

# Main Methods and Development Prospect of Non-Operative Treatment of Lumbar Intervertebral Disc Herniation

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**Abstract.** The study delves into the profound implications of non-operative treatments for lumbar intervertebral disc herniation, shedding light on the evolving trends within this treatment approach. A meticulous examination of the literature spanning from 2017 to 2023, with a specific focus on high-impact references, forms the foundation of this research. Non-operative interventions for lumbar intervertebral disc herniation remain a field ripe for practical exploration. The study highlights the pressing need for future research to fortify the methodology and efficacy of these non-operative treatments. It emphasizes the necessity of delving into the physiological and biochemical mechanisms that underlie these interventions. Moreover, the research advocates for an extension of intervention durations, enlargement of sample sizes, and fostering collaborations across multiple research centers to yield more comprehensive insights. In summary, the study underscores the imperative of further research in the realm of non-operative treatments for lumbar intervertebral disc herniation. It beckons researchers to embark on a journey of discovery, refining methodologies, uncovering underlying mechanisms, and broadening the scope of investigations.

**Keywords:** Lumbar intervertebral disc herniation; non-operative treatment; physical exercise.

## 1. Introduction

Lumbar intervertebral disc herniation (LIDH) is one of the most common spinal degenerative disorders [1]. Which has become one of the major diseases threatening human health around the world. LIDH is primarily caused by degenerative changes in lumbar disc parts, particularly the nucleus pulposus. External force can cause disc annulus rupture, stimulating or compressing adjacent spinal nerve roots, causing waist pain, numbness, and other clinical symptoms, either in the rear of the spinal canal or on one side of the lower limbs.

The primary signs and symptoms of LIDH include radicular pain, sensory abnormalities, and weakness in the distribution of one or more lumbosacral nerve roots [2]. LIDH typically presents with low back pain, sciatica, and radiation pain in the lower waist, buttocks, behind the thigh, and foot. Over 90% of patients have a prominent lumbar 4-5, lumbar 5-sacral 1 gap, making it easy to stimulate the sciatic nerve. Some patients may also experience compression of the cauda equina nerve, resulting in excretory disorders.

Nearly 80% of the population sustains an episode of low back pain (LBP) once during their lifetime [3]. According to the statistics of the Ministry of Health, the number of patients with lumbar spine disease in China has exceeded 200 million, LIDH, accounting for 15.2% of China's total number, is the second-highest incidence rate after cold. At the same time, the United States also has relevant statistics to show that the disease has a morbidity of 20-35% for people older than 50 years [4]. The lumbar process is now growing at an alarming rate, with the youngest in their 10s and the oldest in their 80s and 90s.

The huge patient base and the prevalence of the incidence population make how to choose the appropriate treatment method for the majority of people become a key issue. In recent years, more and more studies on LIDH have begun to focus on non-operative treatment directions. The study aims to investigate non-operative treatment methods for LIDH, and their advantages compared to traditional surgical methods, providing a theoretical foundation for future research in this area.

## 2. Cognitive Progress in the Treatment of Lumbar Intervertebral Disc Herniation

### 2.1. Cognitive Misunderstandings of the Past

Human cognition of LIDH can be traced back to ancient Greece. The earliest people could not scientifically explain LIDH but could only suspect that some supernatural force was at it. Ancient Egyptians believed in the connection between lumbar pathology and leg symptoms, but disc herniation was officially introduced in the early 20th century.

Because LIDH can be defined as the bulging or extrusion of nucleus material into the spinal canal which compresses the nerve and causes pain [5], most people think it is difficult to cure the disease, the only treatment is surgery. One of the most common is laminectomy, which creates space and relieves nerve compression by removing bone spurs and tissue associated with arthritis of the spine. However, it should be emphasized that a laminectomy will only be performed if more conservative therapies (e.g., medication, physiotherapy, or injections) fail to relieve the symptoms.

The reason why the public believes that the treatment of LIDH must be operated on is because its symptoms are gradually deepening. In the early stage of LIDH, the public often does not realize that the source of pain is nerve compression. So, it ignores the best treatment time for the early days. The most common situation is that when the patient visits the hospital for the severity of the problem, the degree of compression of the LIDH is already so severe that surgery must be performed. This creates the public illusion that lumbar disc treatment must be performed.

### 2.2. Common Non-operative Treatment

Non-operative management of symptomatic LIDH is the treatment of choice for the majority of patients [3]. Degenerative disc disease treatment involves adjusting disc tissue and nerve root position, reducing compression, releasing adhesion, and eliminating inflammation, with non-operative treatments like drugs, physical exercises, and massage therapy.

#### 2.2.1 Drugs

In 1982, chymotrypsin has been used as a legal drug in the non-operative treatment of LIDH. It was widely used in a large number of patients in the United States and Europe [6], and the symptom improvement rate is as high as 80%. Although it was eventually banned because of its low drug specificity and the possibility of neurological complications in the process of application, it is also sufficient to prove the application prospect of non-operative drug treatment in LIDH.

In recent years, more and more studies of multi-class and meticulous drug treatment for LIDH, Drug-led intervention therapy has gradually entered the clinical treatment field because of its advantages of simplicity and reliable effect. For example, NSAIDs, have the principal role in pain management of disc herniation [2], which have significant anti-inflammatory and analgesic effects. NSAIDs should be used cautiously to prevent adverse drug reactions.

Traditional Chinese medicine effectively treats LIDH, relieving pain, promoting blood circulation, and eliminating blood stasis. Water and detumescence drugs like intervertebral disc pills, lumbago Ning, and lumbar bi tong capsules are particularly beneficial for acute patients. After the patient reaches the chronic stage, the remaining symptoms are waist pain or lower limb cooling. Traditional Chinese medicine or nutritional nerve drugs should be used, such as strong tendons and bone to strengthen bone and stretch tendon capsules, stretch tendon tablets, Qi Zhongshan pills, and vitamins commonly used in Western medicine. In addition, if patients are not allergic to external drugs, they can choose to paste or external dressings, such as Yunnan Baiyao spray, white plaster, antelope, Tibetan medicine, tongue dispel pain cream, or pain relief paste. Some Chinese patent medicine also has a certain nutritional nerve effect and can also let the numbness of LIDH symptoms get very good relief.

### 2.2.2 Physical Exercises

It has been shown in recent years that, changes in muscle structure and function are unlikely to be corrected by surgery [7]. This means that a laminectomy cannot be used to cure the LIDH. Instead, laminectomy may cause recurrent nucleus pulposus hernia (HNP) and subsequent disc degeneration after discectomy, with a probability of between 2% and 25%. This also means that, nowadays, non-operative treatment has become the preferred clinical treatment of LIDH.

Physical exercise as a typical non-operative treatment of LIDH has its unique role in repairing and preventing the occurrence of LIDH. Conservative physical exercise therapy is generally recommended for 6 weeks in the absence of a major neurologic deficit. In one study, 36% of patients reported improvement in their condition at 2 weeks [8].

LIDH is linked to spinal instability and deep spine weakness. Spine stability is determined by passive, active, and neural subsystems. The passive subsystem, including the vertebral body, intervertebral disc, joint capsule, and ligament, is innate and difficult to change through exercise. Critical spine loading, the carrying capacity of the passive subsystem, has been determined through in vitro experiments. T1-sacral and L5-sacral specimens were bent at 20 N and 90 N loads, respectively. The large carrying capacity is achieved through the involvement of well-coordinated muscles around the spine, which can be increased during dynamic situations or external loads.

Therefore, the physical therapy of LIDH is mainly aimed at the active subsystem and nerve subsystem of the human body. The active subsystem is composed of muscle, which is the most variable part of the spine function, Strong muscle, the spine can bear more load, and muscle weakness, not only causes the spine not to bear the larger load, but makes the passive subsystem such as vertebrae, intervertebral disc, ligament should not bear the load, which make them more prone to degradation. The nerve subsystem and central nervous system work together to ensure spine stability by monitoring sensor signals and guiding the active subsystem. The neural subsystem is responsible for continuously monitoring and adjusting muscle strength around the spine, making decisions to redistribute muscle tension when posture or external load changes.

Physical exercise can strengthen the core strength of the human muscles so that the spine can withstand more loads. First, the local stable muscle group represented by transverse us abdominis and multifidus is strengthened through exercise. They can improve spinal stability by increasing intra-abdominal pressure and maintaining lumbar segments, respectively. Physical exercise is crucial for treating LIDH by training the overall stable muscle group. This means that in the choice of exercise mode, patients not only need to conduct core stability training such as plank, but also do strength training such as rolling and prone forward, and even allow the core muscles to fight external resistance. Physical exercise of the core muscles in the active subsystem can enhance the strength of the muscle itself to make it can bear greater load in activity and exercise the nerve subsystem of this muscle regulation, letting the nerve subsystem can more efficiently identify specific muscle group responsible for specific direction stability, and selectively and appropriately tighten these muscles to enhance the stability of specific direction. In this physical exercise mode, both the active subsystem and the nerve subsystem can be fully developed, to effectively improve the LIDH.

### 2.2.3 Massage Therapy

Massage therapy (MT) is a useful complementary and alternative therapy widely used in treating low back pain, including LIDH [9]. Massage is used to treat the lumbar process by resolving protrusions, and reducing spinal canal pressure, and intervertebral disc pressure on nerve roots. It also changes the relationship between nerve root and disc position, releases nerve root adhesion, relieves inflammatory stimulus, regulates central nervous transmitter and body fluid, adjusts hemodynamic balance, and restores spine mechanical balance.

Traditional Chinese massage is believed to be an effective treatment for LIDH, as it addresses the internal condition of the disease by focusing on the upright position, including the waist-hip, lower limbs, and lateral parts. This treatment can also address the foot's Yin spleen, liver, kidney, and stomach meridian meridians. Bilateral massage treatment is recommended, focusing on both sides of

the waist lesion local massage and lower limb parts and the entire body. A combination of MT and physical exercise can also improve results. This involves determining nerve compression, helping the patient open the target vertebral space through physical exercise, using lumbar massage to promote the return of the nucleus pulposus, and using Mc Kenkey techniques to temporarily stabilize the position of the intervertebral disc and improve symptoms. However, massage manipulation is often not used alone, as the healthy lumbar spine requires the surrounding waist core muscle group to bear the heavy responsibility. Long-term massage can cause muscle elasticity loss and stiffness, making LIDH aggravating.

MT may worsen symptoms in patients with severe LIDH or prolapse, potentially leading to cauda equina injury, foot drop, and irreversible nerve damage. LIDH real cause is the rupture of the annulus fiber and protruding nucleus pulposus, MT can partially back disc herniation, but unable to repair the ruptured annulus fiber or the nucleus pulposus completely back and let it never again, therefore, only by MT to cure disc herniation and great difficulty.

MT has been confirmed for improving LIDH, but its effectiveness is limited due to the variety of massages, intensity, frequency, and time. The lack of a unified guide for massage treatment is a significant limitation in its development.

### **3. Trends in Non-operative Treatment**

#### **3.1. Drugs**

According to the current situation in this research field, medical treatment is still the most effective treatment for the intervention of LIDH. Whether used alone or combined with conservative treatment, it can have a better intervention effect on LIDH. Drug treatment is widely applicable, has high safety, monitoring indicators are relatively clear, and the research on its physiological mechanism is relatively perfect. At present, the research field of drug treatment of LIDH is dominated by the relevant application research of Western medicine. However, with the deepening of relevant research, the relevant research content of traditional Chinese medicine also begins to appear in this field. It can be predicted that in the future, the specific internal classification will become more and more diversified and detailed, and the research of Chinese and Western medicine intervention in LIDH will be turned into a set of standardized drug application processes.

#### **3.2. Physical Exercise**

Due to the high cost of surgical treatment and postoperative rehabilitation for LIDH, physical exercise is gradually being utilized for clinical treatment and prevention. Because physics itself is more adjustable, the classification characteristics in the way of development are more distinct. There are clear differences in the movement pattern, counterweight, and counterweight rate, but the core of the ability to strengthen muscle activity is fixed.

Physical exercise has more unique advantages, it is not limited by the site, equipment, and time, and can meet the needs of patients with LIDH in various health conditions and provide them with more exercise options. Safety and controllability are the premises of arranging the physical exercise treatment plan. Physical exercise can significantly improve the patient's physical strength and increase the strength of his muscles to increase lumbar disc stability.

Current physical therapy intervention studies for patients with LIDH focus on health effect indicators limited to a few broad indicators represented by the recurrence of LIDH. Although physical therapy has become another hot spot in the field of the treatment of LIDH in recent years, physical exercise requires a high level of professional guidance, and there is no clear standard for the monitoring indicators and methods of LIDH. So, in the study will be used as a separate means to exercise, but with the development of exercise intervention effect of diabetes research, physical exercise is gradually become the other two types of LIDH the surgical treatment of joint means to achieve better intervention effect, and increasingly physical exercise and LIDH index research.

### 3.3. Massage Therapy

The emergence of the concept of MT is the result of the popularity of non-operative treatment in medical methods. Generally speaking, the current popular massage therapy in China includes the physiological mechanisms of the effects of skeletal muscle on LIDH. This is closely related to the influence of Chinese traditional culture. If MT is combined with a certain intensity of physical exercise, it can achieve a better exercise intervention effect for LIDH, especially for middle-aged and elderly people. The majority of LBP among older adults has no definite pathology [10]. MT, in addition to drug support and physical therapy, significantly improves the prognosis of elderly patients with LIDH.

The reason why MT is more suitable for middle-aged and elderly patients is that it is the appropriate external force dredging muscle as the main content, in line with the middle-aged and elderly LIDH patients with weakened muscle strength and poor exercise endurance, the treatment plan should be different from the needs of young and middle-aged adult patients. MT is widely used to prevent and treat LIDH, with positive outcomes. It can improve health in middle-aged and elderly patients and relieve pain, but excessive massage should be avoided to avoid adverse effects. Based on physical exercise, the integration of appropriate intensity of MT is the development trend of future research on the intervention effect of non-operative treatment on LIDH. There are various forms of MT, and the effect is positive, but there are few studies on the intensity, frequency, and time of massage. The lack of a unified massage guide for doctors to conduct massage operations is the focus of the development of the effect of the intervention of MT for LIDH.

## 4. Conclusion

At present, the relevant research in this field is still in the initial stage, the overall number is limited, and the intervention used in the study is single, limited, and the intervention time is short. The results of different studies also differ significantly in terms of indicators. Therefore, it is necessary to strengthen the follow-up and validation of the intervention duration and study content. The advancement of science, technology, and non-operative treatment have led to a growing interest in muscle enhancement. Among them, physical exercise and MT have begun to receive more and more extensive attention. However, due to the lack of unified intervention guidance and guidance, the intervention effect has not been fully recognized.

For patients with different phenotypes, the choice of non-operative treatment needs to be considered. In the future research process, in addition to continuing to improve the improvement index of LIDH, Traditional Chinese medicine can be used to construct and enhance the classification system of non-operative therapy, China's unique traditional Chinese medicine sports MT has significant advantages but also has economic, safe, simple, and lasting prevention and treatment effects. On this basis, it can form a unique non-operative treatment system for LIDH.

Physical exercise is the main content of the future diabetes exercise prescription, The choice should follow the principle of individualization, not only consider factors such as patient preference, habits, and curative effect of physical exercise and further define the safety of exercise more focus, it for different parts of the muscle exercise targeted and improve sustainability is also of great significance. Future research will not only focus on how to evaluate the impact of non-operative therapy on LIDH but more importantly, to build a complete non-operative treatment system and choose more abundant treatment methods, to improve the effectiveness of treatment and improve patients' interest and acceptability.

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