

Original Paper

Clinical Efficacy and Mechanism of Micro-needle Pulsedredging Combined with New Bobath Technique in the Treatment of Shoulder Subluxation after Stroke

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Received: August 9, 2026

Accepted: September 2, 2026

Online Published: September 7, 2026

doi:10.22158/rhs.v11n3p71

URL: <http://dx.doi.org/10.22158/rhs.v11n3p71>

Abstract

Post-stroke shoulder subluxation is a relatively common secondary disease of stroke that can cause serious harm to the recovery of upper-limb motor function in stroke patients, reduce their quality of life, and have negative impacts on the long-term rehabilitation results of these patients. The traditional single-rehabilitation intervention method is not very effective in practice because it only has one mode of action and a limited range. Microneedle Tongmai Method is a typical traditional Chinese medicine physical therapy technique that can affect the superficial meridians and muscle fascia of the shoulder joint to promote the circulation of qi and blood and reduce local muscle tension. The new and popular way of neurorehabilitation is the modern Bobath technique; it corrects abnormal postural patterns and rebuilds normal motor control of the limbs through neurodevelopmental intervention. Together, the two treatments can work together to help people with stroke improve their mobility and live more normally. Systematically discuss the application principles, clinical significance and internal action mechanism of the combined therapy for post-stroke shoulder subluxation in this paper, clarify the synergistic therapeutic advantages of the microneedle Tongmai method and the new Bobath technique in alleviating the state of shoulder joint dislocation, repairing neurological damage and reconstructing motor function, provide theoretical support and clinical references for the standardised application and promotion of this combined rehabilitation scheme in post-stroke rehabilitation treatment.

Keywords

Motor Function, Microneedle Tongmai Method, New Bobath Technique

1. Introduction

Shoulder subluxation is a type of dyskinesia that frequently occurs in stroke patients, and it is mainly caused by a loss of neuromuscular control, relaxation of the joint capsule and ligaments around the shoulder, and imbalance in the tension of muscles that support the shoulder. The reason for this problem is local pain and restricted movement of the shoulder joint; it can also cause abnormal movement compensation of the limb, worsen upper-limb motor disorders, and lead to long-term physical and psychological problems for patients. Currently, the rehabilitation methods for post-stroke shoulder subluxation in China are mainly physical factor therapy, exercise rehabilitation, traditional Chinese medicine therapy, etc.; although they help to improve neuromuscular coordination and address the consequences of dislocation, they have limitations in fundamental correction. Microneedle Tongmai Method corrects the meridian stasis and muscle dystonia of the affected shoulder, and the new Bobath technique focuses on the neuroplasticity of the central nervous system and the reconstruction of normal motor patterns.

2. Clinical Efficacy and Mechanism Principle of Micro-needle Pulse-dredging Combined with New Bobath Technique in the Treatment of Shoulder Subluxation after Stroke

2.1 Theoretical Basis of Microneedle Tongmai Method for Rehabilitation of Post-stroke Shoulder Subluxation

Microneedle Tongmai Method is based on the traditional Chinese medicine meridian theory and fascia therapy, with the main idea being to "dredge meridians, regulate qi and blood, relax tendons and relieve spasm" in the treatment of post-stroke shoulder subluxation. In terms of traditional Chinese medicine, post-stroke shoulder subluxation falls under the category of "apoplexy sequelae" and "tendon bi", and its main pathological mechanism is the obstruction of shoulder meridians, deficiency of qi and blood nourishment, and dystrophy of tendon and ligament tissues; thus, there is an imbalance in muscle tension and abnormal joint displacement. A microneedle device can lightly puncture and separate the adherent fascial tissue at the surface of the shoulder joint, meridian points and muscle attachment areas to relieve the blockage of meridian channels and promote the free flow of local qi and blood. This kind of therapy does not cause serious harm to the body; it can be done minimally invasively to boost the body's own regulatory function, increase the supply of nutrients to the capsule of the shoulder joint, ligaments and muscles, reduce muscle spasm and flaccid paralysis in the affected limb, and offer a basis for correcting subluxation of the shoulder joint (Montané, E., Pradié, M., Bigarre, I., et al., 2025). Microneedle Tongmai Method is different from traditional acupuncture and moxibustion in that it aims to improve the general circulation of the local area and the fascia system, and thus can address the specific pathological changes in the shoulder joint caused by stroke, regulating soft tissue lesions that lead to joint dislocation.

2.2 Technical Principles of New Bobath Technique for Post-stroke Shoulder Subluxation Rehabilitation

Based on the traditional Bobath neurorehabilitation theory, the new Bobath technique has been updated and optimised; it is based on the concept of central nervous system neuroplasticity to correct abnormal

postural reflexes and motor patterns and restore the normal motor control function of the shoulder joint. Stroke can harm the cerebral motor cortex and its connecting pathways; thus, there is a loss of voluntary control over the muscle group of the shoulder girdle, an increase in primitive reflexes, and the formation of abnormal compensatory movement patterns, all of which are underlying neurological reasons for post-stroke shoulder subluxation (Sosi, D., & Griffin, E., 2025). The new Bobath method is not a single kind of passive exercise as in the old method, but rather a combination of all kinds of active-passive interventions, such as postural control, key-point compression, anti-spasm mode correction and limb weight-bearing exercises. It can reduce the abnormal muscle tension in the shoulder and upper limb, activate the weakened muscle groups, balance the tension of the internal and external muscle groups of the shoulder joint, and restore the normal mechanical balance of the shoulder joint. The purpose of the above rehabilitation intervention for shoulder subluxation is to help patients learn a proper sense of the position of the shoulder joint, correct abnormal movement compensation habits that have developed after stroke, and promote the restructuring of the motor function of the central nerves; thus, it can improve the neuromuscular control of the shoulder joint at its root and achieve the goals of correcting subluxation and preventing recurrence.

3. Clinical Effect and Mechanism Significance of Micro-needle Pulse-dredging Combined with New Bobath Technique in the Treatment of Shoulder Subluxation after Stroke

3.1 Clinical Application Value of Combined Therapy in Optimizing Post-stroke Rehabilitation Effect

although there will be a temporary decrease in soft tissue symptoms, the basic problem of abnormal neural control and subluxation will not be solved. On the other hand, a single New Bobath technique can regulate nerve motor control and retrain the brain's signalling pathway to restore normal muscle activation, but it is slow to improve local fascia adhesion, meridian stasis and muscle dystonia of the shoulder joint. Most stubborn soft tissue abnormalities need more direct physical intervention for correction, and Bobath alone is not very effective in this regard. Together, the two therapies can reduce the damage at the site of injury and restore central function; thus, the repair of the periphery can also support the organisation of the central nervous system. The Microneedle Tongmai Method can improve the local microenvironment of the shoulder joint, increase blood flow and reduce inflammation, alleviate the pathological state of soft tissues (such as fascia tightness and trigger points), and thus create a good physical condition for Bobath rehabilitation training. Reducing the soft tissue barrier will help the patient do the movement rehabilitation exercise more easily and effectively. The new Bobath technique will further stabilize the joints and improve the motor control ability that has been enhanced by microneedle intervention; extend the new range of motion and alignment; prevent the recurrence of subluxation due to abnormal motor patterns (such as improper muscle compensation or poor posture); and build an uninterrupted and systematic rehabilitation intervention process to address both the local and central problems of the disease (Gauci, O. M., Geofroy, D. B., Chamoux, J., et al., 2024). The two aims above can improve the clinical rehabilitation effect of post-stroke shoulder subluxation and boost the recovery

efficiency of upper limb motor function in patients, helping them regain functional independence more quickly and achieve better long-term results.

3.2 Theoretical Research Significance of Combined Therapy in Establishing the Stroke Rehabilitation System

Combined therapy is based on the dual theoretical support of meridian theory in traditional Chinese medicine and the theory of neuroplasticity in modern science; therefore, we have systematically clarified the internal correlation between local soft tissue dredging and central nerve function reconstruction in the treatment of shoulder subluxation and constructed a new rehabilitation theoretical model of "local lesion repair - central function remodeling - motor pattern normalization". Further investigation into the reasons for this will help correct the existing theoretical deficiencies in the current study on integrated Chinese and Western rehabilitation for post-stroke complications, provide new theoretical support for the innovative development of the discipline of stroke rehabilitation, and promote the standardisation and systemisation of comprehensive rehabilitation therapy for stroke sequelae.

3.3 Social Application Significance of Combined Therapy in Improving Patients' Rehabilitation Prognosis

If the dislocation is not corrected in time, there will be long-term problems in the shoulder joint, and people will be unable to do daily activities such as working and taking care of themselves. Therefore, both the families of the patients and society have been under considerable financial and emotional pressure and require continuous attention and large-scale allocation of medical resources. At the same time, the joint rehabilitation plan can effectively enhance the function of the shoulder joint and the motor ability of the upper limb in stroke patients, helping them regain basic daily living skills such as dressing, eating and personal hygiene. Reduce the reliance of older adults on family care so as to lessen the burden on family members and lower the total amount of social medical and nursing expenses. Microneedle therapy is also relatively small in size, safe and effective, and when combined with the scientific and targeted advantages of new Bobath rehabilitation training, it is expected to have good results in clinical practice. It can offer high-quality rehabilitation services for a larger number of stroke patients and help them improve their physical and mental health and social integration. It can be expected that it will help to raise the overall rehabilitation level of people with strokes in society and promote the improvement of public health and social stability.

4. Clinical Efficacy and Mechanism of Micro-needle Pulse-dredging Combined with New Bobath Technique in the Treatment of Shoulder Subluxation after Stroke

4.1 Clinical Efficacy of Combined Therapy in Correcting Shoulder Subluxation and Improving Joint Function

A combination of the microneedle Tongmai method and the new Bobath technique has been applied to improve the correction of post-stroke shoulder subluxation and restore shoulder joint function. On the one hand, microneedle Tongmai can directly treat fascia and meridian lesions in the shoulder joint to

address the particular pathological sites of soft tissue abnormalities (Hachem, I. A., Barraza, G., Alvarado, F., et al., 2025). Directly address the spasm and adhesion of the muscle groups in the shoulder girdle to reduce tension on the joint and correct the joint misalignment. It can also help relax the shoulder joint capsule and ligaments to improve their function of support and stability. Strengthen the elasticity and toughness of the soft tissues in the area to help them better withstand mechanical injury. Together, the above effects can reduce the main reason for shoulder joint displacement due to soft tissue dystrophy by correcting the underlying structural problems in the joint that are likely to cause subluxation. At the same time, according to the new Bobath technique, one can regularise the posture and movement patterns of the shoulder joint and limbs by using specific neurorehabilitation exercises and guidance to correct abnormal movement. This exercise will help you regulate the pull of the front and back, inside and out, of the muscles around your shoulder joint to prevent any one area from pulling too hard and causing problems for the joint. Restore the mechanical stability of the shoulder joint to accurately correct the subluxation, and then move the humeral head back to the correct position in the glenoid cavity. At the same time, the two treatments are also complementary and can be used together in the clinic. The improvement of the local soft tissue in the area after microneedle therapy can help sustain the rehabilitation training; that is to say, a reduction in spasm and an increase in tissue compliance will make it easier for patients to perform the prescribed exercises. At the same time, the neuro-motor regulation of the Bobath technique can keep correcting the position of the shoulder joint and prevent subluxation at this time after training. Based on the above combined method, various parts of the range of motion, stability and function of the damaged shoulder joint can be improved to correct the disorder caused by stroke, thereby enabling patients to operate their upper limbs normally once more.

4.2 Local Soft Tissue Regulatory Mechanism of Combined Therapy in the Affected Shoulder Joint

Together, the two treatments can address various problems in the soft tissues of the injured area of a dislocated shoulder joint, and working together, they will create a good microenvironment for repairing damage caused by stroke in the shoulder. First, the microneedle Tongmai method is used to apply a small amount of physical stimulation to the superficial tissues of the shoulder joint to effectively dilate the local microvessels, improve blood and lymph circulation, and increase the general metabolic level of the soft tissues in the shoulder joint. The increased metabolic activity will help to raise the concentration of local inflammatory substances and thus promote the organised repair of damaged fascia and muscle tissue to restore the structure of the soft tissue. Therefore, we can adjust the excitability of the local peripheral nerves more accurately, reduce the abnormal pain and numbness in the shoulder joint caused by nerve compression and blood stasis, and gradually restore the normal sensory function of the local tissues in the shoulder joint to improve the patient's subjective feeling of comfort. At the same time, the new Bobath technique can reduce the stress on the shoulder joint capsule and ligaments by combining passive and active limb positioning with specific muscle training; thus, it can prevent soft tissue atrophy and contracture caused by prolonged abnormal joint positions and actively stimulate the vitality of dormant muscle cells in the shoulder girdle to restore muscular support. The joint operation of the two

complementary ways can fully repair the damage to the soft tissues in the shoulder joint, distribute the mechanical stress of the soft tissue structure properly, build a stable and flexible system of soft tissue support for the shoulder joint; thus, the local pathological factors causing recurrent subluxation will be completely eliminated, and long-term therapeutic stability will be achieved.

4.3 Central Neuroplasticity Remodeling Mechanism of Combined Therapy on Stroke Injury

The main reason that the microneedle Tongmai Method combined with the new Bobath technique helps reduce post-stroke shoulder subluxation is that it can promote changes in the central nervous system and rebuild a normal nerve-muscle regulation pathway. Damage to the central nerves in the brain due to stroke interrupts motor nerve conduction, so there is a loss of active regulation function for the shoulder muscles and thus an occurrence of shoulder subluxation. At the base of the new Bobath method is neuroplasticity, and by means of repeatedly practising standardised postural exercises and correcting motor patterns precisely, one can promote the compensatory regeneration of cerebral nerve cells. This way will help to repair the damaged motor nerve conduction pathway, re-establish the central nerve's main control over the muscle groups in the shoulder girdle, and restore the normal neural command chain from the brain to the shoulder muscles. At the same time, the microneedle Tongmai method can also transmit local somatic sensory stimulation of the shoulder joint to the central nervous system by way of peripheral nerve conduction and increase the sensory feedback in the affected limb. The increased sense of touch can activate the dormant nerve function area in the brain and promote the reconstruction of central nerve motor function to improve the therapeutic effect of the Bobath method (Okazaki, T., Nagai, S., Yako, U., et al., 2025). The two kinds of stimulation for peripheral somatic sensation and central motor training form a whole and cooperative closed-loop regulation mechanism of "peripheral stimulation - central response - functional reconstruction". In this way, we can address the problem of neuromuscular control disorders after stroke and reduce post-stroke shoulder subluxation significantly at the level of central nerve function to achieve effective and lasting treatment.

5. Tag

The combination of the Microneedle Tongmai Method and the new Bobath technique is an innovative integrated Chinese and Western rehabilitation system that has received good theoretical support and achieved excellent clinical results in the treatment of post-stroke shoulder subluxation. Combined therapy is based on the meridian dredging theory of traditional Chinese medicine and the theory of neuroplasticity in modern medicine; it makes full use of the technical advantages of the microneedle Tongmai method for repairing local shoulder soft tissue lesions and the new Bobath technique for reconstructing central nerve motor function, achieving a synergistic rehabilitation effect of local lesion repair and central function remodeling to effectively correct the pathological state of post-stroke shoulder subluxation and improve shoulder joint stability and upper limb motor function. Further research will be carried out on the application principles, clinical significance and internal action mechanisms of this will to build a scientific and standardised clinical rehabilitation scheme for post-stroke shoulder subluxation, and also

enrich the theoretical and practical system of integrated Chinese and Western rehabilitation for stroke sequelae. Combined therapy has the attributes of safety, efficacy and practicality; therefore, it is worth continuing to promote in clinical practice and conducting further research on its mechanism to provide better rehabilitation intervention services for stroke patients and improve their long-term rehabilitation prognosis and quality of life.

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