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Case Analysis of Rehabilitation Treatment for Postpartum Sacroiliac Joint Dysfunction

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Abstract. Low back pain is a common symptom in women during pregnancy and the postpartum period, which can be caused by various factors. Among them, sacroiliac joint dysfunction is one of the core inducing factors that are easily overlooked. This case report describes the evaluation and treatment process of a 30-year-old postpartum nurse with low back pain, and explores the efficacy of occupational therapy (OT) centered on posture management, three-dimensional breathing training, and neuromuscular activation in the treatment of postpartum sacroiliac joint dysfunction (SIJD). Through short-term OT intervention focusing on posture management and sequential activation of breathing - core - pelvis, within 2 months of treatment, the patient's postpartum SIJD pain was rapidly relieved, her activities of daily living were restored, and her daily functions related to the maternal role were improved.

Keywords: Sacroiliac Joint, Postpartum Low Back Pain, Occupational Therapy, Three-Dimensional Breathing, Posture Management

1. Introduction

Low back pain and sacroiliac region pain are considered common clinical symptoms during pregnancy and the postpartum period. Although their origins seem to be multifactorial, involving structures such as the spine and pelvis, the etiology is complex. Studies have reported that pregnancy and childbirth can induce sacroiliac joint dysfunction (SIJD) through three mechanisms: hormones, biomechanics, and neuromuscular control, which manifests as lumbosacral-gluteal-lower limb pain, pelvic floor dysfunction, and "maternal role disability" [1,2]. Traditional physical therapy focuses on local pain relief and core training, but ignores the occupational needs of the specific social role of "mother". Guided by the Person-Environment-Occupation model of occupational therapy, this study reports the clinical characteristics and quantitative efficacy of short-term OT intervention in a case of postpartum SIJD, aiming to provide a replicable rehabilitation path for clinical practice.

2. Case report

A 30-year-old female presented with persistent low back pain 18 months after vaginal delivery, accompanied by urinary incontinence. She experienced lumbar soreness and distension after holding

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her baby for 10 minutes, and the pain worsened at night, even affecting sleep. The patient had no previous history of lumbar spine surgery, fractures, or immune diseases, and no trauma or strenuous exercise during pregnancy. She first noticed urinary incontinence while skipping rope 5 months after delivery. Later, she received 5 sessions of pelvic floor treatment in another hospital with poor results, and then came to our hospital for consultation.

On physical examination, the patient exhibited a rounded shoulder-hunchback-pelvic anterior tilt posture: the right shoulder was higher than the left, and the inferior angle of the right scapula was higher than that of the left; gluteal depression was present; the lower abdomen protruded, and the muscles on both sides of the waist were asymmetric; the right lower limb was longer than the left; the right posterior superior iliac spine was higher (anterior rotation); single-leg standing stability on the right was significantly better than that on the left; there was pes planus, and the length difference between the two lower limbs was 0.8cm (right longer). Active Range of Motion (AROM) of the lumbar spine: the right lateral flexion range was smaller than the left, and low back pain occurred at the end of the range of motion.

Muscle strength of the hip joint and lumbar spine was measured according to the Lovett grading scale. The rectus abdominis muscle related to trunk flexion was graded 4/5; the internal and external oblique abdominal muscles related to trunk rotation were graded 4/5. Weak muscle strength can also cause low back pain, and the strength of other muscles was grade 5.

On palpation, there was tenderness in all muscles around the patient's right sacroiliac joint, with radiating pain along the posterior thigh, accompanied by numbness, fatigue and other symptoms. The sacroiliac joint compression/distraction test, Gaenslen test, FABER test, and Yeoman test were all positive. The patient's diastasis recti abdominis (DRA) test showed 2 fingers above the umbilicus (about 22mm), indicating the presence of diastasis recti abdominis. Meanwhile, the thoracic mobility test showed a respiratory difference of 2cm at the level of the 4th rib on the midaxillary line (normal $\geq$ 2.5cm), suggesting insufficient thoracic mobility.

Based on the above findings, the patient was subjectively evaluated using the Canadian Occupational Performance Measure (COPM). The patient scored 3 points for functional limitations in daily parenting activities (holding the baby, breastfeeding, changing diapers, bathing, etc.) and mobility and transfer activities (walking on flat ground, going up and down stairs, etc.). Her satisfaction scores for these two types of activities were only 2 points and 4 points respectively. The patient's goals were: (1) Alleviate low back pain without affecting nighttime sleep; (2) Hold the baby for 20 minutes without worsening pain; (3) Reduce diastasis recti abdominis to $\leq$ 1 finger.

3. Auxiliary examinations

Imaging: Digital Radiography (DR) of the lumbar spine-pelvis showed mild left convexity of the thoracolumbar segment and wider right sacroiliac joint space than the left, with no bone destruction. Pelvic floor surface Electromyography (sEMG): Both anterior resting potential (9.791μV) and posterior resting potential (9.531μV) were higher than the normal upper limit (≤4μV); the average value of the endurance test was 21.93μV. These results indicated high-tension and low-endurance pelvic floor dysfunction, with 0-grade gluteal muscle involvement.

4. Intervention and follow-up

The patient received a total of 5 treatments, 30 minutes each time. Based on the pathological characteristics of the patient, such as weak core muscles, high pelvic floor tension, and abnormal posture, the following intervention plan was formulated.

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Restorative measures: ① Three-dimensional breathing training: The patient adopted a supine position with hip flexion at 90°, and an elastic ball was placed between the knees. During inhalation, three-dimensional expansion of the thorax-abdomen-pelvic cavity was performed; during exhalation, anal contraction-gluteal contraction-abdominal contraction was performed, 10 minutes per session, twice a day. ② Foam roller sequence: Activate deep core and gluteal muscles through thoracic spine extension-pelvic posterior tilt-single-leg glute bridge movements. ③ Thoracolumbar extension: Use a spinal orthosis combined with a yoga ball, maintain for 5 minutes per set, 3 sets in total. Functional training was conducted for the patient through the above methods, aiming to increase the patient's thoracic mobility and spinal flexibility. The focus was not only on exercising individual trunk muscles but also on changing the patient's breathing pattern and focusing on overall activities.

Meanwhile, preventive measures (occupational health education) were provided to the patient: For example, adaptation of maternal role-related occupations: adjust the height of the breastfeeding pillow, use a low stool for bathing, and use a baby carrier for single-arm baby holding; nurse occupational posture: raise the computer to eye level, add a lumbar pad to the chair back, and avoid "lumbar collapse sitting posture"; sleep management: place a pillow under the knees when supine, and place a pillow between the knees when lying on the side to maintain pelvic neutrality. Targeted occupational health education helped the patient establish awareness of daily posture management and reduce the load on the sacroiliac joint.

5. Follow-up results

A re-evaluation was conducted 2 weeks after intervention. All functional indicators improved significantly after intervention, basically reaching the patient's desired functional level. The specific results were as follows: The pain range was reduced to the right gluteal region with tenderness; the pain was characterized by soreness and distension, and the Numeric Rating Scale (NRS) score at rest was 2 points; there was no night awakening due to pain. Meanwhile, according to the COPM scores: The patient's function and satisfaction improved significantly. The limitation scores for parenting activities (holding the baby, breastfeeding, changing diapers, bathing, etc.) and mobility and transfer activities (walking on flat ground, going up and down stairs, etc.) were both 1 point, and the satisfaction scores for these two types of activities increased to 9 points. Other indicators: Pelvic floor sEMG showed that the anterior resting potential decreased to 5.97μV (a decrease of 35% compared with before treatment), the posterior resting potential decreased to 6.78μV (a decrease of 36% compared with before treatment), and the average value of the endurance test was 14.88μV, indicating reduced pelvic floor muscle tension and increased gluteal muscle contraction strength and endurance; thoracic mobility improved to 3.5cm; diastasis recti abdominis was reduced to 1.5 fingers; the patient could complete 20 single-leg glute bridges per set.

6. Discussion

This study describes a skill-training intervention method centered on OT for sacroiliac joint dysfunction (SIJD). As one of the common causes of low back pain, SIJD accounts for 15%-25% of patients with low back pain [3], and its incidence is increasing over time [4]. It is predicted that most puerperae with low back pain will experience sacroiliac joint (SIJ) pain [5], which may even seriously affect the health and quality of life of postpartum women [6]. Therefore, the key to the treatment of sacroiliac joint disorders lies in relieving pain and improving dysfunction. Manual therapy can correct the structural and functional disorders of the SIJ to alleviate symptoms, but

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conventional manual therapy can only achieve short-term effects with limited efficacy [7], and thus cannot effectively improve the lumbosacral core muscles of patients [8].

Postpartum SIJD during pregnancy is caused by various biomechanical mechanisms, including weight gain, posture changes, increased abdominal and intrauterine pressure, and relaxation of the spine and pelvic structures. Studies have shown that during pregnancy, the concentration of the hormone relaxin increases tenfold. The increase in relaxin leads to relaxation of the pelvic ligaments. With the relaxation of the pelvis and surrounding ligaments, especially the relaxation of the SIJ, abnormal wear may occur [9]. In addition, changes in body weight and excessive lordosis lead to forward displacement of the body's center of gravity. Combined with the biomechanical changes caused by weight gain and forward shift of the center of gravity, the load on the overall relaxed SIJ is increased, which further increases the risk of pain and injury and induces dysfunction [10]. During exercise, muscles such as the transverse abdominis, internal and external oblique abdominis, latissimus dorsi, erector spinae, gluteus maximus, piriformis, and biceps femoris play an important role in maintaining SIJ stability. Eldin et al. pointed out that due to changes in biomechanical structure during pregnancy and decreased muscle strength caused by relaxin, more than 80% of puerperae with SIJD reported that their quality of daily life was seriously affected, including daily housework, parenting, and work [11]. In summary, pelvic instability, ligament relaxation, SIJ asymmetry, and weakness of SIJ-related muscles are all important causes of persistent SIJD in postpartum women [12].

In this case, the patient failed to timely and specifically activate the deep core muscles (transverse abdominis, diaphragm, quadratus lumborum, pelvic floor muscles) and gluteal muscles after delivery, resulting in "synergistic failure" between them, increased shear force of the sacroiliac joint, and the formation of a vicious cycle of pain-inhibition-atrophy [13]. Therefore, starting from the key points of occupational therapy intervention, three-dimensional breathing can reconstruct the thorax-abdomen-pelvic cavity coupling, reduce high pelvic floor tension, and provide dynamic stability for joint locking. From the perspective of posture management, maternal role-related occupations were decomposed into tasks such as holding the baby, breastfeeding, and bathing. Through environmental modification and tool use, "spinal neutrality" was integrated into daily life, which is consistent with the core of OT-"occupation as treatment". Therefore, the significant reduction in short-term NRS score in this case was mainly due to three factors: 1. Reduced shear force of the sacroiliac joint; 2. Improved co-contraction of the gluteal-pelvic-lumbar muscles; 3. Enhanced central pain modulation through the respiratory-vagus nerve pathway [14]. In addition, the subjective improvement in COPM satisfaction and the faster recovery of "role ability" than pain recovery can better reflect the patient-centered treatment outcomes.

7. Conclusion

This study is a single-case analysis, with limitations such as a small sample size, lack of a control design, insufficient long-term follow-up data, and failure to collect synchronous pelvic floor and respiratory muscle ultrasound images. Future plans include conducting randomized controlled trials and introducing wireless sEMG real-time biofeedback to verify the applicability of this intervention method in the postpartum SIJD population. Occupational therapy centered on three-dimensional breathing-posture management-neuromuscular activation can rapidly relieve pain symptoms in patients with postpartum sacroiliac joint dysfunction in the short term and quickly restore their performance in maternal role-related occupations. This intervention plan has the characteristics of low equipment dependence and high social adaptability, and can provide a new practical path for clinical rehabilitation of postpartum sacroiliac joint dysfunction.

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