgery, the treatment group showed significantly lower exudate volume scores and pain scores than the control group, with the difference being statistically significant ($P<0.05$) [15].

3. Western Medicine Treatment

3.1 Sphincter-preserving Treatment for Low Rectal Cancer

As a traditional surgical approach for low rectal cancer, the Miles procedure requires diverting the bowel to create a permanent colostomy, which imposes significant lifestyle inconveniences and psychological burden on patients, directly impacting their quality of life. Therefore, in recent years, sphincter-preserving surgical approaches have garnered increasing attention. The Affiliated Traditional Chinese Medicine Hospital of Luzhou Medical University adopted an integrated traditional Chinese and Western medicine, sphincter-preserving approach to treat 50 cases of low rectal cancer, achieving favorable outcomes. The application of traditional Chinese medicine before and after surgery is as follows. For the three and a half days prior to surgery, a liquid diet is required, and oral administration of traditional Chinese medicine is used for bowel preparation instead of enema. If stool contains fecal residue on the day before surgery, the dosage of raw rhubarb should be increased, or folium sennae can be taken concurrently. Six hours after surgery, the hospital's self-formulated Fuzheng Liqi Decoction is administered, followed by a liquid diet starting the next day.

Since 1908, the Miles procedure has been recognized as the standard surgical method for treating low rectal cancer. Patients must endure the distress of a permanent sigmoid colostomy, which severely impacts their quality of life. Precisely for this reason, some patients are unwilling to undergo this surgery, thereby missing out on treatment opportunities. Increased frequency of bowel movements is observed in the majority of postoperative cases. In addition to providing bowel training after surgery, traditional Chinese medicine formulas such as Buzhong Yiqi Decoction or Bazhen Decoction are also administered. When combined with traditional Chinese medicine treatment, significant improvement is observed. Urinary retention, often related to pelvic floor dissection, typically resolves spontaneously. If accompanied by acupuncture at points such as Zhongji (CV3), Guanyuan (CV4), and Shenshu (BL23), recovery can often be accelerated [16].

3.2 Sphincter-preserving Treatment for Anal Fistula

In the endeavor to treat anal fistula, how to minimize surgical damage to the sphincter while preserving anal function has become a focal issue for proctologists in recent years when researching anal fistula. In his article, Liming Pang from Guangxi University of Chinese Medicine introduced various sphincter-preserving surgical techniques for anal fistula, including loose seton technique, thread-dragging therapy, fibrin glue sealing, anal fistula plugging, ligation of intersphincteric fistula tract (LIFT), combination of LIFT with biomaterials, video-assisted anal fistula treatment (VAAFT), rectal mucosal advancement flap, and stem cell transplantation [17].

Meanwhile, Professor Shao Wanjin and his team from Jiangxi University of Chinese Medicine pointed out that in clinical practice, sphincter-preserving treatment for anal fistula often involves multiple anatomical spaces. A single surgical technique is rarely sufficient to address all issues comprehensively, necessitating a combination of multiple surgical approaches. Currently, sphincter-preserving surgical procedures, which encompass techniques such as transanal intersphincteric incision, modified Parks' loose seton placement, advancement flap repair, ligation of intersphincteric fistula tract, fibrin glue and anal fistula plug application, as well as video-assisted anal fistula treatment, have emerged as a trend and can be considered the preferred approach for managing complex anal fistulas. Although new technologies offer renewed hope for patients, further research and long-term follow-up data are still necessary to confirm their feasibility and efficacy [18].

In his article "Advances in Anal Fistula Treatment", Dr. Wang Ren from Harbin Anorectal Hospital wrote: Between 1975 and 1980, Shafik proposed the three-loop theory of the external anal sphincter, which posits that the external sphincter is composed of the top loop, intermediate loop, and base loop. He also suggested that anal continence can be

maintained by the contraction of any single loop, and damage to any one of the three loops does not lead to fecal incontinence. In daily clinical practice, doctors frequently observe that damage to either the internal or external anal sphincter can lead to varying degrees of impairment in anal function. This may result in issues such as stress-related flatus or stool leakage, anal seepage, and difficulties in bowel control. Therefore, during the treatment of anal fistula, doctors should strive to preserve the integrity of both the internal and external anal sphincters to ensure proper anal function. The article further introduces techniques such as fistulectomy, closure of the internal opening, internal opening repair, and tunnel-type sphincter-preserving surgery. These methods, tailored to different pathological conditions, all contribute to fistula treatment while preserving anal function [19].

Professor Xu Ailing from Guangxi University of Chinese Medicine stated in her article that 90% of anal fistulas are caused by infection and rupture of the anal glands. High complex anal fistulas feature an internal opening situated at a higher position, exhibit complex fistula tract morphology, and are typically associated with the anal sphincter. Due to the high recurrence rate associated with conservative treatment for high complex anal fistulas, surgical intervention is generally regarded as the most effective therapeutic approach once a diagnosis is confirmed. The core principle of surgery is to ensure correct management of the internal opening, strive to maintain the integrity of drainage, thoroughly clear the fistula tract, and minimize damage to the anal sphincter in order to preserve the normal physiological function of the anus to the greatest extent. When managing complex anal fistulas, we should advocate for minimally invasive treatment concepts, strive to minimize further damage to the anal sphincter function during surgery, and ensure appropriate preservation of anal function. In recent years, numerous sphincter-preserving surgical techniques have emerged. For example, although fistula plugging, LIFT and LIFT-Plug procedures, as well as internal opening closure using rectal mucosal or perianal skin flaps, are still in their early stages and their efficacy evaluations vary, with continuous practice and accumulated experience, we believe that minimally invasive, restorative treatments that preserve anal function have the potential to replace traditional surgical methods in the future and become the mainstream option for anal fistula management [20].

Through a comparative analysis of tension-adjustable seton combined therapy and traditional seton therapy in terms of postoperative Wexner scores for anal function and anorectal manometry in patients with high anal fistula, Dr. Tan Jinzhi and her team concluded that the tension-adjustable combined seton method is more effective in preserving postoperative anal function and structure in patients with high anal fistula, while also reducing the incidence of fecal incontinence, compared to traditional seton therapy [21].

3.3 Sphincter-preserving Treatment for Perianal Abscess

Chen Honglin from the Anorectal Department of Kunshan Traditional Chinese Medicine Hospital in Jiangsu Province pointed out that high perianal abscesses are located above the anorectal canal. To achieve a curative effect, staged treatment or a one-time seton cutting of the anorectal ring is often chosen. However, after surgery, patients may experience varying degrees of fecal incontinence, which brings them significant distress. Kunshan Traditional Chinese Medicine Hospital opts for the use of a non-cutting seton to preserve the anorectal ring in the treatment of high perianal abscesses, followed by sitz baths with antibiotics and traditional Chinese medicine for 2 to 4 days post-surgery. This technique avoids the division of the anorectal ring, ensuring its structural integrity remains intact. It fully leverages the drainage function of the rubber band, ensuring smooth drainage of the pus cavity. The rubber band causes relatively mild local irritation, leading to a significant reduction in secretions. During postoperative dressing changes, patients do not require gauze packing. Simply gently tugging the rubber band is sufficient, which greatly reduces patient pain and eliminates the need for analgesic medication. Furthermore, postoperative healing scars are significantly reduced, and changes in anal morphology are relatively minor, providing excellent protection for anal function [22].

At Liaoning Central Hospital, Dr. Song Guiyun and their team observed the therapeutic effects of ultrasonic debridement and its impact on anal sphincter function in patients with perianal abscesses. The experimental results indicate that, compared to conventional treatment alone, the addition of ultrasonic debridement significantly enhances therapeutic outcomes and effectively improves the function of the patient's anal sphincter [23].

3.4 Artificial Anal Sphincter System

After in-depth research, the Institute of Medical Precision Engineering and Intelligent Systems at Shanghai Jiao Tong University has discovered an implantable artificial anal sphincter system (AASS) that can be used to treat fecal incontinence. It is concluded that the AASS can mimic the function of the normal human anal sphincter, opening up new treatment avenues for severe patients suffering from fecal incontinence [24].

4. Daily Maintenance

4.1 Prenatal Training

Dr. Huang Xiaomei and Dr. Zheng Quanying jointly investigated the potential effects of prenatal anal sphincter exercises on postpartum rectal and anal function in pregnant women. Experimental design: This study selected 84 women who underwent their first vaginal delivery at the hospital between 2018 and 2019 as the research sample. The study results revealed that the Williams scores and rectal defecation pressures in the observation group were significantly higher than those in the control group, with the difference being statistically significant ($P<0.05$). Therefore, we conclude that performing anal sphincter training before delivery can significantly reduce complications such as fecal incontinence and pain during defecation that primiparous women may experience after vaginal delivery, and helps improve early postpartum rectal and anal function [25].

4.2 Ear Acupoint Bean Therapy

Wang Ni, Zhang Moran, and others proposed that embedding beans in ear acupoints, by stimulating points such as Large Intestine, Small Intestine, Shenmen, and Rectum through massage, can promote blood circulation in the anal region, prevent tissue edema, and further enhance its function by reducing venous congestion and dilation. Over time, the contraction capacity of the anal sphincter, anal canal resting pressure, and maximum anal canal contraction pressure all increase, while the maximum tolerable rectal volume also enlarges, thereby leading to an improvement in the patient's anal function [26].

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