

# Influence of orthodontic-surgical treatment on signs and symptoms of temporomandibular dysfunction in subjects with dentofacial deformities

## *Influência do tratamento ortodôntico-cirúrgico nos sinais e sintomas de disfunção temporomandibular em indivíduos com deformidades dentofaciais*

Marcela Maria Alves da Silva<sup>1</sup>, Amanda Tragueta Ferreira<sup>2</sup>, Renata Resina Migliorucci<sup>3</sup>, Hugo Nari Filho<sup>4</sup>, Giédre Berretin-Felix<sup>5</sup>

### ABSTRACT

**Purpose:** To verifying whether orthodontic-surgical treatment results in modification on the signs and symptoms of temporomandibular dysfunction in individuals with dentofacial deformities. **Methods:** Twenty patients of both genders (ages between 15 and 44 years) with different dental-occlusion and facial characteristics, submitted to mandibular and/or maxillary osteotomy, participated in this study. All patients presented at least one sign or symptom of temporomandibular dysfunction, verified through interview and clinical evaluation carried out before and after 30 to 60 days of the orthognathic surgery. The final evaluation investigated the presence of pain on palpation of masticatory and cervical muscles, and temporomandibular joint pain; auscultation of the temporomandibular joints was performed, and jaw movements were measured. **Results:** All symptoms investigated in the interview decreased after the orthognathic surgery. Regarding mandibular movements, there was a significant decrease in postoperative mandibular opening, and little variation was observed in measures of lateral excursions. It was also noticed a decrease of pain in cervical muscles. **Conclusion:** The orthodontic-surgical treatment resulted in short term decrease of the investigated symptoms and clinical signs of pain in cervical muscles, and reduction of mandibular opening in patients with dentofacial deformities. Clinical trials register: 083578.

**Keywords:** Maxillofacial development; Surgery, oral; Temporomandibular joint/pathology; Malocclusion; Tooth abnormalities

### INTRODUCTION

Temporomandibular joint (TMJ) is responsible for man-

dibular movements, triggered for masticatory muscles<sup>(1)</sup> and is considered the most complex joint in the human body<sup>(2)</sup>.

The occurrence of unfavorable situations that affect TMJ is frequently because that joint should be adapted to the occlusion, muscle and cervical changes<sup>(3)</sup>. Imbalance conditions may result in a dysfunction, which is the generic term for temporomandibular dysfunction (TMD), related to clinical signs and symptoms involving the masticatory muscles, temporomandibular joint and associate structures<sup>(4)</sup>.

TMD's cause is multifactorial, involving occlusion changing, dysfunctional habits (like bruxism and clenching), stress, anxiety or abnormalities in intra-articular disc. This factors may be related to joint inflammatory occurrence, muscular damage and pain or throes<sup>(5)</sup>.

Recently, many theories about TMD's development has been questioned<sup>(5)</sup>. Some authors say that abnormal dental occlusion occurs equally in people with or without TMD's symptoms<sup>(6,7)</sup>; other authors say that normal occlusion doesn't improve TMD's signs and symptoms<sup>(8,9)</sup>.

Therefore, some studies have checked the impact of

Study carried out at the Lato Sensu Course in Speech-Language Pathology and Orthognathic Surgery, Universidade do Sagrado Coração – USC – Bauru (SP), Brazil.

(1) Postgraduate Program (PhD) in Applied Dental Sciences, Faculdade de Odontologia de Bauru, Universidade de São Paulo – USP – Bauru (SP), Brazil.

(2) Postgraduate Program (Masters degree) in Speech-Language Pathology and Audiology, Speech-Language Pathology and Audiology Department, Faculdade de Odontologia de Bauru, Universidade de São Paulo – USP – Bauru (SP), Brazil.

(3) Postgraduate Program (Masters degree) in Speech-Language Pathology and Audiology, Speech-Language Pathology and Audiology Department, Faculdade de Odontologia de Bauru, Universidade de São Paulo – USP – Bauru (SP), Brazil.

(4) Universidade do Sagrado Coração – USC – Bauru (SP), Brazil.

(5) Speech-Language Pathology and Audiology Department, Faculdade de Odontologia de Bauru, Universidade de São Paulo – USP – Bauru (SP), Brazil.

**Correspondence address:** Giédre Berretin-Felix. Al. Dr. Octavio Pinheiro Brisolla, 9-75, Bauru (SP), Brazil, CEP: 17012-901. E-mail: gfelix@usp.br

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orthodontic surgery treatment in dentofacial deformities in modification of signs and symptoms of TMD<sup>(10-12)</sup>.

So, it is important to consider that there are contradictions on the literature about TMD and occlusion which difficult for professional to understand about the rehabilitation of this dysfunction. The object of this study was verifying if the orthodontic surgery treatment may modify signs and symptoms of temporomandibular dysfunction (TMD) in individuals with dentofacial deformities.

## METHODS

The study was approved by the Ethics in Research Comittee of the Universidade do Sagrado Coração (number 108/2005).

Twenty adults patients were included in this study (with age ranging between 15 and 44 years, mean of 25,5 years); 17 were female and three were male, with different occlusion (Angle molar relationship class II for 11 patients and class III for nine) and facial features (medium facial type for 11 patients and dolichofacial for nine), submitted to mandibular and/or maxillary osteotomy responsible for advance or retreat mandibular procedures.

All selected patients presented at least on sign or symptom of TMD, verified through interview and clinical evaluation made by an interdisciplinary group, consisting of a dentist, physiotherapist and speech and language pathologist expert in the area, before the orthognathic surgery. The aspects were evaluated again 30 and 60 days after the surgery.

It was investigated the following symptoms in the interview: headache; pain in facial muscles and/or in TMJ; pain during chewing; auditory or vestibular aspects (earache, vertigo, dizziness, tinnitus, ear fullness and hearing loss).

On the stomatognathic system evaluation were measured the mandibular movements (mouth opening and laterality); realized auscultation from TMJ during opening, closing, laterality and mandibular protrusion and registered the presence of articular reproducible noise (pops and cracks), when it was found in one or more mandibular movement evaluated; investigated pain during palpation on superficial and profound masseter muscles, lateral and medial pterygoid, anterior, medium and posterior temporalis, superior, lateral and posterior TMJ.

The data were submitted to statistical analysis using McNemar test for qualitative data and T test from Student for the quantitative data. The 5% level was considered significant ( $p < 0,05$ ).

## RESULTS

The symptoms investigated through interview are in the Table 1. After orthognathic surgery all symptoms decreased. Twelve patients complained about headache before surgery and did not complain about it after surgery ( $p=0.007$ ). Five patients complained about pain in facial muscle only before surgery ( $p=0.00006$ ). Three patients complained about pain in TMJ only before surgery ( $p=0.00001$ ). Seven patients complained about pain during chewing before surgery and did not complain about it after surgery, but other two patients had pain during chewing after surgery ( $p=0.007$ ).

About auditory and vestibular symptoms, five patients complained about ear fullness before surgery and one patient reported about earache after surgery.

Related to mandibular movements, when compared before and after surgery, the results showed decrease in the mouth

**Table 1.** Symptoms investigated considering the different periods (before and after orthognathic surgery)

Patients	Headache		Pain in facial muscles		Pain in TMJ		Pain during chewing	
	Before	After*	Before	After*	Before	After*	Before	After*
1	+	-	+	-	+	-	+	-
2	-	-	+	-	-	-	-	+
3	-	-	-	-	-	-	-	+
4	+	-	-	-	-	-	+	-
5	+	-	-	-	-	-	-	-
6	+	-	-	-	+	-	+	-
7	-	-	-	-	-	-	+	-
8	-	-	-	-	-	-	-	-
9	+	-	+	-	+	-	+	-
10	+	-	-	-	-	-	-	-
11	+	-	-	-	-	-	-	-
12	+	-	-	-	-	-	-	-
13	-	-	-	-	-	-	+	-
14	-	-	+	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	+	-	-	-	-	-	+	-
17	-	-	-	-	-	-	-	-
18	+	-	+	-	-	-	-	-
19	+	-	-	-	-	-	-	-
20	+	-	-	-	-	-	-	-

\* significant difference ( $p < 0,05$ ) when comparing the presence of symptoms before and after surgery

**Legend:** (+) presence; (-) absence

**Table 2.** Individual results, mean and standart deviation (SD) of mouth opening and mandibular laterality movement before and after orthognathic surgery

Patients	Mouth opening		RL		LL	
	Before	After	Before	After	Before	After
1	55	41	15	9	3	9
2	45	40	6	8	6	8
3	48	49	10	8	8	8
4	50	39	5	5	8	5
5	46	33	3	5	7	4
6	54	40	9	6	4	6
7	55	32	6	7	5	7
8	47	26	8	2	8	2
9	46	35	5	4	5	5
10	45	37	0	9	0	9
11	57	45	7	5	8	5
12	52	44	8	7	8	8
13	55	33	6	7	5	7
14	53	50	7	10	6	5
15	54	47	8	6	8	8
16	50	13	10	0	10	0
17	40	31	8	6	6	6
18	41	38	2	3	3	3
19	50	48	8	8	8	6
20	37	43	5	6	5	6
Mean	49*	38.2*	6.8	6.05	6.05	5.85
SD	5.59	8.85	3.21	2.48	2.37	2.35

\*Significant difference ( $p < 0.01$ ). Values expressed in milimeters

**Legend:** RL = right laterality; LL = left laterality; SD = standart deviation

opening after surgery ( $p = 0.00004$ ) and little variation on laterality movements (Table 2).

When compared the data about pain during palpation on masticatory and cervical muscles and TMJ, before and after orthognathic surgery, it was noticed pain relief on trapezius muscles ( $p = 0.00006$ ) and sternocleidomastoid muscle ( $p = 0.0005$ ) (Figure 1).

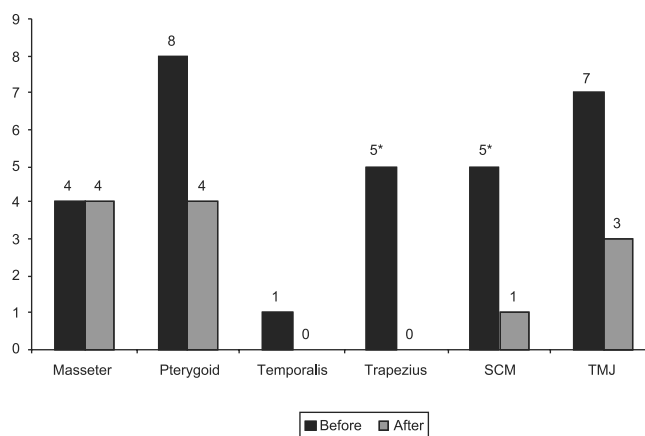
About articulation reproducible noise, it was noticed presence of articulation noise in eight patients before surgery (40%) while seven patients presented it after surgery (35%), result without difference.

## DISCUSSION

The examination of TMD in individuals with occlusion changes can be explained by the high incidence of functional and anatomic problems of temporomandibular joint in these cases<sup>(13)</sup>; however studies that related this condition are contradictory. So, the present study investigated the occurrence of signs and symptoms os TMD in patients submitted to occlusion correction using the orthodontic surgery treatment.

The highest percentage of patients investigated (85%) was female, agreeing with other studies that demonstrate higher prevalence of TMD in women<sup>(14,15)</sup>. Studies that relate hormonal influences on the appearance of signs and symptoms of TMD have found association between this aspects<sup>(16,17)</sup>.

At this study was observed considerable presence of signs and symptoms of TMD before surgery, condition justified by the decrease of stomatognathic system adaptative capacity



\* Significant difference ( $p < 0.005$ )

**Legend:** SCM = sternocleidomastoid; TMJ = temporomandibular joint

**Figure 1.** Sign of pain during palpation in masseter muscle, lateral and/or medial pterygoid, anterior temporalis, trapezius, sternocleidomastoid (SCM) and temporomandibular joint (TMJ), investigated before and after orthognathic surgery

caused by occlusion changes and maxillomandibular discrepancy<sup>(5,18)</sup>.

For patients in this study, after the orthodontic surgery treatment was observed significant decrease on TMD symptoms, agreeing with studies in the literature<sup>(11,12)</sup>. However, authors have found the appearance of TMD symptoms after orthodontic surgery treatment<sup>(10,19)</sup>. This disagreement can be related to the type of surgery procedure realized, since the

first one investigated cases submitted to maxillary osteotomy and the second author evaluated cases submitted to mandibular advancement surgery. At this study, the patients were submitted to different types of mandibular movement with or without maxillary intervention.

About auditory and vestibular symptoms, at this study five patients complained about ear fullness before surgery, agreeing with a study that demonstrated relevant occurrence of this symptom in individuals with TMD<sup>(20)</sup>. One patient complained about earache after surgery, what can be related to pain during mandibular condyle palpation in subjects with dysfunction<sup>(21)</sup>. Studies that make an association between earache, tinnitus, hearing loss, ear fullness and vertigo with DTM are common in the literature<sup>(22-24)</sup>.

At this study was found an important decrease of mouth opening after surgery. According to the literature, after surgery the mandibular movements tend to be reduced, assuming normal values from three to 14 months after surgery<sup>(25,26)</sup>. A study presented some cases that the injury in orofacial myology improved in three months after orthognathic surgery, with a significant increase of mandibular protrusion and laterality<sup>(27)</sup>. A short-term evaluation realized in this study (between 30 and 60 days after surgery) can explain the differences with studies published before.

With orthognathic surgery, a decrease in pain during palpation in cervical muscles was observed. None studies in the literature were found relating this aspect, but bad occlusion can modify the posture as a compensation mechanism. It may justify the decrease of pain during palpation in cervical muscles after orthodontic surgery correction.

On the patients evaluated at this study, it was observed that, even with the structural correction resultant from the orthodontic surgery treatment, the stomatognathic system reorganization did not occur naturally; and speech and language pathology intervention was necessary in order to adapt the orofacial functions. We should pay attention on masticatory function, in which the default is influenced by temporomandibular dysfunction and presence of changes in mandibular movement<sup>(18-28)</sup>.

Another aspect not discussed in this study that should be considered is the change in thermal and tactile sensitivity result from mandibular osteotomy procedure. It may be transitory but causing drooling, accumulation of saliva and food on lips commissure and difficult with lips movement<sup>(29)</sup>.

So, improvement on signs and symptoms of TMD after orthodontic surgery treatment occur because of morphofunctional balance established by the treatment and monitoring of the patient by interdisciplinary group. The interdisciplinary group, in these cases, was extremely important considering the etiology of this dysfunction is multifactorial and need a management of all causal aspects to have a good prognosis.

## CONCLUSION

The orthodontic surgery treatment caused, in a short term, decrease in the symptoms: headache, pain in the facial muscle, pain in TMJ, pain during chewing and in the clinical signs of pain during palpation on the cervical muscle; still result in decrease of mouth opening in patients with defofacial deformities.

## RESUMO

**Objetivo:** Verificar se o tratamento ortodôntico-cirúrgico acarreta modificações nos sinais e sintomas de disfunção temporomandibular em indivíduos com deformidades dentofaciais. **Métodos:** Participaram do estudo 20 pacientes de ambos os gêneros (idades entre 15 e 44 anos), com diferentes características dento-oclusais e faciais, submetidos a osteotomias mandibulares e/ou maxilares. Todos os pacientes apresentavam pelo menos um sinal ou sintoma de disfunção temporomandibular, verificado por meio de entrevista e de avaliação clínica realizada pré e após 30 a 60 dias da cirurgia ortognática. Nesta última buscou-se dor à palpação dos músculos mastigatórios, cervicais e da articulação temporomandibular; foi realizada ausculta das articulações temporomandibulares e mediu-se movimentos mandibulares. **Resultados:** Quanto aos sintomas investigados na entrevista, os resultados demonstraram que após a cirurgia ortognática houve redução de todos os sintomas. No que diz respeito aos movimentos mandibulares, observou-se significante diminuição da abertura da boca no pós-operatório e pouca variação nas medidas de lateralidade mandibular. Em relação à presença de dor à palpação, notou-se diminuição da dor para os músculos cervicais. **Conclusão:** O tratamento ortodôntico-cirúrgico acarretou, em curto prazo, diminuição dos sintomas investigados e dos sinais clínicos de dor à palpação na musculatura cervical e redução da abertura da boca em pacientes com deformidades dentofaciais. Registro de ensaio clínico: 083578.

**Descritores:** Desenvolvimento maxilofacial; Cirurgia bucal; Articulação temporomandibular/patologia; Má oclusão; Anormalidades dentárias

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