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Improvement on oral health related quality of life after orthosurgical treatment: a mixed methods study

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Abstract: The aim of this study was to understand the influence of orthosurgical treatment on oral health-related quality of life (OHRQoL) in patients with Class II and III skeletal malocclusion by conducting a mixed method case series study. Nineteen patients submitted to orthosurgical treatment in a private practice in Brazil were included in the sample. Data were collected retrospectively and interviews were held from March 2020 to July 2021. Patients answered to the Oral Health Impact Profile (OHIP-14) in the first part of the interview and subsequently answered the qualitative questions. The overall mean of OHIP-14 after treatment was 4.21 (SD 4.68). The qualitative data were analyzed according to thematic analysis and four themes emerged from the interviews: a) concept of quality of life, b) pre-treatment life, c) post-treatment life, and d) positive and negative aspects of treatment. Quality of Life was reported by the patients as the absence of feeling pain, having emotional and physical health, having a satisfactory esthetic appearance and self-esteem. Before treatment, most Class II patients used to complain about breathing and sleeping problems, while Class III patients complained more intensely about esthetics. Pain was a common problem reported by both Class II and Class III patients. In general, improvement was perceived in self-esteem, esthetics, function and pain. Complaints about negative aspects of the treatment were restricted to the postoperative period. The orthosurgical treatment was important for improving the OHRQoL of patients in terms of esthetic, functional and psychosocial aspects.

Keywords: Orthodontics, Corrective; Orthognathic Surgery; Oral Health; Quality of Life.

Introduction

Patients with skeletal malocclusion may have functional, physical, emotional and social problems[1]. Surgical interventions in these patients are elective and indicated by orthodontists based on morphological and functional criteria.[1,2] However, patients have to make the decision to undergo surgery, and this depends on their perception of the severity of malocclusion, and psychological, functional and behavioral impact on the lives of patients.[1,2]

Patients with these deformities have a lower oral health-related quality of life than those without the need for orthodontic treatment or who only have dental malocclusion.[3] Studies have reported that orthodontic treatment associated with orthognathic surgery can improve the quality of life of these patients because the treatment can improve oral problems and bring psychosocial benefits that include improved self-confidence, body image, facial and social adjustment.[4] Some studies have also demonstrated a positive influence of both orthodontic and orthognathic treatment on Oral health-related quality of life (OHRQoL)[5,6] that measures the extent to which oral health affects quality of life.[7-9] Oral diseases can have an impact on many aspects that include participation in several systemic conditions, as aggravating factors, data that corroborate the concept that oral health is capable of influencing a person's quality of life.[9]

However, reports in the literature are unclear about the reasons why orthosurgical treatment improves OHRQoL and about the perceptions of patients who undergo these therapies, obtained in open questionnaires. Thus, the aim of conducting this mixed method study was to understand the influence of orthosurgical treatment on OHRQoL of patients.

Methodology

Design and population

This was a sequential case series study, with an explanatory mixed methods design, conducted to evaluate OHRQoL after the conclusion. A sample of patients who completed their orthodontic and orthognathic treatment in a private dental clinic in Santa Maria, a city located in the southern state of Rio Grande do Sul, Brazil, was used. At the time of the data collection, Santa Maria had approximately 283.677 thousand inhabitants, among whom, approximately 187,715 were adults.[10] The eligibility criteria were adult patients who had completed their orthodontic surgical treatment for skeletal Class II or Class III malocclusion, between 2005 and 2020.

Treatment performed

Patients were treated with the Straight Wire technique, by a single orthodontist and operated by the same maxillofacial surgeon, in one hospital only, in the city of Santa Maria, in the period from 2005 (beginning of the first case) to 2020 (end of the last case). The surgical techniques performed in Class II and Class III patients were in the maxilla (LeFort I Osteotomy) and/or mandible (Bilateral Sagittal Mandibular Osteotomy) and in some cases associated with advancement or reduction mentoplasty.

Data collection

Patients were contacted by phone in February and March 2021 and invited to participate in the study using the Google meet digital platform. First, patients answered a sociodemographic, socioeconomic and psychosocial questionnaire, with questions asked by a trained interviewer who did not participate in the treatment of patients. The interviewer received training in theoretical lectures given by a researcher, experienced in the field. Subsequently, a pilot study with two patients was carried out to test and adapt the research questions. These two patients were not included in the sample.

Study outcome

Quantitative evaluation of the OHRQoL was performed by using OHIP-14 questionnaire (Oral Health Impact Profile-14).[11] It is one of the most widely used international indicators to assess OHRQoL because it has good psychometric qualities and allows measurement of self-perception of the consequences inherent to oral conditions.[12] The OHIP-14 is divided into 14 questions distributed into seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. Higher scores on the questionnaire indicate worse OHRQoL. The questions are organized according to a Likert-type scale with five response categories, to enable the participants to indicate how often they experience each of the problems, in a 12-month period. The response categories and their citations are: "often" = 4; "very often" (sometimes) = 3; "occasionally" (rarely)= 2; "almost never" (rarely) = 1; "never" = 0.[12]

After completing the OHIP-14, the qualitative phase of the interview was held. Open questions

were asked, based on the OHIP-14 questionnaire and other questions were added for a better understanding of the theme (Table 1). The answers to all questions were recorded with the aid of an audio recorder and transcribed in full. The interviews were interrupted after data saturation. Saturation is reached as soon as the interviewee's speech begins to repeat itself and the researcher understands that there is enough material to answer the research question.[13]

Data analysis

A descriptive statistical analysis was performed to describe and summarize the quantitative data set using the Stata 14.0 program (Stata Corporation).

Table 1. Questionnaire used in qualitative interviews.

1) What does quality of life mean to you?
2) Do you think that oral health influences your quality of life?
3) How was your life before dental treatment? Can you tell me about it?
4) How did you feel about your oral health before dental treatment?
5) How is your life after dental treatment?
6) Do you think this treatment was important to you?
7) What was the main negative point of the treatment?
8) Would you recommend treatment for those who have the same skeletal problem as you had?

Table 2. Characters of sample of 19 adults in a private clinic in Brazil.

Variable	Quantitative date n (%)	Qualitative date n (%)
Gender		
Female	11 (57.89%)	11 (57.89%)
Male	8 (42v11%)	8 (42.11%)
Household income		
≥ 14000	9 (47.36 %)	9 (47.36 %)
< 14000	10 (52.4 %)	10 (52.64 %)
Class II malocclusion	11 (57.89%)	11 (57.89%)
Class III malocclusion	8 (42.10 %)	8 (42.10 %)

Qualitative data were analyzed by thematic analysis according to Braun & Clark (2006)[14]. Thematic analysis. a method for identifying, analyzing and reporting patterns (themes) in the data, organizes and describes its data set in detail.[14]

Ethical aspects

The research was conducted in compliance with the ethics in medical research protocols of the Declaration of the World Medical Association of Helsinki. The research was approved by the Research Ethics Committee of the Federal University of Santa Maria under Protocol Number CAAE 41856621.0.0000.5346.

Results

Out of the 22 patients who were eligible, nineteen patients were interviewed (Table 2). Two patients were excluded because it was not possible to contact them and one declined to participate in the online interview. Table 2 describes the sample of patients according to their sociodemographic and economic characteristics and Table 3 shows the scores of the OHIP-14 after treatment.

Based on the Qualitative Phase, the following four themes were found: 1. concept of quality of life, 2. life before treatment, 3. life after treatment and positive aspects; and 4. negative aspects of treatment. Each one of them are summarized below and patients' testimonials are in Table 4.

Table 3. Means of overall and domain OHIP-14 scores after treatment.

Variable	Mean (SD)
Overall mean	4.21(4.68)
Domain means	
1 Functional limitation	0.63 (1.30)
2 Physical pain	1.63 (1.83)
3 Psychological discomfort	0.79 (1.27)
4 Physical disability	0.37 (0.76)
5 Psychological disability	0.42 (0.84)
6 Social disability	0.10 (0.31)
7 Handicap	0.26 (0.65)

Table 4. Patients' testimonials according to the four themes raised in the Qualitative Phase of the study.

Concept of quality of life	"To me, quality of life is not feeling pain, is having adequate health, work and a satisfactory family life. It is a set of situations that involve health, work, and personal life. This quest for harmony is quality of life" (patient 1).
	"To me, quality of life is not feeling pains. Pain is something that bothers me a great deal" (patient 6).
Life before treatment	"... I woke up very tired, indeed I woke up more tired than I had been when I went to sleep. I have never had the biotype for sleep apnea (I was thin), but the difference was remarkable after surgery" (patient 5).
	"Normally, I did not have my photo taken, and before I started with the treatment, I used to dance at the CTG (*Centro de Tradições Gaúchas*, a regional center of traditions). I danced for about 6 years - I used to like it very much and stopped because of this, because I wasn't able to smile and do things like that" (patient 9).
	"...before surgery it was total chaos, both appearance and a great deal of toothache, pain in the mouth, it was a completely different life and food. Barbecue? Forget that. 'Today, at least I look at people face to face" (patient 19).
	"I didn't have pain, but the protrusion harmed my sleep because I was unable to close my mouth properly to go to sleep" (patient 10).
Life after treatment and positive aspects	"... when I see myself today, it's excellent. When I see photos of me before and now, it's particularly good" (patient 4).
	"I think, the positive points are having a more normal chewing capacity, esthetics and sleep" (patient 5).
	"... certainly, improved my self-esteem because in addition to correcting the bite, the entire smile has improved" (patient 3).
	"And this is where the quality of life comes in. It makes all the difference: being able to sleep, rest, it is related to your next day" (patient 7).
	"In the first place, I would emphasize appearance, whether you like it or not, the thing that counts most in people's life is appearance, isn't it? For me, my day to day life changed from night to day" (patient 19).
Negative aspects of treatment	"A negative point is this lack of sensitivity, it returned in my upper lip, but not in the lower lip. It is not something I think that draws attention, but due to it, this lip does not move. I am a teacher, and if the lesson takes rather a long time, I feel it tires this side, and I have to stop for a little while. I think this is tiresome" (patient 15).
	"The paresthesia, this is uncomfortable at the base of the nose, it is a negative aspect. Hum.... my chewing is not very good; I think it changed my sense of taste a bit [...]" (patient 4).
	"The post-operative period is the most difficult. Apart from the pain, the swelling is most uncomfortable, you cannot chew. I spent a month without being able to and it drove me crazy... I had that desire to chew" (patient 17).

Concept of quality of life

Quality of Life was reported by the patients as being the absence of feeling pain, having emotional and physical health, and having a satisfactory esthetic appearance. Moreover, it was mentioned that quality of life was related to self-esteem and to the way that other people or the patients see themselves.

Life before treatment

The patients reported having pre-operative pain in the maxillo-mandibular region and headaches before undergoing treatment. The quality of chewing, sleep and breathing were closely associated with skeletal problems because patients felt it difficult to eat and swallow some types of foods, due to occlusal errors caused by the skeletal deformities. Some patients reported that they were unable to eat fruit and more fibrous foods. Disturbed sleep was frequently cited because according to the patients, breathing was deficient. This made them wake up during the night, without having reparative sleep and they still felt tired on the next day. Self-esteem and facial esthetics were also shown to be most important to the majority of the interviewees since many of them felt socially

embarrassed by their appearance, and this led to their failure to perform their activities.

Life after treatment and positive aspects

The patients reported that they felt extremely satisfied with the results of their treatment. The points emphasized were the improvement in self-esteem, for example, feeling more confident when talking to other people and relating to them, and looking at the mirror with increased satisfaction. The esthetic aspects achieved were praised by all patients. Many could no longer imagine themselves without their new appearance. They were extremely pleased and would have liked to have undergone this change earlier in their lives. The quality of breathing and sleep were also pointed out as positive changes because many of them mentioned that they now woke up rested, without headaches, and felt that the sleep was reparative. Moreover, some patients reported that although their respiratory function seemed to be good before, they perceived an enormous improvement after the surgery. In addition, patients felt that their masticatory function was benefited, with stable occlusion. making chewing more efficient, and reducing toothache and muscular pains.

Negative aspects of treatment

In general, post-operative pain was reported, particularly in the first week. It takes time to return to normal life and routine, due to the difficulty with eating and speaking. There were also many complaints relative to nerve paresthesia since patients found this to be bad because it affected speech and chewing with some intensity. Nevertheless, they appeared to be managing the situation well. Some patients also manifested themselves negatively regarding the length time of the treatment. This was due to the fact that it was a complex treatment that involved presurgical orthodontic treatment.

The majority of the interviewees appreciated the absence of pain as part of a satisfactory quality of life. Physical and emotional health were also cited as important factors, because patients appreciated feeling good about themselves, and having balance and inner peace. Some differences were found when analyzing the results categorizing Class II and Class III patients. Both groups reported esthetic and functional benefits, however, the Class II group placed greater emphasis on the respiratory improvements after treatment. Whereas in the reports of Class III patients analyzed, they emphasized the esthetic and psychosocial benefits associated with their post-treatment image (Table 4).

Discussion

In this study, the OHRQoL of patients who received orthosurgical treatment was evaluated. The treatment was found to enable improvement in the esthetic and functional aspects of patients, positively influencing their self-perception of quality of life, in agreement with the findings of previous studies.[4,5,15,16]

The overall mean of OHIP-14 after treatment was 4.21 in this study. Previous studies found values ranging from 3.26 to 6.87.[6,16,17] All of these quantitative studies found the treatment improved the OHRQoL of individuals considering the positive aspects that occurred in chewing, sleep, breathing, dental esthetics, facial esthetics, self-esteem and social life.[16-18] Other studies have also found that patients had an increase in different aspects of their psychological, functional, social, emotional and physical well-being.[19,20]

By qualitative assessment, patients were able to express important answers to questions that are often not contained in closed quantitative questionnaires. Relative to their understanding of the meaning of quality of life, patients reported that quality of life was influenced by oral health and meant the absence of pain. They emphasized pain when chewing, headaches and intraoral injuries due to inadequate occlusion. Moreover, they reported that having a satisfactory esthetic appearance was important because this influenced their daily activities and their relationships with other people. As far as we know there are no studies that have found similar results through quantitative analyses.

With regard to the current perception of how life was before orthosurgical treatment, patients reported that headaches and pain in the facial muscles occurred frequently, and influenced their diet, the quality of

chewing and interaction with other people. They also felt less physically and esthetically attractive; this affected their self-esteem and generated greater social withdrawal, thereby influencing activities such as taking pictures and talking to friends. In the qualitative study of Pahkala and Kellokoski,[21] improvements were reported in facial appearance (82%), chewing ability (61%) and facial pain (56%). Modig et al.[4] also emphasized that their patients were satisfied with the outcome of the surgery. Postoperative improvement was mentioned in terms of chewing, appearance, headaches and bullying. In addition, his patients felt safer in the company of other people post-operatively. Systematic reviews have shown that patients with dentofacial deformities had lower quality of life scores[6] and that esthetics and function were the main motives for seeking orthognathic surgery.[22]

As regards the perception of quality of life after conclusion of the treatment, the patients interviewed reported that it was important to improve their OHRQoL due to functional aspects such as: a) sleep - before the treatment this was not peaceful and restorative and culminated in severe tiredness; b) improved breathing; c) absence of obstructive sleep apnea; d) more efficient chewing;[4,21] e) resolution of pain such as chronic headaches.[21] Also, the patients' self-confidence and esthetic self-perception were benefited, in agreement with the literature.[4,15] After treatment, patients felt more confident due to the esthetic changes that occurred. This was in line with a mixed method study that evaluated the effect of dental treatment on the OHRQoL of adolescents, in which it was found that after dental treatment, adolescents felt more confident to smile and interact socially because they knew that their teeth and oral problems had been solved.[23]

Although patients were unanimous about the improvement in their OHRQoL, patients also reported negative aspects, especially during the first week after surgery. Other studies have also shown orthognathic surgery to be a complex procedure that modified the position of the patients' bone bases and could generate some immediate postoperative effects that were reported in this study, such as edema, bruises, pain, transient nerve paresthesia or temporary change in taste.[16,20,24]

Some differences were found when categorizing Class II and Class III patients. Class II patients were observed to report more functional discomfort, such as restless sleep, muscle pain, when compared with Class III patients who, apparently complained more about adverse esthetic effects. A previous study showed that the improvements in the domains of functional limitation and physical pain continued for one year and were persistent after treatment for Class II patients.[1] Furthermore, previous studies have shown that a prognathic mandible had a greater negative aesthetic impact than a retrognathic mandible since patients with mandibular deficiency could "improve" their facial appearance by having the jaw positioned forward[21]. Moreover, skeletal class III patients had stronger feelings of insecurity regarding their facial appearance and they were significantly less happy with their appearance compared with those with Class II.[1]

A strength of this study is the fact that it was a mixed methods research to explore the perceptions of patients after orthognathic and orthodontic treatment relative to OHRQoL, a topic on which data is still lacking the literature. This method allowed for a better exploration of the subject, giving the patients freedom to tell their story, reporting the situations and changes they had undergone. This study explored the experiences of each of the patients about how their life was before treatment and how it was changed afterwards, by detailed information captured in a qualitative study phase. Therefore, this study can be used as a tool for dentists to provide information about the advantages and disadvantages of treatment, considering the experiences of other patients, in this way assisting health care professionals and patients during their clinical decision-making process.

Some limitations must also be described. Questionnaires were answered by patients only after the end of treatment and the time elapsed from surgery varied among patients. Thus, it is possible that patients who were operated on a long time ago may not remember the details of the period before surgery when compared with those who underwent a recent surgery. However, this effect can be alleviated because the ortho-surgical treatment was considered to have a great impact on patients' life; thus, patients who were treated several years previously may

remember their past experiences and understand the positive effects that occurred after the surgery. Furthermore, because only patients from a single private dental clinic were included, the results of this study should be interpreted with caution, as other populations may have different perceptions. In this sense, we recommend thar further studies with other populations should be conducted.

Conclusion

According to the patients' reports and the themes found during the analysis of this study, it may be possible to use the results to support orthosurgical interventions (when appropriately indicated), as these treatments appeared to be important in improving the OHRQoL of patients.

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