DOI: 10.53469/jcmp.2025.07(09).17

A Retrospective Study on the Efficacy, Safety, and Effects on Systemic Inflammatory Markers of Combined Acupuncture Needle-Knife Therapy with Celecoxib Capsules for Discogenic Low Back Pain

Chaorong Xu, Yanqing Ren*

Ningqiang County Hospital of Traditional Chinese Medicine, Hanzhong 724499, Shaanxi, China
**Correspondence Author*

Abstract: ***Purpose: To investigate the efficacy and safety of combined acupuncture and scalpel therapy with celecoxib capsules for discogenic low back pain, and to explore its effects on patients' neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), and C-reactive protein (CRP). Method: A retrospective analysis was conducted on patients with discogenic low back pain treated with combined suture-needle knife therapy and celecoxib at our hospital. Paired-sample t-tests were used to compare changes in pain scores, lumbar function, and clinical symptom improvement before and after treatment. Concurrently, changes in peripheral blood inflammatory markers—neutrophil-lymphocyte ratio (NLR), platelet-lymphocyte ratio (PLR), and C-reactive protein (CRP)—were assessed pre- and post-intervention. Results: Of the 40 patients, 23 meeting the criteria were included in the analysis. Following two courses of acupuncture with thread implantation therapy, all patients demonstrated improvement in clinical symptoms, with significant reductions in pain NRS scores and OID indices compared to pre-treatment levels. One patient experienced needle syncope during treatment, which resolved after needle removal and rest; no other adverse events were observed. Following two treatment cycles, patients exhibited significantly reduced serum NLR and PLR levels, though CRP levels showed no marked decrease. Conclusion: The combination of acupuncture needle knife therapy with celecoxib proves safe and effective for treating discogenic low back pain, while also reducing changes in peripheral blood inflammatory markers. This suggests the treatment may exert its therapeutic effect on discogenic low back pain by modulating the inflammatory response.***

Keywords: Discogenic low back pain, Acupuncture with thread insertion, Retrospective analysis, Neutrophil-to-lymphocyte ratio, Platelet-to-lymphocyte ratio.

1. Introduction

According to surveys, 80% of people have experienced symptoms of low back pain, with 20% of these cases progressing to chronic low back pain [1]. Significantly impacting patients' quality of life and hindering normal daily activities. Degenerative disc disease in the lumbar spine is the primary cause of chronic low back pain. Traditionally, it was believed that protruding discs compressing spinal nerves within the spinal canal caused the pain. However, subsequent research has revealed that low back pain can also arise from discs without protrusion [2]. Therefore, the concept of discogenic low back pain was first proposed in 1986. This refers to low back pain caused by various disc disorders (such as degeneration or endplate damage) stimulating pain receptors within the disc, without radicular symptoms and lacking radiological evidence of nerve or segmental hyperactivity. With changes in modern lifestyles and increased work pressures, the incidence of this condition is rising annually. Currently, no effective treatment exists beyond surgical intervention. Non-steroidal anti-inflammatory drugs, corticosteroids, and muscle relaxants are most commonly employed, yet their clinical application is limited due to numerous side effects and low efficacy rates. Acupuncture offers distinct advantages and characteristics in treating chronic pain: it is simple to administer, significantly alleviates symptoms, and exhibits synergistic effects when combined with modern pharmaceuticals. Building upon traditional acupuncture techniques, contemporary practitioners have developed the needle-knife suture implantation method through clinical practice, which has found application within certain parameters. However, reports on its efficacy for discogenic low back pain remain scarce. This paper reviews and analyses patients treated at our institution with combined needle-knife suture implantation and celecoxib capsules for lumbar discogenic pain, presenting the findings as follows:

2. Method:

2.1 Patient Sources

This study reviewed medical records and hospital HIS systems to examine patients with low back pain who were seen between 1 January 2024 and 31 December 2024.Diagnostic criteria are as follows [3]: (1) Recurrent episodes with persistent pain lasting over six months; (2) Symptoms aggravated in the sitting position and relieved in the supine position; (3) MRI T2-weighted imaging demonstrating low signal intensity in the disc (black disc) and high signal intensity in the posterior annulus fibrosus; (4) Positive discography.

Inclusion criteria were as follows: (1) Patients underwent at least two courses of acupuncture with thread implantation therapy; (2) All patients regularly took celecoxib capsules (0.2g twice daily) for at least 14 days; (3) Complete follow-up and medical records were available. Exclusion criteria were as follows: (1) Concurrent use of analgesics such as opioids or corticosteroids; (2) Patients with concomitant lumbar-related pain conditions, such as lumbar muscle strain or trauma; (3) Patients undergoing peripheral blood cell count or CRP level

testing before and after treatment.

2.2 Operational Method

Prepare iodine antiseptic, sterile gloves, 4-O# PGLA suture material, and 7# thread-embedded needle knife prior to the procedure. Select acupoints primarily along the Governor Vessel and Foot-Taiyang Bladder Meridian. Position the patient prone with knees slightly bent to relax lumbar muscles. Disinfect the treatment area with iodine solution and don sterile gloves. The instrument assistant prepares the 4-0 PGLA suture, cutting it into several 3 cm segments. Open the 7-gauge suture needle, insert a 3 cm segment into the needle's front 1.5 cm, leaving the remaining 1.5 cm outside the body to form a 'V' shape. Upon insertion into the acupoint, the thread is compressed at the needle tip to fold in half. After ensuring the external thread enters the skin and elicits a needle sensation, perform small lifting and thrusting motions. If no sensation is felt, adjust the direction and depth of insertion. Then rotate and withdraw the needle-knife, embedding the thread. Cover the puncture site with sterile dressing and secure it. Instruct the patient to maintain the treated area dry and clean for 24 hours. Treatment is administered once every 15 days, with two sessions constituting one course. Evaluation is conducted after two courses.

2.3 Inflammatory Marker Assessment

Under aseptic conditions, collect 5 mL of venous blood from the patient. Determine CRP levels using fluorometric spectrophotometry. Employ an automated complete blood count analyser (SYSMEX XN-9000) to measure neutrophil, platelet, and lymphocyte counts, subsequently calculating the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) respectively.

2.4 Efficacy Assessment Criteria

Pain assessment was conducted using the Numerical Rating Scale (NRS) both before and after treatment. Patients were instructed to describe their current pain intensity on a scale of 0 to 10, where 0 represented no pain and 10 represented the most severe pain they could endure. Changes in NRS scores were compared between pre-treatment and after two treatment cycles. Lumbar back function was assessed using the Oswestry Disability Index (ODI), comprising ten domains: pain intensity, personal care, lifting objects, walking, sitting, standing, sleeping, sexual activity, social life, and travelling. Each domain scored out of five, with a maximum total of 50 points. A score of 0 indicates normal function, while 50 indicates severe functional impairment.

2.5 Statistical Analysis

Pain scores before and after treatment were expressed as mean ± standard deviation. Paired t-tests were employed to compare pre- and post-treatment pain scores, with $P<0.05$ indicating statistically significant differences. Data were processed and analysed using SPSS 25.0 statistical software.

3. Results

3.1 General Data

Of 40 patients with discogenic low back pain, 23 met study criteria while 17 were excluded. Exclusion reasons included: 9 patients lacked pre- and post-treatment peripheral blood cell counts and CRP levels; 4 patients had concomitant lumbar muscle strain at diagnosis; 3 patients underwent fewer than two treatment courses; 1 patient received glucocorticoids during treatment. Among the 23 patients, 17 (73.9%) were male, with a mean age of 57.6 years (range: 43–71 years) and a mean disease duration of 13.6 months (range: 7.0–31.1 months). Twenty patients (87.0%) reported lumbar back pain, 17 (73.9%) reported sacrococcygeal pain, 16 patients experienced restricted lumbar mobility, 7 (30.4%) had lower limb pain, and 1 (4.3%) reported perineal sensory abnormalities. Patients underwent an average of 3.1 treatment courses (95% CI: 2.0–6.0) of thread-embedded needle knife therapy.

3.2 Efficacy and Safety

During treatment, one patient (4.3%) experienced one episode of needle syncope, presenting with dizziness, sweating, and nausea. No transient syncope or vomiting occurred. Symptoms resolved after needle removal and rest, with no other adverse events reported. Pre-treatment NRS scores averaged 6.22 ± 0.99. Following two treatment courses, NRS scores decreased to 2.61 ± 1.23. Paired t-test analysis demonstrated statistically significant improvement ($P < 0.001$) (see Figure 1A). Pre-treatment lumbar ODI function scores were 33.73 ± 3.92, decreasing to 18.13 ± 4.29 post-treatment. This difference was statistically significant ($P < 0.001$) (see Figure 1B).

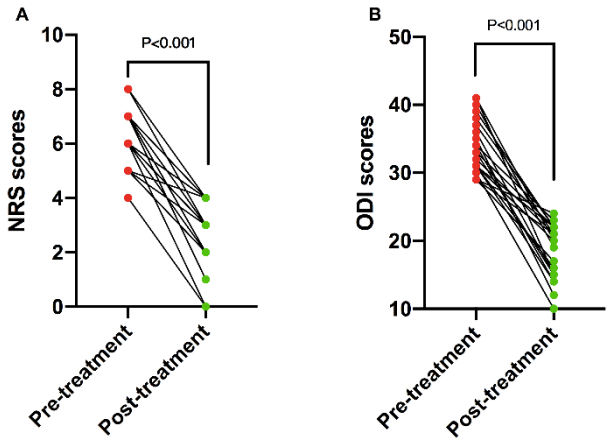

Figure 1: Changes in NRS and ODI scores before and after treatment. A. NRS scores; B. ODI scores.

3.3 Changes in Peripheral Blood System Inflammatory Markers

Peripheral blood cell counts were assessed in 23 patients prior to treatment and after every two treatment cycles. Analysis via paired-sample t-tests revealed that following two cycles of combined suture-needle knife therapy with celecoxib, patients exhibited significantly reduced serum NLR levels (3.49 ± 1.34 vs. 3.25 ± 1.47, P=0.030) (see Figure 2A) and PLR levels (108.20±17.24 vs. 102.00±11.78, P=0.004) (see Figure 2B), but did not significantly alter serum CRP levels (5.04±1.14 vs. 4.97±1.16, P=0.199) (see Figure 2C).

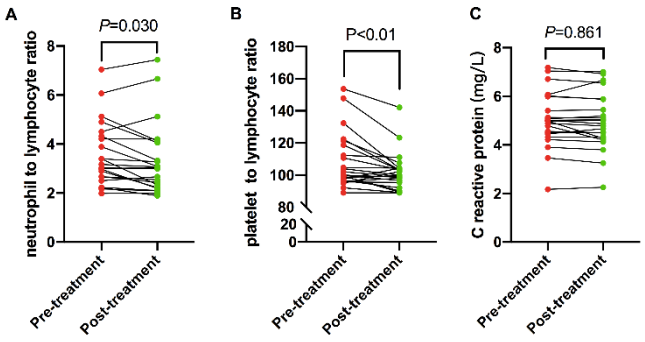

Figure 2: Changes in peripheral blood inflammatory markers before and after treatment. A. Neutrophil-to-lymphocyte ratio, B. Platelet-to-lymphocyte ratio, C. C-reactive protein.

4. Discussion

The pathogenesis of discogenic low back pain remains incompletely understood, with multiple theories proposed. Traditionally, it was believed that the intervertebral disc lacks innervation. However, recent research has revealed that the disc is innervated by the interspinous nerve and sympathetic trunk branches. The interspinous nerve, composed of the spinal nerve recurrent branch and the grey communicating branch, innervates the posterior aspect of the disc, while the sympathetic trunk communicating branch innervates the anterior aspect. Together, they provide innervation to the lateral regions [4]. The pain arises from altered pressure on the intervertebral disc, stimulating preganglionic sensory receptors to generate pain perception. Nerve growth factor (NGF), a member of the neurotrophic factor family, also plays a pivotal role in the pathogenesis of discogenic low back pain. While NGF and its receptors are not expressed in normal disc tissue, elevated NGF expression can be detected in pathological discs. NGF promotes nerve axon growth, exacerbating nerve infiltration. It also induces the release of substance P, thereby causing pain, and can bind to receptors on mast cell surfaces, stimulating cytokine release [5].

Additionally, some scholars contend that although the nucleus pulposus is avascular tissue, degenerated discs may exhibit infiltration by inflammatory cells such as mast cells. This process releases inflammatory mediators like histamine, which stimulate nerve receptors to generate pain [6]. Similarly, research has revealed that local inflammatory responses are closely associated with the development of discogenic low back pain. Studies have demonstrated that normal intervertebral discs lack inflammatory mediators such as interleukin (IL)-1 and IL-6 [7], however, in disc specimens from patients with discogenic low back pain, elevated expression of IL-1 and IL-6 can be detected, alongside the presence of cytokines such as nitric oxide [8], This demonstrates that multiple inflammatory factors are implicated in the degenerative changes of intervertebral discs, contributing to the onset and progression of the disease. Modulating the inflammatory response may therefore hold therapeutic potential.

Although the aforementioned factors have been confirmed in experimental studies, no specific therapeutic approaches targeting their precise mechanisms currently exist. The efficacy of oral non-steroidal anti-inflammatory drugs and corticosteroids alone is limited, and long-term medication carries numerous side effects and complications. Surgical intervention offers certain advantages, particularly with the application of minimally invasive techniques; however, it carries higher risks and remains clinically restricted in its application [9].

Pain constitutes a primary indication for acupuncture treatment, particularly chronic pain. However, traditional needling techniques yield relatively short-lived effects, making sustained therapeutic outcomes challenging to achieve. Building upon clinical practice, contemporary practitioners have developed various methods to enhance the enduring efficacy of acupuncture. Among these, the thread implantation technique stands out. This approach offers the advantages of being suitable for needling, injection, and implantation. For chronic pain conditions, threads implanted at acupoints provide prolonged stimulation. Furthermore, as a foreign protein, the suture material stimulates the immune system to produce antibodies, thereby alleviating inflammatory states and regulating organ function. Additionally, sutures implanted at acupoints induce a blood-letting effect; localised stasis stimulates the secretion of anticoagulant factors, improving circulation and promoting blood activation and stasis resolution. This therapeutic technique finds extensive clinical application in managing pain conditions such as migraines [10] and osteophytes [11], demonstrating favourable safety profiles and enduring efficacy that have garnered recognition within certain medical circles. However, the efficacy and safety of combining thread implantation with oral anti-inflammatory medication for treating this condition remain incompletely established.

This study reviewed patients with discogenic low back pain treated at our hospital over the past year, selecting 23 cases who received combined thread-embedded acupuncture knife therapy with celecoxib capsules. Analysis revealed that thread-embedded acupuncture knife therapy significantly reduced patients' pain NRS scores and lumbar function ODI scores, with only one patient (4.35%) experiencing needle syncope. It has been reported that the incidence of needle phobia in traditional acupuncture treatment is approximately 4% [12], The study indicates that the buried-thread needle knife technique does not significantly increase the incidence of fainting reactions, demonstrating its reliable safety profile. To date, only one retrospective analysis has reported the use of this technique for treating this condition, involving 21 patients with discogenic low back pain. Treatment with the buried-thread needle knife significantly improved both pain levels and lumbar function in these patients [13]. Similar to the findings reported in this study.

Concurrently, this study analysed changes in systemic inflammatory markers NLR and PLR before and after treatment in the enrolled cohort. Results revealed that following treatment with acupuncture needle knife therapy and celecoxib, patients' NLR and PLR levels also decreased significantly. This indicates that such treatment can ameliorate systemic inflammatory responses in patients, suggesting that the combination of acupuncture needle knife therapy with celecoxib may exert therapeutic effects by reducing inflammatory responses. Research has demonstrated that Chinese herbal decoctions combined with local therapy can reduce alterations in multiple peripheral blood

inflammatory factors in patients with discogenic low back pain, including prostaglandin E2 (PGE2), interleukin-6 (IL-6), and tumour necrosis factor-α (TNF-α) [14]. this suggests that modulating systemic inflammatory responses may represent an effective therapeutic approach for this condition.

NLR and PLR are commonly employed systemic inflammatory markers in clinical practice, widely utilised across oncology, critical care medicine, and infectious disease disciplines. They hold considerable reference value for assessing patient prognosis and treatment efficacy. Neutrophils, in particular, not only participate in the body's defence mechanisms but also exacerbate inflammatory responses by secreting cytokines such as IL-6, IL-8, and tumour necrosis factor (TNF). Research indicates that platelets are also pluripotent cells, involved not only in haemostasis but also in inflammatory responses and angiogenesis. By releasing multiple cytokines, including vascular endothelial growth factor, platelets promote the recruitment and infiltration of inflammatory cells, thereby intensifying systemic inflammatory reactions.

This study also examined changes in peripheral blood CRP levels, though no significant alterations were observed before and after treatment. CRP is a commonly used clinical inflammatory marker with high diagnostic sensitivity for stress responses, tissue injury, infection, and malignant tumours, primarily employed in diagnosing acute inflammatory reactions. Discogenic low back pain represents a chronic degenerative condition characterised by predominantly chronic inflammatory responses, rendering CRP changes less sensitive for its assessment. Furthermore, most patients exhibited peripheral blood CRP levels below the normal range prior to treatment, explaining the lack of significant post-treatment variation.

5. Summary

In summary, the combination of acupuncture with thread implantation and celecoxib capsules is safe and effective for discogenic low back pain. Its mechanism of action may be related to improving inflammatory responses, warranting further promotion and investigation. However, this study has several limitations. Firstly, it is a retrospective, single-centre investigation with a small sample size. Secondly, as a single-arm observational study lacking a control group, the superiority of acupuncture combined with thread implantation over other treatments remains unclear. Further confirmation requires multicentre, prospective, controlled studies.

References

[1] Monfett M, Harrison J, Boachie-Adjei K, et al. Intradiscal plateletrich plasma (PRP) injections for discogenic low back pain: an up- date [J]. Int Orthop, 2016, 40 (6): 1321-1328.

[2] Wilson DH, Maccarty WC. Discography: its role in the diagnosis of lumbar disc protrusion [J]. J Neurosurg, 1969, 31 (5): 520-523.

[3] Peng BG. Pathophysiology, diagnosis, and treatment of discogenic low back pain [J]. World J Orthop, 2013, 4 (2): 42-52.

[4] Bogduk N. The innervation of the lumbar spine [J]. Spine (Phila - delphia, 1976), 1983, 8 (3): 286-293.

[5] Tian L, Prabhakaran MP, Ramakrishna S. Strategies for regeneration of components of nervous system: scaffolds, cells and biomole - cules [J]. Regenerative Biomater, 2015, 2 (1): 31

[6] Freemont AJ, Watkins A, Maitre CL, et al. Nerve growth factor epression and innervation of the painful intervertebral disc [J]. J Pathol, 2002, 197 (3): 286-292

[7] Yang J, Kang J, Feng D, et al. Increased IL- 1 and IL-6 expressions are negatively correlated with modified Japanese Orthopedic Association (mJOA) scores of discogenic low back pain [J]. Xi Bao Yu Fen Zi Mian Yi Xue Za Zhi, 2016, 32 (1): 88-91.

[8] Kang JD, Georgescu HI, Mcintyre-Larkin L, et al. Herniated lumbar intervertebral discs spontaneously produce matrix metalloproteinases, nitric oxide, interleukin- 6, and prostaglandin E2 [J]. Spine (Phila Pa 1976), 1996, 21 (3): 271-277.

[9] Li Pinquan. A Brief Discussion on the Diagnosis and Treatment Methods for Discogenic Low Back Pain [J]. Contemporary Medical Forum, 2017, 15(02): 30-31.

[10] Xu Long. Clinical efficacy observation of buried thread needle knife therapy for migraine [A]. Chinese Society of Acupuncture and Moxibustion. New Era, New Thinking, New Leap Forward: New Development — Proceedings of the 2019 Annual Conference of the Chinese Society of Acupuncture and Moxibustion and 40th Anniversary Retrospective [C]. Chinese Society of Acupuncture and Moxibustion, 2019:6.

[11] Gao Jinghui. Clinical Observation on the Therapeutic Effect of Yang's 3A+ 'Five-Needle Foot Acupuncture' Implanted Thread Knife Treatment for Calcaneal Spur [A]. Gansu Provincial Association of Traditional Chinese Medicine. Proceedings of the 2017 Annual Academic Conference of the Gansu Provincial Association of Traditional Chinese Medicine [C]. Gansu Provincial Association of Traditional Chinese Medicine, 2017:5.

[12] Yang Xiaoyu, Ma Hongying. Clinical Analysis of Targeted Nursing Interventions for Acupuncture - Induced Syncope in Patients [J]. Practical Clinical Nursing E-Journal, 2019, 28: 133-134.

[13] Jiao Li, Yang Caide. Clinical observation on the treatment of discogenic low back pain with buried thread needle knife therapy [J]. Modern Distance Education of Traditional Chinese Medicine in China, 2020, 18: 108-110.

[14] Zheng Xuelin. Observation on the Effect of Liver-Soothing and Kidney-Supplementing Decoction Combined with Percutaneous Radiofrequency Thermocoagulation Ablation in the Treatment of Discogenic Low Back Pain [J]. Henan Medical Research, 2020, 29(24): 4477-4479.