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Research Advances of Biofeedback in Anorectal Department

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Abstract: *Certain diseases in anorectal departmentare strongly associated with the pelvic floor muscles and the efficiency of surgery for these diseases has been poor, but after multidisciplinary studies it can be demonstrated that the biofeedback therapy can be the treatment of choice in these pelvic floor muscle dysfunctions. We therefore summarise literature on biofeedback for the treatment of anorectal disorders such as constipation, anal incontinence and functional anorectal pain due to abnormalities in the pelvic floor muscles, discuss the treatment mechanisms and treatment options, and analyse the influencing factors. Because biofeedback has its own distinctive advantages and can be used in combination with other therapies to maximise therapeutic benefits, it can be applied in a multidisciplinary manner and combined with specific therapeutic approaches from other disciplines, it may become a preventive and therapeutic tool for more diseases and thus be better used in clinical practice.*

Keywords: *Biofeedback, Pelvic incontinence constipation, Anal incontinence,Functional anorectal pain*

1. Introduction

Biofeedback therapy is used to improve and enhance pelvic floor function and to equalise the muscle strength of the pelvic floor muscles to treat anal disorders caused by pelvic floor muscle dysfunction. This painless, personalised treatment option has been recognised by most researchers and has been supported by clinical data. However, in most clinicians not much attention has been paid to this treatment method, resulting in it not being widely used clinically. Therefore, the aim of this paper is to explore what kind of anorectal disorders are suitable for the use of biofeedback and how to develop an individualised treatment plan. By discussing the application of biofeedback techniques in the treatment of anorectal disorders caused by pelvic floor muscle dysfunction, it is hoped that it will gain clinical acceptance and ultimately help Clinical.

2. Overview of biofeedback therapy techniques

Biofeedback is the use of electronic technology to capture signals that is not normally perceived by the body, such as electromyographic signals, which are not perceived by the body, and convert them into visual images or audible sounds that are transmitted to the brain through the optic and auditory nerves so that the body can indirectly perceive the signals. The end result is that the patient is able to regulate and control the disordered muscular physiology with the help of equipment, self-learning and training by the therapist.[1] . The patient lies on his back on the treatment bed and is asked to simulate his daily bowel habits with the aid of an anorectal manometer or electromyography sensor, which allows him to obtain a pressure map or electromyography of the pelvic floor muscles with the aid of electronic technology.[2] .

2.1 Steps in the biofeedback approach

A review of the literature reveals that the choice of instrumentation for the biofeedback therapy varies from one research institution to another, but the steps of treatment operation are similar. The three treatment steps are almost always therapeutic education - instrumentation - long-term training at home. As most patients do not use the correct amount of force due to their disease, and do not even think that there is a problem with their muscle contractions, treatment education firstly makes patients aware that there is a problem with their bowel habits, secondly makes them understand how the

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abdominal and anorectal muscles contract and relax during defecation, and explains the therapeutic mechanism of pelvic floor biofeedback therapy so that patients understand the science and ffectiveness of the treatment and build confidence in the treatment programme[3] The treatment is also designed to build confidence in the programme. Instrumental treatments such as myoelectric biofeedback can also be divided into three modules[4-6] The three modules are generally divided into myoelectric triggered electrical stimulation, Kegel exercise and relaxation modules to help the patient learn to control the tension and relaxation of the pelvic floor muscles. Other medical devices also have different treatment modules, but they are all similar. Long-term training at home will consolidate the effect of the treatment and reduce the recurrence rate.

2.1.1 Therapeutic education

Before treatment, the patient should be introduced to the causes of the disease and the mechanism of biofeedback therapy, and the expected effects of the therapy and the duration of treatment should be objectively pointed out.[7] The three main aspects of the treatment are. In Wang Ning's study[8] postnatal health education combined with pelvic floor biofeedback electrical stimulation therapy was effective in relieving negative emotions and improving the muscle strength of the pelvic floor and pelvic floor. Therefore therapeutic education has a great relevance to the outcome of the postpartum period.

2.1.2 Biofeedback therapy devices

The treatment protocols vary slightly from one research institute to another due to differences in the instrumentation of the biofeedback machines. Biofeedback treatments such as anorectal, manometry feedback, myoelectric biofeedback and balloon expulsion are the main methods of biofeedback treatment.[9] However, there is not enough evidence to prove that the efficacy of one of these three therapies is optimal, and the choice of which biofeedback device to use in the clinical setting ultimately depends on the physician's personal preference. However, biofeedback is the most commonly used method in clinical practice and, in the author's opinion, can be more effective because it is more convenient and easier to administer.

2.1.3 Family Education

Included in home education are functional training, instruction in bowel habits, diet structure, lifestyle changes, and other aspects of home biofeedback therapy devices. After biofeedback treatment, patients should learn how to defecate properly and the defecation exercises performed[10][11] . Patients who have problems with their daily diet and lifestyle habits need to adjust their bad habits, focus on diet with more high fibre foods, reduce the intake of red meat and smoked products, and focus on drinking water, ensure sufficient sleep time, and appropriate supplementary exercises, such as pelvic floor exercises (e.g. kegel exercise method). Kegel exercises alone have been shown to be effective in preventing constipation.[13] A large number of studies have shown that kegel exercises alone are also effective in preventing constipation. There is also a study by Yang Xuechun[14] The study by Yang Xuechun demonstrates that a combination of family education and biofeedback therapy can be effective and play a key role.

3. Mechanisms associated with the use of biofeedback in the treatment of anorectal disorders due to pelvic floor muscle dysfunction

3.1 Pelvic floor failure constipation

This refers to the inability to coordinate the pelvic floor muscles of the abdomen and anus during defecation, or the paradoxical contraction of the external anal sphincter and puborectalis muscle resulting in increased anal outlet resistance[15] prolonged constipation can lead to psychological depression and anxiety, which can further aggravate than constipation. The treatment of constipation in the pelvic floor discomfort syndrome is currently based on the use of gastrointestinal motility drugs and, in some cases, surgery.[16] In some cases, surgery is required. Recent studies have shown that the effects of prokinetic drugs are not satisfactory, and their prolonged use is financially stressful, with a high incidence of adverse effects.[17] This is also associated with a high incidence of adverse effects. With the aid of a therapist and biofeedback device, unperceivable electromyographic-activity is converted into visual signals to guide the patient to contract the pelvic floor muscles correctly and learn to defecate. After repeated learning and training, the patient eventually achieves normal pelvic floor muscle activity, thus treating constipation. Biofeedback is a common and effective treatment option for this type of constipation.

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It has been found that in addition to biofeedback, the treatment can be combined with traditional Chinese medicine, with the aid of Chinese herbal tonics, acupuncture and moxibustion to improve the treatment effect.[18] The results can be better and faster.

3.2. Anal incontinence

Anal incontinence, also known as fecal incontinence, refers to anorectal storage and control dysfunction, involuntary defecation and evacuation due to various causes. It can occur in all age groups, but is more common in older people than in younger people and in women than in men[19] . This unconscious behaviour not only reduces the quality of life, but can also cause severe psychological stress. Under such negative pressure, the patient does not recognise himself or herself, and bad psychological thoughts affect mental health, which can lead to greater social problems. In addition, leaking faeces can irritate the surrounding skin and leave it in a wet state, leading to anal eczema and ulcers. In Wang Keke's[20] In her study, biofeedback and pelvic floor exercises increased the contraction and diastolic amplitude of the anal sphincter, strengthened the coordination of the anal sphincter, improved motility and compliance, reduced the incidence of spontaneous relaxation of the anal canal, and enhanced anal muscle strength. The current rationale for biofeedback treatment of anal incontinence may be to convert some type II muscle fibres to type I, increasing the density of type I muscle fibres, i.e. the ratio of fatigue-resistant muscles[21] . This reduces the likelihood of defecation.

3.3. Functional anorectal pain

A functional gastrointestinal disorder of the anorectal region. It is currently an anorectal clinical syndrome of unknown origin[22] .

The condition can recur, causing the patient to become depressed and in severe cases even cause psychiatric problems such as anxiety and depression. Although the cause is unknown, pelvic floor muscle dysfunction can cause the pelvic floor muscles to become unbalanced or spastic, which leads to slow local blood flow and local tissue hypoxia, causing plastic changes in the central nervous system, which can exacerbate pain[23] This type of anorectal pain due to pelvic floor muscle dysfunction has been generally recognised as an etiology. And in the Byrnes KG[24] In a meta-analysis comparing intramuscular tretinoin, sacral neuromodulation (SNM) and biofeedback for the treatment of functional anorectal pain, it was concluded that biofeedback is a reasonable first-line option for patients with high resting pressure or defecation symptoms. Biofeedback not only stimulates the autoregulation of pelvic floor muscle activity and corrects muscle spasm; it also strengthens the patient's own muscle control through repetitive training, exercises the pelvic floor muscles, corrects unbalanced muscle contractions, relieves muscle tension and ultimately achieves pain relief[25] This will help to relieve pain.

4. Biofeedback therapy programme

The treatment options in biofeedback for pelvic floor muscle dysfunction vary from institute to institute, but there are two types of combined therapy using biofeedback alone and other therapies in combination with biofeedback[26]-[28] These include combination therapies include herbal tonics, acupuncture, pelvic floor magnetic stimulation, western medicine, nursing interventions and surgery, and generally one or two therapies are combined at each institution. There are also studies that use only biofeedback therapy alone. For example, a study by Yang Xuechun et al.[29] demonstrated that by using biofeedback alone, patients' clinical symptoms could be effectively improved. However, when combined therapy is used in contrast to treatment alone, the advantages of combined therapy are more apparent. For example, in Dong Ruoxi[30] in a study by Dong Ruoxi, the combination of biofeedback therapy and Chinese medicinal preparations was significantly more effective than biofeedback alone in the treatment of functional anorectal pain in the elderly; in a study by Luo Yulian et al.[31] In a study by Luo Yulian et al, it was concluded that the total efficiency of the conventional treatment + biofeedback + acupuncture group was significantly higher than that of the other groups, with significant clinical efficacy.[32] In Ji Yali's study, it was shown that the total effective rate of treatment in the observation group (91.89%) was higher than that in the control group (72.97%), and the efficacy of the combined therapy was more significant. Through observation of the relevant clinical results and literature review, it was found that the combined therapy was more effective compared to the single biofeedback therapy.

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5. Factors influencing biofeedback treatment

Although better outcomes can be achieved in biofeedback treatment of anal disorders caused by pelvic floor muscle dysfunction, there are still many factors that can influence the efficacy of this treatment method. By summarising the relevant literature, the following elements can be identified (1) duration of treatment: in reviewing the documentation[33-[36] It can be seen from the literature that there is no clear standard for the treatment period, frequency and duration of a single session when using biofeedback treatment, but the summary roughly concludes that the treatment duration is 30-40 minutes for a single session, once a day, 5-7 times a week, a week is a course of treatment, a total of 2-6 sessions, and the total frequency of treatment is 20-60 times. The long duration of treatment makes patients give up mid-treatment, which reduces the therapeutic effect and may lead to recurrence of the disease; (2) patients' mental health: long-term recurrent disease makes patients more or less anxious and depressed. There is a direct link between the severity of anxiety and anxiety and the patient's anorectal dynamics and rectal perception dysfunction.[36] The patient's anorectal dynamics and rectal dysfunction are directly related to the severity of anxiety and depression. A depressed or anxious psychological state may delay the course of the disease and postpone the recovery process, so the operator should be experienced and positive during treatment and can tailor individualised psychological counselling for the patient. (3) Adherence: Jia Bingxin's study[38]In terms of adherence, there are a number of aspects that can be influenced, with different levels of education, gender, age, health care payment methods and access to care all being associated with patient adherence to biofeedback. In terms of gender, adherence is higher among women compared to men, who has a deeper belief in the importance of health care and maintenance.[39] In terms of age, older people are less likely to be adherent to treatment than younger people[40] In terms of payment method, adherence to treatment is lower among self-pay patients than among those who are reimbursed by health insurance. (4) Treatment education and family education: Biofeedback therapy requires a high degree of cooperation with the patient, so in clinical practice, patients should be taught about the physiology of defecation, the basic principles and treatment mechanisms associated with the biofeedback therapy and the issues to be taken into account during the treatment process.

6. Conclusions

Numerous studies have demonstrated the effectiveness of biofeedback in the treatment of pelvic floor dysfunction and have shown that biofeedback is a painless, non-adverse treatment and can reduce the recurrence rate.[41] Biofeedback can be used to treat more than just pelvic floor disorders. Biofeedback can be used to treat not only the three conditions in question, but also other disciplines such as postnatal incontinence in obstetrics and gynaecology, prostate pain in men, paediatric, autism and certain depressions. There is therefore a need to increase clinicians' attention to this treatment method and to treat the symptoms. There is also a need to develop easy-to-use, small, inexpensive home biofeedback devices that will enable patients to undergo long-term home training and, in today's epidemic, reduce the frequency of visits to the doctor and the risk of infection. As major research institutions delve into their biofeedback treatment mechanisms, biofeedback therapy will probably become a means of prevention and treatment for more diseases.

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