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Assessment of the impact of orthodontic-surgical treatment on the quality of life of patients with mandibular prognathism

Procena kvaliteta života pacijenata posle ortodontsko-hirurškog lečenja mandibularnog prognatizma

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Abstract

Background/Aim. Mandibular prognathism, as one of the more severe forms of dentofacial deformities, impairs the oral functions and appearance of the patient's face and represents a psychosocial handicap with a negative impact on the quality of life (QoL). The aim of the study was to assess the impact of orthodontic-surgical (OS) treatment on the QoL of patients with mandibular prognathism. **Methods.** The study involved 40 patients (19 men and 21 women, with a mean age of 24.1 ± 4.1 years) who underwent the OS treatment for mandibular prognathism. All patients completed two questionnaires – the Oral Health Impact Profile (OHIP-14) and the Orthognathic Quality of Life Questionnaire (OQLQ), before the start of treatment and 12 months after the completion of treatment. **Results.** The results of both questionnaires showed an improvement in the QoL compared to the condition before the treatment. According to the OQLQ questionnaire, there was a postoperative improvement in the QoL (score 24.8 ± 12.9) compared to the preoperative period (score 51.3 ± 15.2). According to the results of the OHIP-14 questionnaire, there was a postoperative improvement in the QoL (score 11.3 ± 2.9) compared to the preoperative period (score 20.8 ± 6.9). The improvement of the QoL, 12 months after the treatment, occurred in all life segments, measured by both questionnaires. **Conclusion.** OS treatment of mandibular prognathism improves all oral functions, including the appearance of the patient's face, thus improving the QoL.

Key words:
mandible; orthognathic surgical procedures; prognathism; quality of life; surveys and questionnaires; treatment outcome.

Apstrakt

Uvod/Cilj. Mandibularni prognatizam predstavlja težak oblik dentofacijalnog deformiteta koji narušava oralne funkcije i izgled lica pacijenta, i predstavlja psihosocijalni hendikep sa negativnim uticajem na kvalitet života (KŽ). Cilj rada bio je da se proceni uticaj ortodontsko-hirurškog (OH) lečenja pacijenata sa mandibularnim prognatizmom na KŽ. **Metode.** U istraživanju je učestvovalo 40 pacijenata (19 muškaraca i 21 žena, prosečne starosti 24,1 ± 4,1 godina) kod kojih je izvršeno OH lečenje mandibularnog prognatizma. Svi ispitanici su pre početka lečenja i 12 meseci nakon završenog lečenja odgovorili na pitanja upitnika o uticaju oralnog zdravlja na KŽ (*Oral Health Impact Profile* – OHIP-14) i upitnika o uticaju dentofacijalnog deformiteta na KŽ (*Orthognathic Quality of Life Questionnaire* – OQLQ). **Rezultati.** Rezultati oba upitnika pokazali su poboljšanje KŽ u odnosu na stanje pre početka lečenja. Prema rezultatu OQLQ upitnika došlo je do postoperativnog poboljšanja KŽ (skor 24,8 ± 12,9) u odnosu na preoperativni period (skor 51,3 ± 15,2). Prema rezultatu OHIP-14 upitnika, došlo je do postoperativnog poboljšanja KŽ (skor 11,3 ± 2,9) u odnosu na preoperativni period (skor 20,8 ± 6,9). Do poboljšanja KŽ, 12 meseci posle lečenja, došlo je u svim segmentima merenim putem oba upitnika. **Zaključak.** OH lečenjem mandibularnog prognatizma postiže se poboljšanje svih oralnih funkcija, uključujući izgled lica pacijenta, a samim tim i poboljšanje KŽ.

Ključne reči:
mandibula; hirurgija, ortognatska, procedure; prognatizam; kvalitet života; ankete i upitnici; lečenje, ishod.

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Introduction

Mandibular prognathism (MP) is a developmental skeletal irregularity with a predominantly developed lower jaw and impaired appearance of teeth and face, which, in addition to impaired oral function, leads to psychosocial problems that significantly reduce the quality of life (QoL) of the patient [1].

The most common treatment for MP is orthodontic-surgical (OS) treatment, which improves the appearance of the face, oral functions, and the patient's QoL [2, 3]. The outcome of the OS treatment can be objectively confirmed by analysis of postoperative dental occlusion as well as by measuring cephalometric parameters; however, in modern dentistry, an important role in determining the effectiveness of treatment results is the patient's assessment of the QoL [2, 4]. Increased understanding of the patient's perception, expectations, and views on the overall treatment is necessary to achieve a successful treatment outcome [4].

According to the definition by the World Health Organization, the QoL is an individual's perception of their life position depending on the culture and value system in which they live and is related to their goals, expectations, standards, and interests. It is a broad concept that consists of the physical health of an individual, psychological status, material independence, social relations, and their relations according to the significant characteristics of the external environment [5]. Quality of life is assessed using general health questionnaires and disease-specific questionnaires.

Numerous studies that have been conducted in recent years confirmed that MP is a significant psychosocial deficiency for patients and negatively affects their QoL [6–8]. Many studies have shown that surgical treatment of deformities contributes to good aesthetic results, significantly changing the psychological status of these patients, with a positive impact on their self-confidence and awareness of their values, thus improving their QoL [6, 7]. For some patients, after the OS treatment of MP, the domain of the social aspect was more important than the improved facial appearance and oral function [9]. In general, OS treatment had a positive effect on the QoL of patients with dentofacial deformities [10–13].

The aim of our study was to assess the impact of OS treatment on the QoL of patients with MP.

Methods

This study included 40 patients with an age range of 19–34 years. All patients were diagnosed with MP and underwent the OS treatment of the deformity. The patients were treated at the Department of Orthodontics and the Department of Maxillofacial Surgery of the Dental Clinic of the Military Medical Academy in Belgrade, Serbia. All activities and procedures applied in this study were approved by the Ethics Committee of the Military Medical Academy in Belgrade, on December 13, 2018 according to the Declaration of Helsinki.

The study involved patients with good mental health and psychological status with no previous history of orthodontic treatment (OT). Patients with cleft lip and palate and all other craniofacial deformities, patients with a history of facial trauma or some orthognathic surgery, patients with temporomandibular joint disease, facial asymmetries, etc., were excluded from the study.

Patients in the study were divided into two groups – patients who underwent surgery on one jaw (monomaxillary group) and patients who underwent surgery on both jaws (bimaxillary group).

All patients underwent preoperative OT with the same protocol to achieve adequate and stable postoperative occlusion. After the orthodontic preparation, surgical repositioning of the jaws (mono or bimaxillary type) with rigid fixation was performed. A standard sagittal step osteotomy was performed in the area of the lower jaw ramus, while a Le Fort osteotomy I of the middle facial mass was performed in the area of the upper jaw.

In this study, patients completed two questionnaires to assess the QoL before (T1) and 12 months after OS treatment of MP (T2). One questionnaire contained questions on oral health in general – Oral Health Impact Profile (OHIP-14) [14], and another questionnaire, the Orthognathic Quality of Life Questionnaire (OQLQ) [15, 16], was specifically formulated for orthognathic patients.

The OHIP-14 contained 14 questions that assess the impact of oral health on patients' QoL through seven areas: functional limitations, physical pain, psychological discomfort, physical, psychological, and social disabilities, and handicap. Patients were asked to complete the questionnaire expressing the degree of agreement on a five-point scale, from 0 to 4, where a higher score represents a more frequent presence of functioning problems. The total possible number of points was 56. Moreover, a higher score indicated a poorer QoL. The Serbian version of the OHIP-14 questionnaire was validated by Stančić et al. [17], and the reliability and validity of this questionnaire were confirmed in a study by Lekić et al. [18, 19].

The OQLQ contained 22 questions that assess the impact of dentofacial deformities on a patient's QoL through four areas: social aspects, facial aesthetics, oral function, and awareness of facial deformity. The answers to the questions are ranked on a scale from 1 to 4, and thus a subjective view is expressed in the extent to which each of the claims relates to the patient. Answer ranked as number 1 means that the patient is a little bothered by this condition, while 4 means that it bothers the patient a lot. Answers ranked with numbers 2 and 3 belong between these two statements. There was also a N/A answer, which means that the condition does not apply to the patient or does not bother the patient at all. The result of the questionnaire represented the total sum of rounded numerical options by claims and can be expressed comprehensively or by domains. The total score of the answers to all questions can range from 0 to 88. A score defined by a larger number indicates a poorer QoL. Cunningham et al. [15, 16] developed the OQLQ, which was used in numerous studies, and Vučić et al. [20] validated it in Serbian.

Statistical analysis

The Kolmogorov-Smirnov test was used to examine the layout of a statistical series. Pearson's chi-squared (χ^2) test was

used to test the relationship between the two qualitative variables. Differences in numerical variables were examined using One-Factor Analysis of Variance (ANOVA) and/or *t*-test for large independent samples. To examine the relationship between the two continuous variables, Pearson's correlation coefficient was used as a parametric test, and Spearman's correlation coefficient as a nonparametric substitution. Differences in the values of numerical variables, measured in several time intervals, were tested by the repeated measure ANOVA test. Statistical significance was defined at the level of probability of the null hypothesis of $p < 0.05$. Statistical processing and analysis were done in the computer program Statistical Package for the Social Sciences 24 (SPSS 24), and graphical and tabular presentation in the software package Microsoft Office (Excel and Word).

Results

The study included 40 patients, of which 19 (47.5%) were men and 21 (52.5%) were women. The mean age ± standard deviation (SD) of the patients was 24.1 ± 4.1 years. Out of the total number of patients, surgery on one jaw was performed in 16 (40%) respondents (monomaxillary group), while surgery on both jaws (bimaxillary group) was performed in 24 (60%) respondents. These two groups of patients did not differ significantly concerning gender, age, and type of surgery performed.

Descriptive indicators of QoL measured by the OHIP-14 questionnaire

The results of the OHIP-14 questionnaire, which measured the difference between the QoL of patients before (T1) and 12 months after the OS treatment of MP (T2), showed postoperative improvement of the QoL (11.3 ± 2.9) compared to the preoperative period (20.8 ± 6.9) (OHIP index). There was an improvement in the QoL after completion of treatment in all life segments measured by the questionnaire scale (T2 vs. T1): functional limitation 0.8 ± 1.1 vs. 1.6 ± 1.2; physical pain 1.8 ± 1.5 vs. 3.2 ± 1.2; psychological discomfort 4.3 ± 2.3 vs. 7.2 ± 2.1; physical disability 2.2 ± 2.8 vs. 3.3 ± 2.7; psychological disability 0.5 ± 0.7 vs. 1.1 ± 1.2; social disability 0.9 ± 1.1 vs. 2.3 ± 1.3; handicap 0.9 ± 0.8 vs. 2.1 ± 0.9. The highest average score before and after treatment was recorded on the question: *"Have you been self-conscious because of your teeth, mouth, or dentures?"* (3.1 ± 0.9 vs. 2.5 ± 1.2), which represents the biggest preoperative and postoperative problem for patients. The lowest average result before and after treatment and, at the same time, the smallest problem were recorded on the question: *"The change in the sense of taste because of problems with the teeth, mouth, or dentures."* (0.1 ± 0.3 vs. 0.2 ± 0.5).

Descriptive indicators of the QoL measured by the OQLQ questionnaire

The results of the OQLQ questionnaire, which measured the difference between the QoL of patients before (T1) and 12 months after the OS treatment of MP (T2), showed postoperative improvement of the QoL (24.8 ± 12.9) compared to the preoperative period (51.3 ± 15.2). Improvement in the QoL after completion of treatment occurred in all segments measured by the questionnaire scale (T2 vs. T1): awareness of facial deformity 6.9 ± 4.2 vs. 10.4 ± 4.3; oral function 5.4 ± 2.9 vs. 12.5 ± 3.9; facial aesthetics 6.7 ± 3.8 vs. 14.9 ± 3.7; social aspects 5.7 ± 4.5 vs. 13.5 ± 7.4. Our study showed that the highest average result before treatment was recorded on the question: *"I don't like seeing a side view of my face (profile)."* (3.6 ± 0.7), which is the biggest preoperative problem for patients. The highest average result after the end of treatment was recorded on the question: *"I'm self-conscious about my facial appearance."* (2.0 ± 1.4), which was the biggest postoperative problem for patients. The lowest average result and, at the same time, the littlest problem for the patients, both before and after the treatment, was the question: *"I worry about meeting people for the first time."* (1.1 ± 1.3 vs. 0.6 ± 0.7).

Characteristics of patients and QoL measured by OQLQ and OHIP questionnaires

Table 1 shows that gender did not have a statistically significant effect on the change in QoL ($p > 0.05$). The interaction of gender, age, and type of surgery did not affect the change in subscale values ($p > 0.05$).

Based on the split-plot ANOVA (SPANOVA) test, it was proven that there is a statistically significant effect of the intervention on the change in the QoL measured before and 12

Table 1

Impact of gender, age, and type of surgery on the change in the quality of life measured by the OQLQ and OHIP-14 questionnaires before (T1) and 12 months after (T2) the orthodontic-surgical treatment of mandibular prognathism

Parameter	OQLQ				OHIP-14			
	Wilks' lambda	F	*p*	η^2	Wilks' lambda	F	*p*	η^2
Difference between T1 and T2	0.132	209.639	**0.000**	0.868	0.290	78.375	**0.000**	0.710
Difference between T1 and T2 *gender	0.913	3.045	0.091	0.087	1.000	0.000	0.987	0.000
Difference between T1 and T2 *age	0.967	1.094	0.303	0.033	0.974	0.850	0.363	0.026
Difference between T1 and T2 *group	0.987	0.434	0.515	0.013	0.962	1.266	0.269	0.038
Difference between T1 and T2 *gender*age	0.998	0.060	0.808	0.002	0.907	3.265	0.080	0.093
Difference between T1 and T2 *gender*group	0.971	0.966	0.333	0.029	0.984	0.536	0.470	0.016
Difference between T1 and T2 *age*group	0.992	0.273	0.605	0.008	0.993	0.215	0.646	0.007
Difference between T1 and T2 *gender*age*group	0.942	1.971	0.170	0.058	1.000	0.007	0.932	0.000

OQLQ – Orthognathic Quality of Life Questionnaire; OHIP – Oral Health Impact Profile; F – split-plot analysis of variance (SPANOVA); *p* – statistical significance; η^2 – squared Eta. Bolded values are statistically significant.

months after treatment (p = 0.00). The value of Eta² measured with the OQLQ questionnaire was 0.868, while the value measured with the OHIP questionnaire was 0.710, which indicated that the impact of the intervention was large (0.01= small impact, 0.06 = moderate impact, 0.14 = large impact).

Differences in the QoL of patients measured by the OQLQ questionnaire before and 12 months after the OS treatment of MP in patients with surgery on one jaw (monomaxillary group) and patients with surgery on both jaws (bimaxillary group)

Before and after the OS treatment, no intergroup differences were observed in the recorded values of the OQLQ scale, as well as on the subscales of the questionnaire: awareness of facial deformity, oral function, facial aesthetics, and social aspects (Table 2).

Differences in the QoL measured by the OHIP questionnaire before and 12 months after the OS treatment of MP in patients with surgery on one jaw (monomaxillary group) and patients with surgery on both jaws (bimaxillary group)

Before the start of treatment, intergroup differences were noted on the subscale: physical pain (-2.135, p = 0.039). Patients from the bimaxillary group felt preoperatively greater pain (1.8 ± 0.5) compared to patients from the monomaxillary group (1.4 ± 0.6). After the completion of the OS treatment, intergroup differences were observed on the same subscale of the OHIP questionnaire as at the beginning of the treatment (Table 3).

Discussion

Patients with dentofacial deformities, including MP, have a lack of self-confidence due to their appearance, which negatively affects their social relationships, employment, making emotional relationships, and QoL. In patients with MP, OS treatment is becoming increasingly important, which improves the oral functions and facial appearance of the patients [21].

The impact of malocclusions, including MP, on the QoL of patients was the subject of numerous studies, which confirm that malocclusions cause a higher degree of dissatisfaction with the appearance of the face. Most of these studies found that the QoL of patients with MP significantly improved after OS treatment and that most patients were satisfied with the outcome of treatment [3, 12].

In recent years, many studies have examined the impact of oral health problems on patients' QoL, using general and specific types of questionnaires such as the 36-item Short-Form Health Survey (SF-36), OHIP-14, and OQLQ [12, 22–24]. The questionnaire OHIP-14, developed by Slade [14], is most often used to assess the impact of oral health on the QoL of patients.

To assess the QoL, we used two questionnaires in our study, the OHIP-14 and the OQLQ. The results of our study showed that the biggest problem for patients before treatment

Table 2

Differences in the quality of life of patients before (T1) and 12 months after (T2) the orthodontic-surgical treatment of mandibular prognathism inside of monomaxillary and bimaxillary groups, according to the results of the OQLQ questionnaire

Parameter	Monomaxillary			Bimaxillary		
	T1	T2	*p*	T1	T2	*p*
Awareness of facial deformity	2.7 ± 0.9	1.8 ± 0.9	**0.004**	2.5 ± 1.2	1.7 ± 1.1	**0.001**
Oral function	2.7 ± 0.5	1.1 ± 0.4	**0.000**	2.4 ± 0.9	1.0 ± 0.7	**0.000**
Facial aesthetics	3.4 ± 0.3	1.5 ± 0.6	**0.000**	2.9 ± 0.8	1.3 ± 0.8	**0.000**
Social aspects	1.6 ± 1.0	0.6 ± 0.5	**0.000**	1.7 ± 0.9	0.8 ± 0.6	**0.000**
Overall score	2.4 ± 0.6	1.1 ± 0.5	**0.000**	2.3 ± 0.7	1.1 ± 0.7	**0.000**

OQLQ – Orthognathic Quality of Life Questionnaire. The *t*-test of repeated measurements was applied. Bolded values are statistically significant. The results are presented as mean ± SD.

Table 3

Differences in the quality of life of patients before (T1) and 12 months after (T2) the orthodontic-surgical treatment of mandibular prognathism inside of monomaxillary and bimaxillary groups, according to the results of the OHIP-14 questionnaire

Parameter	Monomaxillary			Bimaxillary		
	T1	T2	*p*	T1	T2	*p*
Functional limitation	0.8 ± 0.6	0.3 ± 0.4	**0.000**	0.8 ± 0.6	0.5 ± 0.6	**0.000**
Physical pain	1.4 ± 0.6	0.8 ± 0.8	**0.004**	1.8 ± 0.5	0.8 ± 0.7	**0.000**
Psychological discomfort	2.5 ±0.7	1.3 ± 0.9	**0.000**	2.3 ± 0.7	1.5 ± 0.7	**0.000**
Physical disability	1.2 ± 1.1	0.6 ± 0.9	0.067	1.1 ± 0.8	0.9 ± 1.0	0.244
Psychological disability	1.3 ± 1.2	0.6 ± 0.7	**0.044**	1.0 ± 1.2	0.5 ± 0.7	**0.043**
Social disability	1.2 ± 0.6	0.4 ± 0.5	**0.002**	1.2 ± 0.7	0.5 ± 0.6	**0.000**
Handicap	2.2 ± 0.8	0.8 ± 0.8	**0.000**	2.0 ± 0.9	0.9 ± 0.9	**0.000**
Overall score	1.5 ± 0.6	1.8 ± 0.7	0.212	1.5 ± 0.5	1.8 ± 1.1	0.129

OHIP – Oral Health Impact Profile. The *t*-test of repeated measurements was applied. Bolded values are statistically significant. The results are presented as mean ± SD.

was facial appearance because the highest result was recorded on the following questions: *"Have you been self-conscious because of your teeth, mouth, or dentures?"* (according to the OHIP questionnaire) and *"I don't like seeing a side view of my face (profile)."* (according to the OQLQ questionnaire). Based on the results of both questionnaires, patients had the littlest problems with their sense of taste. These results justify the fact that the main motive for treating patients is a change in facial appearance due to the present dentofacial deformity.

Based on the results of the OHIP questionnaire, we concluded that worse results were observed in patients before the start of treatment, while better results were recorded after the end of treatment. That shows that patient satisfaction with the QoL is significantly improved after completion of treatment, which is confirmed by a study by Kilinc and Ertas [2] with similar results.

Joachim et al. [8] examined the impact of OS treatment on the QoL of patients with MP and, similar to our results, concluded that this type of treatment has a positive effect on the QoL of both men and women in the physical and social domains.

Some studies have examined the impact of OS treatment on QoL at shorter time intervals after the surgery. In the Eslamipour et al. [21] study, after six months, there was a significant improvement in the QoL compared to the first three months after treatment. In our study, we examined the QoL 12 months after the completion of treatment, after the removal of orthodontic braces, and after the completion of the post-surgical phase of OT. During this period, there were no postoperative problems such as swelling, pain, bleeding, or neurosensitivity disorders which can negatively affect the QoL and temporarily cause its deterioration. Lee et al. [25], also assessing the QoL six weeks and six months after surgery, concluded that there was a deterioration in the QoL in the early postoperative phase compared to the period of six months after treatment. This gradual post-surgical improvement is supported by a study by Choi et al. [26], who reported moderate to vast improvements in the time interval of three to six months after completion of treatment.

In terms of different domains of QoL, when it comes to the analysis of our OQLQ questionnaire, the biggest changes occurred in the emotional domain, followed by psychological and functional aspects. The smallest changes occurred in the social domain, with similar results before and after treatment. According to the analysis of the OHIP-14 questionnaire, in terms of different domains, the littlest problem for patients was the domain of functional limitation both before and after treatment.

Eslamipour et al. [21] and Choi et al. [26] came to similar results, with the difference that the smallest changes occurred in the functional domain, and there were no significant changes in the first three months after the end of treatment. That is also in accordance with the study by Choi et al. [26], in which it was found that there was no significant improvement in the QoL; there was even a short-term deterioration in the QoL of the patients immediately after surgery. Both of these studies assessed the QoL for a limited period of six months after completion of treatment.

Desforges et al. [27] proved that improvement in the functional domain occurs later than the changes in other domains measured by the QoL questionnaires. This finding is to be expected because the surgery itself brings certain inconveniences for the patient, such as pain, swelling, neurosensitivity disorders, limited mouth opening, and reduced muscle efficiency [28].

For some patients, the social aspect was more important than improved facial appearance and oral function after treatment [9]. According to the results of our study, patients had the littlest problems in the social domain before and after the OS treatment. The changes that most affected the QoL were in the domains of facial aesthetics, awareness about deformity, and oral function in the last place.

After completing the treatment, patients have numerous psychological benefits, such as improving their body image, facial appearance, and better interpersonal relationships. Azuma et al. [29] examined changes in QoL about psychological status in patients with malocclusions after combined OS treatment. They concluded that patients after the OS treatment, regardless of the severity of malocclusion, had a lower degree of anxiety and improved QoL, measured by specific questionnaires for oral health and malocclusions, compared to the same parameters before treatment.

When it comes to the differences between men and women, the results of our study showed that there are no significant gender differences in overall QoL as well as in the domains measured by the patient QoL questionnaires after the OS treatment of MP.

Eslamipour et al. [21] noted that the overall QoL outcome for women in all four domains (especially in the emotional and social domains) shows poorer status compared to men before surgery. However, the QoL in women achieved remarkable improvement in all four domains to the same extent as in men after surgery. That shows that the QoL in both women and men has changed for the better, with women having bigger improvements. The results of the study by Rezaei et al. [3] showed that there were no differences between men and women regarding the OHIP questionnaire. When it comes to the OQLQ questionnaire, in all domains measured by the questionnaire, women were more dissatisfied before surgical treatment than men. That means that men had a better QoL before treatment compared to women and that women are more sensitive when it comes to facial appearance.

Our study did not confirm the difference in the QoL between the monomaxillary and bimaxillary groups of patients. Patients from both groups, those who underwent surgery on one and those who underwent surgery on both jaws, showed the same improvement in QoL after treatment. These findings support the fact that OS treatment leads to remarkable improvements in various aspects of the psychological, functional, social, emotional, and physical well-being of the patient [12, 22, 30, 31].

Our study has certain limitations such as the fact that the OS treatment lasts a long time and includes

many phases. A larger number of patients who would follow through all the phases of the OS treatment, including a longer period of time after completion of the treatment, would contribute to a better understanding of the impact of overall treatment on the QoL of patients with MP.

Conclusion

The OS treatment of patients with MP improves all oral functions, the appearance of the patient's face, and self-confidence. All of that leads to a significant improvement in the QoL.

R E F E R E N C E S

1. *Mousoulea S, Tsolakis I, Ferdianakis E, Tsolakis AI.* The effect of chin-cup therapy in class III malocclusion: a systematic review. Open Dent J 2016; 10: 664–79.
2. *Kilinc A, Ertas U.* An assessment of the quality of life of patients with class III deformities treated with orthognathic surgery. J Oral Maxillofac Surg 2015; 73(7): 1394. e1–5.
3. *Rezaei F, Masalehi H, Golshah A, Imani MM.* Oral health-related quality of life of patients with class III skeletal malocclusion before and after orthognathic surgery. BMC Oral Health 2019; 19(1): 289.
4. *Starefeldt M, Ganoo T, Sjöström M.* Changes in oral health-related quality of life for patients undergoing orthognathic surgery- a review. Clin Surg 2020; 5: 2697.
5. *World Health Organization.* Measuring quality of life: the development of the World Health Organization quality of life instrument. Geneva: World Health Organization; 1993.
6. *Ni J, Song S, Zhou N.* Impact of surgical orthodontic treatment on quality of life in Chinese young adults with class III malocclusion: a longitudinal study. BMC Oral Health 2019; 19: 109–16.
7. *Cariati P, Martinez R, Martinez-Lara* I. Psyho-social impact of orthognathic surgery. J Clin Exp Dent 2016; 8(5): 540–5.
8. *Joachim M, Emm Richter D, Mohana A, Labeeb M, Abdelraziq M, Abu El-Naaj I.* Quality of life after class III repair orthognathic surgery: five-year retrospective study. J Craniofac Surg 2021; 32(8): 2588–91.
9. *Abdullah WA.* Changes in quality of life after orthognathic surgery in Saudi patients. Saudi Dent J 2015; 27(3): 161–4.
10. *Meger MN, Fatturi AL, Gerber JT, Weiss SG, Rocha JS, Scariot R,* et al. Impact of orthognathic surgery on quality of life of patients with dentofacial deformity: a systematic review and meta-analysis. Br J Oral Maxillofac Surg 2021; 59(3): 265–71.
11. *Song YL, Yap AU.* Orthognathic treatment of dentofacial disharmonies: its impact on temporomandibular disorders, quality of life and psychosocial wellnes. Cranio 2017; 35(1): 52–7.
12. *Belusic-Gobic M, Kralj M, Harmicar D, Cerovic R, Mady Maricic B, Spalj S.* Dentofacial deformity and orthognathic surgery: Influence on self-esteem and aspects of quality of life. J Craniomaxillofac Surg 2021; 49(4): 277–81.
13. *Gabardo M, Zielak J, Tórtora G, Gerber J, Meger M, Rebellato N*, et al. Impact of orthognathic surgery on quality of life: predisposing clinical and genetic factors. J Craniomaxillofac Surg 2019; 47(8): 1285–91.
14. *Slade GD.* Derivation and validation of a short-form oral health impact profile. Community Dent Oral Epidemiol 1997; 25(4): 284–90.
15. *Cunningham SJ, Garratt AM, Hunt NP.* Development of a condition-specific quality of life measure for patients with dentofacial deformity: I. Reliability of the instrument. Community Dent Oral Epidemiol 2000; 28(3): 195–201.
16. *Cunningham SJ, Garratt AM, Hunt NP.* Development of a condition-specific quality of life measure for patients with dentofacial deformity: II. Validity and responsiveness testing. Community Dent Oral Epidemiol 2002; 30(2): 81–90.
17. *Stančić I, Tihaček Šojić LJ, Jelenković A.* Adaptation of Oral Health Impact Profile (OHIP-14) index for measuring impact of oral health on quality of life in elderly to Serbian language. Vojnosanit Pregl 2009; 66(7): 511–5. (Serbian)
18. *Lekić M, Daković D, Lazić Z, Čutović T, Ilić I, Ilić M.* The Serbian version of the Oral Health Questionnaire for Adults. Vojnosanit Pregl 2021; 78(9): 919–27.
19. *Lekić M, Daković D, Kovačević V, Čutović T, Ilić I, Ilić M.* Testing of the Serbian version of the oral health impact profile (OHIP-14) Questionnaire among professional members of the Serbian armed forces. Vojnosanit Pregl 2021; 78(12): 1257–62.
20. *Vučić Lj, Glišić B, Kisić-Tepavčević D, Vučić U, Drulović J, Pekmezović T.* Cross-cultural adaptation and validation of the disease specific questionnaire OQLQ in Serbian patients with malocclusions. Zdr Varst 2016; 55(3): 166–73.
21. *Eslamipour F, Najimi A, Tadayonfard A, Azamian Z.* Impact of orthognathic surgery on quality of life in patients with dentofacial deformities. Int J Dent 2017; 2017: 4103905.
22. *Duarte V, Zaror C, Villanueva J, Werlinger F, Vidal C, Solé P,* et al. Changes in health-related quality of life after orthognathic surgery: a multicenter study. Clin Oral Investig 2022; 26(4): 3467–76.
23. *Cabral RC, Canellas JV, Tiwana PS, Medeiros PJ, Ritto FG.* Impact of orthognathic surgery on quality of life and comparison of patients` postoperative experience after single and double jaw surgery: a longitudinal study. Pathol Oral Radiol 2021; 132(6): 633–40.
24. *Vučić Lj, Glišić B, Vučić U, Drulović J, Pekmezović T.* Quality of life assessment in patients with malocclusion undergoing orthodontic and orthognathic treatment. Zdr Varst 2020; 59(3): 137–45.
25. *Lee S, McGrath C, Samman N.* Impact of orthognathic surgery on quality of life. J Oral Maxillofac Surg 2008; 66: 1194–9.
26. *Choi WS, Lee S, McGrath C, Samman N.* Change in quality of life after combined orthodontic-surgical treatment of dentofacial deformities. Oral Surg Oral Med Oral Pathol Oral Radiol Oral Endod 2010; 109(1): 46–51.
27. *Desforges E, Mathis R, Wilk A, Zagala-Bouquillon B, Bacon W, Meyer N,* et al. The psychological impact of orthognathic surgery. Orthod Fr 2007; 78(2): 113–21. (French)
28. *Espeland L, Hogevold HE, Stenvik A.* A 3-year patient-centred follow-up of 516 consecutively treated orthognathic surgery patients. Eur J Orthod 2008; 30(1): 24–30.
29. *Azuma S, Kohzuki M, Saeki S, Tajima M, Igarashi K, Sugawara J.* Beneficial effects of orthodontic treatment on quality of life in patients with malocclusion. Tohoku J Exp Med 2008; 214(1): 39–50.
30. *Geramy A, Mazaheri Nazarifar A, Saffar Shahroudi A, Sheikhzadeh S.* Oral health-related quality of life following orthognathic surgery for class III correction its relationship with cephalometric changes. Int J Oral Maxillofac Surg 2019; 48(11): 1434–9.
31. *Ghorbani F, Gheibollahi H, Tavanafar S, Eftekharian HR.* Improvement of esthethic, functional, and social well-being after orthognathic surgical intervention: a sampling of postsurgical patients over a 10-year period from 2007 to 2017. J Oral Maxillofac Surg 2018; 76(11): 2398–403.

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