Original Article

DOI: 10.14235/bas.galenos.2024.31932
Bezmialem Science 2025;13(2):110-6

The Impact of Preoperative Negative Overjet Amount on Postoperative Patient Satisfaction and Quality of Life in Orthognathic Surgery Patients with Skeletal Class III Malocclusion

İskeletsel Sınıf III Maloklüzyona Sahip Ortognatik Cerrahi Hastalarında Ameliyat Öncesi Negatif Overjet Miktarının Ameliyat Sonrası Hasta Memnuniyeti ve Yaşam Kalitesi Üzerindeki Etkisi

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ABSTRACT

Objective: Orthognathic surgery is a procedure performed to correct dentofacial deformities. Patient satisfaction depends on the success of the surgery, the patient's expectations, and psychological factors. The aim of the study was to evaluate the aesthetic and functional satisfaction of patients with class III skeletal malocclusion who underwent orthognathic surgery by using the orthognathic quality of life questionnaire (OQLQ) and the effect of the change in preoperative negative overjet amount on quality of life.

Methods: Patients with class III dentofacial deformities who underwent orthognathic surgery at Bezmialem Vakıf University Faculty of Dentistry in 2022-2023 were included in the study. The patients were requested to complete the OQLQ online. The negative overjet amount of the patients was measured on three-dimensional models in the virtual surgical planning software (NemoFab). The intersection length of the most anterior points of the incisal edges of the maxillary and mandibular incisal teeth was measured. The correlation between the survey scores and the measurements was evaluated statistically.

ÖZ

Amaç: Ortognatik cerrahi, dentofasiyal deformitelerin düzeltilmesi amacıyla yapılan bir cerrahi işlemdir ve hasta memnuniyeti ameliyatın başarısına, hastanın beklentilerine ve psikolojik faktörlere bağlıdır. Çalışmanın amacı, ortognatik cerrahi operasyonu geçirmiş sınıf III iskeletsel maloklüzyona sahip hastaların estetik ve fonksiyonel memnuniyetlerinin ortognatik yaşam kalitesi anketi (OQLQ) ile değerlendirilerek preoperatif negatif overjet miktarındaki değişimin yaşam kalitesi üzerine etkisinin gösterilmesidir.

Yöntemler: Çalışmaya Bezmialem Vakıf Üniversitesi Diş Hekimliği Fakültesi'nde 2022-2023 yıllarında ortognatik cerrahi operasyonu geçirmiş ve ameliyat sonrası en az 6 ay geçmiş sınıf III dentofasiyal deformiteye sahip hastalar dahil edildi. Bu hastalardan online olarak OQLQ anketini doldurmaları istendi. Hastaların negatif overjet miktarı ölçümleri sanal cerrahi planlama yazılımında (NemoFab) üç boyutlu modeller üzerinde yapıldı. Maksiller ve mandibular insizal dişlerin kesici kenarlarının en anterior noktalarının kesişim uzunluğu ölçüldü. Anket sorularına verilen skorlar ile ölçümler arasındaki korelasyon istatistiki olarak değerlendirildi.

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Cite this article as: Akkoyun EF, Pergel T, Kaşarcioğlu G, Dolanmaz D, Çetin A. The impact of preoperative negative overjet amount on postoperative patient satisfaction and quality of life in orthognathic surgery patients with skeletal class III malocclusion. Bezmialem Science. 2025;13(2):110-6

Received: 13.08.2024
Accepted: 22.10.2024
Published date: 24.04.2025

ABSTRACT

Results: Sixty three patients (39 female, 24 male) were included in the study. The mean age was 25.7 years, and the mean negative overjet was 6.47 mm (minimum 1.15 mm, maximum 16 mm). Only in the 14th survey question "I am ashamed of the appearance of my face", was a statistically significant correlation observed (p=-0.259). No statistically significant correlation was found between the severity of the patient's deformity and patient satisfaction, concern about the social aspects of the deformity, oral function, or awareness of facial deformity (p>0.05).

Conclusion: It was found that the amount of preoperative negative overjet was positively correlated with the feeling of embarrassment about the facial appearance after surgery. The results indicated that patients reported lower scores in oral function and facial aesthetics following the surgery, emphasizing the importance of orthognathic surgery for both functional improvement and aesthetic enhancement. Based on the findings, it can be concluded that the impact of orthognathic surgery on patients' quality of life increases in direct relation to the severity of malocclusion.

Keywords: Orthognathic surgery, quality of life, negative overjet, class III skeletal malocclusion

ÖZ

Bulgular: Çalışmaya 63 (39 kadın, 24 erkek) hasta dahil edilmiştir. Ortalama yaş 25,7 yıl, ortalama negatif overjet miktarı 6,47 mm'dir (minimum 1,15 mm, maksimum 16 mm). Yalnızca 14. anket sorusu olan "yüzümün görünümünden utanırım" ifadesinde istatistiksel olarak anlamlı bir ilişki olduğu görülmüştür (p=-0,259). Hastanın mevcut deformite şiddeti ile hasta memnuniyeti, deformitenin sosyal yönüyle ilgili endişe, oral fonksiyon ve fasiyal deformite farkındalığı açısından istatistiksel olarak anlamlı bir ilişki gözlenmemiştir (p>0,05).

Sonuç: Çalışmadan elde edilen bilgilere göre preoperatif negatif overjet miktarının fazla olmasının, ameliyat sonrası yüz görünümünden utanma duygusu ile pozitif korelasyon gösterdiği bulunmuştur. Cerrahi sonrası hastaların oral fonksiyon ve fasiyal estetik alanlarda kabul edilebilir cevaplar vermiş olmaları ortognatik cerrahinin işlevsellik açısından ve estetik açıdan önemli bir tedavi olduğunu desteklemektedir. Çalışmanın sonuçlarına göre ortognatik cerrahi ameliyatların hastalar üzerine etkilerinin, maloklüzyonun şiddeti ile doğru orantılı olduğu söylenebilir.

Anahtar Kelimeler: Ortognatik cerrahi, yaşam kalitesi, negative overjet, sınıf III iskeletsel maloklüzyon

Introduction

Orthognathic surgery is a surgical procedure frequently used to treat dentofacial deformities and related dental disorders, aiming to restore oral functions and achieve facial harmony, thereby effectively improving individuals' quality of life (1). Patients with dentofacial deformities who require orthognathic surgery typically seek treatment due to concerns about their appearance, psychosocial reasons, and functional abnormalities such as difficulties in eating, speaking, and breathing. Such deformities severely impact the patient's quality of life (2). Orthognathic surgery improves facial structure and appearance, increasing social acceptance and enhancing psychological well-being (3,4). Dissatisfaction with one's facial appearance can have a negative impact on a person's quality of life. Therefore, it is crucial to assess a patient's motivation and any unrealistic expectations they may have before undergoing surgery. This is essential for the success of the treatment. In the healthcare field, there is growing recognition of the importance of evaluating patient satisfaction and quality of life as key indicators of treatment success (4). Most research has focused on objective assessments, with only a few studies exploring patients' perspectives and subjective evaluations (3). It is important to use reliable and sensitive assessment tools to understand how dentofacial deformities and their treatments affect an individual's quality of life (5). The concept of "quality of life" was defined by the World Health Organization in 1993 as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. It is a subjective concept that cannot be assessed by others (6). Various different surveys have been used to evaluate patient satisfaction after surgery (7). To determine the impact of dentofacial deformity on quality of life, Cunningham et al. (8) developed the "orthognathic quality of life questionnaire (OQLQ)" in 2000, which is frequently used today to assess quality of life and aesthetic expectations after orthognathic surgery (9). The questionnaire was validated again by Cunningham et al. (8,10) in 2002. The translation and validation of the questionnaire into Turkish were carried out by Turna et al. (11) in 2022. The OQLQ consists of 22 questions divided into 4 subgroups. These subgroups are as follows: concerns related to the social aspects of the deformity (questions 15-22), facial aesthetics (questions 1, 7, 10, 11, 14), oral function (questions 2-6), and awareness of the facial deformity (questions 8, 9, 12, 13). Patients are asked to rate these questions on a scale of 0-4 based on their personal thoughts according to the following explanations:

- 0 points: This statement does not apply to you or does not bother you at all.

- 1 point: It bothers you a little.

- 2 and 3 points: Marked by the patient as a situation between 1 and 4.

- 4 points: It bothers you a lot.

The OQLQ scoring is evaluated based on the total score to assess the patient's postoperative satisfaction and quality of life. A high score indicates a low quality of life, while a low score indicates a high quality of life. Adult skeletal class III malocclusion is one of the most severe and difficult maxillofacial deformities to correct, and the amount of negative overjet is an important reference indicating the severity of class III malocclusion. As the severity of the deformity increases, the patient's complaints and postoperative satisfaction may vary (12). This study aimed to evaluate the aesthetic and functional satisfaction of patients with skeletal class III malocclusion who underwent orthognathic

surgery using the OQLQ to demonstrate the effect of changes in the preoperative negative overjet amount on patient satisfaction.

Methods

This study was approved by the Ethics Committee of Bezmialem Vakıf University (approval number: E-54022451-050.04-153865, date: 10.06.2024). This was a retrospective study which included patients aged 18-40 who underwent bimaxillary orthognathic surgery for class III dentofacial deformity at the Department of Oral and Maxillofacial Surgery, Bezmialem Vakıf University Faculty of Dentistry and had at least 6 months post-surgery. All patients underwent le fort I osteotomy and sagittal split ramus osteotomy using the same surgical technique and team. Patients who had single jaw surgery or underwent genioplasty in addition to bimaxillary orthognathic surgery were excluded from the study. Patients without virtual surgical planning records via NemoFab software were also excluded. Written informed consent was obtained from all patients before the study. The Turkish version of the 5-point Likert scale OQLQ was used in the study (11).

Predictor Variable

The primary predictor variable was a negative overjet amount of the skeletal class III patients. Preoperative negative overjet amounts were measured on three-dimensional models of the upper and lower jaws prepared and recorded in the NemoFab software (Nemotec, Spain, v.20.10.0) for virtual surgical planning. Measurements were made from the buccal surface of the incisal edges of the maxillary central incisors to the lingual surface of the incisal edges of the mandibular central incisors and recorded individually for each patient.

Main Outcome

The main outcome of the study was questionary scores of the patients. An online survey was prepared, and a link to the survey was sent to the patients, asking them to respond based on how orthognathic surgery affected their quality of life. The scores from the questionnaires were recorded individually for each patient. The scores for the postoperative questionnaire were then analyzed for correlation with the preoperative negative overjet measurements.

Statistical Analysis

All statistical analyses were performed using SPSS software (IBM Corp, USA, version 26.0). Descriptive statistics, including mean, standard deviation, median, minimum, and maximum values, were calculated. The normality of the data distribution was evaluated using the Shapiro-Wilk test. The relationship between the OQLQ scores and the preoperative negative overjet measurements (mm) was analyzed using Pearson correlation if the data were normally distributed. Spearman's correlation test was used for data that was not normally distributed. A significance level of 0.05 was considered statistically significant.

Results

Sixty three patients were included in this study and their demographic and clinical characteristics were analyzed in detail (Table 1). Of the participants 24 were male (38%) and 39 were female (62%), and the average age was 25.7 years. Among the patients included in the study, the youngest patient was 19 years old, and the oldest patient was 42 years old. While the average negative overjet amount was determined as 6.47 mm, the lowest negative overjet amount was recorded as 1.15 mm, and the highest negative overjet amount was recorded as 16 mm (Table 1). After the surgery, all patients were within the normal (1-3 mm) overjet range.

It was observed that there was a statistically significant correlation between negative overjet amount and the 14th survey question,

Table 1. Descriptive statistics

	Mean	SD		Mean	SD
Age (year)	25.75	5.495	Question 14	0.44	0.894
Negative overjet amount (mm)	6.4743	3.32386	Question 15	0.30	0.754
Question 1	0.46	0.930	Question 16	0.21	0.544
Question 2	0.59	0.978	Question 17	0.37	0.848
Question 3	0.49	0.965	Question 18	0.37	0.789
Question 4	0.41	0.796	Question 19	0.37	0.903
Question 5	0.24	0.665	Question 20	0.49	1.061
Question 6	0.76	1.073	Question 21	0.40	0.890
Question 7	0.35	0.765	Question 22	0.52	1.120
Question 8	0.63	0.972	Social aspect	3.02	5.425
Question9	0.68	0.895	Facial aesthetics	2.90	4.306
Question 10	0.79	1.207	Oral function	2.49	3.340
Question 11	0.86	1.229	Facial awareness	3.73	3.647
Question 12	1.16	1.273	Total score	12.14	14.127
Question 13	1.25	1.391			

SD: Standard deviation

"I am ashamed of the appearance of my face" (Spearman's rho: -0.259, p=0.041) (Tables 2, 3). When the survey data were examined in detail, it was observed that there was no statistically significant correlation between the patient's current deformity severity and general patient satisfaction score, concern about the social aspect of the deformity, oral function, or facial deformity awareness (p>0.05). In the analysis of the total score for the facial awareness group, no significant correlation with the severity of negative overjet was detected.

Discussion

Dentofacial deformities are deviations from the ideal facial proportions and occlusion. One of the most dramatic and serious malocclusions is class III malocclusions (12). It is observed that patients with class III malocclusion experience increased social acceptance and self-confidence, as well as a decrease in anxiety caused by facial appearance, after surgery to fulfill an ideal function and improve aesthetic appearance (13). Many surveys have been used to evaluate patients' quality of life and satisfaction

Table 2. Non-parametric correlations

Spearman's rho		Negative overjet amount			Negative overjet amount overjet
Question 1	Correlation coefficient	-0.197	Question16	Correlation coefficient	0.021
	Sig. (2-tailed)	0.122		Sig. (2-tailed)	0.871
	N	63		N	63
Question 2	Correlation coefficient	-0.061	Question 17	Correlation coefficient	-0.056
	Sig. (2-tailed)	0.636		Sig. (2-tailed)	0.665
	N	63		N	63
Question 3	Correlation coefficient	-0.140	Question 18	Correlation coefficient	0.021
	Sig. (2-tailed)	0.275		Sig. (2-tailed)	0.870
	N	63		N	63
Question 4	Correlation coefficient	-0.235	Question 19	Correlation coefficient	-0.139
	Sig. (2-tailed)	0.063		Sig. (2-tailed)	0.279
	N	63		N	63
Question 5	Correlation coefficient	-0.014	Question 20	Correlation coefficient	-0.063
	Sig. (2-tailed)	0.912		Sig. (2-tailed)	0.625
	N	63		N	63
Question 7	Correlation coefficient	-0.192	Question 21	Correlation coefficient	-0.013
	Sig. (2-tailed)	0.132		Sig. (2-tailed)	0.922
	N	63		N	63
Question 8	Correlation coefficient	-0.059	Question 22	Correlation coefficient	0.143
	Sig. (2-tailed)	0.645		Sig. (2-tailed)	0.265
	N	63		N	63
Question 9	Correlation coefficient	-0.117	Social aspect	Correlation coefficient	0.052
	Sig. (2-tailed)	0.361		Sig. (2-tailed)	0.686
	N	63		N	63
Question 10	Correlation coefficient	0.024	Facial aesthetics	Correlation coefficient	-0.103
	Sig. (2-tailed)	0.850		Sig. (2-tailed)	0.423
	N	63		N	63
Question 14	Correlation coefficient	-0.259*	Oral function	Correlation coefficient	-0.094
	N	63		Sig. (2-tailed)	0.462
	Sig. (2-tailed)	0.041		N	63
Question 15	Correlation coefficient	-0.003	Total score	Correlation coefficient	-0.050
	Sig. (2-tailed)	0.983		Sig. (2-tailed)	0.697
	N	63		N	63

*: Correlation is significant at the 0.05 level (2-tailed).

Table 3. Parametric correlations

		Negative overjet amount
Question 6	Pearson correlation	0.007
	Sig. (2-tailed)	0.956
	N	63
Question 11	Pearson correlation	-0.098
	Sig. (2-tailed)	0.446
	N	63
Question 12	Pearson correlation	-0.032
	Sig. (2-tailed)	0.805
	N	63
Question 13	Pearson correlation	-0.104
	Sig. (2-tailed)	0.416
	N	63
	Pearson correlation	-0.125
	Sig. (2-tailed)	0.328
	N	63

Sig: Significant

after orthognathic surgery. The "OQLQ" scale, developed by Cunningham et al. (8) in 2000 to meet the quality of life and aesthetic expectations after orthognathic surgery and validated in 2002 (10), is currently being used today. In a study conducted by Rezaei et al. (14) the preoperative and postoperative evaluations of class III patients were assessed, as in our study, using the OQLQ in four main categories: social aspects of deformity, facial aesthetics, oral function, and awareness of facial deformity. The results showed that orthognathic surgery in class III patients improved their quality of life, satisfaction in various aspects, self-confidence, and oral functions, while no difference was found between the groups in terms of the social aspect, which evaluated others' opinions about the patient. Kilinc and Ertaş (15) also did not find a significant difference in this aspect in their study (15).

In this study, the correlation between the scores of the Turkish-translated and modified OQLQ, which we used to measure overall postoperative patient satisfaction in patients with class III malocclusion, and the patient's preoperative negative overjet amounts (mm) was evaluated to examine the effect of preoperative negative overjet amounts on patient satisfaction and quality of life. Malocclusions can have significant impacts on facial aesthetics and function, which may negatively affect the overall quality of life of patients. However, orthognathic surgery can correct these effects and provide significant improvements in patients' aesthetic appearance, social acceptance, functional abilities, and psychological well-being. In this study, no complications were observed during the operation in any of the patients, and the overjet amount in the final occlusion was measured to be on average between 1-3 mm. The OQLQ used in this study, along with other similar questionnaires, has been identified as an effective tool for measuring postoperative satisfaction and quality of life (16). The results showed no significant correlation between preoperative negative overjet amounts and OQLQ scores. This suggests that patients' overall quality of life improves after orthognathic surgery, regardless of the severity of their deformities. The only statistically significant correlation was found between the amount of preoperative negative overjet and the scores given to the statement, "I am ashamed of my facial appearance". This finding suggests that an increase in the severity of the deformity may negatively impact a patient's perception of their facial aesthetics.

Many studies have shown that the quality of life of patients improves in terms of oral function and facial aesthetics after orthognathic surgery. This increase indicates that orthognathic surgery has a positive effect on chewing and facial appearance. The current findings generally show that the OQLQ of patients with class III malocclusion increases after orthognathic surgery. Posnick and Wallace (18) reported that orthognathic surgery was associated with a high level of patient satisfaction. Pahkala and Kellokoski (19) also reported that orthognathic surgery reduced the symptoms of temporomandibular disorders and pain, improved facial aesthetics, and enhanced chewing function. Additionally, most patients were satisfied with the treatment outcome. Esperao et al. (20) demonstrated that orthognathic surgery positively impacted quality of life. Rezaei et al. (14) evaluated the impact of orthodontic intervention on mental health and body image and showed that orthodontic treatment significantly improved a person's mental health and multidimensional attitudes towards body image.

Joachim et al. (21) largely associated satisfaction after orthognathic surgery with improvements in facial aesthetics, while they linked most dissatisfaction after orthognathic surgery to the appearance of the nose, mouth opening, and temporomandibular joint complaints. However, in their study involving 55 patients with class III malocclusion, they reported no significant correlation between the measurements of overjet and overbite and the degrees of aesthetic, social, and functional satisfaction. They stated that they analyzed the connection between preoperative overjet and overbite measures and the postoperative patient responses, however, they did not provide information regarding the preoperative negative overjet amounts, nor did they mention how the measurements were conducted.

In the study conducted by Rezaei et al. (14), the preoperative and postoperative evaluations of class III patients were assessed, as in our study, using the OQLQ in four main categories: social aspects, facial aesthetics, oral function, and facial awareness (14). The results showed that orthognathic surgery in skeletal class III patients improved their quality of life, satisfaction in various aspects, self-confidence, and oral functions, while no difference was found between the groups in terms of the social aspect, which evaluates others' opinions about the patient. In that study, it was noted that the lowest average score in facial aesthetics, which indicated patients' shyness and satisfaction with their facial appearance, was recorded preoperatively, while the highest average score was recorded postoperatively. Kilinc and Ertaş (15) also did not find a significant difference in this aspect in their study.

Study Limitation

One of the limitations of this study was the fact that the questionnaire was completed online, which might reduce comprehensibility compared to face-to-face completion. The study aimed to evaluate how the orthognathic surgery affected the patients' quality of life from different perspectives in relation to the amount of preoperative negative overjet, with the goal of determining whether the severity of the deformity had an impact on satisfaction after orthognathic surgery. Since this is a retrospective study, preoperative scores are not available. Therefore, preoperative and postoperative score changes could not be compared.

Conclusion

The results of the study show that the quality of life of patients with class III malocclusion can be improved with orthognathic surgery and that orthognathic surgery has a positive effect on patient satisfaction. It was observed that the severity of the patient's preoperative deformity did not have a direct effect on postoperative patient satisfaction, concerns about the social aspects of the deformity, awareness of facial deformity, and oral function. However, the scores given to the facial appearance embarrassment question in the facial aesthetics group increased with the increasing amount of negative overjet. Future research that supports these findings and further explores the differences between preoperative and postoperative scores can significantly enhance clinical practices and treatment methods in this field.

Ethics

Ethics Committee Approval: This study was approved by the Ethics Committee of Bezmialem Vakıf University (approval number: E-54022451-050.04-153865, date: 10.06.2024).

Informed Consent: Written informed consent was obtained from all patients before the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: E.F.A., T.P., D.D., Concept: E.F.A., T.P., D.D., Design: E.F.A., T.P., D.D., Data Collection or Processing: G.K., A.Ç., Analysis or Interpretation: E.F.A., G.K., A.Ç., Writing: E.F.A., G.K., D.D., A.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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