Journal of Cranio-Maxillo-Facial Surgery 42 (2014) 1604–1609

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

TMD in class III patients referred for orthognathic surgery: Psychological and dentition-related aspects

Irena Mladenović [a,*], Slobodan Dodić [b], Srboljub Stošić [c], Dragan Petrović [d], Tatjana Čutović [e], Ružica Kozomara [c]

[a] Department of Prosthodontics, Faculty of Medicine (Head: Prof. Milan Kulić (MBiol, PhD)), University of East Sarajevo, 5 Studentska St, 73300 Foča, Bosnia and Herzegovina
[b] Department of Oral Rehabilitation (Head: Prof. Slobodan Dodić (DDS, PhD)), Faculty of Dental Medicine, University of Belgrade, 4 Rankeova St., 11000 Belgrade, Serbia
[c] Clinic for Maxillofacial Surgery, (Head: Srboljub Stošić (MD, PhD)), Military Medical Academy, 17 Crnotravska St., Belgrade, Serbia
[d] Department of Maxillofacial Surgery (Head: Prof. Dragan Krasić (MD, PhD)), Faculty of Medicine, University of Niš, 52 Dr Zoran Đinđić Blvd., 18000 Niš, Serbia
[e] Department of Orthodontic, Dental Clinic (Head: Prof. Zoran Lazić (DMD, PhD)) Military Medical Academy, 17 Crnotravska St., Belgrade, Serbia

ARTICLE INFO

Article history:
Paper received 6 November 2013
Accepted 22 April 2014

keywords:
Class III malocclusion
Depression
Occlusion
Temporomandibular disorders
Somatization

ABSTRACT

Objective: To investigate temporomandibular disorders (TMD), psychosocial, and occlusal variables in class III orthognathic surgery patients with respect to the control subjects, and to compare psychosocial and occlusal features in class III patients with different Research Diagnostic Criteria for TMD (RDC/TMD) diagnoses.
Materials and methods: The study enrolled 44 class III patients referred for orthognathic surgery and 44 individuals without a malocclusion. TMD, depression and somatization were assessed by RDC/TMD. Occlusal analysis included Helkimo's Occlusal Index items, overjet and overbite.
Results: In the controls, patients with class III deformities had higher prevalence of myogenic TMD, increased grade of chronic pain, and more occlusal deviations. Within the study group, TMD patients reported higher depression score ($P < 0.01$), myofascial pain was related to higher depression and somatization grades ($P < 0.01$, $P < 0.05$ respectively), and disc displacement showed relation with RCP-ICP slide interferences ($P < 0.05$).
Conclusion: With respect to subjects without a malocclusion, TMD in class III dentofacial deformities is similar in prevalence, but differs in clinical appearance. Occlusal, but not psychosocial features deviate from those in the controls. While psychosocial variables accompanied TMD and myofascial pain, increased RCP-ICP slide was related to disc displacement in class III patients.

1. Introduction

Dentofacial deformities have been widely investigated for presence of dysfunctional changes in the temporomandibular joint (TMJ) and masticatory muscles (Lindenmeyer et al., 2010), commonly known as temporomandibular disorders (TMD). The interest primarily originated in early aetiological concept that had considered skeletal discrepancy and related occlusal instability as the basis for the development of TMD (Laskin, 1969).

During the last decades, it has been generally accepted that TMD is multifactorial in origin, and that these factors relate mutually to TMD development (Pullinger et al., 1993; Landi et al., 2004). Accordingly, TMD signs and symptoms in patients with dentoskeletal discrepancies have been investigated not only in the context of structural variables (Kerstens et al., 1989; Fernandez Sanroman et al., 1997; Westermark et al., 2001), but also regarding psychosocial factors (Aghabeigi et al., 2001; Kim et al., 2013), gender (Aghabeigi et al., 2001; Dervis and Tuncer, 2002), and age (Aghabeigi et al., 2001). The risk of developing TMD in orthognathic surgery patients has been attributed to various factors such as alterations in the condyle position or mandibular plane angle, occlusal instability, psychologic distress, female gender, and increasing age.

* Corresponding author. Tel.: +387 66 624 250; fax: +387 58 210 420x203.
E-mail addresses: eirene14a@yahoo.com, i.mladenovic.uis@gmail.com (I. Mladenović).

http://dx.doi.org/10.1016/j.jcms.2014.04.029
1010-5182/

Although a clear cause–effect relationship between class III skeletal malocclusions and TMD has not been proven, it seems that they co-exist at many levels. Class III patients generally present considerable deviations in occlusal morphology, (Wisth, 1984; Song et al., 1997), with lower occlusal contact area and decreased bite force than the controls (Song et al., 1997). A considerable number of the patients show alterations in muscle activity pattern (Moss and Chalmers, 1974), impaired mandibular mobility (Wisth, 1984; Song et al., 1997), lower muscle activity (Song et al., 1997), and deviation in the form of the temporomandibular joint (TMJ) components (Katsavrias and Halazonetis, 2005). Finally, psychological problems related to their appearance characterize the vast majority of patients with class III discrepancies (Zhou et al., 2001).

With these considerations in mind, the study aimed to asses TMD, psychosocial factors and 9 significant occlusal variables in class III orthognathic surgery patients with respect to control subjects who did not show clinically relevant malocclusion. Furthermore, the study investigated psychosocial and dentition-related aspects in certain clinical diagnoses based on the RDC/TMD in skeletal class III patients.

The authors hypothesized that, firstly, TMD, psychosocial impairment and occlusal disturbances would be higher in prevalence in untreated class III subjects with respect to the control group and that, secondly, RDC/TMD diagnoses in class III patients would differ in occlusal features and psychosocial profiles.

2. Material and methods

2.1. Subjects

This cross-sectional case–control study involved two groups of patients. Forty four untreated individuals with class III malocclusion, 19 females, age ranging from 18 to 29 years, (mean (SD) 23.2 (2.8)), were recruited from orthognathic surgery patients referred to the Department of Maxillofacial Surgery at the Military Medical Academy, Belgrade to form the study group. Subjects of both sex were accepted for the study if they met the following criteria: atleast 18 years of age, had a diagnosis of skeletal class III malocclusion, and had no previous orthognathic surgery, or conventional orthodontic treatment.

The control group was derived from individuals with no clinically relevant malocclusion. Controls were selected from under- and post-graduate students of dentistry at the University of Belgrade, Serbia if they had no malocclusion, or presented with minor occlusal traits that did not need to be treated with either orthodontic therapy or orthognathic surgery, had no previous orthognathic surgery, conventional orthodontic treatment or other occlusal therapy, and were selected to match the patients in the orthognathic surgery group in sex, with an overall age distribution similar to the cases. A total of 44 subjects, age ranging from 18 to 28 years, (mean (SD) was 23.5 (2.2)), were recruited.

All subjects were examined by the first author. Subjects with systemic muscle or joint disorders, or history for orofacial trauma were excluded from the study. Skeletal class III patients were identified by cephalometric analysis on lateral cephalograms.

The research was approved by the Ethical Committee of Military Medical Academy in Belgrade and conducted in accordance with accepted ethical standards for research practice (guidelines of the Helsinki Declaration). All participants signed the informed consent form.

2.2. Clinical assessment of TMD and occlusal analysis

TMD and psychosocial factors were assessed according to the Research Diagnostic Criteria for TMD (RDC/TMD) (Dworkin and LeResche, 1992). Axis I component of RDC/TMD was applied to address the most common TMD subtypes. According to precise definition given in the criteria, presence of specific combinations of signs and symptoms gathered through subjective reporting by the patients and clinical examination each subject was placed into one of the diagnostic categories: myofascial pain, disc displacements and other joint conditions (arthralgia, arthritis and arthrosis). Axis II component was used to estimate level of chronic pain and related disability, depression and non-specific physical symptoms (somatization). Chronic pain grade was calculated from a 10 point numerical verbal rating scale and data related to impact of pain on daily, social and work activities. Depression and somatization scores were assessed by means of the depression and somatization scales of the Symptom Checklist 90R (SCL-90R). The RDC/TMD history questionnaire, examination forms and examination specifications for this investigation were identical to those of the RDC/TMD.

The following occlusal variables were analysed: total number of teeth, number of occluding pairs of teeth, retruded contact position to intercuspal position (RCP-ICP) slide length and direction, presence of the interferences during protrusive and lateral jaw movements (as specified in Helkimo's Occlusal Index (Oi)) (Helkimo, 1974), overbite (as described in RDC/TMD) (Dworkin and LeResche, 1992), and overjet (as the least horizontal overlap between incisors) (Pullinger et al., 1993). Presence of the interferences was recorded clinically, as proposed in Oi. The remaining data were collected from dental casts registered in non-reversible hydrocolloid impressions. Items included in Oi are graded on a scale of "0", "I" or "II", depending on presence and severity of deviation, according to Oi: 0 = no occlusal disturbances (Oi0); I = moderate occlusal disturbances (Oil); II = severe occlusal disturbances (OiII). Prevalence of laterotrusive interferences, mediotrusive interferences and protrusive interferences were calculated separately.

2.3. Statistical analysis

Non-parametric data were expressed as percentage of positive findings or as mean ranks, and compared using Chi-square, Fisher's exact or Mann–Whitney tests. The means (SD) were calculated for parametric data, and significant differences were sought by Student's *t* test. Analysis was handled with the SPSS 19.0 software for Windows (IBM Corp., Armonk, NY). Statistical significance was set at $\alpha = 0.05$.

3. Results

The comparison of overall TMD prevalence between the groups did not show significant differences. In terms of RDC/TMD diagnoses, myofascial pain was significantly more prevalent ($P < 0.001$) in the study group. Diagnoses related to arthritis and arthrosis were not observed (Table 1).

Chronic pain was present in 29.5% of the patients and was significantly higher in grade compared to the controls ($P < 0.05$). Statistical analysis did not show significant difference in scores for depression and non-specific physical symptoms between the groups (Table 2).

Analysis of the occlusal parameters revealed higher Oi index ($P < 0.001$), lower total number of teeth ($P < 0.001$), lower number of occluding pairs of teeth ($P < 0.001$), more interferences during mandibular movements ($P < 0.05$), higher prevalence of protrusive interferences ($P < 0.001$), as well as lower values of overbite ($P < 0.001$) and overjet ($P < 0.001$) in class III when compared to control subjects (Table 3).