

# FUNCTIONAL GAINS MEASURED BY MBGR AND IMPACT ON QUALITY OF LIFE IN SUBJECT SUBMITTED TO ORTHOGNATHIC SURGERY: CASE REPORT

## *Ganhos funcionais mensurados pelo MBGR e impacto na qualidade de vida em sujeito submetido à cirurgia ortognática: relato de caso*

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### ABSTRACT

The theme of this study is Speech therapy intervention before and after orthognathic surgery. Evaluation was performed (through the Protocolo de Avaliação Miofuncional Orofacial - MBGR) and speech therapy intervention in the preoperative period and for three months postoperatively for four months. Furthermore, we evaluated the impact of the deformity dentofacial in patient's quality of life, through the Oral Health Impact Profile – short form. On preoperative evaluation, we found bilateral mastication simultaneous presence of Temporomandibular Joints sounds and lip closure unsystematic. Swallowing showed contraction of the perioral muscles and residues after swallowing. Found himself in speech distortion in the phoneme / r /. There was pain on palpation in the masticatory muscles and decreased tone in the perioral and masticatory muscles. We also assessed the impact on quality of life that showed high, 32 points. In the postoperative evaluation and after speech therapy intervention, there was improvement in mastication (before: 4 points, after 1 point), swallowing (before: 14, after: 5), breath (before: 3, after: 1), speech (before: 7, after: 1) in muscle mobility (before: 8 after 1), muscle tone (before 5, after: 0) and palpation tor (before: 10, after: 2). There was also improvement in the lips posture and significant improvement in quality of life, increasing to 8 points. Improvement was found in the physiology of the stomatognathic function, decreased pain on palpation, balance in tone, muscle mobility and improved quality of life.

**KEYWORDS:** Orthonathic Surgery; Prognathism; Rehabilitation; Stomatognathic System; Myofunctional Therapy

### ■ INTRODUCTION

The dentofacial deformities (DFD) bring to the Stomatognathic System (SS) changes and adaptations in the functions of chewing, swallowing, breathing and speech that vary according to the facial feature found<sup>1</sup>. These patterns of stomatognathic functions were built and adapted throughout life, causing the individual to believe that is the only possible way to accomplish it<sup>2</sup>.

In Angle Class III, it is considered that the mandible has a mesial relationship with the jaw, the molars are occluded improperly and lower incisors have crossbite. This type of configuration of the occlusion, in most cases, results in accentuated skeletal prognathism<sup>3</sup>. The facial profile is shown as concave, the upper lip is presented narrower than the lower, the lip seal is ineffective, hypotonic lower lip, tongue in the floor of the mouth, being also present changes in the functions of chewing, swallowing, breathing (oral or oronasal) and speech<sup>2,4</sup>.

The orthognathic surgery presents several objectives, namely: facial harmony, dental harmony, functional occlusion, health of the orofacial structures and stability of the stomatognathic system.

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The reason why the patient seeks treatment is important, since these factors can define which monitoring will be proposed<sup>5</sup>.

The treatment plan defined jointly by the surgeon and the orthodontist has the crucial contribution of speech therapy, since this professional is responsible for the diagnosis of myofunctional alterations present, as well as of rehabilitation, in order to promote greater stability in the outcome of the treatment<sup>6</sup>.

The audiologist is presented as an integral part of the performance team in orthognathic surgery, being important to carry out in his intervention the evaluation of the stomatognathic system (SS) in the pre- and postoperative periods, in order to obtain all the present features, compensations and adaptations.

In the postoperative, the period of beginning of the follow-up can be 20-60 days after surgery<sup>4</sup>, but will depend mainly on the service in which the professional is inserted, on the characteristics presented by the patient and on what the team proposes. There are cases where only the structural change brings upgrading to the soft tissues and hence an adaptation of the functions without need for specific therapy, though it is interesting to have an assessment in order to determine these adjustments<sup>1,4-6</sup>. In contrast, it was found that it may occur the need for speech therapy, given the presence of alterations such as: difficulty in mouth opening, presence of paresthesia in the region of ment and lips<sup>7</sup>, facial edema, altered chewing, swallowing and tongue positioning<sup>8</sup>, changes in TMJ and jaw movement<sup>9,10</sup>, and changes in the posture of lips, due to the type of suture held<sup>4</sup>.

It is known that the MBGR protocol is of great value to the orofacial movements and that brings a full assessment of various types of patients<sup>11</sup>. The protocol efficiency is undisputed and shows the results in scores, which facilitates the comparison of results before and after each procedure. However, there are no studies that bring the orofacial myofunctional differences found in patients with dentofacial deformity submitted to orthognathic surgery with evaluation by MBGR. Also there are few studies that bring the complete overview of the functions and stomatognathic structures before and after this kind of surgery<sup>1</sup>.

Thus, the aim of this study is to describe a case of a patient submitted to orthognathic surgery and speech therapy in the pre- and postoperative periods evaluated and measured through MBGR<sup>11</sup> protocol, in addition to assess the impact of facial deformity in the quality of life of these subjects.

## ■ CASE REPORT

This research was approved by the Ethics and Research Committee on Human Beings of the Health Sciences Center - UFPB under protocol n. 0512/2013 and with the Free and Informed Term of Consent (FITC) signed by the same.

It was performed a case study of a twenty-nine years old patient, with dentofacial deformity and Angle Class III malocclusion. The patient was accompanied by the team of professionals from the Service of Treatment of Dentofacial Deformities (STDDF) of the Lauro Wanderley University Hospital of the Federal University of Paraíba (HULW-UFPB).

In conjunction with the Dental Division and an orthodontist, she was accompanied by the speech therapy service, where the treatment started in the preoperative period. It should be noted that the patient had never been submitted to speech therapy intervention.

Initially, the interview was conducted in order to find the data on the development, overall health, treatments performed previously, feeding, oral habits and posture, communication and functions of chewing, swallowing, breathing and speech.

The initial assessment, carried out before surgery, aimed to gather and raise data about the SS and its functions, requiring the evaluation of morphological aspects of the SS and characterization of orofacial functions of breathing, chewing, swallowing and speaking through MBGR Protocol of Orofacial Myofunctional Evaluation<sup>11</sup>, and the research regarding the impact of oral changes in her quality of life through the Oral Health Impact Profile - short form (OHIP-14)<sup>12</sup>.

To evaluate the chewing and swallowing, fresh French bread and water were used, in pre- and postoperative periods. Evaluations of chewing and swallowing were recorded on digital camcorder of the brand Samsung, SMX-F400 model, with the patient seated and positioned at 90° from the ground with the camera at 1 meter away from the chair. To the measurement of the face and of the jaw movement, it was used a digital caliper rule of the brand *Stainless Hardened*<sup>13</sup>.

For photographic documentation it was used a digital camera, Nikon brand, D7000 model, with circular flash, positioned about a meter away from the patient and it were taken photographs of the face, occlusion and body in prone, lateral and 45° positions. These recordings were made before the speech therapy is started and 90 days after surgery.

In the preoperative, the patient underwent 15 sessions, weekly, lasting thirty minutes, at the Speech Therapy Service in order to adjust the tone

and stomathognathic functions, including isotonic, isometric and counter-resistance exercises, plus extra and intraoral handling.

The procedure performed was a combined surgery of the maxilla and mandible, with treatment in the maxilla by Le Fort I osteotomy for maxillary advancement and mandibular midline correction by sagittal split osteotomy of the rami.

Postoperative speech therapy monitoring began with the liberation from the bucomaxillofacial surgeon 20 days after surgery, being held twice a week in one month using thermotherapy by subtraction and isotonic and isometric exercises. In the subsequent two months, monitoring was weekly and included, in addition to exercise, extra and intraoral handling and expansion of the maximum oral opening, totaling 20 sessions of thirty minutes and being finished with speech therapy and maxillofacial releases.

■ RESULTS

The data from the survey revealed that the ILS presented complaints as noise and TMJ pain, changes in speech and facial aesthetics, difficulty in mandibular movement, pain in the cervical region and shoulders, changes in chewing and headache, being common and presented as a nuisance to the general health throughout her life cycle.

With regard to food, the patient reported that ingested food in varying consistencies (liquid, paste and solid) and in a balanced way, but with difficulties in chewing.

In the preoperative evaluation of the SS, the head posture was presented as anterior and inclined to the left side, in addition to the elevation of the right shoulder with relation to the left. It was found that the patient has long face, in the height and width ratio of the face, with the lower third larger than the middle third (Table 1), facial type III (concave), parted lips, and the lower with discrete eversion (Figure 1).



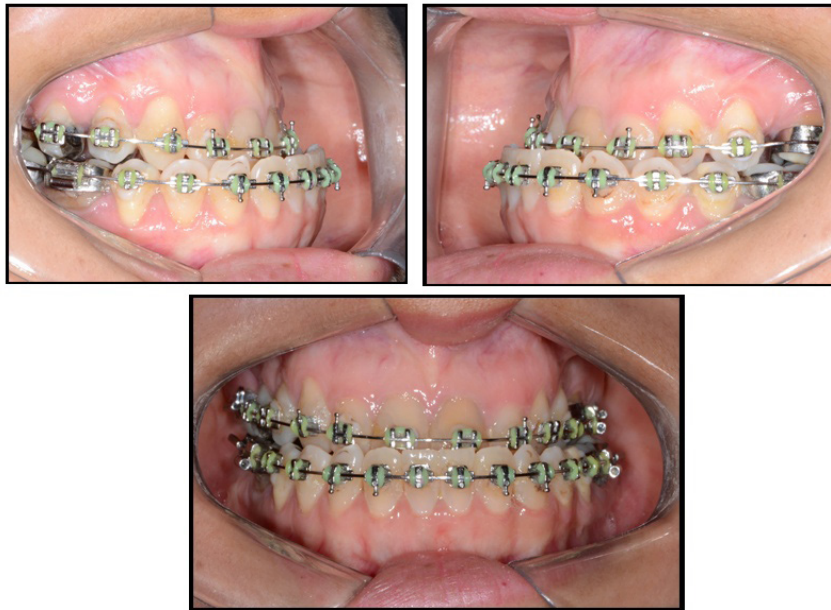
Figure 1 – Photography of front position and left side in preoperative period

Table 1 – Average of face measures and mandibular movement (MM)

	Middle third of the face	Lower third of the face	Face height	Face width	Maximum oral opening	Right laterality of the mandible	Left laterality of the mandible
Preoperative	60.20	65.26	125.60	108.00	41.85	4.87	5.47
Post operative (90 days)	56.51	66.10	120.33	104.95	33.84	7.97	7.85

In intraoral examination, it was observed internal mucosa of the lips with tooth marks, tongue in the oral cavity floor, high hard palate with reduced width, uvula shifted to right and slender and elongated lingual frenulum. The mobility of OFA's was adequate, but had difficulty to vibrate and to suck the tongue on the palate.

In opening and closing the mouth, the amplitude of this movement was considered adequate<sup>11</sup> (Table 1), the mandible swerved to the left and presented noise on the same side, and well as when the lateralization to the right side was asked. Occlusion was presented as Class III malocclusion, with anterior and left posterior crossbite (Figure 2).



**Figure 2 – Preoperative occlusion**

In the assessment of pain on palpation, ILS presented pain in temporal, masseter, trapezius and sternocleidomastoid muscles and in the TMJ region. Regarding the tone, it presented hypotonicity in lips and cheeks, and hypofunction in the tongue.

In the evaluation of stomatognathic functions, it was observed that breathing is of the middle/

superior type, oronasal mode and with the possibility of using the nose for only 1 minute. In chewing, the incision was deficient, simultaneous bilateral chewing pattern with unsystematic lip closure, and presence of noise in the TMJ. The average of strokes and chewing time are shown in Table 2.

**Table 2 – Average of strokes and chewing times**

		Preoperative	Postoperative (90 days)
Number of strokes	Portion 1	27	63
	Portion 2	27	32
	Portion 3	23	36
Chewing time (in seconds)	Average	14,5	43

In solid swallowing, it was observed partial closure of the lips, contraction of the orbicularis muscle of the lips and chin and the presence of residues after swallowing, requiring multiple swallows. Yet in the usual swallowing of liquid, there was also contraction of chin muscle, and head movement forward. In the directed swallowing, the tongue was positioned between the teeth and there was contraction of the chin muscle and of the orbicularis muscle of the lips.

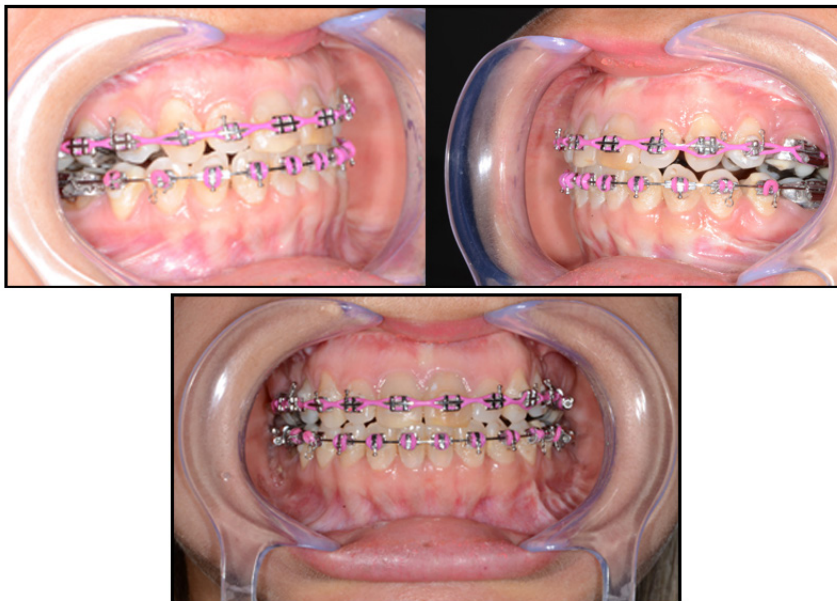
The speech presented systematic distortion of /r/ and /s/ phonemes, hypernasality and articulatory imprecision.

In the postoperative period (90 days after surgery), the measurement of the face and jaw movement and extra and intraoral assessment of OFA's was held, being these measures reported in Table 1. The face is long, comparing face width and height, the profile is of Type II, convex (Figure 3), and occlusion appears as Angle<sup>3</sup> Class I, with mild posterior open bite on the left side (Figure 4).





**Figure 3 – Photography of the face in front position and profile in postoperative period**



**Figure 4 – Postoperative occlusion**

Still, in the postoperative, the patient reported paresthesia on the left side of the face, mainly in the region of ment, lower lip and cheek, being this one of the aspects worked in therapy.

It was observed that the lips were closed in usual position, though dry due to the oronasal breathing, which was another aspect worked on speech therapy and that showed improvement after the end of the sessions, occurring change to nasal breathing. The tongue was shown to be symmetrical, with appropriate height and width and normal mucosa. The horizontal and vertical ratio of jaw were appropriate, and the mobility of the OFA's is preserved with noise only at maximum mouth opening. The pain on palpation is present only in trapezius muscle and the tone has shown to be appropriate.

Chewing was worked during speech therapy with the following food: cake, bread and apple. In this role, the incision was anterior, with increased speed (Table 2), left side preferred, but with approximate amount of chewing strokes, featuring an efficient chewing; and noise in the TMJ, which was already present before the surgery. In the swallowing, there was little contraction of the orbicularis muscle of the lips and chin, as well as food residue after swallowing. In speech, there was systematic distortion in the /r/ and /s/ phonemes, and appropriate lip and mandibular movement and speech rate in this function. Comparison of MBGR scores in both periods studied is shown in Table 3.

**Table 3 – Comparison of MBGR Protocol scores in pre- and postoperative periods**

	Preoperative	Postoperative
Extraoral Exam	13	5
Intraoral Exam	17	7
Mobility	8	1
Pain on Palpation	10	2
Tone	5	0
Orofacial Functions	28	8

On the quality of life and the impact on patient's health, measured by OHIP - 14, it was observed that there was significant improvement from the preoperative period to the postoperative period, from 32 points in the score to 8, being 56 points the maximum, considering that the greater the score, the worst the individual's quality of life.

In the preoperative period, the highest scores of OHIP - 14 were in relation to psychological aspects, being the discomfort and the psychological limitation the most frequently reported, followed by physical pain, social limitation and disability. In an evaluation within 90 days after surgery, these aspects were not taken as central, being observed the improvement of the psychological aspects, pain, physical, functional and social impairment and disability.

## ■ DISCUSSION

Some features are present and specific to each facial type. In Angle Class III malocclusion, facial profile is concave, with upper lip narrower than the lower, there is no lip sealing at rest and the tongue is in the floor of the mouth, as well as the maintenance of swallowing pattern in postoperative with contraction of the perioral muscles<sup>2,4,8,14</sup>.

The middle third of the face showed variation in the clinical evaluation with caliper rule<sup>15</sup>, and there have been changes in the facial profile<sup>16,17</sup>, improving the facial convexity, the position of the lips and the chin-lip groove, therefore, orthognathic surgery was effective in producing a profile near the normal range, as shown in Figure 5.



**Figure 5 – Comparison of preoperative and postoperative**

In study<sup>9</sup> conducted with individuals with Angle Class III molar relation in order to analyze whether the orthodontic-surgical treatment entails modification in signs and symptoms of TMD, it was found that there is a reduction of signs and symptoms in the postoperative, as well as a decrease in the oral

opening. This finding corroborates findings from this and another study<sup>10</sup>, and can be explained by functional adaptation or remodeling of the condyle after surgery, which brings changes in the lateral pterygoid muscle and temporomandibular ligament, causing reduction in maximum mouth opening.

Complaints related to signs and symptoms of TMD were noted and need to be accompanied, as well as it is necessary to perform detailed assessment of these aspects before surgery to achieving accurate and stable results after the procedure<sup>9,18,19</sup>.

The paresthesia reported by the patient is also a factor that commonly appears in orthognathic surgery. What happens is that during surgery there may be trauma of the Inferior Alveolar Nerve, thus causing abnormal sensitivity in the region of ment, inferior lip and injured side of cheek<sup>5,7,20,21</sup>.

The chewing pattern found suggests the presence of alteration in this role due to dentofacial deformity, being common the preference for one chewing side<sup>22</sup> and reduction of the chewing efficiency<sup>23</sup>. Furthermore, it was observed that the number of chewing strokes and time spent in the function is not uniform<sup>24</sup>, being greater in the postoperative evaluation at 90 days.

The speech introduced distortions in phonemes that are expected due to dentofacial deformity and consistent with literature findings<sup>4,25</sup>.

The quality of life and body image of individuals are characteristics that are consistent with the treatment of dentofacial deformities because they are one of the main reasons to seek the treatment, therefore, the improvement in these aspects brings significant increase in the social, psychological and physical life of the patient<sup>26,27</sup>.

The findings suggest that speech therapy was effective during the pre- and postoperative periods, according to Table 3, being of fundamental importance the interdisciplinary monitoring of the patient<sup>2,4,8</sup>, for the pre- and postoperative to achieve expected results, corresponding to the expected and efficient prognosis.

## ■ CONCLUSION

It was obtained significant improvement in muscle mobility, decreased pain on palpation, balance of tone, more efficient chewing, alternating bilateral, standard appropriation of swallowing and adequacy of speech production, as well as improving quality of life. This indicates that the surgical procedure associated with speech therapy intervention during the pre- and postoperative were effective, demonstrating the importance of this interdisciplinary approach in cases of DFD. In addition, it is concluded that the MBGR protocol of orofacial myofunctional evaluation is effective in detecting changes and assessing the progression of patients undergoing this type of surgery.

It is suggested to conduct studies evaluating the efficacy of speech therapy intervention with a larger number of subjects, as well as quantifying the gain in quality of life of these individuals, since there is still a lack of studies of these aspects.

## RESUMO

O tema proposto é Intervenção Fonoaudiológica pré e pós Cirurgia Ortognática. Foi realizada avaliação (por meio do Protocolo de Avaliação Miofuncional Orofacial MBGR com escores) e intervenção fonoaudiológica em período pré-operatório (por três meses) e pós-operatório iniciado no 20º dia (por três meses), após a liberação do cirurgião. Além disso, investigou-se o impacto da deformidade dentofacial na qualidade de vida do paciente, por meio do Oral Health Impact Profile – versão reduzida. Na avaliação pré-operatória, foram encontradas mastigação bilateral simultânea, presença de ruídos na Articulação Temporomandibular e fechamento labial assistemático durante a realização da função. Durante a deglutição houve contração da musculatura perioral e presença de resíduos após essa função. Encontrou-se na fala distorção no fonema /r/. Houve dor à palpação nos músculos mastigatórios e diminuição da tonicidade na musculatura perioral e mastigatória. Encontrou-se alto impacto na qualidade de vida, totalizando em 32 pontos. Na avaliação após a intervenção fonoaudiológica, observou-se melhora nas funções de mastigação (pré: 4 pontos, pós: 1 ponto), deglutição (pré:14, pós :5), respiração (pré: 3, pós: 1) e fala (pré: 7, pós: 1), na mobilidade muscular (pré: 8, pós 1), na tonicidade da musculatura (pré 5, pós: 0) e na dor à palpação (pré: 10, pós: 2). Houve melhora na postura dos lábios e melhora significativa na qualidade de vida, passando de 32 para 8 pontos. Constatou-se melhora na fisiologia das funções estomatognáticas, diminuição da dor à palpação, equilíbrio no tônus, na mobilidade muscular e melhora na qualidade de vida.

**DESCRITORES:** Cirurgia Ortognática; Prognatismo; Reabilitação; Sistema Estomatognático; Terapia Miofuncional



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