Original Article
Clinical effects of acupuncture and massage in treating acute lumbar sprain

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Abstract: Objective: This study was designed to analyze the effects of acupuncture and massage in treating acute lumbar sprain. Methods: A total of 93 patients diagnosed with acute lumbar sprain in our hospital were divided into Group A (GA, n = 48, traditional Chinese acupuncture + massage) and Group B (GB, n = 45, routine Western medicines + lumbar exercises) according to the sequence of admission. The VAS score, lumbar motion score, RDQ score of lumbar dyskinesia, range of lumbar motion and treatment effectiveness were compared between the two groups. Results: At 3 d, 5 d and 7 d after treatment, the VAS score and the RDQ score were lower in GA (P < 0.05). At 3 d and 7 d after treatment, the lumbar motion score was lower in GA (P < 0.05). The OR was 89.58% in GA and 73.33% in GB (P < 0.05). Conclusion: Acupuncture combined with massage is conducive to effectively mitigate pain, reduce lumbar dyskinesia and improve lumbar motion in the treatment of acute lumbar sprain.

Keywords: Acute lumbar sprain, TCM, acupuncture, massage, treatment

Introduction
As an acute injury at the waist, acute lumbar sprain is often caused by sudden forces on the lower back, lumbosacral fascia, muscles, and ligaments, etc. Its manifestations include acute lumbodynia, lumbar muscle spasm, and limitations of lumbar motion to different degrees. In some cases, forced positions may occur, seriously affecting patients' work and daily life [1, 2].

According to Western medicine, acute lumbar sprain is a traumatic disease with pain caused by sudden external forces. However, the root causes of pain are not sufficiently investigated [3]. Believing that trauma is irreversible, Western medicine adopts mainly conservative treatment, including analgesics, physical therapy, and bed rest [4]. However, physical therapy is not suggested in the early stage as it may aggravate patients' conditions. Though drug treatment can temporarily relieve the pain, the symptoms are not eliminated and the recurrence rate after drug withdrawal is high [5]. Therefore, Western medicine fails to find a specific treatment for acute lumbar sprain. As studies go further and become extensive, acute lumbar sprain is drawing rising attention from researchers in the TCM field. Although trauma is an important cause of acute lumbar sprain according to TCM, the pathogenesis is that external forces result in local depression and stagnation of Qi, and blood stasis [6]. There is no direct record and description of acute lumbar sprain in TCM. According to clinical manifestations and pathogenic reasons, acute lumbar sprain is included in the category of blood stasis, lumbodynia and injury of the muscle and tendon at the waist. In TCM, acute lumbar sprain is caused by sudden strain or contusion which injures the veins and muscles, and leads to lumbar muscles and vessels having issues. The results include muscle spasm, meridian obstruction and stagnation of Qi and blood [7, 8].

In TCM, acute lumbar sprain has been studied for a long time, evidenced by many clinical reports. In these studies, methods such as
decoctions, massage, acupuncture and cupping were applied both individually or singly with Western applications [9]. Few attempts were made to combine different TCM methods. Therefore, this study included 93 patients in our hospital to explore the efficacy of acupuncture combined with massage, in order to find more effective methods for treating acute lumbar sprain.

**Materials and methods**

**Materials**

A total of 93 patients diagnosed with acute lumbar pain from August 2018 to August 2019 were divided into GA (n = 48) and GB (n = 45) based on their sequence of admission. They were informed of the study content and provided their consent for participation. The study has been approved by the ethics committee of the Binzhou Medical University Hospital. Inclusion criteria: Admitted to the Emergency Department for lumbar sprain and met the diagnostic criteria of lumbar sprain [10]; course of disease shorter than 3 d; not treated by other means; age between 18 and 60; good treatment adherence. Exclusion criteria: cases not confirmed through clinical examinations; history of prolapse of lumbar intervertebral disc, lumbar muscle degeneration, lumbar fracture or other lumbar diseases; complicated with other severe underlying body diseases or mental disorders, or pregnant or lactating women.

**Methods**

Patients in GB orally took Meloxicam (Product specification: 7.5 mg*20 s, approval document No.: GYZZ H20030486, manufacturer: Simcere Pharmaceuticals Co., Ltd.) with warm water at a dose of 7.5 mg/time qd for one week, during which, lumbar exercises were also performed under the following guidance: patients stood still and bent the waist rightward, forward, leftward and backward until the limitation point of motion. For instance, if the point was at the right side, patients rotated backward, leftward, forward and rightward, and if it was at the left side, the sequence was backward, rightward, forward and leftward. The range of motion increased gradually.

Patients in GA were treated by acupuncture and massage. Acupuncture: All points at the waist with pain were selected by the following method: by spreading the palm, the point between the second and third, the fourth and fifth metacarpal bones, and between the rasceta and the central point of the metacarpophalangeal joint. The selected points were disinfected with medical alcohol, and a stainless filiform needle (0.30 mm*25 mm) was straightly inserted and repeatedly lifted up for 1 min with a narrow range until local soreness occurred spreading to the whole palm. The needle was kept in place for half an hour, and every 10 min needle manipulation was performed. For each point, the needle manipulation lasted 1 min. Every patient was given acupuncture once a day for a course consisting of 7 d. Massage: (1) With patients lying on their stomach, the doctor stood by the waist side at a T-step and flatly pushed on the back with one palm of the hand from the Dazhui of the governor meridian to the Yaoyu at the waist and from the Dushu of Taiyang bladder meridian of foot to the point Ju. The process was repeated 3 times. (2) The second form was top-down rolling from the circulating point of the governor meridian on the lower back and the bladder meridian to the Fuyang of lower extremities. Each lower limb was massaged for 5 min. (3) The waist was gently pressed and vacillated to the left and to the right to cause the lower extremities to move. The cycle was repeated 15 times. Guided by the doctor, patients put their palms and forearms together, and bent the elbows at 90°. Both arms were put at the Pingyinmen at the middle part of posterior femoral side and swung to put the waist in motion. The cycle was repeated 15 times as well. (4) The pain points on the waist were pinched with both thumbs, 15 times, and the waist was kneaded with the heel of the hand for 5 min. (5) From top to bottom, points including Mingmen, Yaoyangguan, Shengyu, Dachangyu, Taixi and Pangguanguyu were malaxed by the thumb, 36 times, while the Weizhong was pinched 36 times. Every patient was massaged once a day for a course of 7 d.

**Observation indices**

Lumbar pain intensity: Visual Analogue Score (VAS) [11] was adopted to evaluate the lumbar pain intensity of both groups before, at 1 d, 3 d, 5 d and 7 d after treatment. Three times a day, patients were guided to select a number from a 10 cm ruler to express their pain inten-
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Figure 1. VAS.

mit. The average was taken as the pain intensity of that day. A higher score indicates more severe pain (Figure 1).

Lumbar motion: The evaluation was performed before, at 3 d and 7 d after treatment according to the lumbar motion scoring system [12]. According to the scores, patients were graded into 6 levels from 0 to 5; 0 for patients who could bend their waist to touch the ground, 1 for patients who can bend the waist to touch the knees, 2 for patients who can bend to an extent of 70°, 3 for patients who bend to 30° with difficulty, 4 for patients who can’t bend, and 5 for patients who are unable to move as the waist extends backwardly and the belly is stiff.

Lumbar dyskinesia: The Roland-Morris Disability Questionnaire (RDQ) [13] was used for evaluation before, at 3 d, 5 d and 7 d after treatment. The questionnaire contains 24 questions answered by yes or no, 1 point for yes and 0 for no. By adding up the score of each question, a total score is obtained in the range of 0 and 24, and positively correlated to the degree of lumbar dyskinesia.

Range of lumbar motion: The angles of forward and lateral flexion, backward extension and spin were measured before and at 7 d after treatment, and judged referring to the normal values of 90°, 30°, 30° and 30°, respectively. A larger value indicates better motion.

Efficacy criteria: Efficacy index (EI) was expressed as the (results after treatment - the results before treatment)/the results before treatment *100%, and calculated referring to the changes of VAS, lumbar motion and waist function before and at 7 d after treatment. The efficacy criteria were formulated based on the EI. In case of EI greater than 90%, the patient is cured; in case of EI between 50% and 90%, the effect is marked; in case of EI between 30% and 50%, it is a healthy upturn, and in case of EI under 30%, treatment is ineffective. The OR = Cure rate + Marked effect rate + Upturn rate.

Statistical analysis

Statistical analysis was performed with SPSS 23.0. In case of numerical data it was expressed as Mean ± Standard Deviation, comparison studies were carried out through independent-samples T test. In the case of nominal data it was expressed as [n (%)], comparison studies were carried out through chi-squared test for intergroup comparison. For intragroup comparison at multiple points, ANOVA analysis and F test were performed. Graphs were drawn in Graphpad Prism 8. For all statistical comparisons, significance was defined as P < 0.05.

Results

General materials

The two groups were not statistically different in terms of proportion of male patients, age range, average age/BMI and course of disease (P > 0.05) (Table 1).

Mitigation of waist pain intensity

There was no significant difference in VAS score between GA and GB before and 1 d after treatment (P > 0.05). VAS scores of GA were significantly lower at 3 d, 5 d and 7 d after treatment than those before treatment (P < 0.05). VAS scores of GB were significantly lower at 5 d and 7 d after treatment than those before treatment (P < 0.05). VAS scores of GA were significantly lower at 3 d, 5 d and 7 d after treatment than that of GB (P < 0.05). (Figure 2).

Improvement of lumbar motion

There was no significant difference in lumbar motion scores between GA and GB before treatment (P > 0.05). Lumbar motion score of GA was lower at 3 d and 7 d after treatment than that before treatment (P < 0.05). The lumbar
motion score of GB at 7 d after treatment was lower than that before treatment (P < 0.05). Lumbar motion scores of GA at 3 d and 7 d after treatment were significantly lower than those of GB (P < 0.05) (Figure 3).

**Improvement of lumbar dyskinesia**

There was no significant difference in RDQ scores between GA and GB before treatment (P > 0.05). The RDQ scores of GA were lower at 3 d, 5 d and 7 d after treatment than those before treatment (P < 0.05). The RDQ scores of GB were lower at 5 d and 7 d after treatment than those before treatment (P < 0.05). The RDQ scores of GA at 3 d, 5 d and 7 d after treatment were significantly lower than that of GB (P < 0.05) (Figure 4).

**Improvement of range of lumbar motion**

There was no significant difference in the angles of forward and lateral flexion, backward extension and spin between GA and GB before treatment (P > 0.05). The angles of forward and

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**Table 1. Intergroup comparison of general materials (X ± s)/[n (%)]**

<table>
<thead>
<tr>
<th>Materials</th>
<th>GA (n = 48)</th>
<th>GB (n = 45)</th>
<th>t/X²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29 (60.42)</td>
<td>27 (60.00)</td>
<td>0.002</td>
<td>0.967</td>
</tr>
<tr>
<td>Female</td>
<td>19 (39.58)</td>
<td>18 (40.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average age (y)</td>
<td>40.75±16.34</td>
<td>38.65±14.19</td>
<td>0.660</td>
<td>0.511</td>
</tr>
<tr>
<td>Age range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>6 (12.50)</td>
<td>4 (8.89)</td>
<td>1.572</td>
<td>0.362</td>
</tr>
<tr>
<td>31-40</td>
<td>23 (47.92)</td>
<td>21 (46.67)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>13 (27.08)</td>
<td>14 (31.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-60</td>
<td>6 (12.50)</td>
<td>6 (13.33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average course of disease (d)</td>
<td>1.75±1.03</td>
<td>1.81±0.95</td>
<td>0.291</td>
<td>0.771</td>
</tr>
<tr>
<td>Average BMI (kg/m²)</td>
<td>23.61±1.86</td>
<td>24.03±1.64</td>
<td>1.152</td>
<td>0.252</td>
</tr>
</tbody>
</table>

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**Figure 2.** Intergroup comparison of lumbar pain intensity. In terms of VAS, the two groups were not statistically different before treatment and at 1 d after treatment (P > 0.05). At 3 d, 5 d and 7 d after treatment, the VASs were significantly lower in GA. *P < 0.05 vs GB.

**Figure 3.** Intergroup comparison of lumbar motion. The lumbar motion scores were not significantly different between the two groups before treatment (P > 0.05) but were markedly lower in GA at 3 d and 7 d after treatment (P < 0.05). *P < 0.05 vs GB.
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lateral flexion, backward extension and spin of GA and GB at 7 d after treatment were greater than those before treatment in the same group (P < 0.05), and the angles of lumbar motion of GA were greater than those of GB at 7 d after treatment (P < 0.05) (Figure 5).

Improvement of OR

Of the 48 patients in GA who received acupuncture and massage, there were 9 cured cases, 16 marked cases, 18 upturn cases, and 5 ineffective cases, with the total effective rate of 89.58% (43/48). Of the 45 patients in GB who received western medicine treatment, there were 3 cured cases, 10 marked cases, 20 upturn cases, and 12 ineffective cases, with the total effective rate of 73.33% (33/45) (P < 0.05, Table 2).

Discussion

Acute lumbar sprain is often found in athletes, young adults and manual workers, and more in men than women. It involves the lumbar sacral joints, intervertebral facets, fascia, ligaments, and waist muscles, resulting in highly complicated conditions. If not treated timely in the acute stage, the disease is likely to become chronic, further increasing the difficulty of clinical treatment [14, 15]. With the gradual increase of TCM research on acute lumbar sprain, more options are available.

The waist is the largest joint in the human body. According to TCM, acute lumbar sprain belongs to the category of crash and fall due to pathogenic factors neither endogenous nor exogenous. Bearing the most weight and responsible for various motions, the waist requires the coordination of multiple veins. In case of improper forces in activities, violent torsion, fall, tumble or attack, channels and collaterals will be damaged, leading to Qi and blood stagnation, congestion and agglutination in the waist, causing severe pain [16, 17]. In TCM, regardless of its acute attack and short course, acute lumbar sprain is easy to be confirmed and always accompanied by kidney deficiency [18]. If no timely and thorough treatment is provided, the disease will linger and the channels and collaterals will stagnate with a possibility of recurrence [19]. There are many ways to treat acute lumbar sprain in TCM, which emphasizes guiding Qi downward and activating blood circulation in consideration of its main type of syndrome of Qi stagnation and obstruction [20]. For patients in GA, acupuncture and massage were combined. The point Yaotong corresponding to the reaction points on the hand was acupunctured. Anatomically these reaction points are located in the dorsal interosseous muscle, and include the dorsal metacarpal arteries, venous network and nerves, as well as the common palmar digital nerves [21]. The Yaotong point was selected for acupuncture based on the meridian theory and haptic theory of traditional Chinese medicine. It is located on the back of the hand and in the scope of Wushu, and belongs to the Large Intestine Channel of Hand-Yangming and the Shaoyang Sanjiao Channel of Hand [22]. In this study, the points of Renzhong and Yanglao on both sides were acupunctured with a cure rate of 95% [23] and 65% [24] respectively. The standard selection method of Yaotong point was employed in this study (two points in one palm). However, as Yaotong point is just one of the reaction points, and the locations of reaction points are affected by the lumbar sprain position, the pressure points around the lumbar pain points were...
identified and a needle was inserted into the most painful one to bring about the desired sensation as soon as possible and to easily obtain the upwardly conducting acupuncturing sensation for the most remarked effects.

In this study, the GA had lower VASs and lumbar dyskinesia scores at 3 d, 5 d and 7 d after treatment, higher lumbar motion scores at 3 d and 7 d after treatment and OR as well as larger angles of forward and lateral flexion, backward extension and spin at 7 d after treatment (P < 0.05). These findings suggest that the combination of acupuncture and massage, in comparison with Western medicine, can rapidly and markedly mitigate the pain intensity and lumbar dyskinesia, and recover the lumbar motion quickly and significantly. The overall effects in GA are more dominant. A comparative study with a group treated by massage only also revealed higher OR and lower pain intensity in patients treated by the combination [25]. The primary goal of treatment is to ease pain, which in turn builds the foundation of mitigated dysfunction and improved motion. The mechanism of action for pain control by acupuncture was analyzed from following points: 1. By acupuncture, the nervous system could be simulated to receive more sensory signals, while the effectors of the endogenous descending inhibitory system and deep points are activated. As a result, more powerful stimulating signals are transmitted to the spinal marrow and further integrated in the central nervous system. Consequently, the pain signal becomes sluggish, the pain threshold of the body is increased, and the pain intensity is reduced. 2. Acupuncture can promote

Table 2. Intergroup Comparison of OR [n (%)]

<table>
<thead>
<tr>
<th>Group</th>
<th>Cured</th>
<th>Marked</th>
<th>Upturn</th>
<th>Ineffective</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA (n = 48)</td>
<td>9 (18.75)</td>
<td>16 (33.33)</td>
<td>18 (37.50)</td>
<td>5 (10.42)</td>
<td>43 (89.58)</td>
</tr>
<tr>
<td>GB (n = 45)</td>
<td>3 (6.67)</td>
<td>10 (22.22)</td>
<td>20 (44.44)</td>
<td>12 (26.67)</td>
<td>33 (73.33)</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.106</td>
</tr>
<tr>
<td>$P$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.043</td>
</tr>
</tbody>
</table>

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In this study, the GA had lower VASs and lumbar dyskinesia scores at 3 d, 5 d and 7 d after treatment, higher lumbar motion scores at 3 d and 7 d after treatment and OR as well as larger angles of forward and lateral flexion, backward extension and spin at 7 d after treatment (P < 0.05). These findings suggest that the combination of acupuncture and massage, in comparison with Western medicine, can rapidly and markedly mitigate the pain intensity and lumbar dyskinesia, and recover the lumbar motion quickly and significantly. The overall effects in GA are more dominant. A comparative study with a group treated by massage only also revealed higher OR and lower pain intensity in patients treated by the combination [25]. The primary goal of treatment is to ease pain, which in turn builds the foundation of mitigated dysfunction and improved motion. The mechanism of action for pain control by acupuncture was analyzed from following points: 1. By acupuncture, the nervous system could be simulated to receive more sensory signals, while the effectors of the endogenous descending inhibitory system and deep points are activated. As a result, more powerful stimulating signals are transmitted to the spinal marrow and further integrated in the central nervous system. Consequently, the pain signal becomes sluggish, the pain threshold of the body is increased, and the pain intensity is reduced. 2. Acupuncture can promote

Figure 5. Intergroup comparison of range of lumbar motion. The angles of forward (A) and lateral flexion (C), backward extension (B) and spin (D) were not significantly different between the two groups before treatment (P > 0.05) but were larger in the GA at 7 d after treatment (P < 0.05). *P < 0.05 vs GB.
the release of analgesic substances by activating various central parts, and has effects on opioid peptides, thus easing the pain [26]. Massage plays a role in treating acute lumbar sprain by reducing the abdominal pressure and relieving the spasms in the lower back muscles. Abdominal point massage can indirectly stimulate the spasms of musculi psoas major and restore the biomechanical balance of lumbar and abdominal muscles and lumbar stability. Massaging the lumbar pain points with various techniques exerts indirect stimulation on the governor meridian and the Taiyang bladder channel of the foot, in order to remove blood stasis, activate blood circulation and smooth Qi [27]. The combination of acupuncture and massage can give full play to the internal role of acupuncture and the external role of massage, and maximally control the symptoms of acute lumbar sprain.

The values of acupuncture and massage in treating acute lumbar sprain have been established, such as mitigating pain and lumbar dyskinesia and improving lumbar motion. However, the number of subjects is limited and the results are not comprehensively analyzed in this study, which may lead to biased conclusions. Future studies shall be more extensive, in-depth and forward-looking on the basis of a larger sample size to obtain more scientific and representative conclusions for the reference of treatment.

In conclusion, acupuncture combined with massage is conducive to effectively mitigating pain, reducing lumbar dyskinesia and improving lumbar motion in the treatment of acute lumbar sprain.

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Disclosure of conflict of interest

None.

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