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Clinical Study

Comparison of curative effect of different media in pediatric tuina for infantile muscular torticollis

不同介质的小儿推拿治疗小儿肌性斜颈的疗效比较

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Abstract
Objective: To observe the clinical efficacy of different media in pediatric tuina treatment for children with muscular torticollis.
Methods: A total of 80 children with muscular torticollis were randomized into an observation group and a control group, 40 cases in each group. Both groups received conventional pediatric tuina therapy. The observation group was treated with *Bai Mai* ointment as the massage medium, while the common lubrication oil was used as medium in the control group. Both groups were treated five times a week, 20 min for each time, 20 times constituted a course of treatment. The traditional Chinese medicine (TCM) syndrome scores were evaluated before and after treatment, and the curative effect was observed after 3 courses and 6 courses of treatment respectively.
Results: The TCM syndrome scores improved in both groups after treatment, and the intra-group differences were statistically significant (both $P<0.01$). The score of the observation group was statistically different from that in the control group ($P<0.05$). In the observation group, the total effective rates after 3 courses and 6 courses of treatment were 95.0% and 100.0%, respectively, versus 87.5% and 95.0% in the control group. The total effective rates of the two groups were statistically different (both $P<0.05$).
Conclusion: *Bai Mai* ointment has a better curative effect than the common lubricating oil as a massage medium in the treatment of children with muscular torticollis.
Keywords: Tuina; Massage; Pediatric Tuina; Medium; Torticollis; Infant

【摘要】目的：观察不同介质的小儿推拿治疗小儿肌性斜颈的临床疗效。**方法：**将80例肌性斜颈的患儿随机分为观察组和对照组，每组40例。两组均接受常规小儿推拿手法治疗，观察组用白脉软膏作为推拿介质，对照组使用普通润滑油作为介质。两组均每星期治疗5次，每次20 min，治疗20次为1个疗程。分别于治疗前和治疗后进行中医证候积分评定，并于治疗3个疗程和6个疗程后进行疗效观察。**结果：**治疗后，两组中医证候积分均有改善，组内治疗前后评分差异均有统计学意义(均$P<0.01$)；观察组评分与对照组有统计学差异($P<0.05$)。观察组治疗3个疗程和6个疗程后的总有效率分别为95.0%和100.0%，对照组的总有效率分别为87.5%和95.0%，两组总有效率差异均有统计学意义(均$P<0.05$)。**结论：**用白脉软膏作为推拿介质治疗小儿肌性斜颈的疗效优于用普通润滑油作为介质。

【关键词】推拿；按摩；小儿推拿；介质；斜颈；婴儿
【中图分类号】R244.1　　**【文献标志码】**A

Infantile muscular torticollis (CMT) refers specifically to a torticollis caused by fibromuscular contracture (shortening) on one side of the sternocleidomastoid muscle[1], characterized by the head tilting to the affected side and the chin turning to the healthy side. Lots of CMT children have facial dysplasia, and the affected side is significantly smaller than the contralateral side. The incidence of CMT ranges between 0.3% and 1.9%[2], and it is the third-leading congenital malformation of the musculoskeletal system following clubfoot and dislocation of the hip[3]. Because of fibrosis of one-sided sternocleidomastoid in pediatric CMT, the affected side shorter than the healthy side, in traditional Chinese medicine (TCM) theory, it belongs to 'muscle contraction' category[4]. The efficacy of pediatric tuina treatment for CMT is reliable, while the massage medium has a certain impact. To improve the clinical efficacy of tuina treatment of CMT, this study compared the impact of different massage media on the curative effect in treating CMT, and the research results are reported as follows.

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1 Clinical Materials

1.1 Diagnostic criteria

This study referred to the diagnostic criteria of infantile CMT in *Practical Pediatric Surgery*[5]: the mass can be found on one side of the sternocleidomastoid muscle in the lower 1/3, hard texture, spindle or oval, and movable with sternocleidomastoid muscle activity; a history of breech delivery, the neck mass found in about 2 weeks after birth, and a head facial deformities later; the mass is hard, movable, with clear boundary, without swelling or pain; 3 to 4 months after birth, the eye on the affected side becomes smaller due to atrophy of facial muscles and trapezius muscle, and the face becomes obviously thin and small, showing asymmetry; no skeletal change in cervical spine by X-ray.

1.2 Inclusion criteria

Those who met the above diagnostic criteria; aged 1 to 6 months; ultrasound showed significant difference in the thickest part of sternocleidomastoid between the two sides, and the difference ＞10 mm[6].

1.3 Exclusion criteria

Children aged ＜1 month or older than 6 months; those had skeletal torticollis, or torticollis caused by neck inflammation or ocular anomalies; the ultrasound showed that the difference in the thickest part of sternocleidomastoid between two sides was ＜10 mm.

1.4 Statistical method

All data were statistically analyzed by the SPSS 16.0 version statistical software. Chi-square test was applied to the comparison of counting data. $P<0.05$ for the difference was considered statistically significant.

1.5 General data

A total of 80 cases were enrolled in this study, collected from the Acupuncture and Massage Department of Ningbo Haishu District Hospital of Traditional Chinese Medicine, Zhejiang Province between May 2014 and June 2016. There were 48 males and 32 females. The shortest course of disease was 3 d, up to 95 d, averaged at (42±1) d. They were randomly divided into an observation group and a control group, 40 cases in each group. There were no statistically significant differences in gender, age, or duration of disease between the two groups (all $P>0.05$), indicating that they were comparable (Table 1).

Table 1. Comparison on general data of the two groups before treatment

Group	*n*	Gender (case)		Average age ($\bar{x}\pm s$, month)	Averageduration ($\bar{x}\pm s$, day)
		Male	Female		
Observation	40	23	17	4.2±1.6	25.0±4.2
Control	40	25	15	5.1±0.7	31.9±3.7

2 Treatment Methods

2.1 Observation group

2.1.1 Massage medium

Bai Mai ointment, produced by Tibet Qizheng Tibetan Medicine Factory, lot number: (2012) national drug labeler Z-317; standard number: YBZ14322006-2012Z; national drug registration number: Z20043178; specification: 20 g.

2.1.2 Tuina

Manipulations as Rou-kneading, Nie-pinching, Qian-pulling, Zhuan-rotating were applied[7].

Rou-kneading, referred to An-pressing and Rou-kneading manipulations. Children were generally placed in dorsal position, off pillow, with the affected side skin exposed as much as possible (Figure 1). The physician sat in front of the kid's head, smeared the medium, with index, middle, and ring fingers slightly open, to keep the manipulation smoothly applied. And then, kept Tui-pushing and Rou-kneading back and forth, along the sternocleidomastoid muscle from the sternum tendon attachment to the muscle belly and then to the enthesis point of temporal bone mastoid muscle. Increased the strength and prolonged the operating time at the obvious part of the mass (Figure 2), to relax sinews and activate collaterals and blood. The manipulation was generally 100-120 times/min, and lasted for 5 min every time.

Figure 1. Preparation pose

Figure 2. Rou-kneading manipulation

Nie-pinching, referred to Nie-pinching and Na-grasping manipulations. Children were in the same position as above. The physician repeatedly pinched, grasped, and plucked the soft tissues on the affected side of the sternocleidomastoid muscle with finger pulp of the thumb, index finger or together with the middle finger (Figure 3), mainly in bulk or local spasm part, to release the muscle adhesions. The manipulation was generally 100-120 times/min, 5 min for every time.

Figure 3. Nie-pinching manipulation

Qian-pulling, referred to Qian-pulling and La-plucking manipulations. Children took the supine position naturally. The physician held the kid's pillow temporalis above ear on the affected side in one hand, and with another hand holding the ipsilateral shoulder and pillow temporalis. During the process, the physician's palm close to the location between the thumb-index web was the stress focus point, meanwhile, the wrist was slightly open during the forcing process of the manipulation. Both hands forced antagonistic against each other at the same time, symmetrically forcing the pressure on the shoulder and pillow temporalis simultaneously, making the kid's head curvature gradually towards the contralateral side (Figure 4). In the process, the physician gradually stretched the affected sternocleidomastoid muscle, increased the extent little by little, and repeated in the physiological range. Paid attention to the frequency of children crying and stopped to appease at some time. Generally 20 times for a cycle, repeated 4 cycles. It could improve the lateral flexion function of CMT children's neck through the passive training of traction manipulation.

Zhuan-rotating, referred to Xuanzhuan-rotating manipulations. Children were placed in dorsal position. The physician stood beside the affected side and told the kid's family to press a little hard on the shoulder to fix the body, in order to make sure that the rotation of neck within the physiological range could reach the effective range. The physician opened the thumb-index web of his palm, with one hand pressing and buckling children's contralateral temporal, and another hand holding the mandible of the affected side to fix the head. During rotation, rotated the kid's head towards the affected side gradually (Figure 5). This manipulation could elongate the affected sternocleidomastoid slowly in the physiological range, and give the effective traction on ipsilateral muscle mass. Repeated this manipulation for 20 times as a rotation cycle, 4 cycles each time, thus to improve and restore the rotation of the neck.

Figure 4. Qian-pulling manipulation

Figure 5. Zhuan-rotating manipulaiton

Tuina treatment took about 20 min each time, once a day, 5 times a week, 20 times for a course of treatment. The curative effect was observed after 3 and 6 courses of treatment respectively.

2.2 Control group

2.2.1 Massage medium

In the control group, the common lubricating oil was used as the massage medium.

2.2.2 Tuina

Children in the control group received the same tuina treatment as in the observation group, with the same treatment duration and course.

3 Observation on Curative Efficacy

3.1 Observation items

According to the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese Medicine*[8], TCM syndrome score

was assessed. Five main symptoms, including neck stiffness of affected side, rotation difficulties, shortness of breath and irritability, restlessness, tongue ecchymosis, would be classified into four grades: light, moderate, severe and extremely severe, scored 1, 2, 3 and 4 points respectively. The sum of the five main symptoms scores was the total syndrome score, the higher the score, the more severe the symptoms, maximum 20 points.

The efficacy index was calculated by the Nimodipine method based on the total syndrome score.

Efficacy index = (Total syndrome score before treatment − Total syndrome score after treatment) ÷ Total syndrome score before treatment × 100%.

3.2 Criteria of curative efficacy

Cured: Head in central, normal neck movement, with no obvious difference in rotation, difference in the thickest part of the sternocleidomastoid between two sides by ultrasound examination ≤ 2 mm; efficacy index ≥95%.

Markedly effective: The head was quite in central, neck able to move freely, the rotation ranges were slightly different, difference in the thickest part of the sternocleidomastoid between two sides by ultrasound examination > 2 mm, but ≤6 mm; efficacy index ≥ 70%, but <95%.

Effective: The head condition was better than that on the first visit, neck movement still had some obstruction, the rotation amplitudes were obviously different but improved than before, the difference in the thickest part of the sternocleidomastoid between two sides by ultrasound examination was >6 mm but ≤10 mm; efficacy index ≥30%, but <70%.

Invalid: No significant change in the head condition compared with the first visit, cervical movement had disorders, no significant improvement in rotation range, difference in the thickest part of the sterno-cleidomastoid between the two sides by ultrasound examination was >10 mm; efficacy index <30%.

3.3 Results

3.3.1 TCM syndrome scores

After treatment, the TCM syndrome scores in both groups were statistically different from those before treatment (all $P<0.01$), and there were statistical differences in those scores between the two groups (all $P<0.05$), indicating that the clinical symptoms were both improved, and the observation group improved more than the control group (Table 2).

3.3.2 Clinical efficacy

Three months and 6 months after treatment, statistical differences showed between the two groups in total effective rate (both $P<0.01$), suggesting that *Bai Mai* ointment was superior to the common lubricating oil as a massage medium in tuina treatment (Table 3 and Table 4).

Table 2. Comparison of TCM syndrome scores between the two groups before and after treatment ($\bar{x}$ ±s, point)

Group	*n*	Before treatment	After treatment
Observation	40	13.31±2.03	4.17±1.29[1)2)]
Control	40	13.27±2.06	5.09±1.33[1)]

Note: Compared with the same group before treatment, 1) $P<0.01$; compared with the control group after treatment, 2) $P<0.05$

Table3. Comparison of clinical efficacy after 3 treatment courses (case)

Group	*n*	Cured	Markedly effective	Effective	Invalid	Total effective rate (%)
Observation	40	19	11	8	2	95.0[1)]
Control	40	8	15	12	5	87.5

Note: Compared with the control group, 1) $P<0.01$

Table 4. Comparison of clinical efficacy after 6 treatment courses (case)

Group	*n*	Cured	Markedly effective	Effective	Invalid	Total effective rate (%)
Observation	40	28	7	5	0	100.0[1)]
Control	40	21	10	7	2	95.0

Note: Compared with the control group, 1) $P<0.01$

4 Discussion

The sternocleidomastoid muscle is a paired muscle in the superficial layers of the side of the neck. Most part of the muscle is covered by the platysma muscle, forming a notable landmark of the neck[9]. The primary actions of the muscle are rotation of the head to the opposite side and flexion of the neck. The etiology of muscular torticollis is not fully clear yet. Currently there are three underlying theories: birth trauma, in utero crowding and ischemic myopathy[10]. However, these theories cannot fully explain this condition.

Pediatric tuina is one common treatment for CMT, without trauma and pain, parents and infants or young children can accept and well cooperated. So far it is the top priority for CMT as an expectant treatment. In this

study, Tui-pushing and Rou-kneading manipulations can relax the affected sternocleidomastoid muscle, relieve muscle tension; Na-grasping and Nie-pinching manipulations act as eliminating stasis to subdue swelling by repeatedly squeezing the local muscle mass. Qian-pulling and La-plucking manipulations can increase the extensibility of sternocleidomastoid muscle, which is benefit to restoring muscle elasticity and relieving muscle spasm, thereby restoring the activity of the neck[11]. Best TM, *et al*[12] found that massage manipulation could promote muscle repair. Men ZT, *et al*[13] considered that tuina can improve the local tissue biochemical environment, promote blood circulation, to relax sinews. Feng Y, *et al*[14] observed the impact on α-SMA expression of tuina manipulations for myofibrosis rabbit model, and the results showed that tuina manipulation can slow or even reverse the muscle fibrosis changes. Lin XQ, *et al*[15] suggested that tuina treatment can promote the repair of muscle damage, resist teratogenic capacity from collagen fibers contraction, and reduce the number of myofibroblasts. At the same time, ultrasound and real-time tissue imaging also confirmed the efficacy of tuina treatment for CMT[16-17].

Massage medium is one impact on curative effect of tuina treatment. In this study, *Bai Mai* ointment, a Tibetan medicine, was applied as the massage medium in the observation group. The main components of *Bai Mai* ointment are *Jiang Huang* (*Rhizoma Curcumae Longae*), *Rou Dou Kou* (*Semen Myristicae*), *Gan Song* (*Radix et Rhizoma Nardostachyos*), *Yang Qi Shi* (*Tremolitum*), *Gan Cao* (*Radix Glycyrrhizae Preparata*), artificial *She Xiang* (*Moschus*), *Gan Jiang* (*Rhizoma Zingiberis*), *Zang Hui Xiang* (*Tibetan Fructus Foeniculi*), *Zang Chang Pu* (*Tibetan Rhizoma Acori Calami*), *Hua Jiao* (*Fructus Zanthoxyli*) and *Jian Hua* (*Trona*). The main effect is to relax sinews and activate collaterals, primary for *Bai Mai* disease (*Bai Mai*, in anatomy of Tibetan medicine theory, refers to nervous system in general, including the brain, cerebellum, medulla oblongata, spinal cord and various nerves. *Bai Mai* disease refers to function disorder or pathological damage of nervous system), paralysis, hemiplegia, tendons ankylosis, and broken or damage of meridians and tendons caused by injury, or spasm of hands and feet, or limp[18]. Of all the components, *Jiang Huang* (*Rhizoma Curcumae Longae*) is the sovereign medicine, to detoxify and eliminate putridity, and to free the collaterals vessels and relieve pain. According to the Tibetan medical writings, *Jing Zhu Ben Cao* (*Jing Zhu Materia Medica*) records, dried ginger can warm the middle jiao, dissipate cold and resolve blood stasis; *Rou Dou Kou* (*Semen Myristicae*) warms the middle jiao and regulates the spleen function, artificial *She Xiang* (*Moschus*) is to detoxify. *Ben Cao Gang Mu* (*Compendium of Materia Medica*) records that *Rou Dou Kou* (*Semen Myristicae*) can warm the middle jiao and relieve pain. *Shen Nong Ben Cao Jing* (*Shen Nong's Classic of Materia Medica*) states that dried ginger can warm the middle jiao and dissipate cold; *She Xiang* (*Moschus*) can activate blood and unblock the meridian, relieve swelling and pain. Accompanied with *Gan Cao* (*Radix Glycyrrhizae Preparata*) to clear heat, *Gan Song* (*Radix et Rhizoma Nardostachyos*) to clear old heat and toxic heat and relieve swelling, together with *Yang Qi Shi* (*Tremolitum*) to clear various heat, *Zang Hui Xiang* (*Tibetan Fructus Foeniculi*) to dissipate cold and relieve pain, *Hua Jiao* (*Fructus Zanthoxyli*) to warm the middle jiao and relieve pain, the *Bai Mai* ointment has efficacy of dispelling wind and resolving stasis, relaxing sinews and activating collaterals[19]. Modern pharmacological studies showed that the *Jiang Huang* (*Rhizoma Curcumae Longae*) in *Bai Mai* ointment has curcumin, which has anti-inflammatory effect and can down-regulate inflammatory mediators and inflammatory cytokines[20]; methyl eugenol contained in *Rou Dou Kou* (*Semen Myristicae*) has obvious analgesic effect[21]; dried ginger extract can clear heat and relieve pain, which may work by inhibiting the activity of cyclooxygenase and lipoxygenase, and reducing the production of prostaglandin (PG) and lymphotoxin (LT)[22]. Clinical studies found that *Bai Mai* ointment has a certain effect in the treatment of facial neuritis[23], trigeminal neuralgia[24], chronic tension-induced headache[25] and sciatica[26].

In this study, *Bai Mai* ointment was used as the massage medium in the observation group, and results indicated that it could improve the elimination of the mass in the CMT children's neck, and the efficacy was better than that of the common lubricant oil, very much worth promoting in clinic.

Conflict of Interest

The author declared that there was no conflict of interest in this article.

Statement of Informed Consent

Informed consent was obtained from the guardians of the recruited children in this study.

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