

# A Case Study of Clinical Effect of Water Cupping Combined with Ultrasound Drug Penetration in the Treatment of Acute Lumbar Disc Herniation

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**Abstract.** A patient with acute lumbar disc herniation (LDH) was admitted to the outpatient department of our hospital, who, having lifted heavy objects, suffered tingling pain in the lumbosacral region accompanied by limited movement, especially limited flexion, and radiating pain from the outside of right lower extremity to the right ankle. The patient was given a 30-minute ultrasound drug penetration once a day. After the treatment, the water cupping was applied to acupuncture points such as Large Intestine Point (大肠腧), Life Gate (命门), Lumbar Yang Pass (腰阳关), etc. for 10 minutes once every other day. A course contained three days and there was a one-day break between two courses. The patient's lumbosacral pain was relieved and there was no radiating pain in the lower extremities after the treatment of integrated traditional Chinese and Western medicine. This method provides a simple, low-cost, easy-to-operate, safe, and effective Traditional Chinese Medicine (TCM) treatment for clinical patients with acute LDH.

**Keywords:** Lumbar Disc Herniation (LDH), Water Cupping, Ultrasound Drug Penetration

## 1. Clinical Information

### 1.1. Patient Information

Female, 56 years old, presented to the doctor on April 7th, 2021 with a complaint of "lumbosacral pain with radiating pain in the right lower extremity for 3 days".

### 1.2. Symptom

At the consultation, the patient had tingling pain in the lumbosacral region, accompanied by limited movement, especially limited flexion, radiating pain from the outside right lower extremity to the right ankle, and the waist was afraid of cold. According to her medical history, she lied on a cool mat for an afternoon nap after lifting heavy objects and felt low back pain after waking up, when there was no lower extremity radiating pain. She then did some housework after dinner. At night, she felt lumbosacral tingling pain accompanied by right lower extremity radiating pain which kept her awake. The patient took 0.3 g Ibuprofen Sustained-release Capsules without improvement, and come to our hospital. After 12 times of TCM external therapy and nursing treatment, there was no radiating pain in the lower extremities and no obvious tingling pain in the lumbosacral region.

### 1.3. Physical Examination

Inspection: no obvious redness, swelling, and ulceration on both sides of the spine, no obvious scoliosis; palpation: muscle tension on both sides of the lumbar spine, spinous process tenderness (+), percussion pain (+); lumbar joint range of motion: flexion: 40°, extension: 10°, left and right lateral flexion: 15°, left and right rotation: 10°; positive laboratory signs: femoral nerve pulling test left (-) right (+); straight leg raising test left 80°, 50° to the right, and left (-) to the right (+) for the reinforcement test. VAS score: 9, JOA score: 14.

### 1.4. Diagnostic Evaluation

#### 1.4.1. Western medicine diagnostic criteria [1]. Combined with "Clinical Diagnosis and Treatment Guidelines (Orthopaedic Division)"

1. Low back pain combined with "sciatica", radiating to the calf or foot; straight leg raising tests positive;
2. There are obvious tender points on the lateral side of the L4, L5 or L5, S1 interspinous ligament, and there is radiation pain to the calf or foot at the same time;
3. Decreased sensation of the skin on the anterior and lateral sides of the calf, decreased strength of the toe muscles, decreased or disappeared Achilles tendon reflex on the affected side;
4. Frontal and lateral X-ray films of the lumbar spine can provide some indirect signs to roughly locate and make a preliminary diagnosis of lumbar disc herniation. At the same time, it can provide a basis for the differential diagnosis of other diseases of the lumbar spine. CT and MRI examinations can clearly display the location, size, and shape of intervertebral disc herniation, and the compression and displacement of nerve roots and dural sac.

#### 1.4.2. TCM diagnostic criteria [2]. With reference to the "Traditional Chinese Medicine Diagnosis and Efficacy Standards" promulgated by the State Administration of Traditional Chinese Medicine

1. Have a history of lumbar trauma, chronic strain, or exposure to cold and dampness. Most patients had a history of chronic low back pain before onset.
2. Often occurs in young adults.
3. Low back pain radiates to the buttocks and lower limbs, and the pain increases when the abdominal pressure increases (such as coughing and sneezing).
4. Scoliosis, lumbar physiology disappears, tenderness in the paravertebral lesions, and radiation to the lower limbs, lumbar activity is limited.
5. Hyperesthesia or sluggishness in the nerve innervation area of lower extremities, and muscle atrophy may occur in the elderly with the course of the disease. The straight leg raising or strengthening test was positive, the knee and Achilles tendon reflexes were weakened or disappeared, and the dorsal extension of the great toe was weakened.
6. X-ray examination: scoliosis, lumbar lordosis disappears, the intervertebral disc may be narrowed, and there are osteophytes on the adjacent edges. CT examination can show the location and degree of disc herniation.

This patient has obvious low back pain with radiating pain in the lower extremities, limited lumbar movement, positive straight leg raising test and reinforcement test, and CT of the waist shows 1. L4/5 and L5/S1 intervertebral disc herniation; 2. L3/4 intervertebral disc bulge; 3. lumbar degenerative changes and ligament hyperplasia. It should be differentiated from chronic lumbar muscle strain and lumbar vertebral tuberculosis. Lumbar muscle strain is often associated with soreness in the waist and no radiating pain in the lower extremities, which can be relieved after rest. Lumbar vertebral tuberculosis is accompanied by fever and fatigue, and the laboratory test shows positive for tuberculosis, which can be identified.

### 1.5. Therapeutic Intervention

The patient is placed in a prone position, with both arms flexed and elbows placed in front of the head, and the lower back of the patient is naked. Make sure the patient is relaxed as much as possible. Acupuncture points: Large Intestine Point (大肠腧), Kidney Point (肾俞), and crevice points (First Crevice Point (上髎), Second Crevice Point (次髎), Third Crevice Point (中髎), and Fourth Crevice Point (下髎)). Drug penetration was performed using an ultrasonic conductivity meter and a gel patch from Beijing Noah Tongzhou Medical Technology Co., Ltd. Operation: Apply the patch containing medicinal liquid (Shenjincao 30 g, safflower 10 g, frankincense 6 g, myrrh 6 g, travertine vine 10 g, raw mugwort 30 g, angelica 10 g, cassia twig 3 g) together with the treatment electrode on the pain point. The treatment is 30 min once a day. After the treatment, the water can will be used on acupuncture points such as Large Intestine Point (大肠腧), Life Gate (命门), Lumbar Yang Pass (腰阳关), etc. for 10 min, once every other day. A course contained three days and there was a one-day break between two courses.

### 1.6. Follow-up and Outcomes

The curative effect was comprehensively evaluated with reference to the curative effect evaluation method for lumbar intervertebral disc herniation in the "Traditional Chinese Medicine Disease Syndrome Diagnosis Efficacy Standards" promulgated by the State Administration of Traditional Chinese Medicine in 1995:

(1) Cure: The subjective symptoms such as low back and leg pain disappeared, the straight leg raising test was over 70°, and normal work was resumed, and the analgesia score was  $\geq 90\%$ .

(2) Significant effect: The subjective symptoms such as low back and leg pain basically disappeared, the straight leg raising test was close to 70°, and the patient basically returned to work,  $60\% \leq \text{analgesia score} \leq 90\%$ .

(3) Effective: partial disappearance of symptoms, mild limitation of activities, light work,  $30^\circ \leq \text{straight leg raising test} \leq 45^\circ$ ,  $30\% \leq \text{analgesia score} \leq 60\%$ .

(4) Invalid: no improvement in symptoms and signs, incompetent for work. Straight leg raising test  $\leq 30^\circ$ . Analgesia score  $\geq 30\%$ . Pain score  $\leq 60\%$ .

The patient's pain basically disappeared and the joint range of motion increased. The straight leg raising test was negative and there was no radiating pain in the lower extremity. The overall treatment was effective and the prognosis was good.

## 2. Nursing

### 2.1. Nursing Assessment

This patient is in the acute stage of lumbar intervertebral disc herniation, with obvious tenderness in the waist and limited mobility, which radiates from the lower waist to the back of the buttocks, the posterolateral aspect of the thigh, the outer side of the calf, and the heel or the back of the foot. Pain is aggravated by a series of actions that increase cerebrospinal fluid pressure, such as coughing, sneezing, and defecation.

### 2.2. Nursing Diagnosis [3]

According to the physical and chemical examination in primary survey, this patient is in the acute stage of lumbar disc herniation, which is mainly based on the following points: 1. The movement of the waist is limited, and the patient is impossible to bend over; 2. The nerves are compressed, causing radiating pain in the lower extremities, and the skin along the nerves is numb, dull, and sensitive to pain; 3. The spinous process of the lumbar spine has obvious tingling, and there is radioactive pain on both sides of the spinous process; 4. Pain can be relieved in a supine position, when lumbar spine pressure is reduced. Digestive ability is weakened, resulting in constipation.

### *2.3. Nursing Plan*

Nursing routines for lumbar disc herniation include that patients with lumbar disc herniation need to strictly rest on bed. During the rest, they must perform functional exercises of the limbs to avoid deep vein thrombosis. They should turn over regularly to avoid bedsores. According to the patient's condition and the doctor's order, there needs dehydration, anti-inflammatory, analgesic, and nerve nutrition drugs for treatment. Pelvic traction treatment could be applied for reduction of nerve root compression and pain relief.

### *2.4. Nursing Implementation*

1. Patients in the acute stage should lie on a flatbed for a rest. In addition, psychological care is very important to make the patient relax. When the body is relaxed, the stimulation of the nerve root caused by the local disc will be relieved, which will also reduce the pain or suffering of the patient.

2. The second aspect of nursing is to prevent the occurrence of constipation and bedsores. It is necessary to closely observe the condition of the compressed skin, and to massage the compressed skin regularly every day to prevent the formation of local bedsores and ulcers. Defecation training is very necessary. When the patient is in bed, the gastrointestinal motility is generally poor, and defecation is more difficult than that in bed. Therefore, defecation training is very necessary.

3. For patients wearing a leash, it is necessary to closely observe the tightness of the leash to prevent loosening or over-tightening. Maintain a certain degree of tension to keep the therapeutic effect. Turning over and patting the back is important to prevent hypostatic pneumonia and urinary tract infection.

4. Dietary care: Give the patient a single-digestible food rich in dietary fiber, and encourage the patient to drink more water, which reduces the dryness of the stool and is more convenient for defecation.

5. Functional exercise: instruct the patient to perform functional exercise of quadriceps femoris, functional exercise of limbs, and exercise of lumbar back muscles, etc., As well, appropriate muscle massage for calf could prevent thrombosis of lower limbs.

### *2.5. Nursing Evaluation*

After treatment and intervention, the patient's pain was significantly relieved. There was no lower extremity radiating pain. VAS score: 3. JOA score: 21. There were no complications such as constipation, bed sore, and lower extremity thrombosis, and no adverse events occurred. Overall patient satisfaction rating is excellent. It can be reflected that nursing for patients with lumbar disc herniation in the acute stage is one of the keys to the recovery of the disease. It can be combined with the doctor's treatment to increase the durability of the curative effect.

## **3. Discussion**

Lumbar disc herniation (LDH) is a common and frequently-occurring disease in orthopedics. LDH is caused by intervertebral disc degeneration or induced by external force damage on the basis of degeneration. Some simple violence can also lead to intervertebral disc herniation. The degree of change of LDH is divided into lumbar intervertebral disc herniation, intervertebral disc herniation, and intervertebral disc herniation. With the extension of working hours in a sitting position and the reduction of other postural activities, the incidence of LDH is increasing year by year. As early as the first 10 years of the 21st century, the WHO proposed to pay attention to bone and joint diseases. At this time, low back pain has become a very important social health problem. Epidemiological survey results show that 50% to 80% of Western adults experience low back pain in their lifetime, and it has become the most common and costly disease among non-fatal diseases in Western countries. The prevalence of lumbar disc herniation among adults in China is 8% to 25%. Beijing and North China are generally high-incidence areas. The decline in patients' working ability and the increase in medical costs will directly cause economic burdens to society.

This study provides a simple, low-cost, easy-to-operate, safe, and effective traditional Chinese medicine technique for clinical patients with acute LDH. On the basis of dredging the meridians and promoting local blood circulation, the TCM nursing technology produces a local heat sensation through the warming meridian and dredging effect of the water tank. This thermal effect accelerates the absorption of water from the prolapsed nucleus pulposus by improving the microcirculation around the nucleus pulposus, which would dehydrate and shrink the prolapsed nucleus pulposus and reduces its size. Therefore, the compression on the nerve root will be reduced and eliminated so as to relieve symptoms [5]. In addition, drug penetration through ultrasound is the use of ultrasonic energy to deliver drugs through the skin or mucous membranes into human tissues to be effective [6].

This method is superior to pure ultrasound therapy and can deliver the drug to the designated location without destroying the structure of the drug. Macromolecules and drugs with complex structures can also be penetrated by ultrasound, which has a good curative effect. The drug concentration is not limited by the degree of dissociation so that drug can easily enter the body. Therefore, the active ingredients are highly retained and the treatment effect is good. Meanwhile, traditional Chinese medicine is used for tendon injury and local blood circulation to remove blood stasis, dispel cold and dehumidify, and relieve pain [7].

However, the sample size of this study is insufficient and lacks clinical data support. It can only indicate the effectiveness of the treatment. Physical tests and physical and chemical examinations can be applied in later research to explain the advantages of traditional Chinese medicine infiltration and water cupping therapy in patients with acute LDH from the molecular and quantum gene levels. Then, the treatment plan will be optimized and further reference evidence is provided for the comprehensive application of TCM techniques appropriate for patients with lumbar disc herniation.

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