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Pelvic Floor Dysfunction: Analysis of Diverse Treatment Methods and Progress

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Abstract: *Pelvic floor dysfunction (PFD) refers to a group of disorders caused by damage or dysfunction of the pelvic floor muscles and their supporting structures, leading to a disruption in the normal function of pelvic organs. It is commonly seen in women, especially postpartum or during menopause, and manifests clinically as urinary incontinence, constipation, pelvic organ prolapse, and sexual dysfunction. With increasing research into pelvic floor muscle function, diverse treatment methods have emerged, including conservative treatments such as pelvic floor muscle training (PFMT), biofeedback, electrical stimulation therapy, and surgical interventions. This article reviews the latest progress in these treatments, analyzes their clinical efficacy, and explores future directions.*

Keywords: *Pelvic floor dysfunction, pelvic floor muscle training, biofeedback, electrical stimulation therapy, surgical treatment*

1. Introduction

Pelvic floor dysfunction is a group of syndromes caused by damage to the pelvic floor muscles and their supporting structures, leading to symptoms such as urinary incontinence, pelvic organ prolapse, and constipation. It not only affects the daily life and work of patients but also significantly impacts their physical and mental health, particularly among postpartum women and elderly females. With advancements in modern medicine, treatment methods for pelvic floor dysfunction have become increasingly diverse. This article will delve into these treatment methods and their clinical efficacy.

2. Causes and Pathogenesis of Pelvic Floor Dysfunction

The pathogenesis of pelvic floor dysfunction involves multiple factors, including postpartum damage, aging and hormonal changes, as well as lifestyle-related influences. These factors collectively lead to dysfunction in the pelvic floor muscles and supporting structures, which in turn causes issues such as urinary incontinence and pelvic organ prolapse. Below are the primary causes and mechanisms of the disease[1].

2.1 Postpartum Damage

The birthing process is one of the major triggers of pelvic floor dysfunction in women. During childbirth, particularly vaginal deliveries, the pelvic floor muscles and supporting structures (such as fascia and ligaments) are subjected to enormous pressure. This pressure can cause tears or excessive stretching of these tissues, compromising their ability to support the pelvic organs, such as the bladder, uterus, and rectum. This often results in postpartum issues like stress urinary incontinence and pelvic organ prolapse.

In cases of prolonged labor, large fetal size, or the use of obstetric tools like forceps or vacuum extractors, the risk of damage to the pelvic floor muscles and tissues significantly increases. Women who have had multiple pregnancies, especially those who have given birth in short succession, have a higher likelihood of experiencing pelvic floor dysfunction. Research shows that early intervention and postpartum pelvic floor rehabilitation exercises can effectively reduce the long-term impact of this damage on women's quality of life[2].

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2.2 Aging and Hormonal Changes

As women age, the strength and elasticity of the pelvic floor muscles gradually decrease. During the aging process, muscle tissues weaken, and the elasticity of the pelvic floor's supporting structures diminishes, making it easier for the pelvic organs to descend. Additionally, women in menopause experience a drop in estrogen levels, which leads to a reduction in connective tissue and decreased blood flow in the pelvic floor, further exacerbating muscle laxity. These changes increase the risk of pelvic organ prolapse and urinary incontinence.

During menopause, the thinning of the urethra and bladder walls, combined with decreased muscle strength, makes women more prone to stress urinary incontinence. In this context, aside from the physiological aging of muscles, hormonal changes are a significant factor contributing to pelvic floor dysfunction. Hormone replacement therapy (HRT) may alleviate or improve symptoms in some patients.

2.3 Other Factors

In addition to childbirth and aging, lifestyle and other medical factors can exacerbate pelvic floor dysfunction. Obesity is a common risk factor. Excess weight increases intra-abdominal pressure, placing additional strain on the pelvic floor muscles over time, which can lead to dysfunction.

Chronic constipation and persistent coughing also significantly increase pressure on the pelvic floor muscles. Repeated increases in abdominal pressure, particularly when straining during bowel movements or due to chronic coughing, can lead to muscle fatigue and laxity. This repeated pressure is a common cause of both urinary incontinence and pelvic organ prolapse.

Moreover, genetic factors, heavy physical labor, and unhealthy lifestyle habits such as smoking are also believed to contribute to pelvic floor dysfunction. A woman's genetic structure may influence the strength and elasticity of her pelvic floor muscles and supporting structures, making her more susceptible to dysfunction[3].

3. Conservative Treatment Methods

3.1 Pelvic Floor Muscle Training (PFMT)

Pelvic floor muscle training is a conservative treatment method aimed at strengthening the contraction ability of the pelvic floor muscles through targeted exercises. A commonly used exercise method includes Kegel exercises. PFMT not only helps improve symptoms of urinary incontinence but also enhances the pelvic floor's ability to support the organs.

3.2 Kegel Exercises

Kegel exercises are a classic method of pelvic floor muscle training, designed to consciously contract and relax the pelvic floor muscles to improve their strength and endurance. Studies have shown that Kegel exercises are effective in improving postpartum urinary incontinence, sexual dysfunction, and pelvic organ prolapse[4].

3.3 Research Progress

Recent studies show that combining Kegel exercises with other physical therapy methods, such as biofeedback and electrical stimulation therapy, can significantly enhance treatment outcomes and improve patients' quality of life.

Biofeedback therapy helps patients perceive and control pelvic floor muscle activity through the use of instruments. Patients receive visual or auditory signals about their muscle contractions, allowing them to perform targeted exercises. This therapy is particularly useful for patients who are unable to effectively perform PFMT. Biofeedback precisely guides patients in correctly performing pelvic floor training, helping to enhance the effectiveness of the exercises and significantly improve pelvic floor muscle recovery, especially for those with stress urinary incontinence and mild pelvic organ prolapse.

Electrical stimulation therapy uses low-frequency currents directly applied to the pelvic floor muscles, causing involuntary contractions to enhance muscle strength and endurance. This therapy is

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widely used in postpartum rehabilitation and the treatment of urinary incontinence. Electrical stimulation therapy includes surface electrical stimulation and vaginal electrical stimulation. Studies have shown that combining electrical stimulation with pelvic floor muscle training significantly improves treatment outcomes, especially in increasing pelvic floor muscle strength and reducing symptoms of urinary incontinence[5].

4. Surgical Treatment Methods

4.1 Pelvic Floor Repair Surgery

Surgery is an effective treatment for severe pelvic organ prolapse and pelvic floor dysfunction that cannot be improved through conservative treatments. The surgery primarily involves repairing or replacing damaged support structures to restore the normal position and function of pelvic organs.

4.2 Vaginal Mesh Implant Surgery

In cases of severe organ prolapse, vaginal mesh implant surgery is commonly used to support the prolapsed organs. While this surgery is effective, there are risks of postoperative complications, such as infection and mesh displacement.

4.3 Urethral Sling Surgery

Urethral sling surgery is a common procedure for treating stress urinary incontinence. It works by suspending the urethra in a higher position to enhance its closure function, thereby reducing the occurrence of urinary incontinence. Surgical treatment is usually recommended for patients who do not respond to conservative treatments[6].

5. Combination of Diverse Treatment Methods

With the continuous deepening of medical research and innovations in treatment methods, the treatment of pelvic floor dysfunction is no longer limited to a single approach. Multiple conservative treatment methods, such as pelvic floor muscle training (PFMT), biofeedback, and electrical stimulation, are being combined to enhance efficacy further. The combination of diverse treatment methods acts on the pelvic floor muscles through different mechanisms, not only accelerating functional recovery but also significantly improving the patient's quality of life. Below are several common combinations of diverse treatment methods.

5.1 Combination of Pelvic Floor Muscle Training and Biofeedback

The combination of PFMT and biofeedback therapy is one of the most common and effective treatment methods. PFMT helps strengthen the pelvic floor muscles, while biofeedback assists patients in better perceiving and controlling muscle activity through technical means, thereby enhancing the effectiveness of the exercises.

Biofeedback devices monitor the patient's pelvic floor muscle activity in real-time and provide visual or auditory feedback, enabling patients to more accurately contract the pelvic floor muscles. For patients lacking muscle perception, biofeedback helps them gradually develop control over their muscles. While PFMT alone is effective, many patients struggle to perceive or perform the exercises correctly. Adding biofeedback can help patients understand and execute the exercises properly, avoiding incorrect movements and significantly improving treatment outcomes. Moreover, biofeedback offers immediate feedback, enhancing patient compliance with treatment.

Studies show that PFMT combined with biofeedback can significantly improve symptoms in patients with stress urinary incontinence and mild pelvic organ prolapse. Compared to PFMT alone, this combination therapy shows more notable improvements in the patient’s quality of life, reduces the frequency of urinary incontinence episodes, and enhances pelvic floor muscle endurance[7].

5.2 Combination of Electrical Stimulation and Kegel Exercises

The combination of electrical stimulation therapy and Kegel exercises is a common and effective

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rehabilitation method, particularly suitable for patients with weak pelvic floor muscles. Electrical stimulation guides passive contraction of the pelvic floor muscles through external currents, while Kegel exercises involve voluntary muscle contraction by the patient. Together, these methods can significantly enhance the recovery of pelvic floor muscle function.

Electrical stimulation therapy uses low-frequency currents to stimulate the pelvic floor muscles, causing involuntary contraction and relaxation. Electrodes are typically placed vaginally or anally to deliver mild electrical signals that directly stimulate muscle contractions. This method activates deep pelvic floor muscles that are difficult to control voluntarily, making it particularly suitable for patients with weakened muscles who cannot perform effective voluntary exercises. Kegel exercises, on the other hand, involve conscious contraction and relaxation of the pelvic floor muscles to strengthen them, and are effective for patients with mild to moderate pelvic floor dysfunction, improving urinary incontinence, pelvic organ prolapse, and sexual dysfunction. The method is simple and easy to perform, making it suitable for long-term practice.

Electrical stimulation helps patients with weak muscles regain some muscle function early on, while Kegel exercises further enhance voluntary control. When the two are combined, electrical stimulation enables passive contraction of the muscles without conscious control, improving muscle memory and perception, while Kegel exercises strengthen the pelvic floor through voluntary training. Through this dual mechanism, patients can restore pelvic floor function more quickly and effectively. Research indicates that combining electrical stimulation with Kegel exercises has a significantly greater therapeutic effect on patients with pelvic floor dysfunction compared to single treatments. In particular, electrical stimulation activates deep pelvic floor muscles, which are hard to control, while Kegel exercises consolidate this effect. Post-treatment, patients experience a reduced frequency of urinary incontinence episodes, improved sexual satisfaction, and enhanced pelvic floor muscle strength[8].

5.3 Combination of Biofeedback and Electrical Stimulation

The combination of biofeedback and electrical stimulation is another diverse treatment method for patients with pelvic floor dysfunction. This approach not only helps patients perceive their muscle status in real-time but also enhances muscle contraction and control through electrical stimulation.

Biofeedback therapy monitors the patient's pelvic floor muscle activity and provides feedback, helping them understand and regulate muscle contractions. This real-time feedback allows patients to adjust the intensity and method of muscle exercises consciously, maximizing the effectiveness of the exercises. In cases where patients cannot effectively activate the pelvic floor muscles, electrical stimulation serves as an auxiliary method to help activate deep muscles, leading to more significant biofeedback results. Electrical stimulation also assists patients who struggle to activate muscles through voluntary movements, allowing for quicker recovery of pelvic floor function.

The combination of electrical stimulation and biofeedback improves patients' control over the pelvic floor muscles, enhancing muscle perception and contraction strength. During treatment, electrical stimulation helps activate the muscles, while biofeedback allows patients to gradually take over muscle control, leading to better recovery outcomes. Research shows that patients using a combination of biofeedback and electrical stimulation experience significant improvements in urinary incontinence recovery, as well as enhanced quality of life and pelvic floor function.

6. Evaluation of Treatment Outcomes

6.1 Clinical Outcome Evaluation

Evaluating clinical outcomes is a key indicator for assessing the effectiveness of pelvic floor dysfunction treatments. Common evaluation tools include pelvic floor electromyography, biofeedback measurement instruments, and functional scales. After receiving treatment, patients typically undergo regular pelvic floor electromyography to assess muscle contraction strength and endurance, providing an objective assessment of treatment outcomes.

6.2 Improvement in Quality of Life

Pelvic floor dysfunction significantly affects patients' daily life and work; therefore, improving quality of life is one of the main goals of treatment. The SF-36 quality of life scale is used to assess

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improvements in emotional, physical, and social aspects of patients' lives. Studies indicate that patients who have undergone biofeedback and electrical stimulation therapy generally experience an enhanced quality of life, particularly in terms of reduced urinary incontinence and improved sexual satisfaction.

6.3 Long-term Follow-up and Sustainability of Treatment Outcomes

Although various conservative treatments can significantly improve pelvic floor function, the sustainability of treatment outcomes remains a concern. Long-term follow-up studies show that patients who continue pelvic floor muscle training after treatment maintain their therapeutic effects for a longer period, while symptoms may relapse if training is discontinued. Therefore, long-term rehabilitation training and regular follow-up are crucial for maintaining treatment outcomes.

7. Current Research Progress and Future Directions

7.1 Innovative Therapies Based on Technological Advancements

With advancements in medical technology, an increasing number of new treatment devices and methods are being applied to the treatment of pelvic floor dysfunction. For example, the integration of 5G internet with telemedicine in a continuous care model allows patients to conduct pelvic floor rehabilitation exercises at home while doctors provide real-time guidance through remote monitoring devices. This model not only improves the convenience of treatment but also enhances patient compliance and therapeutic outcomes.

7.2 Development of Intelligent Rehabilitation Devices

Currently, many intelligent devices, such as portable biofeedback instruments and wearable electrical stimulation devices, are gradually being applied to pelvic floor rehabilitation. These devices enable patients to perform pelvic floor exercises anytime and anywhere in their daily lives. Data is recorded via mobile apps, allowing doctors to monitor progress remotely and adjust treatment plans accordingly. In the future, these intelligent devices will be further promoted and become an important component of pelvic floor dysfunction treatment.

7.3 Multidisciplinary Collaboration and Personalized Treatment Plans

Due to the complex causes of pelvic floor dysfunction, future research will focus more on multidisciplinary collaborative treatment approaches. This involves integrating knowledge from various fields, including obstetrics and gynecology, rehabilitation, and psychological therapy, to create personalized rehabilitation plans for patients. By considering factors such as the patient's age, medical history, and lifestyle habits, personalized treatment plans can better meet individual recovery needs and significantly improve treatment outcomes.

7.4 Prevention and Early Intervention

In future treatments for pelvic floor dysfunction, prevention and early intervention will become research priorities. Through widespread health education and awareness campaigns, greater emphasis will be placed on postpartum pelvic floor rehabilitation, thereby enhancing women's overall health. In addition, early screening for high-risk groups, such as pregnant women, obese women, and older women, will enable timely detection and intervention in the early stages of pelvic floor dysfunction. This will help slow disease progression and avoid more complex treatments later on.

8. Conclusion

Pelvic floor dysfunction is a multifactorial and complex condition, commonly seen in women, especially postpartum women. With advances in medical technology, treatment methods for this condition are continuously evolving and improving. Conservative treatments such as pelvic floor muscle training, biofeedback, and electrical stimulation therapy have already shown significant efficacy, particularly in improving patients' quality of life and reducing symptoms like urinary incontinence and sexual dysfunction. At the same time, surgical interventions remain an effective option for patients with severe pelvic floor dysfunction.

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In recent years, the integration of various treatment methods has further enhanced the recovery outcomes of pelvic floor dysfunction. The development of intelligent devices and telemedicine has greatly improved patient compliance and rehabilitation results. Moreover, personalized treatment plans and early interventions are expected to become key focuses in future treatments. Through multidisciplinary collaboration and preventive measures, there is hope for a significant reduction in the incidence of pelvic floor dysfunction.

In the future, with further research and continuous technological innovation, the effectiveness of treatments for pelvic floor dysfunction will improve even more, leading to a substantial increase in patients' quality of life. With long-term follow-up and personalized rehabilitation training, patients with pelvic floor dysfunction will be able to restore their health in daily life, regain confidence, and achieve a better sense of well-being.

References

[1] Yang Ying. Application of Pelvic Floor Electrophysiological Parameters in Postpartum Stress Urinary Incontinence [J]. Journal of Modern Electrophysiology, 2024, 31 (03): 155-158.

[2] Xing Yuhong, Yang Yanyan, Jin Yaci, et al. The Effect of Traditional Chinese Medicine Du Meridian Fumigation Combined with Biofeedback Training on Pelvic Floor Muscle Strength and Urodynamics in Postpartum Pelvic Floor Dysfunction Patients [J]. China Rehabilitation, 2024, 39 (08): 489-493.

[3] Liu Fangyin, Song Baoqin, Wang Zeqing. Observation on the Efficacy of Pelvic Floor Rehabilitation Device Combined with Pelvic Floor Muscle Training in Postpartum Stress Urinary Incontinence Patients [J]. Chinese Modern Drug Application, 2024, 18 (16): 170-173. DOI:10.14164/j.cnki.cn11-5581/r.2024.16.046.

[4] Chen Weichun. The Effect of Biofeedback Combined with Pelvic Floor Muscle Training on Postpartum Pelvic Floor Dysfunction [J]. Jilin Medicine, 2024, 45 (08): 1868-1870.

[5] Li Xiu, Wei Lijuan, Wu Min. Observation on the Efficacy of Electroacupuncture Combined with Manual Release Therapy for Female Pelvic Floor Myofascial Pain Syndrome [J]. Global Traditional Chinese Medicine, 2024, 17 (08): 1645-1649.

[6] Zhou Li, Chen Beibei, Wang Xiudi, et al. The Effect of SOC-based Health Management Combined with Bioelectric Stimulation on Self-efficacy and Pelvic Floor Muscle Rehabilitation in Primiparas [J]. Maternal and Child Health Care of China, 2024, 39 (15): 2944-2948. DOI:10.19829/j.zgfybj.issn.1001-4411.2024.15.041.

[7] Du Rongmei, Song Bing. Study on the Recovery of Pelvic Floor Function after Vaginal Delivery through Pelvic Floor Muscle Training Combined with Electromyographic Biofeedback Therapy [J]. Anhui Medicine, 2024, 45 (07): 910-914.

[8] Shan Qingyan, Liu Guiying, Huang Huanrong, et al. The Improvement of Postpartum Pelvic Floor Muscle Function and Patient Quality of Life through Biofeedback Electrical Stimulation Combined with Pathway Rehabilitation Nursing [J]. Sino-Foreign Medical Research, 2024, 22 (21): 99-103. DOI:10.14033/j.cnki.cfmr.2024.21.025.