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Clinical Study

Clinical observation on tuina plus Baixiao moxibustion for temporomandibular joint dysfunction syndrome

推拿结合百笑灸治疗颞下颌关节功能紊乱综合征疗效观察

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Abstract

Objective: To observe the clinical effect of tuina plus Baixiao moxibustion in the treatment of temporomandibular joint dysfunction syndrome (TJDS).

Methods: A total of 70 TJDS patients who met the inclusion criteria were randomized into an observation group and a control group by flipping a coin, with 35 cases in each group. Patients in the observation group were treated with tuina plus Baixiao moxibustion, while patients in the control group received oral intake of diclofenac potassium (75 mg/pill), 1 pill after every dinner. Both tuina and Baixiao moxibustion were done once a day during treatment. The therapeutic evaluation was evaluated after 10 treatments in both groups. The maximum mouth opening distance and visual analog scale (VAS) were observed before and after treatment, and the therapeutic efficacy was also compared.

Results: After treatment, the maximum mouth opening distance and VAS improved in both groups (all P<0.05); both items in the observation group were superior to those in the control group (both P<00.05). The total effective rate was 91.4% in the observation group, versus 74.3% in the control group, and the between-group comparison of the total effective rate showed statistical significance (P<0.05).

Conclusion: Tuina plus Baixiao moxibustion can effectively improve TJDS patient's temporomandibular joint function and alleviate pain, with better efficacy than oral intake of diclofenac potassium.

Keywords: Tuina; Massage; Moxibustion Therapy; Indirect Moxibustion; Moxa Cone Moxibustion; Baixiao Moxibustion; Visual Analog Scale; Temporomandibular Joint Dysfunction Syndrome

【摘要】目的：观察推拿结合百笑灸治疗颞颌关节功能紊乱综合征(TJDS)的临床疗效。**方法：**将符合纳入标准的70例TJDS患者用抛币法随机分为观察组和对照组，每组35例。观察组采用推拿结合百笑灸治疗，推拿和百笑灸均每日1次。对照组采用口服双氯芬酸钠缓释剂(75毫克/片)治疗，每日晚餐后口服1片。两组均治疗10次后进行疗效评价。观察两组患者治疗前后最大主动张口度和视觉模拟量表(VAS)，比较两组临床疗效。**结果：**治疗后，两组最大主动张口度和VAS评分与同组治疗前均有统计学差异(均P＜0.05)；观察组最大主动张口度和VAS评分与对照组差异均有统计学意义(均P＜0.05)。观察组总有效率为91.4%，对照组总有效率为74.3%，两组疗效差异有统计学意义(P＜0.05)。**结论：**推拿结合百笑灸治疗能有效改善TJDS患者的颞颌关节功能并缓解疼痛，其疗效优于口服双氯芬酸钠缓释剂。

【关键词】推拿；按摩；灸法；间接灸；艾炷灸；百笑灸；视觉模拟量表；颞下颌关节功能紊乱综合征
【中图分类号】R244.1　　**【文献标志码】**A

Temporomandibular joint dysfunction syndrome (TJDS) refers to a group of symptoms including pain, knocking, soreness, fatigue, joint movement dysfunction in temporomandibular joint area, together with limitation when opening mouth[1]. It is a common oral and facial disease. Many patients seek medical help for their pain and limitation of chewing and talking. The pathogenesis of TJDS is complicated with limited treatment method. We used tuina plus Baixiao moxibustion for the treatment of TJDS, and the report is now given as follows.

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1 Clinical Materials

1.1 Diagnostic criteria

Diagnostic criteria of TJDS in our research was based on the *Oral and Maxillofacial Surgery*[2]: joint or surrounding muscle pain during opening mouth or chewing; knocking or other noises around temporomandibular joint; joint movement dysfunction,

such as reduced maximum mouth opening distance or abnormal mouth opening status or facet dislocation; imaging examination showed no bone distraction in condyle process or glenoid fossa area around temporomandibular joint.

1.2 Inclusion criteria

Conforming to the diagnostic criteria; aged between 18 and 60 years; male or female; not receiving other medicines or related physical treatments; informed consent.

1.3 Exclusion criteria

With tuina manipulation restrictions; imaging result showed cancer, tuberculosis or bone or joint injuries; with serious cardiocerebrovascular diseases or hemorrhagic disease; with otogenic disease; during pregnancy; with mental disorder.

1.4 Statistical methods

The data processing was done using the SPSS version 18.0 software. The mean ± standard deviation ($\bar{x} \pm s$) was used to describe measurement data of normal distribution, and *t*-test was used for between-group comparisons; data that didn't conform to normal distribution were compared using non-parametric test. Chi-square test was used for ratio comparisons. The *Ridit* analysis was used for ranked data. A *P*-value of less than 0.05 indicated statistical significance.

1.5 General data

A total of 70 TJDS patients conforming to the inclusion criteria were all from the Orthopedics Department of Traditional Chinese Medicine (including those transferred from the Stomatology Department) in Shanghai Shibei Hospital of Jing'an District between February 2016 and March 2018. The 70 cases were randomized into an observation group and a control group by flipping a coin, with 35 cases in each group. There were no drop-out cases during treatment. Between- group comparisons showed no statistically significant differences in age, gender and duration (all *P*>0.05), indicating that the two groups were comparable (Table 1).

Table 1. General data comparison

Group	*n*	Gender (case)		Average age ($\bar{x} \pm s$, year)	Average duration ($\bar{x} \pm s$, day)
		Male	Female		
Observation	35	15	20	25.8±5.3	4.4±2.7
Control	35	14	21	26.4±5.4	4.5±2.8

2 Treatment Methods

Patients in both groups were required to change the unilateral chewing habit, and avoid injuring temporomandibular joint on the affected side during chewing hard objects, avoid opening the mouth fully and keep facial region warm.

2.1 Observation group

Patients in the observation group received tuina plus Baixiao moxibustion treatment.

2.1.1 Tuina treatment

Patients rested on one side with the affected side facing upward.

The practitioner Rou-kneaded the patient's temporomandibular joint and its surrounding muscles with thenar eminence for 2-3 min (Figure 1); then one-thumb Tui-pushed Shangguan (GB 3), Xiaguan (ST 7), Jiache (ST 6), Tinghui (GB 2), Ermen (TE 21) and Yifeng (TE 17) 3-5 times, for about 10 min (Figure 2).

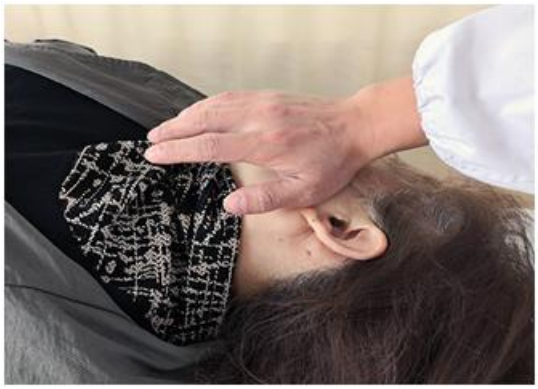

Figure 1. Rou-kneading manipulation

Figure 2. One-thumb Tui-pushing manipulation

Soothing tendon: With fingers close together, the practitioner Rou-kneaded with the lateral finger tips along the temporalis, masseter and lateral pterygoid muscle repeatedly for 5 min (Figure 3). Searched the junction gap anterior to the temporomandibular joint with the tip of the thumb, and An-pressed upward, downward and forward respectively, to find the tender point. An-pressed each tender point for 10-20 s. Finally, An-pressed and Rou-kneaded bilateral Hegu (LI 4), 10 s for each side (Figure 4).

2.1.2 Baixiao moxibustion manipulation

Acupoints: Xiaguan (ST 7) on the affected side.

Apparatus: Baixiao moxibustion (Chongqing Baixiao Medical Equipment Co., Ltd., China, series number: ZL201120322798.3)[3].

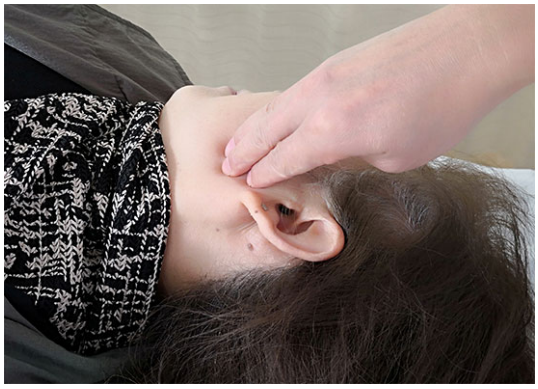

Figure 3. Soothing tendon manipulation with fingers close together

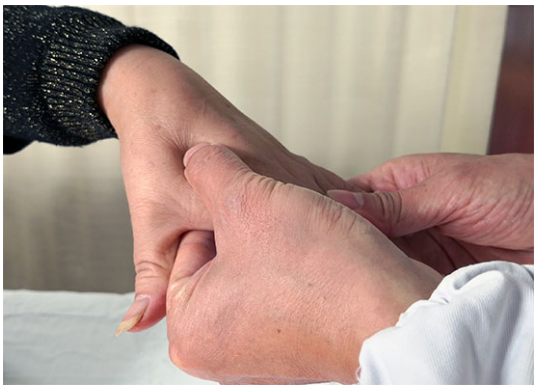

Figure 4. Rou-kneading Hegu (LI 4)

Methods: The patient rested on one side with the affected side facing upward. The practitioner fixed the moxibustion tube with the medical pastry at the targeted acupoint. Removed the cover, and then lighted the moxa cone and fixed the cone onto the tube. Then rotated the tube and adjusted the size of the ventilation hole or the height of the cover to change the moxibustion temperature, adjust the temperature to make patients' skin warm. Closed the air hole when the combustion was done or following doctor's instruction, and then removed the moxibustion apparatus. The whole treatment lasted for 20 min. Both tuina and Baixiao moxibustion were done once a day, 10 times of treatment was counted as a course. One course was conducted in this study.

2.2 Control group

Patients in the control group received oral intake of diclofenac potassium [tartrin sustained release tablet, State Food and Drug Administration (SFDA) approval number: H10980297, 75 mg/pill, Beijing Novartis Pharmaceutical Co., Ltd., China] after every dinner, at a dosage of 1 pill, with consecutive 10 d as 1 course.

3 Therapeutic Efficacy Observation

3.1 Observation items

The following observation items were evaluated before and after treatment in the two groups.

3.1.1 The maximum mouth opening distance

To measure the distance between the upper and lower incisor teeth when the patient's mouth opened at the maximum degree. The distance between the upper and lower middle incisor teeth was counted as the standard[4].

3.1.2 Joint pain intensity

Visual analog scale (VAS) was used to measure the subjective pain intensity of the patients[5]. Drew a line of 10 cm on a piece of white paper, and the two ends of the line represented no pain and unbearable pain respectively, a 1-centimeter space indicated 1 point. Patients selected a proper position on the line to represent their pain severity, and the point was recorded. Evaluation was done by one specific personnel.

3.2 Therapeutic efficacy criteria

It was based on the therapeutic efficacy criteria in the *Temporomandibular Arthrosis*[6].

Cured: No pain during opening mouth and chewing, no pressing pain and knocking around the joint region, total recovery of chewing function, and normal maximum mouth opening distance (3.7 cm).

Marked effect: No pain during opening mouth and chewing, substantial recovery of chewing function, nearly recovery of the maximum mouth opening distance.

Improved: Improvements in the symptoms and signs.

Invalid: No improvements in the symptoms and signs after treatment.

3.3 Results

3.3.1 Clinical efficacy evaluation

The total effective rate was 91.4% in the observation group, versus 74.3% in the control group, and the between-group difference in the total effective rate was statistically significant (P<0.05), (Table 2).

Table 2. Comparison of clinical efficacy (case)

Group	n	Cured	Marked effect	Improved	Invalid	Total effective rate (%)
Observation	35	19	8	5	3	91.4[1)]
Control	35	13	6	7	9	74.3

Note: Compared with the control group, P<0.05

3.3.2 Comparison of the maximum mouth opening distance

There was no between-group statistical significant difference in the maximum mouth opening distance before treatment (P>0.05). After treatment, there were significant intra-group difference in comparing the maximum mouth opening distance in both groups (both P<0.05); between-group comparison showed that there was a statistical significant difference in comparing the maximum mouth opening distance (P<0.05). It is showed that both methods can improve temporomandibular joint function in TJDS patients. Please see Table 3 for detailed.

Table 3. Comparison of the maximum mouth opening distance ($\bar{x}$ ±s, cm)

Group	n	Before treatment	After treatment
Observation	35	1.5±0.3	3.5±0.2[1)2)]
Control	35	1.8±0.4	3.2±0.2[1)]

Note: Intra-group comparison, 1) P<0.05; between-group comparison, 2) P<0.05

3.3.3 Comparison of VAS score

There was no significant between-group difference in comparing VAS score before treatment (P>0.05). After treatment, there were significant intra-group differences in comparing the VAS score in both groups (both P<0.05); between-group comparison showed that there was a statistical significant difference in comparing the VAS score (P<0.05). It is showed that both methods can alleviate pain in TJDS patients. Please see Table 4 for detailed.

Table 4. Comparison of VAS score ($\bar{x}$ ±s, point)

Group	n	Before treatment	After treatment
Observation	35	5.5±0.5	1.5±0.5[1)2)]
Control	35	5.4±0.7	2.9±0.4[1)]

Note: Intra-group comparison, 1) P<0.05; between-group comparison，2) P<0.05

4 Discussion

TJDS usually occurs in young or middle-aged people with an incidence of 28% to 88% by overseas reports. The visiting rate has increased in recent years. TJDS normally happens on one side in most cases, but some may gradually affect both sides in progression[2]. TJDS is a disease of functional disorder, whereas joint structural change can be observed in some cases, or even organic damage. Pathological changes such as leakage and edema caused by non-bacterial inflammation can be found around the affected joint and the surrounding tissues, which can lead to histamine or other inflammatory material accumulation, and cause a group of symptoms including pain, knocking, and functional disorder of the affected joint[7]. The pathogenesis of TJDS is complicated and yet not fully understood. Traditional view holds that TJDS arise due to the imbalance of masticatory muscle and movement dysfunction of different parts of the temporomandibular joint. According to the severity of the disease, TJDS can be classified into 4 categories: dysfunction of the masticatory muscle, functional disorder, joint inflammatory disease and osteoarthritis according to the most popular diagnostic criteria in China[8]. Patients with organic damage and osteoarthritis require surgery treatment. Common conservative therapies for TJDS include psychological intervention, medication or infrared thermo-imaging, micro-wave physical therapy and local anesthesia and block therapy, which only target at symptoms and have a high recurrence rate.

In traditional Chinese Medicne (TCM), TJDS is caused by emotional changes, injury, fatigue and cold stimulation, which can weaken the healthy qi, and thus wind, cold or dampness evils may invade and get stuck between joints and tendons, causing qi and blood stagnation and meridian blockage. Therefore, pain is caused by the blockage, together with movement dysfunction and limitation of mouth opening. Temporomandibular joint is located on the Gallbladder Meridian and the Stomach Meridian. Xiaguan (ST 7) has the function of dispelling wind evil, opening orifice, unblocking meridians and facilitating blood flow to stop pain. Xiaguan (ST 7) is located at the sunken region between the zygomatic arch and the sigmoid notch when the mouth is closed. According to anatomy, temporomandibular joint capsule is made of high elastic fiber, and also is the only joint which can dislocate without exterior force and keep joint capsule intact during dislocation. Therefore, alleviating inflammatory reactions and spasm can effectively alleviate TJDS symptoms[9]. Jiache (ST 6) can transfer water and food essence onto the facial region through the Stomach Meridian, and can also receive meridian qi from Hand and Foot Shaoyang Meridians. It can also harmonize qi and blood, transport qi and blood through trunk to face, and govern the chewing movement of the mouth[10]. Therefore, Xiaguan (ST 7) was chosen for tuina manipulation to facilitate qi and blood movement in local regions. Selection of Shangguan (GB 3), Tinghui (GB 2), Ermen (TE 21) and Yifeng (TE 17) were all based on the principle of local point selection. Hegu (LI 4) is a key point for the treatment of facial disorders[11]. The combination of the above points has the effect of unblocking meridians and stopping pain.

With a good penetration effect, one-thumb Tui-pushing manipulation has been widely used in limb joint disorders for its function of unblocking meridians, facilitating qi and blood flow, removing spasm and alleviating pain[12]. With the principle of searching acupoints along meridians, rapid pushing and slow moving, heavy while not sluggish, light while no floating, one-thumb Tui-pushing manipulation can facilitate qi and blood circulation in the local region, and can also smooth sinews and unblock meridians. With proper manipulation, local blood and lymph circulation can be accelerated to promote dilution and metabolism of local inflammatory factors, and relax spastic muscles to alleviate pain. Meanwhile, the dislocated joints and tissues can be corrected[13]. Therefore, one-thumb Tui-pushing manipulation can facilitate facial meridian movement, connect joints and orifices and promote absorption of local leakage to eliminate inflammation. Soothing tendon manipulation can relax muscles, tendons, joint capsules and other soft tissues, dispatch muscle fibers in spasm, alleviate pressure from local blood vessels and nerves, reduce spastic muscle fibers and increase the force of the weak ones. Thus, joint can return to a relatively relaxed state, and muscle fibers can recover to the normal anatomical structure. Clinical research has shown that pressing stimulation at acupoint can accelerate degeneratation of cellular protein, increase the generation of histamine, and furthermore expand capillary muscle, accelerate blood circulation, increase lympha flow, and promote absorption of blood stasis[14]. Xiaguan (ST 7) is a popular acupoint for the treatment of TJDS in acupuncture and tuina manipulation.

Xiaguan (ST 7) is located at the temporomandibular joint, moxibustion at Xiaguan (ST 7) has the function of dispersing wind and opening orifices, and facilitating joints to kill pain[15]. Temporomandibular joint pain has a deep and fixed site. Moxibustion treatment can eliminate cold and dampness evils in deeper layers. Moxibustion is a kind of heat radiation therapy. By infrared thermo-radiation, receptors on skin can be stimulated and thus interfere the metabolism of cells and nervous system functions. During the warm stimulation of moxibustion, transient receptor potential on vascular endothelium cells can be activated to dialate capillaries, giving rise to congestion in local tissues, accelerating blood and lympha circulation in the local area and the metabolism of local skin tissues, and reducing inflammatory leakage to eliminate inflammation[16]. Through the warm stimulation, moxibustion can activate rich transient receptor potential (TRP) in vascular endothelial cells, expand blood capillaries, make local skin congestion, improve the circulation of blood and lymph and metabolism of local skin tissues, decrease inflammatory exudation, and thus eliminate inflammation[17]. Just through its unique warm effect, moxibustion can improve local blood circulation, alleviate muscle tension, reduce joint attachment, and finally promote the structural recovery of local tendon, joint capsule and condyloideus processus to alleviate clinical symptoms. Meanwhile, warm effect can also inhibit nerve excitement to yield a better analgesia effect[18]. Baixiao moxibustion in our research is a new product in the series of TCM diagnosis and treatment products and got approval from the State Administration of Traditional Chinese Medicine[19]. As a moxibustion apparatus, there is a magnetic needle with therapeutic effect on the head of the moxa cone, which has a magnetic force of 2 000 Gs and works under the heat energy. Such treatment can combine the moxibustion and magnetic treatments, which can facilitate the functions of unblocking meridians and rehabilitation[20].

The result in our research showed that the maximum mouth opening distance, VAS and total effective rate in the observation group were superior to those in the control group, indicating that tuina plus Baixiao moxibustion can improve temporomandibular joint functions and alleviate pain in TJDS patients, and have a better effect than oral intake of diclofenac potassium alone. It is a safe and convenient method with a good compliance, and worth clinical popularization.

Conflict of Interest

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

Statement of Informed Consent

Informed consent was obtained from the patients in this study.

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