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OSTEOPATHIC CORRECTION IN TREATING PATIENTS WITH TENSION HEADACHE SYMPTOM AGAINST TMJ DYSFUNCTION

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ABSTRACT — Patients may have headache due to pathological issues occurring in the cervical spine and resulting in compression of the vertebral artery passing nearby. This comes along with disturbed blood supply to the brain. The aim of this study is to offer reliable grounds, and evaluate osteopathic correction when treating headache of tension (HAT) caused by a dysfunction of the temporomandibular joint (TMJ). A comprehensive examination involved 26 patients aged 18 to 65. The study outcomes allow recommending to include soft osteopathic techniques in the set of therapeutic measures. In order to make osteopathic treatment available for patients with HAT caused by the TMJ dysfunction, computed tomography (CT) of the TMJ and cranio-cervical junction is a typical choice. Given the high efficiency of the combined work of an osteopath joining effort with an orthopedic dentist and an orthodontist who has a good command of neuromuscular correction approaches, it appears a feasible option to use such combined treatment in patients with the TMJ dysfunction-caused HAT. To improve the quality of osteopathic correction and maintain the positive outcome we recommend using a supporting teeth protector — an elastopositioning corrector or TMJ trainer. This enables to decompress the TMJ.

KEYWORDS — headache of tension, TMJ dysfunction, craniosacral system, osteopathic treatment.

INTRODUCTION

Headache may occur due to pathological processes affecting the cervical spine leading to a compressed adjacent vertebral artery, which is accompanied by a disturbance in the brain blood supply. Compressed nerves result in a violation of the neuromuscular impulse transmission. In view of this, the measures taken by an osteopathic doctor are to be aimed at eliminating the major cause of pain thus trying to prevent the development of a tension headache, and subsequently — a brain stroke. Osteopathy employs the method of relaxing tense tissues, while restoring the activity of all the structures that are clamped and compressed. Unlike manual therapy, osteopathy works not only with musculoskeletal diseases yet also corrects clamps in deeper systems of the body. A few painless procedures usually prove enough to eliminate the headache issue [10]. Headaches of tension (HAT) are the most common types of headache, which in most cases are a symptom of the TMJ dysfunction [2, 5, 8, 14]. The factors causing the TMJ dysfunction include head injuries and jaw tension through stress, gum chewing and biting a pencil/pen, which, in turn, results in muscle spasms, circulatory disorders, and all this combined can cause headaches [1, 4, 7, 12].

Inflammation of the joint and the surrounding muscles leads to the temporomandibular joint displacement, thus causing tension in the main masticatory muscles (pterygoid lateral, pterygoid medial, masticatory and temporal). As a result, there appears pain in the head caused by muscle tension [3, 9, 13, 15]. Treatment of tension headaches in orthodox medicine is mainly seen from the standpoint of medication treatment, which proves ineffective in case HAT is caused by the TMJ dysfunction — a powerful factor of the trigeminal nerve irritation. The term "HAT" reflects the theory claiming that it is the result of long tension of the head and neck muscles [6, 11]. However, not all patients suffering from this pathology feature high tension of the pericranial muscles.

In this regard, osteopathic correction when treating patients suffering from the tension headache symptom with a disturbed dysfunction of the temporomandibular joint and cranial system is a relevant measure since it will increase the treatment effectiveness and improve the patient's life quality.

Aim of the study:
to offer reliable grounds and evaluate osteopathic correction when treating cases of tension headache caused by the TMJ dysfunction.

MATERIALS AND METHODS

The comprehensive examination, which was carried out, involved 26 patients aged 18 to 65, among them 18 women and 8 men (Table 1), who had the symptom of tension headache caused by the TMJ dysfunction. As the table shows, females predominate in the pool of patients. This pathology was to be observed in fewer patients aged 18–30 if compared to those within the group of 31 to 65.

Table 1. *Distribution of the examined patients – age and gender*

Number of patients	Age, yrs		Gender	
	18–30	31–65	F	M/M
26 (100%)	7 (26.9%)	19 (73.1%)	18 (69.2%)	8 (30.8%)

The examination included collecting anamnesis of the disease; assessing the intensity based on the visual analog scale (VAS); postural examination and osteopathic testing of the musculoskeletal, craniosacral and visceral systems; neurological examination; consultation & examination of an orthopedic dentist; CT of the TMJ and of the cranio-cervical junction.

The duration of the disease (verified tension headache symptom) ranged from 3 months to 20 years. Around 45% of the patients had tension headache with weekly attacks. All the patients had periodical HAT since they had the temporomandibular joint dysfunction, as verified through CT and confirmed with dental and osteopathic examinations.

Based on the random sampling method, the patients were divided into two groups: the main group – 17 patients who underwent osteopathic correction at the stages of comprehensive treatment: dental, medical and physiotherapy, and the control group, which included 9 patients who underwent alternative treatment with no osteopathic intervention. The patients of the main and control groups had their disease anamnesis analyzed along with the specific features of the clinical manifestation, as well as they had CT scanning of the TMJ and the cervical-brain junction examined, with clinical and osteopathic changes identified and evaluated prior to, and following the treatment.

The diagnostics of patients with the tension headache symptom relied on one of the major examination methods — a thorough collection of the patient's complaints concerning the time of seeking help from an osteopathic doctor. In case of specific complaints registered, which were related to the localization of the maxillary system and the facial area, the TMJ dysfunction was assumed to be present, which allowed the osteopathic doctor to follow the examination protocol. Complaints presented by patients with the TMJ dysfunction are conditionally broken into two groups: a specific symptom complex that characterizes functional and morphological changes in the TMJ, and a non-specific symptom complex that describes the clinical picture, where symptoms related directly to the TMJ develop, yet going beyond the masticatory system — headache (forehead, occiput, temporal area, radiating pain), noise, ringing in the ears, vertigo, etc.

In order to assess the headache intensity, a ten-point visual-analog scale (VAS) was employed, where the patient registers the intensity of headaches within a certain period of the study.

The postural study is aimed at investigating the redistribution of the muscle tone and tonic responses that serve to ensure dynamic stabilization of the body in an upright position and detect the point where there was some imbalance of a complex mechanism.

Musculoskeletal dysfunctions affect the posture and the redistribution of the muscle tone in charge of the body vertical position. After the postural examination, a posturological diagnosis was set, i.e., the factor behind the pain syndrome development identified.

The evaluation of the craniosacral mechanism was carried out subject to a conventionally accepted osteopathic methods by examining and palpating the anatomical structures of the craniosacral system, namely, the skull and the sacrum. The skull was palpated under the arch based on the Sutherland method. The neurological examination was carried out according to the classical methods.

The dental examination was performed by an orthopedic dentist or an orthodontist aiming to diagnose the TMJ dysfunction. At the initial visit, the patient, jointly with the dentist, filled out the questionnaire form *Musculoskeletal and occlusive symptoms and signs*.

The data on the TMJ dysfunction was confirmed through computed tomography and X-ray examination. A diagnostic Galileos Sirona 3D cone-beam computed tomograph was used to perform computed tomography of the temporomandibular joint and the craniocervical junction. A 3D image allows obtaining any cross-section of the required area as well as any projection. Computed tomography was performed in patients of the main and control groups. The factors that were taken into account included: the position of the mandibular head in the articular cavity; the size and the asymmetry of the TMJ articular cavities; the mandibular head posterior displacement (disc compression); the symmetry of the atlanto-occipital joints articular cavities; the dens axis position.

The patients of the main group were given conservative treatment, which included muscle relaxants,

non-steroidal anti-inflammatory drugs, B vitamins, physiotherapy, general relaxing massage, physical therapy, dental correction. The treatment was administered and supervised by a neurologist, once a week on an outpatient basis.

The examination results were documented in the dental patient's personal medical record (each patient's functional norm, probability of dysfunction (risk group), and presence of dysfunction were registered).

RESULTS OF EXAMINATION

An analysis of the results obtained through registering the disease details revealed that the most common complaints presented were headache, pain in the cervical spine, ringing and tinnitus, sleep disorders, nervousness, vertigo, sounds in the TMJ when opening the mouth, pain in the face area, numbness in the fingers, restricted mouth opening (Fig. 1).

Following the VAS-based test outcomes, which will be obtained through the entire observation period for both main and control groups, the osteopathic doctor will analyze the course of pain attacks in general and evaluate the dynamics of treatment.

Fig. 2 shows the results of an osteopathic examination of the craniosacral system, TMJ, masticatory, supra- and sub-lingual muscles and ligaments.

Osteopathic observation revealed the most common issues in patients with HAT due to TMJ dysfunction: temporal muscle dysfunction (100% for both groups); hyoid bone dysfunction (88.2% for the main and 88.9% for the control group); decrease in the sacral force of the primary respiratory mechanism (PRM) (88.2% in the main group and 88.9% in the control group); masticatory muscle dysfunction (82.4% for the main and 88.9% for the control group); decrease in the cranial force of the PRM (82.4% in the main and 77.8% in the control group); dysfunction of the stylomandibular ligament (70.6% in the main and 77.8% in the control group); decrease in the PRM sacral amplitude (70.6% and 77.8%); reduced cranial amplitude of the PRM (70.6% and 66.7%).

The following issues were identified through a neurological observation (Fig. 3).

A dental examination by an orthopedic dentist revealed a correlation between the TMJ dysfunction and a change in the conventional occlusion (extraction of one or more teeth, depulpation, elevated fillings, poorly installed prosthetics, braces). CT studies showed certain changes in the joint topography and asymmetry of the masticatory muscles; besides, at the articular walls are displacement, microtrauma of the joint soft tissues occurred, as well as compression of tissues in certain areas and their stretching in other parts of the joint (compression and distraction). Computer tomograms do not distort the image of tissue structures, while both bone and soft tissues are visualized, i.e., the articular disk and masticatory muscles.

RESULTS OF TREATMENT

In the main group, the patients received conservative treatment, which was carried out in view of the diagnosed osteopathic disorders. Osteopathic rehabilitation in the main group was done once a week. The selection of the methods employed for each session depended on the osteopathic disorders and on the dynamics of the disease clinical manifestations. The number of sessions depended on the neurological and osteopathic status, and varied from 5 to 8 sessions. An average rehabilitation period was 1.5–2 months.

The sequence of the treatment offered to the patients in the main group was as follows: first, the TMJ trainer was administered (supporting teeth protector to decompress the TMJ) with osteopathic treatment performed at the same time; further, the patients were referred to the dentist to fix the result through an orthotic made individually in view of the neuromuscular occlusion. In some cases, after wearing an orthotic, patients were given prosthesis or had a repeated prosthesis, still taking into account their respective neuromuscular occlusion.

Based on the osteopathic concepts, aiming to complete the tasks set herein, we found it important to release all the anatomical structures underlying the muscle, fascial, bone and visceral dysfunctions in the body that can affect the mandibular joint function. Osteopathic treatment started with the release of the sacrum in relation to the L5 vertebra and the release of the cranio-vertebral junction, followed by the release of the thoracic diaphragm, the release of the upper aperture, the correction of the jugular foramen, the large occipital foramen, the membranous equalization of the skull and, in some cases, the venous sinuses drainage.

Based on the data obtained from the anamnesis, the neurological and osteopathic examination, as well as CT data, respective treatment was caried out, which included several major stages:

Stage 1. A global approach to treating HAT, which appeared as shown below:

1. Recovered sacral mobility in the sacroiliac joints, L5–S1.

2. Elimination of dysfunctions in the thoracic, pelvic diaphragms and upper thoracic aperture.

3. Elimination of cervical spine dysfunctions, specifically levels C0–C1. Balancing the neck deep fascia, as well as restoring the free kinetics of the clavicles and the first ribs.

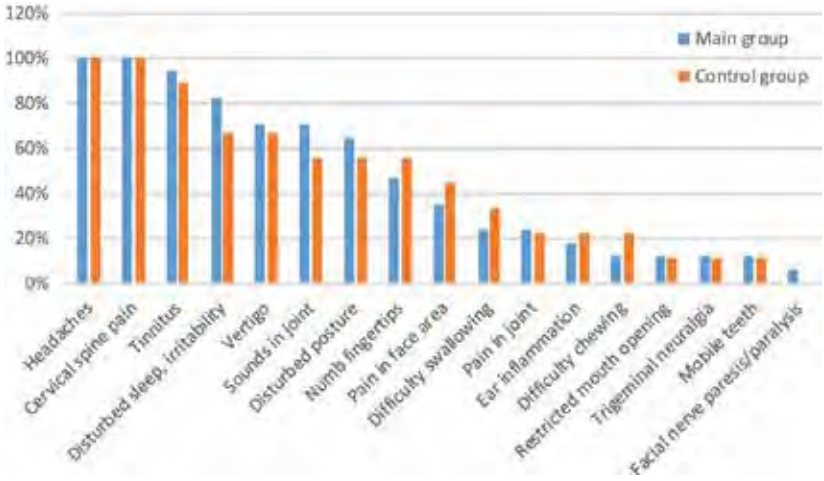

Fig. 1. *Complaints reported by patients in main and control groups, %*

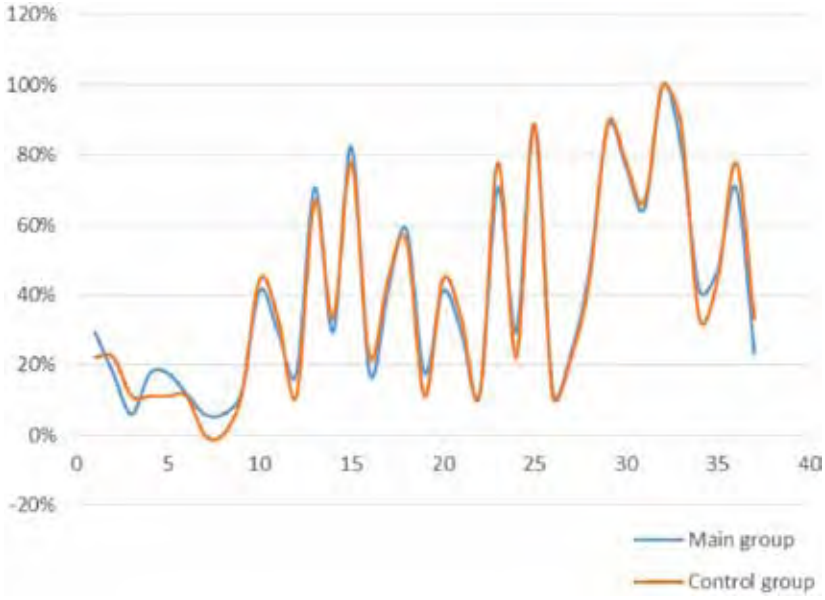

Fig. 2. *Results of an osteopathic observation prior to treatment, main and control groups*

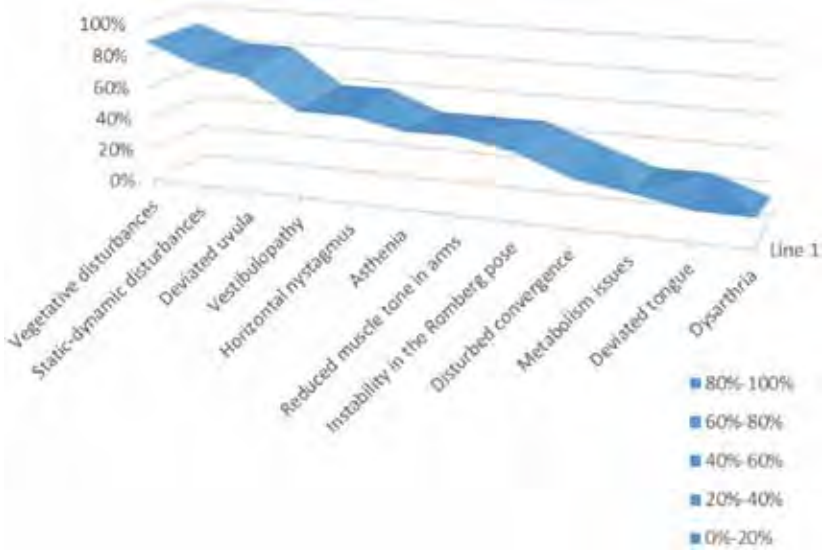

Fig. 3. *Neurological status of patients with HAT at their first visit to medical experts*

4. Elimination of sphenobasilar synchondrosis dysfunction, correction of the skull base sutures (occipito-mastoid suture, petro-jugular, petro-basilar).

5. Inhibition of the upper and lower cervical sympathetic ganglia.

6. Drainage of venous sinuses.

Stage 2. Correction specific techniques:

— masticatory muscles treatment;
— hyoid muscles treatment and the hyoid bone correction;
— lower jaw ligaments treatment (sphenoid-mandibular ligament, stylomandibular ligament);
— treatment of petrosphenoid ligament and sphenopetrosal synchondrosis;
— nasal breathing improvement: treatment of paranasal sinuses and tonsils.

CT results prior to, and following the treatment in the main and control groups

The studies were carried out using a Galileos Sirona diagnostic 3D cone-beam computed tomographic scanner. If compared with the previous tomogram image, there is a positive dynamics to be seen in recovering the symmetry of the temporomandibular joints articular cavities.

If matched against the previous tomogram of the craniocervical transition, the symmetry of the C0–C1 and C1–C2 articular cavities appears restored, while the asymmetric position of the dens axis — relative to the atlas lateral masses — is eliminated.

As far as our work is concerned, the most notable was the change in the articular cavity size after the treatment, as well as the improved position symmetry of the dens axis as well as the position between C0–C1, C1–C2, both on the left and on the right.

As can be seen from the table above, positive changes in the cranio-cervical junction joints are more pronounced in the main group. The change in C0–C1 was 66.67% (38.89% for the control group), C1–C2 — 74.27% (30.83% for the control group), the distance difference from the dens axis to the atlas lateral masses decreased in the main group by 50.48% (42.49% for the control group).

As the CT data shows, uni- or bilateral TMJ compression was identified in the main and control groups of patients with HAT caused by the TMJ dysfunction.

In most cases, patients with the TMJ dysfunction featured an asymmetry of the temporomandibular joint articular cavities. In the Galileos software program, the radiologist measured the articular cavities on the left and right before and after the treatment. The obtained data served to calculate the asymmetry value before and after the treatment. Due to the treatment, the asymmetry decreased, whereas the change was statistically significant (Table 3).

Since an approximately equal number of patients featured the left and right joints compression (47% and 53%) among those with asymmetry in the TMJ articular cavity (both in the main and in the control group), the calculation of the average articular cavity values of the left and right TMJ would prove not reliable in view of the aims set for this study. We calculated the average articular cavity before and after the treatment to find out that the average value after the treatment in the main group was 4.45 mm, which is 47.8% above the initial value of the articular cavity. As far as the control group is concerned, the result proved similar — the change made up 44.9% (Table 4). These results point at joint decompression after the treatment in both groups.

Table 2. *Average values of the cranio-cervical transition asymmetry, prior to and after the treatment*

Parameter	Group	Prior to treatment, mm (M±m)	Following treatment, mm (M±m)	Change, M	Reliability of difference
Δ of C0-C1 distances	Main group (n=17)	0.51±0.26	0.17±0.11	66.67%	p<0.05
	Control group (n=9)	0.54±0.29	0.33±0.22	38.89%	p>0.05
Δ of distances from dens axis to the atlas lateral masses	Main group (n=17)	2.08±0.77	1.03±0.15	50.48%	p<0.05
	Control group (n=9)	1.93±0.55	1.11±0.21	42.49%	p<0.05
Δ of C1-C2 distances	Main group (n=17)	1.71±0.84	0.44±0.32	74.27%	p<0.05
	Control group (n=9)	1.2±0.52	0.83±0.21	30.83%	p>0.05

The dynamics observed on the computed tomography images before and after treatment in the main and control groups can be seen from Table 2.

The following changes could be observed in both the main and in the control groups following the treatment:

Table 3. *Average asymmetry in the articular cavities of the left and right TMJ, prior to and after the treatment*

	Prior to treatment	Following treatment	Reliability of difference
Main group (n=17)	0.6±0.23	0.47±0.25	p<0.05
Control group (n=9)	0.58±0.24	0.46±0.26	p<0.05

Table 4. *Average values of the TMJ articular cavities, prior to and after the treatment*

	Prior to treatment, mm	Following treatment, mm	Change, %	Reliability of difference
Main group (n=17)	3.01±0.88	4.45±1.03	47.84%	p<0.001
Control group (n=9)	2.94±0.89	4.26±1.04	44.90%	p<0.001

—reduced asymmetry in the TMJ articular cavity as well as an increase in its size on both sides (joint decompression);

—aligned dens axis tooth relative to the atlas lateral masses;

— aligned C0–C1 and C1–C2 distances.

These changes are statistically significant for the main group. As for the control group, they manifested there to a lower extent. An increase in the articular cavity size as well as a decrease in its asymmetry from left to right as a result of treatment entailed a distinctly improved status of the cranio-cervical junction (aligned dens axis relative to the atlas lateral masses, a better symmetry of the C0–C1 and C1–C2 articular cavities).

To be noted also that the correlation between TMJ dysfunction and the joint dysfunction of the cranio-cervical junction was observed in 72% of the cases in the two groups.

The dens axis deviation was found in all patients with significant asymmetry of the TMJ articular cavities. There was no clear correlation between the TMJ compression and the dens axis deviation in either direction. This, as we see it, is due to the body's different potential to adjusting to such structural issues.

Changing HAT intensity before and after the treatment was statistically significant for both groups, whereas the difference between the average tension headache intensity after the treatment in the groups was statistically significant as well, with a probability degree of p<0.001. (Table 5, 6).

It should be noted that in the absolute majority of cases, the patients did not get rid of headaches — the pain intensity went down, as well as the frequency and the duration of seizures decreased. The average score of the HAT intensity, estimated on the visual analog scale in the main group dropped from 8.3 to 4.9 (by 41%). The frequency of HAT attacks in the main group decreased from 1 time per week to 1 time per month. The duration of seizures in the main group prior to the treatment was 24 hours and 8 hours — after the treatment.

The patients in the control group revealed lower results. The decrease in the average HAT intensity (VAS scale) was 31%. The seizures frequency decreased from 1 time a week to 2 times a month. The seizures duration changed from 24 hours to 15 hours for the entire group on average.

CONCLUSION

The 26 patients with tension headache had a dysfunction of the temporomandibular joint, which was verified by CT and confirmed by dental and osteopathic examinations, as well as the said patients suffered from periodic HAT attacks. A comparative assessment of the patients' status dynamics was carried out 1 month following the completion of the treatment course. The assessment focused on complaints (either reported or lacking), CT data of the TMJ and the cervical-brain junction, neurological and osteopathic statuses. The osteopathic correction of HAT caused by the TMJ dysfunction reveled a significantly improved clinical presentation, subject to the neurological indicators dynamics. The achieved improvement was most significant in the main group for the following syndromes: asthenia — from 47% to 6% (no dynamics observed in the control group); vegetative disorders — from 88% to 19% (in the control group – from 89% to 44%); dysarthria — from 18% to 0% (no dynamics observed in the control group); horizontal nystagmus — from 53% to 0% (in the control group — from 56% to 11%); vestibulopathy — from 53% to 13% (in the control group — from 56% to 22%).

In view of the above, the osteopathic correction produced more significant outcomes for the dynamics of neurological indicators. The HAT intensity before and after the treatment was assessed by VAS, where the difference between the average tension headache intensity after the treatment in both groups was statistically significant, too.

It should be noted that in the absolute majority of cases, headaches never disappeared completely – the pain intensity went down, as well as the frequency and the duration of seizures decreased. The HAT intensity average score, estimated on the visual analog scale dropped from 8.3 to 4.9 (by 41%) in the main group. The HAT attacks frequency in the main group went

Table 5. HAT average values, prior to and after the treatment, M±m

	Prior to treatment	Following treatment	Reliability of difference
Main group	8.3±0.8	4.9±1.1	p<0.001
Control group	8.4±0.9	5.8±1.4	p<0.001

Table 6. HAT intensity average values in the main and in the control groups following the treatment, M±m

	Main group (n=17)	Control group (n=9)	Reliability of difference
HAT intensity, VAS scale (points)	4.9±1.1	5.8±1.4	p<0.001

down from 1 time per week to 1 time per month. The duration of seizures in the main group prior to the treatment was 24 hours and 8 hours — after the treatment.

The results in the control group were not so significant — the decrease in the average HAT intensity (VAS) was 31%. The seizures frequency decreased from 1 time a week to 2 times a month. The seizures duration changed from 24 hours to 15 hours for the entire group on average.

Given the above, patients with HAT caused by TMJ dysfunction need an osteopathic diagnostics procedure, for the craniosacral system above all. Based on the study results we can recommend including soft osteopathic techniques in the entire set of treatment measures.

To make the osteopathic treatment offered to patients with the TMJ-dysfunction-bound HAT, CT of the TMJ and cranio-cervical transition are recommended. Given the high efficiency produced by combining an osteopath's effort with an orthopedic dentist who has a command of the neuromuscular correction methods, it is advisable to act jointly when treating patients with HAT caused by the TMJ dysfunction. To improve the osteopathic correction outcomes and maintain the achieved results we recommended using a TMJ trainer — a TMJ supporting and decompressing teeth protection appliance.

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