European Journal of Musculoskeletal Diseases
ISSN 2038-4106/2023

Case report

TREATMENT MANAGEMENT IN A YOUNG PATIENT WITH TEMPOROMANDIBULAR DISORDER AND MALOCCLUSION: A CASE REPORT

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ABSTRACT

Signs and symptoms of temporomandibular disorders (TMD) are observed in a percentage ranging from 7.3 to 30.4% of children and adolescents. The purpose of this work is to report a clinical case of a young patient suffering from TMD and malocclusion and who was treated with a gnathological occlusal splint and fixed orthodontic appliance. The patient, a girl aged 10 years and 10 months, had a slight tendency to skeletal Class III malocclusion, 6 mm overbite, 1.4-1.5 crossbite, multiple rotations and lower crowding. A gnathological occlusal splint was made to alleviate the acute symptoms and a gnathological retention splint at the finishing stage of fixed appliance was applied to achieve the functional occlusion. Observation after 2 years out of orthodontic treatment revealed a stable occlusion and improved of TMD symptoms.

KEYWORDS: *temporomandibular disorder, malocclusion, treatment, management, adolescent patients*

Received: 15 July, 2023
Accepted: 28 August, 2023

ISSN: 2038-4106

INTRODUCTION

In everyday clinical practice, it is common to find patients reporting orofacial pain. Thus, a routine temporomandibular disorder (TMD) examination prior to the beginning of the orthodontic therapy is essential (1). For orthodontists and general dentists, it is mandatory to carry out a complete medical history and a comprehensive temporomandibular joint (TMJ) exam to evaluate the presence of any TMD. This allows to recognize patients suffering from orofacial pain conditions and thus to exclude them from the orthodontic treatment until the pain sensation is managed (2).

TMD is a collective term, including several clinical problems involving muscles, TMJ or both. Even if TMD more frequently affects adults, signs and symptoms are observed in a percentage ranging from 7.3 to 30.4% of children and adolescents. The prevalence is higher in females than males and increased with pubertal development (3–5).

The TMD etiopathogenesis of growing patients includes systemic, pathological, psychosocial traumatic, hormonal, genetical, skeletal and occlusal factors (3, 6). The diagnosis of TMD is based on anamnestic collection, clinical examination and instrumental diagnosis.

Clinical and physical assessment of the patient may include the history and determination of joint sounds, evaluation of the mandibular range of motion, appraisal of pain, evaluation for signs of inflammation and a correct clinical and radiographic examination (7, 8). For clinical diagnosis, the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) use, by Schiffman et al (2014), are strongly recommended (9).

TMD treatment goals include restoration of function, pain decrease, control of any aggravating or contributing factors and improvement of life quality.

Treatment of TMD can be divided into reversible and irreversible. It has been suggested that simple, conservative and reversible types of therapy are effective in reducing most TMD symptoms in children (10–13), including patient education, physical therapy [e.g., jaw exercises or transcutaneous electrical nerve stimulation [TENS)], behavioral therapy, prescription medication (e.g., non-steroidal anti-inflammatory drugs and muscle relaxers) and occlusal splints (3).

The goal of an occlusal appliance is to provide orthopedic stability to the TMJ. These may be used to decrease parafunctional activity and pain (14–16). Occlusal splints are made of hard acrylic. The stabilization type of splint covers all teeth on either the maxillary or mandibular arch and is balanced to allow the occlusion of all teeth when the jaw is in a musculoskeletal stable position.

The aim of an occlusal appliance is to provide orthopedic stability to the TMJ before starting an orthodontic treatment in permanent dentition. These alter the patient's occlusion temporarily and may be used to decrease the parafunctional activity and pain.

Every comprehensive dental history and examination should include a TMJ history and assessment (17). The history should include questions concerning the presence of head and neck pain and mandibular dysfunction, previous orofacial trauma and current illness with an account of the symptoms. In the presence of a positive history and/or signs and symptoms of TMD, a more comprehensive examination (e.g., palpation of masticatory and associated muscles and the TMJ's, documentation of joint sounds, occlusal analysis, and assessment of range of mandibular movements including maximum opening, protrusion, and lateral excursions) (18), together with general dental and medical assessments (19, 20) should be performed.

Thus, the purpose of this work is to report a clinical case of a young patient accompanied with temporomandibular, treated with gnathological occlusal splint, fixed orthodontic appliance and transcutaneous electrical nerve stimulation (TENS).

CLINICAL CASE

Diagnosis and etiology

The patient came with their parents to the Orthodontic Program of the Multidisciplinary Department of Medical-Surgical and Dental Specialties of the University of Campania Luigi Vanvitelli in Naples. They were worried about her orofacial pain and temporal headache and were unsatisfied with her smile.

The patient was a 10 years and 10 months old Caucasian girl who was particularly anxious. A full visit with occlusal and functional examinations was performed by an orthodontist. The clinical evaluation revealed mouth opening reduced

(36 mm), normal lateral mandibular movements (9 mm), joint pain during functions and no clicking sounds in the TMJ. About the symptoms, she referred daily temporal headache, weakness upon weaking, myofascial pain, difficulty in mouth opening, parafunctional activities and anxiety.

Moreover, the patient presented a slight tendency to class III skeletal malocclusion, increased lower third of the face, irregular smile arch, crossbite of 1.4-1.5, increased overbite (6 mm), moderate lower crowding and multiple rotations. She did not receive any previous gnathological or orthodontic treatment.

In frontal view, the patient presented a symmetric face while in lateral view, the profile was retruded with incompetent lips at rest. There was no history of trauma of craniofacial complex. The panoramic radiograph showed the presence of all permanent teeth and the symmetric condyles without any pathological alterations (Fig. 1).

The cephalometric morphological assessment of the lateral skull radiograph showed a slight tendency of skeletal Class III (ANB = 1°; AoBo = -1 mm) with hyperdivergency (S-N / Go-Gn = 39°; FMA = 30°) and the lower incisors presented lingual inclination (IMPA = 82°).

Treatment objectives

Based on the patient's age and diagnosis, the best treatment option was an initial gnathological phase followed by orthodontic treatment.

The treatment of choice seemed to be the most rational option considering the patient and her parents' anxiety and expectations, the TMD and the occlusal features showing unilateral crossbite and lower crowding. The main treatment objectives are described below.

First phase: gnathological treatment to reduce muscle contraction, parafunctional activity and pain. The appliances used were gnathological occlusal splint, TENS and physical therapy.

Second phase: orthodontic treatment with crossbite correction, vertical growth pattern control, lower crowding correction, alignment, leveling and arch form coordination and overbite correction. The appliances used were a 7-7 multibracket fixed appliance in the upper and lower arch (0.022x0.028 MBT prescription) and cusp seating elastics.
Thus, a two-phase gnathological-orthodontic treatment was proposed and accepted by the patient and her parents.

Treatment progress

The first phase of treatment started one month later the initial check-up, in October 2016. The first gnathological phase

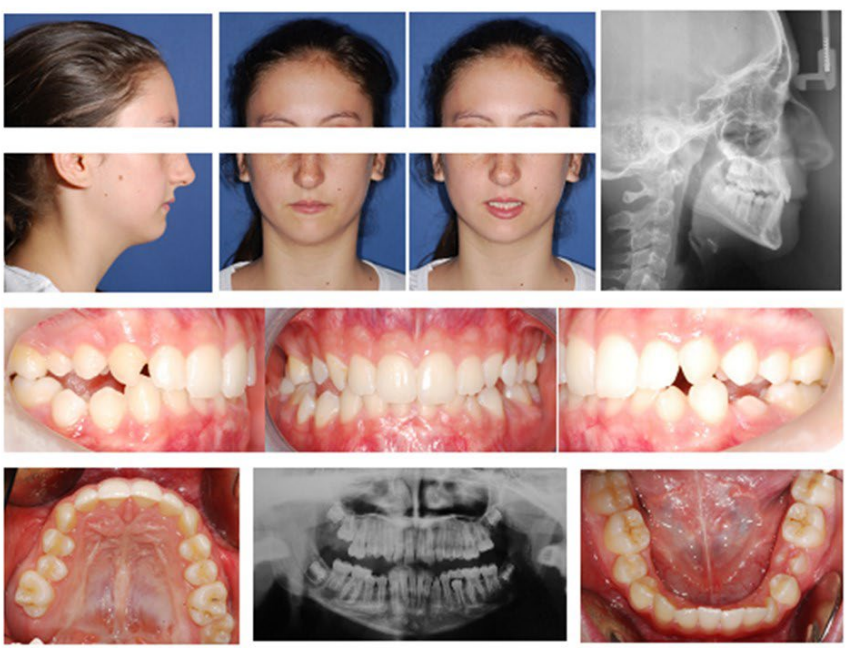

Fig. 1. *Pre-treatment records*

consisted of a treatment with occlusal splint in the upper arch (functionalized one a month), TENS (two a month) and physical therapy (two a month) for 8 months (Fig. 2).

After this period of time, the patient underwent a re-evaluation with interim records (both photographic and radiographic) in July 2017. During the re-evaluation was found an improvement of temporal headache, weakness upon weaking, myofascial pain, difficulty in mouth opening, parafunctional activities and anxiety. Then the patient was ready to proceed towards the second phase, controlling constantly any recurrence of temporo-mandibular symptoms.

Fig. 2. *Gnathological occlusal splint and TENS*

The second phase of treatment started in September 2017. The upper and lower arches were fully bonded with 0.022x0.025" MBT multibracket fixed appliances.

The following archwire sequencing was used: .016 nickel-titanium for alignment, .019x.025 nickel-titanium for leveling, .019x.025 stainless- steel for arch coordination and .018 AJ Wilcock Australian wire with refinement bends and cusp seating elastics for the finishing stage. This phase of treatment lasted 1 years and 6 months.

The retention phase included a Hawley retainer appliance in the upper arch and a cuspid-to- cuspid fixed retainer in the lower arch. The patient was repeatedly advised to report any case of recurrence of orofacial pain during the orthodontic phase.

Treatment results

The treatment goals were achieved (Fig. 3). The occlusal, functional and esthetic results were satisfactory, the patient and her parents were happy of her smile. TMD symptoms were improved, the smile arch was good with no buccal corridors, however the profile appears still biretruded.

Oral hygiene during orthodontic treatment was quite good, periodontal tissues were healthy. There were no decayed elements or signs of enamel decalcification and the panoramic radiograph did not show any sign of bone loss or root resorption.

Fig. 3. *Final records*

Intra-oral photographs and dental casts showed a good alignment of marginal ridges, while leveling and arch coordination were achieved: the crossbite and the lower crowding were corrected. The overjet was maintained and the overbite was corrected.

The final static occlusion was satisfactory also on the lingual side and no prematurity was present during protrusive and lateral mandibular movements. Panoramic radiograph revealed that good roots angulation was achieved.

The lateral skull radiograph showed the control of vertical skeletal relations between pre-treatment and post-treatment cephalograms and the incisor inclination.

The panoramic radiograph showed no signs of condylar resorption or periodontal disease. The third molars were present and impacted within the jaw bones.

No clear signs of root resorption can be noted. Root angulations were parallel.

In the final lateral cephalogram assessment the hyperdivergent pattern was controlled (S-N/Go-Gn from 39° to 38°).

The upper and lower incisors inclinations were improved (I/SN from 98° to 102°; IMPA from 82° to 92°). Overjet has remained relatively unchanged while the overbite was corrected.

DISCUSSION

The reported case of a child with TMD pain shows how treatment goals were achieved. The symptomatic, functional, occlusal, esthetic and psychological results were satisfactory. The outcome was rewarding for the clinicians and appreciated by the patient and her parents The key points determining the success of the treatment were good interdisciplinary cooperation (orthodontist, physiotherapist and mental health specialist) and the parent's and patient's collaboration, as reported previously in the international literature (21, 22). Further possible medical correlations should be always checked and monitored in these patients. It is important to prioritize the patient's symptoms, evaluating not only the occlusion but the entire orofacial area, trying not to minimize any signs of TMD. In the field of clinical dentistry, TMD are one of the major diseases. TMD pain in adolescents' patients is frequent and has a clear impact on daily living. In the present study we have used a splint in the upper arch (functionalized one a month), and TENS. Splint therapy has been used to help a majority of young patient with TMD pain and was also a treatment approach in this study (23). TENS is a non-invasive treatment modality for acute and chronic pain. TENS has a positive effect in treatment of TMD patient.

CONCLUSIONS

Treatment of adolescent patients with combined TMD and severe dento-skeletal malocclusions is among the most difficult challenges for orthodontists. In fact, the orthodontists cannot simply aim an occlusal correction but also have to treat all the orofacial complex trying to keep TMD under control, trying to prioritize TMJ signs and symptoms improvement.

Therefore, the treatment in a patient with TMD and malocclusion should be an interdisciplinary treatment that aimed to improve the function, the occlusion and consequently the patient's quality of life. The present study shows also the immediate effects of TENS treatment on TMD-related muscle pain.

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