

# *Clinical Research Progress in the Treatment of Children with Cerebral Palsy by Tui Na*

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**Abstract:** Cerebral palsy short for cerebral palsy, is caused by non-progressive brain injury such as immature brain, congenital developmental defects or injury. The main manifestations are motor and postural abnormalities. In this paper, we analyze the advantages and shortcomings by compiling the literature related to the treatment of children with cerebral palsy by Tui Na in recent years. We summarize the mechanism of Tui Na in the treatment of children with cerebral palsy, the basic manipulation techniques and sites, and summarize specific Tui Na methods and Tui Na combined with other therapies. The results show that Tui Na has unique advantages for the rehabilitation of children with cerebral palsy, thus laying the foundation for further research and application.

## **1. Introduction**

Cerebral palsy is a group of persistent central motor and postural developmental disorders and activity limitation syndrome. The prevalence of cerebral palsy is reported to be 1.4‰~3.2‰ at home and abroad, and the prevalence of cerebral palsy is 2.46‰ at the age of 1~6 years in China. With the improvement of modern neonatal resuscitation techniques, the development of perinatal medicine and screening during pregnancy, the survival rate of newborns has increased significantly, and the incidence of cerebral palsy has increased year by year worldwide. With the improvement of modern neonatal rescue technology, the development of perinatal medicine and the investigation of pregnancy, the survival rate of newborns has been greatly improved, and the incidence of cerebral palsy has also been increasing year by year worldwide<sup>[1]</sup>. According to the clinical manifestations, cerebral palsy is divided into spastic quadriplegia, spastic diplegia, spastic hemiplegia, involuntary movement, ataxia, syndrome, and mixed type<sup>[2]</sup>.

Children with cerebral palsy have a complex etiology, variable conditions and a long course of treatment. Modern medicine believes that the occurrence of cerebral palsy is mostly related to prenatal, perinatal, postnatal or genetic factors. Due to the unique nature of the disease itself, caregivers are required to provide long-term care to the child, not only to provide care that is higher than that of the average child, but also to provide home rehabilitation training to ensure the child's daily life. Due to the long duration of the disease, it brings back a huge burden to the family and society. Currently, there are many treatment methods for children with cerebral palsy, among which traditional Tui-Na techniques in Chinese medicine have played a great efficacy in the treatment process. In this paper,

we will review the recent literature on the study of Tui Na in the treatment of children with cerebral palsy, so as to provide effective clinical value.

## 2. Chinese medicine understanding of cerebral palsy

In traditional medicine, children with cerebral palsy belong to the categories of "five late", "five soft", "five hard" and "weak fetus"<sup>[3]</sup>. According to traditional medicine, cerebral palsy is caused by congenital deficiency in the fetal endowment or loss of nourishment in later life. For example, as stated in "The Golden Guide to the Medical Practice - The Essentials of the Heart Method for Young Children", "Most of the cases are due to the parents' weakness in Qi and blood and congenital deficiency". It is mentioned in the book "The weakness of the fetus is due to the deficiency of the endowment of Qi". In addition, as also stated in the "Summary of Infant Protection - five soft": "five soft, all because of the five organs of Qi weakness, cannot nourish the full reach". According to traditional medicine, the kidney is the main reservoir of essence, and its strength and weakness affect the growth and development of the body; the liver is the main drainage, which is related to the distribution and operation of essence, blood, fluid and fluid, and can smooth the qi flow of the whole body; furthermore, the liver is the main tendon, and sufficient liver blood can moisten the tendons and bones of the limbs and make the tendons flex and extend flexibly. If the liver blood is insufficient, the tendons and veins will be unfavorable, resulting in abnormal flexion and extension of the tendons and bones. Treatment should follow the basic principles of nourishing the liver and kidney, nourishing blood and nourishing yin. Professor Tai Xiantao<sup>[4]</sup> combined with the theory of traditional Chinese and western medicine, believed that cerebral palsy is "brain" and "du pulse".

## 3. Mechanism of Tui Na for cerebral palsy

Based on the basic theories of TCM, Tui Na is a method of treating diseases by applying different Tui Na techniques or by using Tui Na media to specific parts of the body, and is part of the external treatment of TCM<sup>[5]</sup>. Tui Na treatment for pediatric cerebral palsy is simple and effective, compared with adult Tui Na, it is lighter, gentler, smoother, and more moderate. Based on the theory of meridians, acupuncture points and Tui Na, it combines the child's condition and the direction of meridian circulation with the corresponding acupuncture points, and stimulates with certain techniques to regulate the meridians, smooth the flow of qi and blood, and harmonize yin and yang<sup>[6]</sup>.

## 4. Clinical study of Tui Na for cerebral palsy

### 4.1 Basic Tui Na Techniques

Due to the historical faction, there are various manipulation techniques of Tui Na, but the basic techniques are the same. According to the structure of movement, there are six major categories, including pushing and kneading, friction, holding and pressing, percussion, vibration and shaking. The pushing and kneading category includes pushing, kneading, rolling, etc.; the friction category mainly includes moistening, rubbing, wiping, etc.; the holding and pressing category includes holding, pressing, and pinching; the percussion category includes clapping and striking; the vibration category includes vibration and rubbing; the shaking category includes shaking, shaking, and wrenching, etc. Hong Wenyan<sup>[7]</sup> treated 105 children with spastic cerebral palsy by kneading, pressing, pushing, pressing, pulling and shaking, and other basic techniques, and the results showed that they could effectively restore the muscle tension and motor function of the children.

## 4.2 Acupressure points

In clinical studies, acupoint pressure is one of the modalities used by many healers. In addition to the traditional fourteen meridian points, extra-meridian and ayurvedic points, pediatric specific acupuncture points also play a good therapeutic role. Pediatric specific points are points specific to pediatric Tui na, excluding the traditional fourteen points and extra-meridian odd points. They can be divided into points, status quo, and face, and are mostly two-handed, which is well illustrated by the "two palms and the hundred chakras of children". For example: (1) point-specific points: pushing the kangong, opening the tianmen, rubbing the high bone behind the ear, pushing the tianzhu bone, rubbing the breast root, and rubbing the dantian; (2) line specific points: pushing the spine, spleen meridian, lung meridian, and other meridians; (3) face specific points: the four transverse lines, the small transverse lines of the palm, etc. Zheng Weiguo<sup>[8]</sup> treated children with cerebral palsy by selecting acupuncture points symptomatically, taking Sishencong, Baihui and Fengchi for mental retardation; Jinjin, Yuyu, Tongli and Lianquan for speech disorders. It was argued that the long-term efficacy of acupoint point pressure in the treatment of children with cerebral palsy was significant.

## 4.3 Tui Na for different areas

### 4.3.1 Head Tui Na

The physiological development of the child begins at the head and proceeds in a caudal direction<sup>[9]</sup>. Some studies have shown the effectiveness of head massage in the early stage of treatment. The head is the meeting of all the yang, contains the brain and marrow, and is the master of the spirit and unifies the whole body. For example, the Su Wen states: "The head is the house of the essence"; the Ling Shu states: "When a person is born, he first becomes the essence, and when the essence becomes, the brain marrow is born". The medical practitioners of the past generations divided the scalp into sensory area, motor area, speech area and so on. By massaging the corresponding areas of the head, we can improve the blood circulation in the head and promote the effective compensation of the damaged brain tissue functions, thus improving the clinical symptoms of children with cerebral palsy. Liang Shaoying<sup>[10]</sup> has improved the quality of head control in children with cerebral palsy by performing special push-ups on their heads at an ultra-early stage. He Guangyuan<sup>[11]</sup> has improved the central motor disorders and postural abnormalities in children with cerebral palsy by combining functional training and medication with tui-na in different parts of the head.

### 4.3.2 Abdominal Tui Na

The gut is called the human "second brain"<sup>[12]</sup>. Human enteric neurons are five times the size of murine neurons and contain more than 500 million neurons. By regulating the intestinal microbiota and metabolites, abdominal massage directly or indirectly affects the synapse and increases the neuronal activity, so as to improve the core stability of children with cerebral palsy<sup>[13]</sup>. Moreover, according to the meridian theory, the abdominal distribution of liver, spleen, kidney, meridians, Ren mai, etc., through the abdominal meridians and acupoints, holding, can play the effect of near and far treatment, adjust the viscera, soft tendons and urgent, improve the upper and lower limb spasm and muscle abnormalities in children with cerebral palsy. Zhao Yimeng<sup>[14]</sup> observed the treatment of children with cerebral palsy, including rubbing, pushing, rubbing, rubbing, pulling, pushing abdomen and limb massage, which had a significant effect on reducing muscle tone. Feng Zhaocai<sup>[15]</sup> also used the six methods of abdominal massage to intervene in 20 children who do not exercise casually, and the total effective rate was 85%, indicating that the massage can improve the motor function and social adaptability of children who do not exercise casually.

### 4.3.3 Spine and Extremity Tui Na

According to the theory of cortical functional localization scalp projection theory<sup>[16]</sup>, the spinal massage of children with cerebral palsy can repeatedly stimulate the brain and spinal cord, accelerate the activation of the nerve center to a certain extent, reduce the threshold, and reorganize part of the nerve function, so as to improve the symptoms. Chen Yuhua<sup>[17]</sup> created "spinal spinal therapy" to treat children with cerebral palsy, indicating that chiropractic therapy combined with modern rehabilitation technology can improve the clinical function of children with cerebral palsy. He ping<sup>[18]</sup> Observe the "back six methods" massage method (pushing ridge, chiropractic, ridge, percussion ridge, ridge, ridge) combined with exercise therapy to treat children spastic cerebral palsy, liver strong spleen weak syndrome, the further development of children chiropractic therapy, can effectively reduce the lower limb muscle tension in children, increase joint mobility, improve motor function.

## 5. Clinical research progress in massage treatment of cerebral palsy

### 5.1 Clinical research progress of Tui Na for cerebral palsy

"Liu's Ten Methods of Paediatric Tui Na" is based on "five elements to help control" and "pushing the meridians to treat the organs" as the basic rule of treatment<sup>[19]</sup>. Shao Keyan<sup>[20]</sup> uses Liu's pediatric tuina method to treat children with cerebral palsy. The main components are: pushing the five meridians, opening the orifices (pinching the general meridian, pushing the solar plexus, opening the Tianmen point, etc.), chiropractic, and guanjiao (holding and pressing the shoulder well point). The treatment was continued once a day for 2 months. After treatment, the muscle tone, gross motor function and comprehensive function scores of the extremities in the observation group were superior to those in the control group. The use of Liu's pediatric tuina method combined with modern rehabilitation therapies (neurodevelopmental therapies including reflex inhibition, reflex facilitation techniques, and percussive techniques) by Zhang Chun<sup>[21]</sup> has similarly demonstrated that the therapy can effectively improve the clinical symptoms of children with cerebral palsy.

Fang Qian<sup>[22]</sup> used the "Guiding Belt and Qi" Tui Na method to treat the gait movement of children with spastic cerebral palsy, focusing on the "Guiding Belt and Qi" method and the "Pinned Spine" technique to correct the anterior protrusion of the lumbar spine and stabilize the lumbar region. With the support of three-dimensional gait analysis system, the "Guiding Belt and Qi" method could correct the force lines of pelvis and lower limbs, improve the stability of the support and swing phases, and prolong the stride length.

Wang Yue<sup>[23]</sup> believe that the head is extremely important in the treatment of cerebral palsy. Through local stimulation, combined with relevant acupoints, promote blood circulation in the brain and strengthen the development of brain tissue and the metabolism of damaged cells. The author used the method of soft tendon massage to treat children with cerebral palsy, using different techniques in the back, head and limbs, demonstrating that the massage can promote the recovery of the brain function of the limb, improve abnormal posture, and improve the gross motor function of children.

Zhang Jing<sup>[24]</sup> gave the child with cerebral palsy the awakening brain and enlightenment Tui-na method combined with conventional corrective techniques. It mainly includes: ① Tui Na for the head following the Sanyang meridian, along both sides of the head and neck to the large vertebrae, and massage for the muscles and abnormal posture areas. ② Torso movement training: follow the foot sun bladder meridian and foot shaoyang bile meridian along the large vertebrae, lightly pressing and pushing 5 times each, and pushing 5 times to the lateral side. ③ Squatting training for the limbs. Research techniques confirm that the method can promote brain development, activate brain function and reduce brain damage. Zhou Ruigang<sup>[25]</sup> used the Waking Brain and Tongluo Tui-Na method combined with rehabilitation training treatment to improve gross motor function and muscle tone in children with spastic cerebral palsy.

Hong Wenbin<sup>[26]</sup> studied the effect of Jianshuangjianjian tui-na method in treating children with cerebral palsy. Main operations: ① Head: the practitioner kneaded the head points such as Fengchi and Mute Gate with gentle techniques. ② Upper limbs: following the hand Shaoyang and Sun meridians, the practitioner kneads and kneads the upper limb muscles using certain techniques, rolls the peri-shoulder acupoints, points such as shoulder well and Hegu, and extends the shoulder joint. ③ Periumbilical: rubbing and kneading the periumbilical area, point pressing Fengmen, Liver Yu, Shen Que and other points. ④ Lower extremities: kneading along the foot Shaoyang meridian and foot Sun meridian, pushing and transporting Sanyinjiao, abducting and flexing the hip and knee joints, pointing and pressing Kunlun and Zhizhong, etc. 5 times a week, 3 months as a course of treatment. It was concluded that the combination of kidney-strengthening and spleen-strengthening massage method with conventional rehabilitation training was more effective than rehabilitation training alone, and could improve the motor function, relieve muscle tension and improve gait of children with cerebral palsy.

Ma Bingxiang<sup>[27]</sup> used the strength-suppressing and weak-supporting massage method to intervene in 84 children with cerebral palsy aged 6 months to 6 years, randomly divided into 43 groups of strength-suppressing and weak-supporting massage and 41 groups of conventional massage. The GMFM scale was used to assess gross motor movements, and the study showed that the strength-suppression and weak-suppression massage group was more effective than the conventional massage group in reducing muscle tone and improving joint mobility.

Based on TCM theory, modern anatomy and biomechanics, Wang Hui<sup>[28]</sup> studied the effect of dredging the meridians and ductus on the jaw movement of children with cerebral palsy<sup>[29]</sup>. Mainly includes: dredging the meridians and pushing the Governor's meridian (head and face operation: first pushing the five meridians from front to back according to the meridian circulation, pointing and pressing Shenting, Baihui, Si Shencong, opening Tianmen, pushing Kangong, rubbing Yin Tang, etc.; neck operation: mainly pressing and rubbing the Governor's meridian and bladder meridian, improving the muscle tone of the neck, improving the head control ability, pushing it from top to bottom, and finally pulling and stretching the neck according to the specific situation). Combined with jaw movement training for 30minutes each time, 5 times a week, 3 months as a course of treatment. The method regulates the circumferential meridian qi through meridian pushing, improves the excitability of the tissues and strengthens the local tissue motility. By observing the changes in mandibular motor function, degree of dysarthria and myoelectric values of the occlusal muscles before and after treatment, the study group was proved to be superior to the control group.

## 5.2 Tui Na combined with other therapies

### 5.2.1 Tui Na combined with rehabilitation training

Rehabilitation training is theoretically based on the plasticity of the central nervous system. It includes exercise therapy, occupational therapy, physical therapy and other training methods. Fang Xueting<sup>[30]</sup> studied the combined rehabilitation therapy to treat children with cerebral palsy, indicating that the combination of massage and rehabilitation therapy is conducive to improving the muscle strength and motor function of quadriceps children, and improving the daily living ability of children. Zhang Chunmei<sup>[31]</sup> used massage and Bobath technology to treat high-risk children with cerebral palsy, which showed that it could better improve the gross motor function of children with cerebral palsy. Huang Jianhua<sup>[32]</sup> used pediatric massage combined with Bobath method and Vojta method to treat children with spastic cerebral palsy, which improved the motor function of children with cerebral palsy to some extent.

### 5.2.2 Tui Na combined with acupuncture therapy

Yue Ling<sup>[33]</sup> studied snap-needle compression therapy (on the foot Sanli point, the life-gate point,

the lumbar Yangguan point, the Wei Zhong point, and the bilateral pinch points of the 2nd to 5th lumbar vertebrae at the Great Vertebrae point, respectively) combined with pediatric tui-na techniques (meridian-pushing, acupoint pressing, pediatric chiropractic and massage of the dorsal muscles at the Governor and pinch points). It was shown that snap-needle compression therapy combined with pediatric tuina techniques could better improve the stability of core muscle groups in children with cerebral palsy. Zhang Lijun<sup>[34]</sup> uses Jin San Acupuncture (the main acupuncture point is Sishen Acupuncture, with symptomatic additions and subtractions, such as Tongue San Acupuncture, Zhi San Acupuncture, and Temporal San Acupuncture) combined with Tui Na techniques, which can effectively improve the child's intelligence. Yuan Guona<sup>[35]</sup> studied the effects of meridian acupuncture and massage on muscle spasticity, motor development and serum BDNF, NGF and GDNF levels in children with spastic cerebral palsy, and the results showed that serum BDNF, NGF and GDNF levels increased after treatment.

### 5.2.3 Tui Na combined with herbal therapy

In the herbal treatment of children with cerebral palsy, it can be divided into two ways, internal and external, with external use being more common. Jie Xiaosu<sup>[36]</sup> use of traditional Chinese medicine wax therapy combined with massage, acupuncture and other routine functional training, research shows that it can effectively improve the exercise ability of children. Peng Yunchao<sup>[37]</sup> used traditional Chinese medicine fumigation combined with massage and massage to improve the motor function of children with cerebral palsy. Chinese herbal medicine is mainly based on evidence-based treatment. Combined with clinical observation, children with cerebral palsy can be divided into those with weak liver and spleen, two deficiencies of spleen and kidney, deficiency of liver and kidney, phlegm and stagnation of ligaments, and two deficiencies of heart and spleen, with clinical addition and reduction according to the evidence. In addition, there are tui na combined with herbal collapse, acupuncture point application and herbal nebulization transdermal treatment.

### 5.2.4 Tui Na combined with other therapies

Liu Ruibin<sup>[38]</sup> using pediatric massage (spleen meridian, plate door, Yunnei gossip, Yin and Yang, abdomen, chiropractic, etc.) combined with four stitches to treat children with cerebral palsy combined with Yin and Yang research shows that: picking four stitches can effectively improve the nutritional conditions of children with cerebral palsy, promote the development of gross movement, which is worthy of clinical application. Liu Zhenhuan<sup>[39]</sup> research massage (and kidney, brain puzzle point massage method, spleen yiqi massage method) combined with five elements of traditional Chinese medicine music therapy (five elements of music, Buddha classics music, such as Mozart effect music as background music) is given priority to, with sports training, observe 60 cases of early cerebral palsy baby, proved the massage combined music therapy can improve the clinical performance of children with cerebral palsy. In addition, massage can also be combined with muscle patch, ankle foot orthosis to treat children with cerebral palsy, clinical effect is significant.

## 6. Summary

In summary, traditional Chinese medicine Tui Na techniques have obvious advantages in the treatment of children with cerebral palsy. Tui Na therapy is based on the TCM theory of internal organs and meridians, and through certain application sites and techniques, according to the different Tui Na areas, the corresponding Tui Na techniques are used. The action of Tui Na on muscles can increase the regulation ability of nerve fibers, reduce muscle tone, relieve muscle spasm, and improve the motor function of the limbs of the affected children. In addition to their unique Tui Na techniques, the author listed Liu's Tui Na technique, the "leading belt and guiding qi" Tui Na method, the marrow and tendon tui-na technique, the awakening brain and opening the ligaments Tui Na method, the strengthening spleen and kidney Tui Na method, the suppressing strength and supporting weakness

Tui Na method, and the draining of the meridians and draining the governors Tui Na method, etc. The areas of application may include the head and face, the abdomen, or the spine and extremities. According to the modern medical zoning of the head, Tui Na can have good effects on speech, swallowing and abnormal posture; Tui Na on the abdomen can improve the child's motor function and constipation; Tui Na on the spine and extremities can improve the child's lower limb motor function and abnormal posture, etc.

Although, traditional Tui Na techniques have obvious advantages in the treatment of children with cerebral palsy, there are several problems that should not be ignored as follows. (1) Traditional Tui Na method has been applied in the rehabilitation of children with cerebral palsy, but there are few reports in the literature on the application of specific acupoint Tui Na to the rehabilitation of children with cerebral palsy, due to the lack of efficacy or insufficient research, which needs to be further tested clinically; (2) There are limitations in the improvement of children with cerebral palsy by a single Tui Na technique, and most clinics use Tui Na combined with other therapies, such as rehabilitation training, other external therapies of TCM (3) The effectiveness of tui na varies depending on the technique and location of the practitioner and the degree of cooperation of the child; (4) There is no uniform standard for the mechanism of Tui Na, so there is no uniform standard for the evaluation of clinical effectiveness; (5) The efficacy of Tui Na on different types of children with cerebral palsy varies, and there is no objective standard. Therefore, in the process of clinical research, the mechanism of tui na can be improved under the guidance of basic theories of Chinese medicine and modern rehabilitation theories, combined with modern evidence-based medical methods, combined with objective evaluation criteria to unify the clinical efficacy and better determine the clinical effect.

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