

Evaluation of temporomandibular disorders in Class III patients treated with mandibular cervical headgear and fixed appliances

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Introduction: Our aim in this study was to evaluate the prevalence of temporomandibular disorders (TMD) in Class III patients treated with mandibular cervical headgear (MCH) and fixed appliances. **Methods:** The sample of 75 patients included 25 patients with no previous orthodontic treatment, 25 Class I patients who had undergone orthodontic treatment with fixed appliances and without extractions, and 25 patients with dentoskeletal Class III disharmonies treated with MCH and fixed appliances. The Helkimo index was used to test the prevalence of TMD symptoms in the 3 groups. The prevalence rates of the Helkimo index in the 3 groups were compared with the z score on proportions. **Results:** No statistically significant differences in the prevalence rates of the Helkimo index scores in the 3 groups were found ($P = .367$). Most subjects in the 3 groups had an Helkimo index of zero (66.7%). **Conclusions:** Subjects with Class III malocclusions treated with MCH and fixed appliances do not have greater prevalence of TMD symptoms than do Class I subjects treated with fixed appliances or untreated subjects. (Am J Orthod Dentofacial Orthop 2008;133:379-81)

Temporomandibular disorders (TMD) are functional or pathological conditions that affect the temporomandibular joint (TMJ), the masticatory muscles, and the tissues surrounding them. However, the physiopathology is not totally known and remains controversial in the literature because many signs and symptoms can be self-limiting, and can recur and fluctuate with time.¹ Some types TMD have been related to several types of malocclusion—eg, increased overjet, posterior crossbite, anterior deep bite, skeletal anterior open bite, and mandibular asymmetries, among others changes.^{1,2} The literature also suggests that orthodontic appliances are rarely involved in the etiology of TMD, and that orthodontic treatment in general does not increase or decrease the risk of developing TMD throughout life.^{1,3-7} Several studies have indicated that the role of orthodontic treatment in the development of TMD is not thoroughly known, and that it should be studied further in the long term.^{8,9}

A common finding in TMD is displacement of the articular disc; this can suggest that treatment modalities such as chin cup or mandibular cervical headgear (MCH) that position the condyle to a more posterior position could be associated with increased risk of joint dysfunction. Janzen and Bluher¹⁰ found that, when a continuous retraction force was applied to the mandible in *Macaca mulatta* subjects, it did not produce degenerative inflammatory changes in the TMJ. Treatment-induced modifications in the TMJ must be interpreted as remodeling changes, similar to those described by Joho.¹¹ Deguchi et al¹² and Gavakos and Witt⁸ concluded that the relationship between treatment with chin cup and TMD is weak.

There are no studies on the influence on the TMJ from treatment of Class III malocclusion with MCH. The purpose of this study was to evaluate the incidence of TMD after orthodontic treatment with MCH combined with fixed appliances in Class III patients compared with untreated patients and Class I patients treated with orthodontics and without extractions.

MATERIAL AND METHODS

For this study, the records of 75 adolescent and young adult patients (32 female, 43 male) were obtained from 2 private practices. They comprised 3 groups: a control group of 25 patients with no previous orthodontic treatment who came for their first consultation; 25 Class I patients who had undergone orthodontic treatment with fixed appliances and without

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Table. Distribution by sex, group, and total Helkimo index

Value	No treatment (n)			Class I with treatment (n)			Class III with MCH (n)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
0	10	6	16 (64%)	9	8	17 (68%)	11	6	17 (68%)
1	4	4	8 (32%)	4	4	8 (32%)	5	2	7 (28%)
5	0	1	1 (4%)	0	0	0 (0%)	0	1	1 (4%)
Total	14	11	25 (100%)	13	12	25 (100%)	16	9	25 (100%)

extractions, with Class I and normal overjet and overbite at the end of treatment; and 25 patients with dentoskeletal Class III disharmonies (pretreatment dentoskeletal characteristics included Wits appraisal < -2 , ANB angle $< 0^\circ$, Class III molar relationships, and negative overjet) treated with MCH and fixed appliances. The MCH was worn approximately 14 hours daily with a force of 300 g per side. The duration of MCH treatment followed by fixed appliances ranged from 2 to 3 years.¹³ The patients who had been treated with MCH and fixed appliances, or with fixed appliances alone, had been in the retention phase for at least 6 months after treatment.

The Helkimo index¹⁴ was used for the analysis of the TMJ in all subjects. Signs and symptoms evaluated included mandibular mobility range, clicking or deviations in mandibular movement, pain at palpation of the TMJ or in the masticatory muscles, and pain during opening and closing movements.

The prevalence rates for values of the Helkimo index in the 3 groups were compared with the z score on proportions. Differences regarding the Helkimo value in relation to sex in each group were tested statistically with the same test.

RESULTS

Sex distribution and the prevalence rates for the Helkimo index in the 3 groups are given in the Table. The patients' ages in the 3 groups were similar (range, 12-24 years; average, 16.7 ± 2.8 years).

No statistically significant differences for the Helkimo index in the 3 groups were found ($P = .367$). Values of the Helkimo index of zero point represent the absence of TMD, values of 1 to 4 points refer to minimal or slight dysfunction of the TMJ, and values of 5 to 9 points indicate moderate dysfunction.

Most patients (50, or 66.7%) had no signs and symptoms of TMD, whereas 30.7% had a mild Helkimo index score, and only 2.7% were moderate. Of the 25 patients with some sign or symptom (33.4%) of TMD, the most prevailing sign was clicking, found in 23 (92%). There were no statistically significant differ-

ences in the Helkimo values with sex as the discriminant variable.

DISCUSSION

A sample of 75 patients between 12 and 24 years of age was divided into 3 groups to compare the presence or absence of TMD in Class III patients treated with orthodontics and MCH, Class I patients treated orthodontically without extractions, and subjects who had not been previously treated.

Epidemiological studies have shown that the signs and symptoms of TMJ can be found in patients between the ages of 15 and 25 years.^{15,16} Carlson¹⁷ found that prevalence levels for TMD increase at approximately 35 years of age, whereas, at earlier ages, TMD might be less frequent.¹⁸ The Helkimo index was used in this study because it is a commonly used tool to evaluate signs and symptoms of TMJ.¹⁹

Our results showed that Class III patients treated with MCH and fixed appliances for 2 to 3 years did not have greater prevalence of TMD signs and symptoms than Class I patients treated with fixed appliances only or untreated controls. In a previous study, Gavakos and Witt⁸ found that treated Class III patients had a better functional state compared with nontreated prognathic patients,⁹ but not better than the general population.

Deguchi et al¹² studied the incidence of TMD in patients treated with chincup during and after active treatment; 86 of 160 patients responded to a questionnaire and were checked for pain, clicking, and mouth opening. Twenty-eight subjects (32%) showed at least 1 symptom of TMD. These results are similar to those of our study, in which mild TMJ dysfunction was found in 28% of the patients and moderate dysfunction in only 4%.

In contrast to previous studies that showed more TMD in female subjects during the growing stages,^{5,20} we found no statistically significant differences between the sexes in any group.

CONCLUSIONS

We did not find a greater prevalence of TMD signs and symptoms in subjects with Class III malocclusions

treated with MCH and fixed appliances compared with subjects with Class I malocclusions treated with fixed appliances and orthodontically untreated subjects.

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