

# Acupuncture in Temporomandibular Disorders Painful Symptomatology: An Evidence-Based Case Report

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## Abstract

Temporomandibular dysfunction (TMD) is complex and multifactorial. Its etiology involves various factors, such as malocclusion, psychological patterns, parafunctional habits, and the temporomandibular joint anatomy. Symptoms include myofascial pain, joint clicking, mouth opening limitation, headaches, earaches, and neck pain, comprising one of the greatest causes of nondental pain. Acupuncture has been used to treat these conditions by acting locally both in muscle relaxation and pain management as well as reaching physical, mental, and emotional balance. The aim of this study is to present a brief literature review reporting the efficacy of acupuncture on TMDs and a case report in which the painful symptomatology of TMD was treated with a systemic protocol, based on scientific evidence and concepts of traditional Chinese medicine. Acupuncture may be a complementary treatment for TMD, and in this case report, it eliminated the patient's painful symptomatology.

## Keywords

- ▶ acupuncture
- ▶ case report
- ▶ temporomandibular dysfunction
- ▶ traditional Chinese medicine

## Introduction

Temporomandibular dysfunction (TMD) refers to different kinds of conditions that affect the temporomandibular joints (TMJs), masticatory muscles, and associated structures of the head and neck.<sup>1</sup> Signs and symptoms linked to TMD are debilitating pain in the orofacial region, TMJ pain and/or clicking sounds, mouth opening limitation, restriction in mandibular movements, and presence of trigger points (TPs) on palpation.<sup>2-5</sup> TMD consists a major cause of nondental pain, more frequent in people from 20 to 40 years, and twice as common in females than in males.<sup>6,7</sup>

Its etiology is multifactorial, involving several factors such as parafunctional habits (bruxism, teeth clenching), trauma to the jaw and surrounding areas, degenerative joint diseases,

postural changes, TMJ anatomy, hormonal alterations, and maxillomandibular relationship instability.<sup>1</sup> Studies show that emotional factors (stress, anxiety, depression) also play an important role in TMDs.<sup>1,8,9</sup>

Due to TMDs' complex characteristics, conservative treatment modalities include education, self-care, neuro-myorelaxing occlusal splints, pharmacotherapy, and behavioral therapy. Relaxation techniques and acupuncture have been used as complementary therapy in patients with TMD painful symptomatology.<sup>1,2,4</sup>

Acupuncture originated in China over 3,000 years ago consisting one of the building blocks of traditional Chinese medicine (TCM) and it has been used to treat plenty clinical conditions, especially in pain management.<sup>2,3,10</sup> Since pain is

often observed in patients with TMD, acupuncture has been widely chosen as adjunctive therapy, with a considerable number of studies corroborating to its effectiveness.<sup>2,4,11,12</sup>

The aim of this case report is to present a case report of a patient diagnosed with TMD, submitted to an acupuncture protocol treatment based on scientific evidences and TCM concepts, offering a more individualized approach.

## Case Report

This clinical case is part of a research examination approved by the Patos de Minas School of Dentistry Committee for Research Involving Human Subjects (number approved 2.439.313 and CAAE: 75474217.1.0000.8078).

The inclusion criteria of the patient in this study were the presence of pain by TMD of muscular origin or mixed, with or without mouth opening limitation, according to the research diagnostic criteria for temporomandibular disorders (RDC/TMD), Angle's Class I, and no absence of teeth up to second molar.

A 22-year-old woman complaining of severe pain in the middle third of the face radiating to the head searched for treatment. Patient had no systemic alterations and reported that pain begun 2 months prior to the first appointment and was managing it by taking analgesic (dipyrone 500 mg) and anti-inflammatory (ibuprofen 400 mg) on her own. However, pain became worse and medication was not being effective anymore.

At clinical examination, patient reported pain score 10 in the 10 cm visual analog scale (VAS), where 0 represents "no pain" and 10 the "worst pain possible." Occlusion evaluation and muscle palpation were performed in accordance with the RDC/TMD (Axis I).<sup>13</sup>

The patient had premature contacts on the anterior teeth and occlusal interference on right lateral movement (LR). Intense pain was reported in the masseter, temporalis, trapezius, and sternocleidomastoid muscles bilaterally during palpation examination, as well as mouth opening limitation, pain on mastication, especially food of harder consistency. Patient also reported being under stress because of daily routine of studies and a night shift job. The RDC/TMD (Axis II)<sup>13</sup> questionnaire was applied to confirm TMD diagnosis. According to TMD (RDC/TMD), the patient was diagnosed with muscle disorders with myofascial pain and limited mouth opening, where the pain was directly related to the masticatory and cervical muscles. Five acupuncture sessions (one session a week—10 minutes) were proposed to the patient to minimize painful symptomatology. The utilized points were: ST6, ST7, SI19, TE21, Yintang, TPs, GV20, LI4, SI3, GB34, GB20, and ST36. To make muscle activity assessment before and after treatment, the patient underwent electromyography (EMG) test.<sup>14</sup> The handler used the EMG030204/06U (EMG System do Brasil Ltda) equipment with four channels, 14 bits resolution in signal acquisition, and 5,000-volt electrical isolation. The software (EMG System do Brasil—www.emgsystem.com.br) was used for assessment.

The skin was cleaned with cotton wool and 70% alcohol before signal acquisition. Disposable bipolar Ag/AgCl

electrodes of 1 cm, which were circular in shape, were connected to the preamplifier and placed at a distance of 2 cm from each other according to Surface ElectroMyoGraphy for Non-invasive Assessment of Muscles (SENIAM) Project<sup>15</sup> on the following muscles: first the masseter and then the temporalis (anterior portion), bilaterally.

The electrical activity of these muscles was recorded at rest (R), maximum voluntary contraction, maximum protrusion (P), LR, left lateral movement, clenching wax, habitual mastication, chewing peanut, and chewing raisin. EMG test was performed right before the first acupuncture session (T0), right after it (T1), and after the fifth (T2) session (—Table 1). During the test, patient remained sitting in a comfortable position, and was oriented to keep the back straight, arms relaxed, feet on the floor, and eyes fixed on the horizon. Patient was advised to interrupt self-medication 1 week prior to the first session. At week 1, VAS score was 8 before EMG test and 10 after it (T0). VAS score was 0 after the first acupuncture session and 3 after EMG test (T1). As the patient reported greater discomfort on the left side of the face on that day, only acupoints on the left side of the body were punctured. On the following sessions, acupoints of the both sides were selected for puncturing. After the last session, the patient reported no more painful symptoms.

The acupoints selected for this case were those recommended based on TCM, by the literature, for orofacial pain<sup>2,3</sup> as well as TPs (Ashe)<sup>16</sup> and points for anxiety (—Table 2). Also was considered the Ashi point which is an unconventional point on the individual's body that is sensitive to touch, and may be present on the integument or muscle, being identified through digital pressure, next to the main complaint region. Punctures with 5 to 15 mm depth, appropriate to the targeted muscle or point were performed with stainless steel acupuncture needles (DongBang; DBC 108 Medical Co Ltd, South Korea) were chosen in sizes 0.22 mm × 13 mm (for points of the face) and 0.25 mm × 30 mm (for distal points). All inserted and stimulated manually for 10 minutes, bilaterally. For the precise puncturing of active TPs, palpation and localization of taut muscle bands and TPs on the most important masticatory and cervical muscles were performed. The needles were inserted in these spots (5–15 mm depth). The skin was previously cleaned on the point's location with cotton wool and 70% alcohol. During therapy, the patient stayed lying on a stretcher in supine position.

The patient underwent occlusal adjustment after the first acupuncture session and will receive a myorelaxing occlusal splint to protect the teeth and neuromuscular system from parafunctional activities such as teeth clenching and bruxism.<sup>1</sup>

## Discussion

TMDs are multifactorial disorders, which appear as painful symptomatology and/or functional alterations of the mandible, needed to be investigated through patient's historic, clinical, and psychobehavioral evaluations, for a therapeutic planning directed to pain or dysfunction.<sup>3,5,17–19</sup> It displays a predominance in individuals with age range of 20 to 40 years,

**Table 1** Electromyography test

Muscle	Data	Channel	Muscular electrical activity								
			R	MVC	P	LR	LL	CW	HM	CP	CR
Masseter	RMS	C3-T0	56.6	66.51	61.92	54.48	58.36	77.41	66.63	63.48	64.55
		C3-T1	48.44	50.48	42.77	45.94	48.43	68.14	52.6	64.8	64.89
		C3-T2	40.94	35.15	41.98	45.05	44.09	66.06	51.33	63.47	55.54
		C4-T0	52.03	53.37	52.92	50.1	36.67	66.77	69.12	59.84	59.84
		C4-T1	19.48	27.53	32.95	24.83	20.85	49.42	39.18	45.38	39.57
		C4-T2	16.15	26.41	30.42	28.23	25.30	48.00	38.89	37.02	38.37
	Area	C3-T0	44.53	23.45	47.19	46.23	46.81	48.87	48.85	48.96	48.96
		C3-T1	51.01	51.01	48.77	50.22	50.24	51.68	50.17	51.15	51.25
		C3-T2	44.96	22.67	45.32	44.87	44.46	46.78	44.17	44.58	44.10
		C4-T0	18.8	10.11	20.37	20.15	19.19	22.84	22.56	22.56	22.65
		C4-T1	22.37	22.37	22.15	21.39	22.36	23.69	22.59	22.81	22.03
		C4-T2	14.82	10.14	20.38	19.87	19.09	22.55	20.02	20.57	20.76
Temporalis	RMS	C3-T0	27.37	104.88	17.24	18.09	16.14	138.95	89.04	76.48	71.62
		C3-T1	19.02	109.08	16.67	17.69	17.6	168.72	75.57	99.75	88.2
		C3-T2	18.15	92.98	15.62	17.39	16.49	136.91	60.32	80.09	69.05
		C4-T0	29.86	65.34	31.3	28.25	40.13	156.05	112.09	113.64	91.75
		C4-T1	39.58	71.71	26.23	26.37	26.85	147.55	67.21	102.59	86.61
		C4-T2	36.72	70.95	22.48	26.55	24.52	144.56	50.99	101.18	86.68
	Area	C3-T0	43.94	25.53	42.99	43.02	43.11	52.3	46.78	45.89	46.69
		C3-T1	43.57	25.71	44.09	44.01	44.15	54.18	46.15	46.8	46.29
		C3-T2	41.86	24.18	41.99	42.62	42.77	50.38	46.03	43.92	43.14
		C4-T0	22.44	11.76	22.13	21.65	22.71	28.14	26.29	25.5	24.77
		C4-T1	21.72	12.96	21.48	21.24	21.4	28.42	22.23	24.1	23.31
		C4-T2	20.36	11.47	17.96	17.19	18.08	25.56	18.00	21.26	19.62

Abbreviations: CP, chewing peanut; CR, chewing raisin; CW, clenching wax; HM, habitual mastication; LL, left lateral movement; LR, right lateral movement; MVC, maximum voluntary contraction; P, protrusion; R, rest; RMS, root mean square.

feminine gender.<sup>6,7,11</sup> The patient of this study fits this age range and gender, and the proposed therapy was planned for painful symptomatology remission.<sup>3,11,12</sup>

Chronic pain is a great burden to society, responsible for personal suffering, drug abuse, and a considerable financial problem due to treatment spending and lost productivity.<sup>10</sup> A study from 2012 found that the annual cost of pain in the United States ranged from \$560 to \$635 billion dollars, being superior to the costs of heart disease (\$309 billion), cancer (\$243 billion), and diabetes (\$188 billion).<sup>20</sup> In this context, acupuncture can play an important role considering its efficacy in reducing pain, few occurrence of adverse effects, and relatively low cost.<sup>10</sup>

Acupuncture has been often used as a complementary treatment in pain management in TMD.<sup>3</sup> A study comparing dry needling (DN) with methocarbamol (380 mg) and paracetamol (300 mg) combination drug therapy in TMD patients with pain on the lateral pterygoid muscle showed better results in the DN group.<sup>21</sup> In a clinical trial involving occlusal splints, a group treated only with splint and another only with acupuncture had significant and similar results on pain reduction.<sup>2</sup> In another study, the group treated with a combination of occlusal splint and laser acupuncture had faster and

greater pain reduction than the group treated with occlusal splint and laser placebo.<sup>4</sup>

According to Western medicine, acupuncture is responsible for activating peripheral sensory nerves and the afferent nerve pathway in the spinal cord, liberating cortisol, enkephalins, endorphins, dynorphins, and endomorphins blocking the painful stimulus.<sup>10,16,22</sup> In the reported case, the patient was in great pain before treatment (score 10 on VAS) and pain medications were not being sufficiently effective, reducing pain to a score of 6 on VAS according to the patient. Acupuncture treatment could eliminate patient's pain without the intake of any substance and the patient had no side effects and as was observed on the EMG test, muscular activity reduced both in T1 and T2 for most of the evaluated positions (– **Table 1**).

Chronic pain is characterized by the International Association for the Study of Pain as the one which persists for more than 6 months.<sup>23</sup> Pain perception during the first 6 months is considered more trustworthy because the patient can better comprehend the location and duration of it, where the discriminative system dominates the motivational/effective one, herewith the individual can not only just to locate but also isolate it.<sup>9,24,25</sup> These information just highlight the

**Table 2** Selected acupoints description

Body place	Point	Anatomical position	Indication
Facial	Jiache (ST6)	On the cheek, 1 cun superior to the anterior angle and above the mandible, on masseter muscle prominence	Relax facial muscles, facilitate mandible opening. Improves TMJ Qi
	Xianguan (ST7)	On the face, distally to the zygomatic bone, in the center of the depression between the mandible incisure and the inferior edge of the zygomatic arch, anterior to the mandibular condylar process, on the posterior margin of masseter muscle	Improve ear and TMJ functions. Alleviate spasms and pain
	Tinggong (SI19)	On the face, anatomical depression formed when mouth opens, localized anterior to the ear tragus, between the TMJ and the tragus	Relax the Shen, benefits the mind, removes Qi and blood obstructions of the vessels, alleviates pain, muscular spasms, trismus, TMJ motor impairment, and toothaches
	Ermen (TE21)	Superior part of the cavity before the tragus and above the mandibular condyle as mouth opens	Toothaches and pains, TMJ arthritis, headaches
	Yintang	Anterior middle line of the face, middle point between the eyebrows	Extra point that eases the mind
	Trigger points	A palpable taut band anywhere on the body	Relaxation of the region and pain reduction
Systemic	Bai Hui (GV20)	Middle of the skull, at the top of the head, on the intersection of the body middle line with the line from the vertical axis of both ears	Stimulates the memory and the mind
	Hegu (LI4)	Radial face of the hand, between metacarpal bones I and II, closer to the second one, approximately on its center, on the muscular projection when adduction of the thumb is performed	Eases the mind, decreases pain and inflammation, improves gastrointestinal function and headaches
	Houxi (SI3)	On the ulnar margin on the hand, in the depression proximal to the metacarpal bone head V	Alleviates pain and releases articular movements
	Yanglingquan (GB34)	Superior third of the leg lateral face, on the muscular depression anterior and inferior to the fibular head	Alleviates pain, decreases anger, and relaxes the TMJ
	Fengchi (GB20)	Lateral and posterior to the neck, on the bone depression between external occipital tuberosity and mastoid process, at Fengfu level, on the depression between the sternocleidomastoid muscle and the superior margin of the trapezius	Relax the muscles and tendons, improves articular functions
	Zusanli (ST36)	Anterolateral face of the leg, 3 cun directly below the Dubei and 1 cun lateral to the anterior margin of the tibia between the muscles tibialis anterior and the extensor digitorum	Stomach tonification, alleviates pain and inflammation, improves gastrointestinal function and headaches

Source: Adapted from Han et al.<sup>16</sup>

fidelity of the painful symptomatology intensity related to the patient on this study, not only the initial but also after the treatment, in as much as they began approximately 2 months prior to therapy beginning, being still considered acute, allowing a better perception of the patient regarding the painful spots, which not only contributed to the diagnosis as for treatment application, especially on the painful points. And the importance of a quick intervention for painful

symptomatology remission is indispensable for quality of life maintenance and effectiveness on the patient's routine.

## Conclusion

Myofascial pain is one of the main symptoms of TMD and treatments must act on pain control.<sup>1-3,6,11</sup> The patient's psychological and emotional status are risk factors for the

uprising or aggravation of the painful symptomatology.<sup>3,4,8,11,19</sup> In this case report, acupuncture was chosen before occlusal splint therapy because of its effectiveness on acting quickly on TMD painful symptoms as was observed by the absence of pain after acupuncture treatment since the first session, directly impacting the patient's well-being considering that pain was present for 2 months and medications were not working effectively anymore. However, acupuncture alone does not cure TMD due to its multifactorial etiology which often requires multidisciplinary approaches that not only treat painful symptomatology but also work to eliminate the causes.

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#### Conflict of Interest

None declared.

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