Influence of orthognathic surgery for symptoms of temporomandibular dysfunction

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Objective. To evaluate the influence of orthognathic surgery on the clinical signs and symptoms of temporomandibular disorders (TMDs).

Study Design. In a cohort study, 54 patients undergoing orthognathic surgery were evaluated with regard to the signs and symptoms of TMDs through subjective and objective assessments. These evaluations were performed 1 week preoperatively (T1), 1 month postoperatively (T2), and 6 months postoperatively (T3). The evaluations included patient variables and surgery. Univariate analyzes were performed to verify the association of the variables ($P < .05$).

Results. The incidence of TMD 6 months after orthognathic surgery was significantly lower ($P < .001$). TMD intensity decreases significantly in the postoperative period. Females had a higher prevalence of TMD ($P = .003$) and muscular disorders preoperatively ($P = .001$). There was a decrease in clicks between T1 and T3 ($P = .013$). Mouth opening without pain worsened from T1 to T2 ($P < .001$) and improved from T1 to T3 ($P = .015$) and T2 to T3 ($P < .001$). The results were similar for mouth opening with pain ($P < .001$). In patients undergoing jaw fixation with bicortical screws, mouth opening without pain was significantly less in T3 patients than in patients undergoing fixation with plate and monocortical screws ($P = .048$).

Conclusions. Orthognathic surgery reduces the clinical signs and symptoms of TMD. (Oral Surg Oral Med Oral Pathol Oral Radiol 2016;121:119-125)

Dentofacial deformities have been investigated for changes in the temporomandibular joint (TMJ) and pain in the masticatory muscles.[1-5] This primary interest originated from the etiologic concept of skeletal discrepancies and occlusal instability being the basis for the development of temporomandibular disorders (TMD). In recent decades, the multifactorial theory has been more accepted.[6]

Patients who want correction of facial deformities through orthodontic surgical treatment often have high expectations for resolution of TMD after surgery. Thus, the influence of orthognathic surgery on the symptoms of TMD is a subject widely debated among oral and maxillofacial surgeons, not only because of the possibility of improvement through deformity correction but also because of the possibility of development of symptoms in patients who did not have TMD preoperatively, which may occur due the extensive bone and muscle manipulation during surgery. Despite being a subject investigated for decades,[7,8] no conclusive evidence has been reported in the literature,[2-5,9-12] with some differences in the results due to the methods used in different studies.

The aim of our study was to elucidate the influence of orthognathic surgery on the clinical symptoms of TMD.

MATERIAL AND METHODS

Our cohort study included patients with dentofacial deformities who had undergone orthognathic surgery at Universidade Federal do Paraná between August 2013 and June 2014 (54 patients). Participants in this study were the patients who had the following surgical techniques performed: Le Fort I osteotomy, bilateral sagittal split osteotomy, or both. The patients who agreed to participate in the study were required to sign an informed consent form. The following patients were excluded: patients who had a previous surgical treatment in the TMJ and maxillofacial region, patients in clinical treatment for TMD or who used medications (anti-inflammatory drugs, analgesics, and muscle relaxants), and patients who developed local

Statement of Clinical Relevance

The influence of orthognathic surgery on the symptoms of temporomandibular disorders (TMDs) is a subject widely debated among oral and maxillofacial surgeons, and firm evidence for it has not been reported in the literature. Our study has shown that orthognathic surgery reduces the clinical signs and symptoms of TMD.

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complications that affected the parameters to be assessed during the postoperative period.

All patients underwent orthognathic surgery according to the protocol and the surgical principles of service, and the surgery was performed by residents supervised by a senior surgeon. All cases were planned, starting from facial analysis and cephalometric and model analysis. Manual model surgery was performed for all cases requiring bimaxillary surgery, and intermediate and final splints were made. For surgery in 1 segment, the models were positioned in the Galetti articulator, and the final splint was made. During surgery, the condyle was positioned manually by positioning it passively in the center of the articular cavity, and the segments were held with the aid of a modified Allis forceps. Only intermaxillary fixation was used during surgery. In the postoperative period, patients were maintained on an elastic tabs box in the region of the canines for 15 days.

This project was approved by the Research Ethics Committee (Universidade Federal do Paraná Health Sciences Sector, CAAE: 19204113.3.0000.0102). Because our study involved humans, we followed all the guidelines of the Helsinki Declaration.

In an initial assessment, we collected patient data including age, gender, race, and type of dentofacial deformity. To evaluate the deformities, facial profiles were classified as I, II, and III, and the presence of asymmetry and vertical deformities (vertical excess or deficiency of the maxilla and anterior open bite) was verified. Facial profile I was facial normality with moderate convexity. Profile II was a convex facial profile occurring as a positive sagittal step between the maxilla and the mandible. Facial profile III was a negative step between the maxilla and the mandible, representing a concave profile.

The evaluation of the signs and symptoms of TMD was performed in 3 different periods: 1 week preoperatively (T1), 1 month postoperatively (T2), and 6 months postoperatively (T3). The patients were evaluated subjectively first by having them answer the Fonseca Clinical Index (FCI) questionnaire.[13] The answers generated a score, and the sum of the scores indicated the degree of dysfunction of the patient. When the sum of the answers totaled 0 to 15, the patient was considered not to have any dysfunction; 20 to 40 indicated mild dysfunction; 45 to 65 indicated moderate dysfunction; and 70 to 100 indicated severe dysfunction. An objective clinical assessment, based on the clinical examination of the questionnaire for RDC-TMD (Research Diagnostic Criteria—Temporomandibular Disorders), Axis I,[14] was also carried out by an appraiser to evaluate the following variables: muscular disorders, arthralgia, TMJ sounds, and mouth opening. During the evaluation of mouth opening, the patients were initially invited to open their mouths to the limit without pain and later up to their limit even with pain.

Each patient's record was evaluated to collect data such as operated segments (maxilla, mandible, or

Table I. Epidemiologic and surgical variables

Variable	*Measure*	*Value*
Age (y)	Mean ± SD	29.0 ± 9.2
Gender		
Male	n (%)	17 (31.5)
Female		37 (68.5)
Ethnicity		
Caucasian	n (%)	36 (66.7)
Non-Caucasian		18 (33.3)
Profile		
I	n (%)	4 (7.4)
II		17 (31.5)
III		33 (61.1)
Asymmetry		
Yes	n (%)	9 (16.7)
No		45 (83.3)
Vertical Deformities		
Yes	n (%)	12 (22.2)
No		42 (77.8)
Operated Segment		
Maxilla	n (%)	12 (22.2)
Mandible		14 (25.9)
Combined		28 (51.9)
Occlusal Plane Rotation		
Yes		10 (18.5)
No		44 (81.5)
Fixation*		
Monocortical	n (%)	27 (64.3)
Bicortical		15 (35.7)

*Excluding cases of isolated maxillary surgery.

Table II. Comparison of presence or absence of TMD with epidemiologic variables in preoperative period

Variable	*Measure*	*No TMD*	*TMD*	*P*
Age (y)	Mean ± SD	23 ± 5.2	30.2 ± 9.5	**.033***
Gender				
Male	n (%)	7 (41.2)	10 (58.8)	**.003**†
Female		2 (5.4)	35 (94.59)	
Ethnicity				
Caucasian	n (%)	2 (5.6)	34 (94.44)	
Non-Caucasian		7(38.9)	11 (61.1)	**.004**†
Profile				
I		1 (25)	3 (75)	
II	n (%)	2 (11.8)	15 (88.2)	—
III		6 (18.2)	27 (81.8)	
Asymmetry				
Yes	n (%)	0 (0)	9 (100)	.328†
No		9 (20)	36 (80)	
Vertical Deformities				
Yes	n (%)	1 (8.3)	11 (91.7)	.665†
No		8 (19)	34 (81)	

TMD, temporomandibular disorders.
**t* student test/95% CI.
†Fisher's exact test/95% CI.
Bold values indicate statistical significance.