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Special Topic Study

Therapeutic observation of tuina manipulation for lumbar intervertebral disc herniation

推拿手法治疗腰椎间盘突出症临床疗效观察

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Abstract
Objective: To observe the clinical efficacy of balance-impact tuina therapy for lumbar intervertebral disc herniation (LIDH).
Methods: A total of 118 eligible LIDH patients were randomized into an observation group and a control group by the random number table method, with 59 cases in each group. The observation group was intervened by balance-impact tuina therapy, while the control group was intervened by conventional tuina therapy, both for consecutive two weeks. The scores of visual analog scale (VAS), Oswestry disability index (ODI), quality of life questionnaire-core 30 (QOL-C30) were observed before and after treatment; the relapse rate was estimated at the sixth month and twelfth month following the treatment. The data were statistically analyzed.
Results: After intervention, the total effective rate was 96.6% in the observation group versus 91.5% in the control group, and the between-group difference was statistically significant (P<0.05). The VAS and ODI scores declined significantly after treatment in both groups (all P<0.05), and the observation group was markedly lower than the control group (P<0.05, P<0.01). The QOL-C30 score increased significantly after treatment in both groups (both P<0.05), and the observation group was markedly higher than the control group (P<0.05). The relapse rates at the post-treatment sixth month and twelfth month in the observation group were lower than those in the control group (P<0.05, P<0.01).
Conclusion: Compared with the conventional tuina therapy, the balance-impact tuina therapy shows advantage in lessening pain, improving the function and enhancing the quality of life in the treatment of LIDH, and it has a lower relapse rate. Thus, this therapy is worth promoting in clinic.
Keywords: Tuina; Massage; Low Back Pain; Intervertebral Disc Displacement; Pain Measurement; Visual Analog Scale; Quality of Life

【摘要】目的：观察平衡冲击推拿疗法对腰椎间盘突出症(LIDH)的临床疗效。**方法：**将符合纳入标准的118例LIDH患者按随机数字表法随机分为观察组和对照组，每组59例。观察组采用平衡冲击推拿疗法，对照组采用传统推拿疗法，两组均连续治疗2周。观察治疗前后视觉模拟量表(VAS)评分、Oswestry功能障碍指数(ODI)评分、生活质量核心量表(QOL-C30)评分及治疗结束后第6个月、第12个月复发率，并进行统计分析。**结果**：治疗后，观察组总有效率96.6%，对照组总有效率为91.5%，两组比较有显著差异(P＜0.05)。治疗后，两组VAS评分和ODI评分均较治疗前明显降低(均P＜0.05)，且观察组明显低于对照组(P＜0.05, P＜0.01)。治疗后，两组QOL评分均较治疗前明显升高(均P＜0.05)，且观察组明显高于对照组(P＜0.05)。治疗后第6个月及第12个月随访复发情况，观察组复发率均低于对照组(P＜0.05, P＜0.01)。**结论：**平衡冲击推拿疗法治疗LIDH在缓解疼痛、改善功能障碍、提高生活质量方面优于传统推拿疗法，且复发率低，值得临床推广应用。

【关键词】推拿；按摩；腰痛；椎间盘移位；疼痛测评；视觉模拟量表；生活质量
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Lumbar intervertebral disc herniation (LIDH) mainly manifests as pain in one or both sides of the low back, sometimes accompanied by radiating pain in the lower extremities. LIDH may result from injuries, chronic strain or degeneration. In traditional Chinese medicine (TCM), this disease is under the scope of Bi-impediment or low back pain[1]. In China, LIDH affects 8%-25% of the adults[2]. Numerous clinical studies have proved the effectiveness and advantages of TCM external therapies in the treatment of LIDH, despite problems such as a high relapse rate[3-4]. Through long-term clinical practice, and based on both TCM and modern rehabilitation theories, our Rehabilitation Department has brought up

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that the loss of relevant balance between muscles, joints, ligaments, nerves, discs, etc. should be the key factor in causing LIDH. Thus, the treatment for LIDH should also help rebalance the joints and soft tissues around the affected areas besides pain relief. And that is how the balance-impact tuina therapy derived. To observe the clinical efficacy of this tuina therapy in the treatment of LIDH, we had conducted a trial during 2016-2017 by recruiting 118 patients. The report is given as follows.

1 Clinical Materials

1.1 Diagnostic criteria

The diagnosis of LIDH referred to the criteria in the *Practical Orthopedics*[5] and the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine*[6]: in the stage of attack of LIDH; pain in the low back, accompanied by radiating pain in the lower extremities; straight leg raise test showed positive; trigger points could be found in the affected areas; scoliosis or loss of the physiological curvature of the lumbar spine; changes in muscle force, tendon reflexes and skin sensations; altered spinal posture; herniated discs in lumbar vertebrae revealed by MRI or CT examination.

1.2 Inclusion criteria

Conforming to the diagnostic criteria; aged 30-65 years old, gender unlimited; without a history of lumbar surgery; patients who were willing to participate in the study with informed consent.

1.3 Exclusion criteria

Cauda equina injury or paralysis, causing significant urinary or defecation dysfunction; lumbar spinal stenosis or space-occupying lesions; lumbar spinal tumor, tuberculosis or infection; significant osteoporosis or bone destruction; mental disorders and nervous system diseases; pregnant women.

1.4 Statistical method

The SPSS version 21.0 was used for data processing. Enumeration data were analyzed by Chi-square test. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$), with the between-group comparisons processed by independent samples *t*-test and intra-group comparisons processed by paired samples *t*-test. Ranked data were analyzed by *Ridit* analysis. $P<0.05$ was considered as statistical significance.

1.5 General data

The subjects were all diagnosed with LIDH and recruited from the Rehabilitation Department of Chenzhou No.1 People's Hospital between January 2016 and April 2017. The 118 patients were randomized into an observation group and a control group by the random number table method, with 59 cases in each group. There were no significant differences in the general data between the two groups (all $P<0.05$), indicating the comparability (Table 1).

Table 1. Comparison of the general data

Group	*n*	Gender (case)		Mean age ($\bar{x} \pm s$, year)	Mean duration ($\bar{x} \pm s$, year)
		Male	Female		
Observation	59	36	23	46.5±9.4	2.5±0.7
Control	59	38	21	45.8±7.7	2.8±0.7

2 Treatment Methods

2.1 Observation group

The observation group was intervened by the balance-impact tuina therapy. The methods are described as follows.

2.1.1 Pre-treatment evaluation

The patient took a prone position, and the doctor stood by the affected side, palpating the tensed muscles in the affected area and locating the affected lumbar processes with the fingers. The affected vertebral bodies and locations were marked. With the help of imaging examinations, for the transverse processes dislocated posteriorly within 5 mm, the impact force should be mild-to-moderate; for those dislocated posteriorly over 5 mm, the impact force should increase correspondingly but remain tolerable.

2.1.2 Treatment process

The first step: The patient took a prone position to receive manipulations to relax topical tissues, and the manipulations included Rou-kneading, An-pressing, Dian-digital pressing and Pai-patting, for 5 min in total (Figure 1-Figure 3).

The second step: The practitioner put one middle finger closely on one side of the transverse process of the lumbar vertebra, and impacted on the middle finger with the fist formed by the other hand (the fist did not directly touch the patient). This performance was applied from L_2 to L_5 in sequence, 30 s for each transverse process (Figure 4-Figure 5). The impact force was determined by the pre-treatment evaluation.

Figure 1. An-pressing manipulation

Figure 2. Dian-digital pressing manipulation

Figure 3. Pai-patting manipulation

Figure 4. Impacting transverse process 1

Figure 5. Impacting transverse process 2

The third step: The practitioner moved the middle finger to the sacrum and impacted the finger with the fist of the other hand. The sacrum area was treated from up to down and from the center to the outside (Figure 6-Figure 7). The treated points were 2 cm away from each other and the impact force should be within the patient's tolerance, 20 s for each point.

Figure 6. Impacting sacrum 1

Figure 7. Impacting sacrum 2

The fourth step: The patient took a supine position, and the practitioner used his fist to directly impact the area around the patient's knee joints (Figure 8-Figure 9). The impacting direction should depend on the shape of the patient's legs. For example, for bow legs, the lateral side of the lower end of the thigh was impacted towards inside, and vice versa. The impact force should also be within the patient's tolerance, two minutes for each knee. The impacting manipulations should be performed swiftly and repetitively to different areas within the patient's tolerance.

2.2 Control group

The control group was treated with conventional tuina therapy. The method is given as follows.

The patient took a prone position and the doctor applied Na-grasping, Rou-kneading and thumb Tui-pushing manipulations to the affected side of the low back for 5 min (Figure 10). Then, with the elbow or the

root of the palm, the doctor An-pressed lumbar Jiaji (EX-B 2), Dachangshu (BL 25), Shenshu (BL 23), Mingmen (GV 4), Huantiao (GB 30), and Zhibian (BL 54), one minute for each point (Figure 11-Figure 12). Tanbo-plucking manipulation was then applied to bilateral psoas major muscles, two minutes for each side. Afterwards, oblique Ban-pulling manipulation was conducted for the lumbar spine when the patient lied on the side (Figure 13). Finally, the doctor Ca-rubbed the affected side of the low back (Figure 14) until heat sensation penetrated inside.

Figure 8. Impacting knee 1

Figure 9. Impacting knee 2

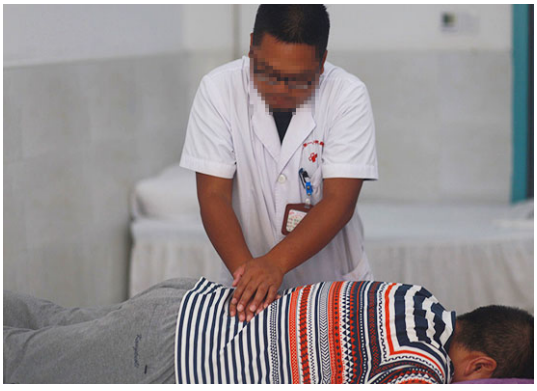

Figure 10. Rou-kneading manipulation

Figure 11. An-pressing lumbar Jiaji (EX-B 2) with the elbow

Figure 12. An-pressing Huantiao (GB 30) with the elbow

Figure 13. Oblique Ban-pulling of the lumbar spine

Figure 14. Ca-rubbing manipulation

The tuina manipulations for the two groups were all performed by one same physician. Both groups were treated once a day, six times a week, for consecutive two weeks. They were evaluated by relevant scales and the therapeutic efficacy was also determined.

3 Observation of Therapeutic Efficacy

3.1 Observation items

3.1.1 Pain

The pain intensity was estimated by visual analog scale (VAS) before and after treatment. A 10 cm line was drawn on a piece of paper with the two ends marked 0 and 10 cm, respectively, to stand for 0 and 10 points. 0 represented no pain, while 10 stood for unbearable pain. Each patient was asked to mark on the line according to their own feeling of pain intensity. The higher the score, the more intensive the pain.

3.1.2 Dysfunction

Oswestry disability index (ODI) was employed to assess the dysfunction degree before and after treatment. ODI mainly covers three aspects: pain, monomial ability and comprehensive ability. Pain refers to both pain intensity and its effect on sleep; monomial ability includes four aspects: sitting, lifting/carrying, standing and walking; comprehensive ability also includes four aspects: sexual function, ability to care for oneself, social life, and ability to travel. It consists of 10 questions and each question is scored 0-5 points, which make a full score of 50 points. The higher the score, the severer the dysfunction.

3.1.3 Quality of life (QOL)

QOL was estimated by the quality of life questionnaire-core 30 (QOL-C30), which covers the physiological function, psychological function, social function and general QOL. The full score is 100 points. The higher the score, the better the QOL.

3.1.4 Relapse

A one-year follow-up study was performed for all the patients to compare the relapse at the sixth month and the twelfth month following the treatment between the two groups.

3.2 Criteria of therapeutic efficacy

The criteria of therapeutic efficacy were made by referring to the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine*[6] and the *Guiding Principles for Clinical Study of New Chinese Medicines*[7].

Recovered: Symptoms including pain in the low back and lower extremities and signs were gone, straight leg raise showed negative, living and working abilities were restored, and the improvement rate of the total score of the scales ≥75%.

Markedly effective: Symptoms including pain in the low back and lower extremities and signs were substantially gone, straight leg raise >70°, working ability was restored, living ability was not affected, and the improvement rate of the total score of the scales ≥50% but <75%.

Effective: Symptoms including pain in the low back and lower extremities and signs showed improvements, the range of motion of the low back and legs increased, the improvement rate of the total score of the scales ≥25% but <50%, and the patient was able to take care of oneself.

Invalid: Failed to reach any of the above standards or even got worse.

3.3 Treatment results

3.3.1 Comparison of the clinical efficacy

The total effective rate was 96.6% in the observation group versus 91.5% in the control group, and the between-group difference was statistically significant (P<0.05), indicating a better clinical efficacy in the observation group (Table 2).

Table 2. Comparison of the therapeutic efficacy (case)

Group	n	Recovered	Markedly effective	Effective	Invalid	Total effective rate (%)
Observation	59	22	28	7	2	96.6[1)]
Control	59	14	21	19	5	91.5

Note: Compared with the control group, 1) P<0.05

3.3.2 Comparison of the VAS score

After treatment, the VAS score declined significantly in both groups (P<0.01, P<0.05), indicating the improvement of pain in the two groups. The VAS score in the observation group was significantly lower than that in the control group after intervention (P<0.05), suggesting a better effect in easing pain in the observation group (Table 3).

Table 3. Comparison of the VAS score before and after treatment ($\bar{x}$ ±s, point)

Group	n	Pre-treatment	Post-treatment	t-value	P-value
Observation	59	8.12±1.26	2.87±0.56	12.38	0.00
Control	59	7.98±1.31	4.65±0.43	23.37	0.02
t-value		0.39	12.28		
P-value		0.07	0.03		

3.3.3 Comparison of the ODI score

After treatment, the ODI score declined significantly in both groups (both $P<0.01$), indicating the improvement of function in the two groups. The ODI score in the observation group was significantly lower than that in the control group after intervention ($P<0.01$), suggesting a better effect in improving the function in the observation group (Table 4).

Table 4. Comparison of ODI score ($\bar{x}$ ±*s*, point)

Group	*n*	Pre-treatment	Post-treatment	*t*-value	*P*-value
Observation	59	60.58±8.34	14.21±5.62	38.24	0.00
Control	59	61.44±7.85	28.36±7.54	24.84	0.00
t-value		0.85	15.42		
P-value		0.56	0.00		

3.3.4 Comparison of the QOL-C30

After treatment, the two groups achieved noticeable improvement in the physiological function, psychological function, social function and general QOL ($P<0.01$, $P<0.05$). The observation group had more significant improvements in the above aspects compared with the control group (all $P<0.01$), (Table 5).

3.3.5 Comparison of the relapse

The relapse was estimated at the sixth month and the twelfth month following the treatment. At the sixth month, there was no relapsed case in the observation group while six cases got a relapse in the control group, and the between-group difference was statistically significant ($P<0.05$). At the twelfth month, three cases in the observation group and 16 cases in the control group got a relapse, and the between-group difference was statistically significant ($P<0.01$), (Table 6).

Table 5. Comparison of the QOL-C30 ($\bar{x}$ ±*s*, point)

Group	*n*	Time	Physiological function	Psychological function	Social function	General QOL
Observation	59	Pre-treatment	59.25±7.58	57.22±5.52	63.25±7.68	61.32±7.66
		Post-treatment	87.63±6.32[1)3)]	81.62±7.34[1)3)]	83.93±8.24[1)3)]	94.65±10.39[1)3)]
Control	59	Pre-treatment	61.44±8.25	56.37±6.45	62.47±7.31	60.97±8.26
		Post-treatment	75.38±7.28[2)]	72.58±4.38[2)]	74.29±8.54[2)]	83.56±9.89[2)]

Note: Intra-group comparison, 1) $P<0.01$, 2) $P<0.05$; compared with the control group after intervention, 3) $P<0.05$

Table 6. Comparison of the relapse (case)

Group	*n*	Time	Relapse	Remission	Relapse rate (%)
Observation	57	Post-treatment month 6	0	57	0.0[1)]
		Post-treatment month 12	3	54	5.3[2)]
Control	54	Post-treatment month 6	6	48	11.1
		Post-treatment month 12	16	38	29.6

Note: Compared with the control group at the same time point, 1) $P<0.05$, 2) $P<0.01$

4 Discussion

In TCM, there is no specific term for LIDH, and it is classified into the scopes of lumbago, Bi-impediment syndrome, or low back pain[8]. LIDH may result from injuries brought by a sudden force, chronic strain or degenerated lumbar intervertebral discs, which can tear the outer fibrous ring and the protruded disc compresses the nerve root, presenting as inflammation in the topical area, and subsequent pain in the lower back and radiating pain in the lower limbs or motor dysfunction[9-10]. The basic treatment principle for LIDH is to ease pain and restore the lumbar movement[11]. Currently, treatments for LIDH can be classified into two types: conservative treatment and surgery. Surgery usually causes a massive wound and runs certain risks. Therefore, patients often prefer the conservative treatment. The conservative treatment ranges from acupuncture-moxibustion, tuina, needle knife, cupping, physiotherapy, and external medicinal application[12]. Although many clinical studies have proved the efficacy of the conservative treatments, the treatment result is inconsistent due to the diversity of treatment method and intervention time, let alone the high relapse rate. Therefore, how to enhance and maintain the effectiveness of conservative treatments has become a tangible issue to tackle with[13-16]. Rehabilitation Department has always had advantage in treating LIDH. Through long-term clinical practice, our Rehabilitation Department posits that LIDH be rooted in the relevant imbalance between lumbar muscles, nerves, tendons, joints and intervertebral discs, and thus the treatment for LIDH should not only target the symptoms but also the restoration of the balance between the tissues mentioned above.

According to TCM, LIDH is caused by the mechanical

instability of 'tendons' and 'bones'. Here, 'tendons' in low back range from the intervertebral discs, nucleus pulposus, nerve root, ligaments and muscles (such as multifidi, intertransverse muscle, and interspinalis); while bones include vertebral bones and zygapophyseal joints, etc. Tendon controls the bone while bone supports the tendon. The harmonious coordination between tendon and bone is fundamental to the dynamic balance of spine and joints[17]. Once the balance between tendon and bone is broken, problems will occur. The famous orthopedics expert Feng Tian-you[18] believes that the pathogenesis of LIDH should involve tear of annulus fibrosus, herniated nucleus pulposus, disordered zygapophyseal joints, and damaged intervertebral ligaments, covering the injuries of both tendon and bone[19]. Therefore, the treatment of LIDH needs to target the clinical symptoms as well as the imbalanced tendon and bone, which is of great significance in boosting the release of symptoms and maintaining the therapeutic efficacy.

The balance-impact tuina therapy was developed by Professor Xie Hui from the Rehabilitation Department of Chenzhou No. 1 People's Hospital through long-time clinical practice. It is based on the precise evaluation of the disease condition and performed by repetitively and swiftly impacting the specific area in certain articular disorders. This therapy combines both TCM and modern rehabilitation theories, emphasizes the pre-treatment evaluation, and applies swift external impact to restore the balance of the affected joints and soft tissues. It accords with the TCM bonesetting theory that 'to separate before integrate', emphasizing the self-healing ability of the body. Pain often arises from the imbalanced areas, and thus the restoration of balance should be the premise to release pain. Pain in LIDH is rooted in the compression of nucleus pulposus on the nerve root, while the balance-impact tuina therapy can work on the compression and balance the tissues around the lumbar spine. For the treatment of LIDH, balance-impact tuina therapy works by four steps which all take balance as the key. The first step is relaxing manipulations. It records in *Huang Di Nei Jing* (*Yellow Emperor's Classic of Internal Medicine*) that 'working without feeling fatigue', which means that sports or work should be within a proper load and excessive work or sports will lead to diseases or pain. Relaxing manipulations are to release the tense in muscles and soft tissues and restore their balance. The second step is to impact the transverse processes. LIDH often presents displaced vertebral bodies, and impacting the disordered transverse processes can help the vertebral bodies move back to the right places. Meanwhile, the impacting force can reach to the deep-layer muscles. The mild movement of vertebral bodies and relaxation of deep-layer muscles give more space to the nerve root, so as to erase the compression. The third and fourth steps are to impact the sacrum and knee joints. *Su Wen* (*Essential Questions*) says that treating the lower body for the diseases affecting the upper body. Although LIDH mainly affects the low back, the imbalance of the upper body will cause imbalance of the lower body because of the integrity of human body. To relax the whole, each point on the line should be relaxed first. When the structure of both upper and lower bodies is corrected and the lower-body muscles and tendons are relaxed, not only the problems of the upper body can be solved but the disorders of the lower body can also be prevented and treated.

This study showed that the balance-impact tuina therapy and conventional tuina therapy both produced satisfactory efficacy for LIDH, but the balance-impact tuina therapy presented significant advantage in comparing the therapeutic efficacy and the improvements in pain, dysfunction, and quality of life. Follow-up studies were performed to observe the recurrence of low back pain at half a year and one year after treatment. The result revealed that the balance-impact tuina therapy had markedly lower relapse rate than the conventional tuina therapy, suggesting that the balance-impact tuina therapy can produce satisfactory long-term efficacy. To conclude, the balance-impact tuina therapy is worth promoting in clinic.

Conflict of Interest

The authors declared that there was no potential conflict of interest in this article.

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Statement of Informed Consent

Informed consent was obtained from all individual participants.

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