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The Impact of Improved Flying Swallow Combined Pillow Waist Method on Lumbar Disc Herniation

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Abstract: ***Objective*** *To explore the clinical efficacy and quality of life impact of the improved Flying Swallow training combined with pillow waist therapy for patients with lumbar disc herniation (LDH).* ***Methods*** *A total of 86 LDH patients were randomly and evenly divided into a control group and an observation group. The control group received improved Flying Swallow functional exercises and oral Celecoxib capsules, while the observation group additionally received waist pillow therapy. After one week of continuous treatment, changes in VAS scores, SCODI index, WHOQOL scores, lumbar physiological curvature, straight leg raise height, and clinical efficacy assessment were compared between the two groups.* ***Results*** *The cure and effectiveness rate in the observation group was significantly higher than that in the control group (P<0.01). VAS scores, SCODI index, lumbar physiological curvature, and WHOQOL scores were all significantly better in the observation group compared to the control group (P<0.05), but the difference in straight leg raise height was not significant (P>0.05).* ***Conclusion*** *The improved Flying Swallow training combined with pillow waist therapy can effectively alleviate clinical symptoms of LDH and improve quality of life, warranting further exploration and promotion in clinical practice.*

Keywords: Lumbar disc herniation, Improved Flying Swallow Style, Method of waist cushion, Functional exercise.

1. Introduction

Lumbar Disc Herniation (LDH) is a condition that occurs when the fibers of the lumbar intervertebral disc rupture due to natural aging, degeneration, or trauma, causing the nucleus pulposus to protrude and compress and irritate the nerve roots and cauda equina. The main clinical manifestations include low back pain, sciatica, cauda equina syndrome, radiating pain in the lower limbs, and numbness [1]. LDH is a common orthopedic disease, with an incidence rate as high as 15% among adults in China, severely threatening patients' health and affecting their quality of life [2]. The "Flying Swallow" exercise is a commonly used functional training method in orthopedics; however, the traditional Flying Swallow has shortcomings such as a large range of motion and difficulties in implementation during acute pain periods [3,4]. The "Occipito-Lumbar Method" can alleviate the pressure on the lumbar disc through mechanical support, reducing patients' low back and leg pain while restoring the physiological curvature of the lumbar spine [5]. We aim to modify the traditional Flying Swallow to make it easier to perform and combine it with the advantages of the Occipito-Lumbar Method to explore its efficacy for patients with lumbar disc herniation and its impact on quality of life.

2. Materials and Methods

2.1 General Information

We selected 86 patients with lumbar disc herniation who visited the Orthopedics Department of Chongqing Shapingba District Traditional Chinese Medicine Hospital from August 1, 2024, to March 1, 2025. The diagnostic criteria were based on the 2020 edition of the "Clinical Diagnosis and Treatment Guidelines - Orthopedic Volume" [6]. Patients were randomly divided into an observation group and a control group using computer-generated random numbers, with 43 cases in each group. In the observation group, there were 22 males and 21 females, with an average age of (42.88±6.73) years and an average disease duration of (2.52±0.96) months. In the control group, there were 20 males and 23 females, with an average age of (43.49±7.34) years and an average disease duration of (2.56±1.09) months. Comparisons of gender, age, and disease duration between the observation group and the control group showed no statistically significant differences (P > 0.05), indicating comparability. This study has been approved by the hospital's ethics committee.

2.2 Inclusion and Exclusion Criteria

2.2.1 Inclusion Criteria

(1) Patients who meet the diagnostic criteria for lumbar disc herniation; (2) Aged between 20 and 70 years; (3) Patients who voluntarily agree to participate in this study and sign an informed consent form.

2.2.2 Exclusion Criteria

(1) Those with severe cardiopulmonary diseases that cannot be tolerated; (2) Individuals allergic to celecoxib capsules; (3) Patients and their families who refuse to participate in the study, pregnant women, or individuals with mental disorders who are unable to cooperate with the researchers.

2.3 Treatment Methods

(1) Control Group

The control group received modified Flying Swallow exercises for back muscle function and orally took celecoxib capsules (Jiangsu Zhengda Qingjiang Pharmaceutical Co., Ltd., product batch number: National Medicine Approval Code H20193414, specification: 0.2g) at a dosage of 0.2g once daily. The specific exercise method for the modified

Flying Swallow was as follows: patients lie face down, legs extended straight, with hands crossed behind the waist; with the abdomen on the floor, lift the head and neck, extending one leg backward and upward while maintaining the position for 3 seconds; then switch to the other leg and repeat the exercise, also holding for 3 seconds. Maintaining both legs for 3 seconds counts as one set of exercises. After resting for 10 seconds, the next set is performed. Each patient completes 15 sets of exercises twice daily for one week. As shown in Figure 1.

Figure 1: Modified Flying Swallow exercises

(2) Observation Group

The observation group received lumbar pillow treatment in addition to the treatment methods used in the control group. The specific method was as follows: patients lie supine with a bamboo lumbar pillow placed at the lumbar region. The height of the lumbar pillow is 5 cm. When using the lumbar pillow, the chest and back should remain in contact with the bed while maximizing the stretch toward the head, and the legs should be maximally stretched toward the tail side, achieving the effect of lumbar traction. Each session lasts for 15 minutes, performed once in the morning and once in the evening, continuously for one week. The lumbar pillows were purchased from the same manufacturer and batch. As shown in Figure 2.

Figure 2: The lumbar pillows

2.4 Observation Indicators

(1) Pain intensity was assessed using the Visual Analog Scale (VAS).

(2) The Short Form Chinese Oswestry Disability Index (SCODI) was used to evaluate lumbar function.

(3) Quality of life was assessed using the World Health Organization Quality of Life Assessment Scale (WHOQOL).

(4) The physiological curvature of the lumbar spine was measured using the Seze method.

(5) The height of straight leg raise (SLRT) was recorded.

2.5 Efficacy Assessment

Referring to the "Standards for the Diagnosis and Efficacy of Traditional Chinese Medicine Diseases" [11], the total effective rate is calculated as follows: Total Effective Rate = (Cured + Significantly Improved + Effective) / Total Cases × 100%. The significant improvement and cure rate = (Cured + Significantly Improved) / Total Cases × 100%.

2.6 Statistical Methods

Statistical analysis of all data was performed using SPSS 23.0 software. Data were described using standard deviation (SD). Measurement data were analyzed using t-tests and rank-sum tests, while comparisons before and after treatment within the same group were conducted using paired sample t-tests. Count data were analyzed using chi-square tests, with $P < 0.05$ considered statistically significant.

3. Results

3.1 Comparison of SCODI Index and VAS Scores Between the Two Groups

Table 1: Comparison of SCODI Index and VAS Scores Between the Two Groups

Group	n	SCODI Index		VAS	
		Before treatment	After treatment	Before treatment	After treatment
Observation Group	43	30.07±2.26	15.88±2.17*	6.05±1.53	2.51±1.44*
Control Group	43	29.35±1.93	19.98±2.31*	5.93±1.56	3.63±1.53*
t		1.59	-8.45	0.35	-3.49
p		0.12	<0.01	0.73	<0.01

Note: * indicates a statistically significant difference compared to the pre-treatment values within the same group (P < 0.05).

3.2 Comparison of Lumbar Curvature and SLRT Angles Between the Two Groups

Table 2: Comparison of Lumbar Curvature and SLRT Angles Between the Two Groups

Group	n	Lumbar Curvature		SLRT	
		Before treatment	After treatment	Before treatment	After treatment
Observation Group	43	11.05±1.59	16.05±1.56*	54.84±11.02	77.67±7.51*
Control Group	43	11.33±1.64	14.09±1.70*	53.19±13.66	73.95±11.16*
t/z		-0.80	5.55	0.72	1.64
p		0.43	<0.01	0.47	0.10

Note: * indicates a statistically significant difference compared to the pre-treatment values within the same group (P < 0.05).

3.3 Comparison of WHOQOL Scores Between the Two Groups

Table 3: Comparison of WHOQOL Scores Between the Two Groups

Group	n	Before treatment	After treatment
Observation Group	43	65.81±5.67	88.49±9.03
Control Group	43	66.98±6.47	83.49±7.36
z		-0.77	-2.99
p		0.44	<0.01

Note: * indicates a statistically significant difference compared to the pre-treatment values within the same group (P < 0.05).

3.4 Comparison of Efficacy Between the Two Groups

Table 4: Comparison of Efficacy Between the Two Groups of Patients [n(%)]

Group	n	Cure	Significant effect	Effective	Invalid	Total efficiency	Cure＋Significant effect
Observation Group	43	8(18.60)	20 (46.51)	13 (30.23)	2 (4.65)	41(95.35)	28(65.12)*
Control Group	43	3(6.98)	9(20.93)	24(55.81)	7(16.28)	36(83.72)	12(27.91)

Note: Compared to the control group (cure + significant effect), $\chi^2 = 11.965$, * P < 0.01.

4. Discussion

Back muscle function exercises are an important treatment method in orthopedics and rehabilitation, which can increase spinal stability to some extent, prevent adhesion between spinal nerve roots and tissues, and improve microcirculation in the lumbar region, thereby alleviating lower back pain and radiating numbness in the lower limbs [7]. Among these, the Flying Swallow back muscle function exercise is a commonly used functional exercise in clinical practice. It helps prevent muscle spasms and atrophy in the back, enhances back muscle strength, promotes local blood circulation, restores oxygen supply to cells, and reduces the accumulation of acidic metabolic products and inflammatory factors, thereby alleviating symptoms such as pain in patients [8]. However, for patients with acute low back pain due to lumbar disc herniation, performing traditional Flying Swallow back muscle function exercises can be quite challenging and may even exacerbate pain during the acute phase [9]. The Flying Swallow exercise primarily targets the superficial muscles of the lumbar region. While it is effective in enhancing back muscle strength and correcting dysfunctions in the thoracolumbar small joints, its effect on restoring the overall biomechanical structure of the spine is not significant [10].

The use of lumbar pillows to treat low back pain has a long history, with records in the Yuan Dynasty's "Huihui Prescriptions" stating, "Have the patient lie supine with a hard pillow placed under the spine. The "Compendium of Materia Medica" also mentions using herbs like Fangfeng and Jingjie to create lumbar pillows for treating "low back pain and neck stiffness. This method has a certain effect on restoring the physiological curvature of the lumbar spine, as the lumbar pillow provides physical support to the lumbar vertebrae, achieving extension of the lumbar spine and allowing the vertebral bodies to return to their original anatomical position, thus correcting the physiological lordosis of the lower back [11].

The position and structure of the lumbar vertebral bodies are fundamental to lumbar biomechanics. By adjusting the positions of the lumbar vertebral bodies, the lumbar pillow helps achieve relative mechanical balance, ultimately increasing the relative stability of the lumbar region. This finding is consistent with the observation that the degree of lumbar curvature recovery in the treatment group was more significant than that in the control group (P<0.01). Additionally, the lumbar pillow has a traction-like effect on the lumbar spine, opening up the intervertebral spaces and reducing pressure on the intervertebral discs, which plays a positive role in the repair of the annulus fibrosus. The application of traction alters the relative position of the herniated nucleus pulposus and the compressed nerve roots, alleviating pressure on the nerve roots and leading to relief or disappearance of symptoms such as radiating pain or numbness in the lower limbs [12].

We have made improvements to the traditional Flying Swallow exercise by incorporating a single-leg decomposed functional exercise, which is easier for older patients with poor lumbar function and those experiencing acute pain. This method employs flexible functional exercises and is characterized by a lower risk. At the end of the exercise, raising the head, neck, chest, and both legs simultaneously to their limits and holding for 3 seconds aligns better with the principles of strength training in sports medicine, which emphasizes "dynamic points for muscle strength training and static points for shaping."

Additionally, the combination of the lumbar pillow significantly improves patients' symptoms of low back and leg pain and enhances quality of life, achieving the effects of lumbar traction and restoring physiological lordosis. However, there was no significant difference in the straight leg raise angles between the two groups after treatment. This can be attributed to the fact that straight leg raise angles exceeding 70° hold no special clinical significance. Both groups experienced marked improvement in symptoms such as pain following treatment, resulting in most patients achieving straight leg raise angles above 70°, which rendered them negative.

The results of this study indicate that the total effective rate, as well as the (cure + significant improvement) rate and WHOQOL scores in the observation group, were significantly higher than those in the control group ($P<0.01$). This suggests that the improved Flying Swallow functional exercise combined with the lumbar pillow method offers greater advantages in treating lumbar disc herniation compared to the modified Flying Swallow exercise alone and can improve patients' quality of life. However, since this study involved a small sample size and a short treatment duration, further large-scale and long-term research is needed to confirm its efficacy.

5. Conclusion

In summary, the improved Flying Swallow exercise combined with the lumbar pillow method has significant advantages in alleviating symptoms of low back and leg pain associated with lumbar disc herniation, restoring the physiological curvature of the lumbar spine, and enhancing patients' quality of life. This approach is also easy to implement, carries a lower risk, and holds potential value in the treatment of lumbar disc herniation, warranting further exploration and promotion in clinical practice.

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