Class II, Division 2 Treatment in a Dysfunctional Patient: A Case Report

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The presence of a temporomandibular joint dysfunction is a decisive factor in the treatment plan of a malocclusion. This article discusses an adult patient with a Class II, Division 2 malocclusion, referred to the authors by a maxillofacial surgeon for orthodontic treatment prior to surgical advancement of the mandible. A previously undiagnosed temporomandibular joint dysfunction led to different and less invasive treatment planning. World J Orthod 2002;3:342–348.

There have been many studies of the condylar position and its relationship to craniomandibular pain dysfunction. A condyle that is not centered in the articulating fossa has frequently been related to signs and symptoms of temporomandibular joint (TMJ) internal derangement. Of the various condylar displacements that are possible, posterior displacement appears to be a main etiologic factor in TMJ dysfunction.1–7 However, the frequency with which posterior condylar position is seen in the asymptomatic population emphasizes that a posterior condylar position is not axiomatic of a derangement.8 Deep overbite and maxillary incisor retroinclination may force the mandible to assume a more posterior position, thereby producing condylar retrusion.1 The morphologic condition of deep overbite can produce an increased load on the TMJ.9,10 Other conditions, such as parafunctional activity, stress, and occlusion, are contributing factors. As a consequence, a centric condylar position has been regarded as a sign of correct morphofunctional status of the TMJ components. Efforts have been made, therefore, to guide the condyle into a centric position, with the aim of relieving symptoms in patients with orofacial pain.

The following case report highlights the importance of evaluating the presence of TMJ dysfunction, associated with posterior condylar displacement, in the treatment plan of a patient with a malocclusion, even though temporomandibular dysfunction (TMD) symptoms were not the patient’s primary complaint.

DIAGNOSIS AND TREATMENT PLAN

A female, 36 years of age, was referred to the authors by a maxillofacial surgeon for orthodontic treatment prior to surgical advancement of the mandible. The treatment goal was to establish a Class I molar and canine relationship. The patient’s complaint was exclusively limited to the appearance of the anterior teeth and the smile line. Clinical examination revealed bilateral TMJ noises (crepitus) during opening and closing movements. The patient also had occasional pain and muscle tenderness.

Prior to starting treatment, critical information was presented to the patient. She was informed of the different ways that orthosurgical treatment could solve the esthetic-occlusal problems, but, because of the undiagnosed TMJ dysfunction, a different and less invasive treatment plan was possible.

Four years previously, the patient had undergone orthodontic treatment, with four premolar extractions. From an orthodontic viewpoint, the patient showed a retrognathic profile with retrusion of both maxilla and mandible and lip incompetence at rest. No asymmetries were present. Occlusally, the

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patient still had a Class II molar and canine relationship with deep overbite, retroclined maxillary central incisors, and a pronounced curve of Spee in the mandibular arch (Fig 1). Radiographic and cephalometric analyses confirmed that both the maxilla (SNA angle, 77 degrees) and the mandible (SNPg angle, 71 degrees) were retruded. No alteration of most vertical parameters was present (FMA [Frankfort-mandibular plane angle], 25 degrees), with the exception of the excessive overbite (9 mm). The most evident deviations from normal standards were in the maxillary incisor inclination (84 degrees), the mandibular incisor inclination (87 degrees), and the interincisor angle (159 degrees).
Using a submentovertex film, tomograms were oriented on the patient's condylar angle so that future tomograms could be superimposed to evaluate changes in the condyle-fossa relationship, concomitant with the alteration of the mandibular position and the occlusal relationship. All subsequent tomograms were taken at the same condylar angle and at the same depth of cut to minimize errors in superimposition. Oriented tomograms of the TMJ showed a bilateral posterior condylar displacement, with abnormal condylar head morphology that was more pronounced on the left side (Fig 2).

Following disc-repositioning theory, but aware that mechanical repositioning of the mandible to an arbitrary anterior position will not result in a stable occlusal condition, treatment without a splint was started.

The treatment plan called for the following:

1. Aligning the maxillary arch, correcting linguoinclination of the maxillary incisors, giving the patient a better smile line (patient's primary complaint), and eliminating the steep anterior guidance.
2. Aligning the mandibular arch and correcting the mandibular curve of Spee, thus increasing the posterior vertical dimension, and opening the bite.
3. Establishing a Class I molar and canine relationship, allowing repositioning of the mandible through the use of Class II traction and the simultaneous use of posterior composite cones (occlusal build-up). Traction was performed with 3.5-oz elastics, 24 hours a day, except during meals, applied from maxillary premolar to mandibular premolar and from maxillary first molar to mandibular first molar.
4. Finishing and detailing.
5. Retention with mandibular fixed lingual and maxillary Essix retainers.

**TREATMENT MECHANICS AND PROGRESS**

The first phase of treatment consisted of full bonding of the maxillary arch with a preadjusted appliance (slot, 0.022 × 0.028-inch MBT prescription); in addition, a 0.016-inch nickel titanium (NiTi) maxillary arch was inserted. Three months later, a 0.019 × 0.025-inch heat-activated NiTi maxillary arch was used. The Orthoform III (3M Unitek, Monrovia, CA, USA) arch form was selected. When the maxillary arch was completely leveled, the bite was slightly open (Fig 3) and, with the addition of posterior composite cones, the mandibular arch was fully bonded. A 0.016-inch NiTi mandibular arch form was then placed (Fig 4). Subsequently, a 0.019 × 0.025-inch heat-activated NiTi mandibular arch form was placed.

After this first phase of leveling, two 0.019 × 0.025-inch maxillary and mandibular super-elastic
NiTi intrusion arches were inserted to completely correct the deep curve of Spee. After desired progress, two 0.019 × 0.025-inch stainless steel maxillary and mandibular arches were placed. At this time, light intermaxillary vertical elastics were used to extrude mandibular posterior teeth, to definitively correct the curve of Spee and the severe deep bite (Fig 5).

Intermaxillary vertical elastics were used for 5 months, then the posterior occlusal build-up was removed. At this time, the bite had been opened and a Class I relationship was achieved through the use of light intermaxillary Class II elastics.

After 18 months of treatment, the patient was debonded (Fig 6).

**TREATMENT RESULTS**

At the end of treatment, retrusion of the mandibular and maxillary jaws was still present, but the increase in the lower anterior face height consequent to the downward and backward mandibular rotation (FMA from 25 degrees to 28 degrees) appeared to make both the frontal and lateral views more harmonious,
A Class I molar and canine relationship was achieved, and the bite was opened with a good correction of the lower curve of Spee (Fig 7). Radiographic and cephalometric analyses (Fig 8, Table 1) revealed no significant variations in the sagittal parameters, with a slight forward movement of the mandible (SNPg angle, 73 degrees). The FMA increase (from 25 degrees to 28 degrees) showed a posterior mandibular rotation; the angle between the palatal plane and the maxillary incisors increased significantly (from 84 degrees to 94 degrees). In addition, the incisor mandibular plane angle (IMPA) increased from 87 degrees to 100 degrees, as the mandibular incisors were proclined.

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The Wits appraisal changed from 8.5 mm before treatment to 3.5 mm after treatment, probably due to the clockwise cant of the occlusal plane consequent to the Class II intermaxillary elastic traction and to the downward and backward mandibular rotation achieved with the extrusion of posterior teeth.

Superimpositions (Fig 9) showed that the Class II correction was primarily achieved through dental movement. Point Pg was stable but FMA increased, so the rotational effects of the bite opening on Pg point were minimized, probably by the simultaneous mandibular advancement. Relevant torque of the maxillary incisors was performed and a forward movement of the mandibular incisors and molars occurred.

Functional examination of the TMJ revealed no adverse clinical signs (clicking, crepitus, etc). Radiographs of the TMJ showed both condyles centered in the fossae; signs of remodeling of the left head condyle appeared to have occurred (Figs 10 and 11).

During treatment, a vertical and sagittal repositioning of the mandible was achieved. This repositioning could be confirmed by the extrusion of the posterior teeth and by the forward slide of the mandible, due to the repositioning of the condyles that were previously in a retruded position. Part of this is the anterior translatory condylar movement associated with normal mouth opening.

Some authors postulate that when an anterior deep overbite relationship loses vertical dimension (previous orthodontic extraction treatment plus loss of control of the curve of Spee), the closing arc of the mandible directs the mandibular anterior teeth into steep maxillary incisor lingual inclines that can produce a distalizing effect on the mandible.\textsuperscript{13-16}

The stability of the occlusion obtained through orthodontic treatment must be evaluated on a long-term basis to determine if the new condylar position is stable and the apparent improvement in condylar morphology is permanent.
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