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ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

Quality of life in correlation with presurgical psychological assessment of surgically treated patients with class III skeletal deformities

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SUMMARY

Introduction/Objective Quality of life before and after mono- and bimaxillary surgery may vary from patient to patient depending on psychological assessment score. The aim of this study was to compare the quality of life before and six months after orthognathic surgery in correlation with a presurgical psychological assessment of patients with class III skeletal deformity, assuming that patients with low psychological assessment results might have a lower quality of life after surgery despite successful treatment results.

Methods For this prospective study, 30 patients (19 female,11 male) were included. Psychological assessment was obtained before, and quality of life before and after surgery in skeletal deformity class III patients. Statistical analysis was done with a statistical package for social science – SPSS.

Results The overall quality of life significantly improved in all the patients after surgery. Surgical correction of class III deformities provided a significant improvement independent of the type of surgery and the severity of the deformity, as well as gender and age. There were significant differences in post-surgical quality of life scores between patients with good and poor psychological assessment scores, related to social disability ($p < 0.05$).

Conclusion Patients with lower preoperative psychological scores experienced a lesser improvement in quality of life, particularly in the domain of social disability. This suggests that additional psychological treatment of these patients could further improve the beneficial effects of orthognathic surgery on postoperative quality of life.

Keywords: quality of life; mono–bimaxillar surgery; skeletal deformities

INTRODUCTION

The number of patients requiring correction of craniofacial disproportions, particularly class III deformities, has undoubtedly increased. Skeletal class III deformities can be a result of mandibular prognathism, maxillary deficiency, or both [1, 2, 3]. Orthognathic surgery aims to restore proper dental occlusion and facial harmony through modification of the position, shape, and size of the facial bones. Bone movement implies positional and tensional changes in the attached soft tissues. These new soft tissue relationships introduce significant changes in the facial appearance. Skeletal class III deformities can be surgically corrected by using mandibular setback surgery or bimaxillary surgery (maxillary advancement and mandibular setback) [4–7].

At the first appointment, every patient was assessed to establish the motive for the treatment. Ideally, they should initially be evaluated by a psychologist, to determine whether their expectations are realistic and possible to achieve. In clinical practice, this is seldom possible, and clinicians have to do the initial evaluation including psychological assessment. However, a patient-centered approach to examining the outcomes of the treatment is as important as the initial assessment. It complements the study of morphological and physiological responses to the treatment, as the success of the treatment must also be defined in the context of the patient's perceptions, and beyond traditional health indicators, such as mortality and morbidity [8–11].

The World Health Organization (WHO) defined quality of life (QoL) 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" (WHO study protocol, 1993); patient's perception of the treatment success becomes the most important parameter.

Present research hypothesized that the patients with low psychological assessment results and risk of body dysmorphic disorder (BDD) will have a lower QoL despite successful morphological and physiological responses to the treatment.

The aim of this study was to compare QoL before and six months after orthognathic surgery in correlation with a presurgical psychological assessment of patients with class III skeletal deformity, assuming that patients with low psychological assessment results might have lower QoL after surgery despite successful treatment results.

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METHODS

The study was approved by the ethics committee of the School of Dental Medicine, University of Belgrade (No. 36/24)598

All patients were provided with written informed consent to participate, and they were instructed about the aims and protocol of the study as well.

Patients with skeletal class III deformities were selected at the first visit to the Clinic for Maxillofacial Surgery, School of Dental Medicine, University of Belgrade. The exclusion criteria were the following: patients with complex craniofacial syndromes and patients with matured cleft lip and palate. The prospective study sample consisted of 30 consecutive patients (19 female and 11 male; mean age ± standard deviation: 22.27 ± 3.39 years, range 18–29 years) (Table 1).

Table 1. Distribution of patients according to sex and type of surgery

Sex	Group		Total
	Monomaxillary	Bimaxillary	
Male	7	4	11
Female	7	12	19
Total	14	16	30

Table 2. The initial assessment of patients requesting orthognathic treatment

Question	Positive finding	Negative finding
The defect		
Is there an actual deformity?	Yes	No
Is the defect minor?	No	Yes
The request		
Is the request obscure?	No	Yes
Is the requested change surgically feasible?	Yes	No
Is there a history of dissatisfaction with previous surgery?	No	Yes
Has the patient been "surgeon shopping"?	No	Yes
The decision to seek help		
Was there long-term planning?	Yes	No
Is the patient in acute crisis?	No	Yes
Is there pressure from others?	No	Yes
Is there support from friends/family?	Yes	No
Expectations		
Are the expectations reasonable?	Yes	No
Psychodynamics		
Is there evidence of the complaint reflecting deeper conflicts? E.g., poor relationship with parent who has the same feature	No	Yes
Previous history		
Is there a history of past psychiatric disturbance?	No	Yes
Is there a history of severe maladjustment in life situations?	No	Yes

The psychological assessment included a questionnaire with a number of significant questions specific to orthognathic deformities, developed by Cunningham and Feinmann [12] in 1998 at University College London, Orthodontic Department and Academic Department of Psychiatry. The questionnaire titled "The initial assessment of patients requesting orthognathic treatment" is presented in Table 2. The interview was performed during the initial appointment by a surgeon in a private consultation. Based on psychological assessment, the patients were divided into two groups: Group 1 – patients with low psychological assessment results (less than 50% positive responses) and Group 2 – patients with satisfactory psychological assessment results (more than 50% positive responses).

Afterwards, in preoperative QoL assessment, the patients were given one of the most widely used questionnaires, disease-specific measurement of the Oral Health Impact Profile (OHIP14). It measures individuals' perception of the social impact of their oral disorders and their well-being. The OHIP-14 questionnaire was developed as a shorter version of the OHIP-49, where the 49 questions might be too long or unnecessary for the purpose. Questions included in this questionnaire measure seven domains: functional limitation (OH-1, OH-2), physical pain (OH-3, OH-4), psychological discomfort (OH-5, OH-6, OH-10), physical disability (OH-7, OH-8, OH-14), psychological disability (OH-9), social disability (OH-11, OH-12), and handicap (OH-13) (Table 3).

Table 3. Questionnaire consisting of OHIP-14 items (OH-1–OH-14) for pre- and post-surgical and additional items (AD-1–AD-3) for postsurgical assessment of quality of life

Item	How often do you have problems with your teeth, mouth or dentures (during the previous month*) Please answer using the following scores: 0 (never), 1 (seldom), 2 (occasionally), 3 (often), and 4 (very often)
OH-1	Did you have trouble pronouncing words because of problems with your teeth, mouth, or dentures?
OH-2	Did you feel that your sense of taste has worsened because of problems with your teeth, mouth or dentures?
OH-3	Did you have painful aching in your mouth?
OH-4	Were you uncomfortable while eat because of problems with your teeth, mouth or dentures?
OH-5	Did you feel self-conscious because of problems with your teeth, mouth, or dentures?
OH-6	Did you feel tense because of problems with your teeth, mouth, or dentures?
OH-7	Was your diet unsatisfactory because of problems with your teeth, mouth, or dentures?
OH-8	Did you have to interrupt meals because of problems with your teeth, mouth, or dentures?
OH-9	Did you find it difficult to relax because of problems with your teeth, mouth, or dentures?
OH-10	Were you embarrassed because of problems with your teeth, mouth, or dentures?
OH-11	Were you agitated around other people because of problems with your teeth, mouth, or dentures?
OH-12	Did you have difficulty doing your usual work because of problems with your teeth, mouth, or dentures?
OH-13	Did you feel that life in general was less satisfying because of problems with your teeth, mouth, or dentures?
OH-14	Were you totally unable to function because of problems with your teeth, mouth, or dentures?
AD-1**	Did you feel discomfort while chewing?
AD-2**	Were you unsatisfied with your facial aesthetics?
AD-3**	Did you have a loss of sensitivity in your lips, tongue, or other facial area?

*Time specification was only given in a post-surgical questionnaire;
**AD – alternative-question only administered in post-surgical questionnaires

Initial cone-beam computed tomography (CBCT) scans of each patient were done for treatment planning. 3D

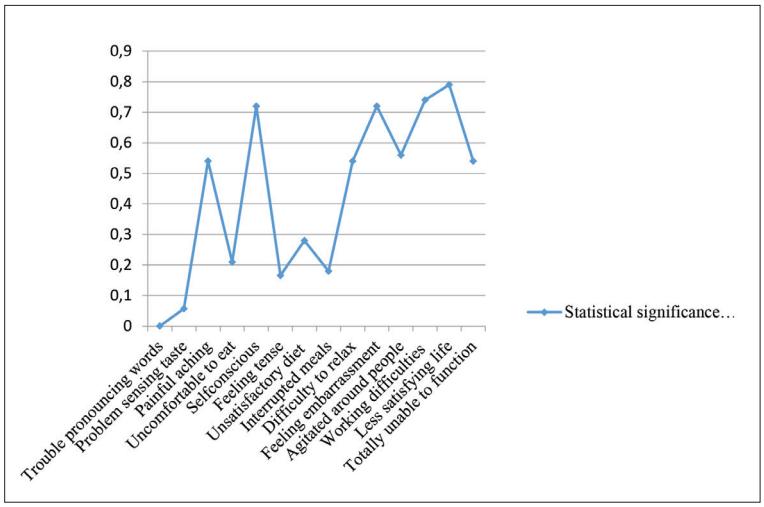

Figure 1. Pre- and postsurgical mean item scores and correlation of changes

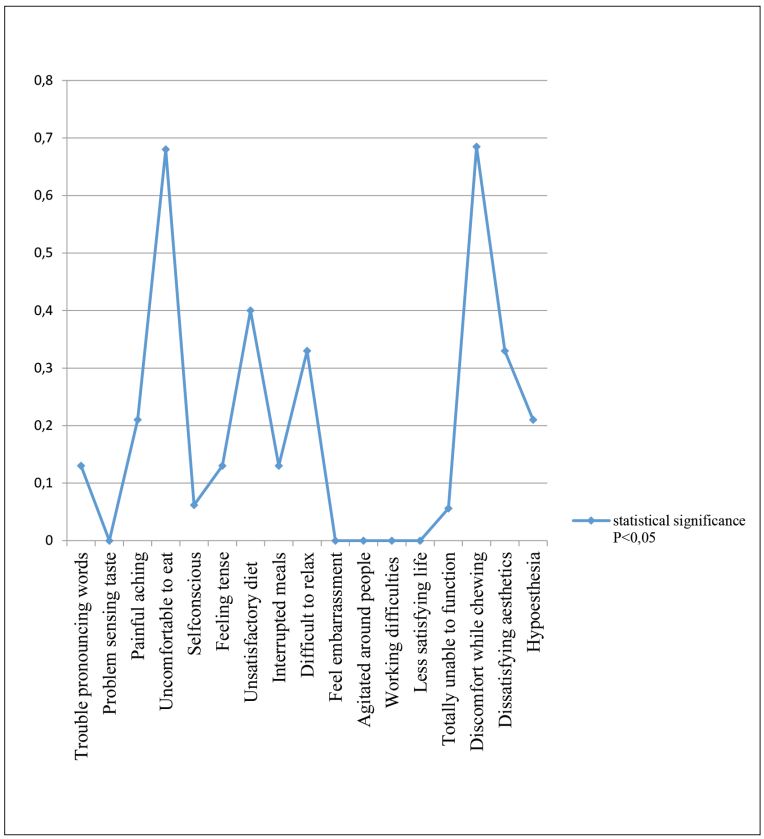

Figure 2. Differences in post-surgical scores of quality of life between patients with and without low score on the initial psychological assessment

planning was done in InVivo 5.2 software (Anatomage, San Jose, CA, USA). Study models were mounted onto a semi-adjustable articulator (Artex® ct, Amann Girrbach AG, Koblach, Austria) for manufacturing the interocclusal positioning splints.

Surgical correction of Class III deformities was performed by bilateral sagittal split osteotomy (BSSO) with mandibular setback in 14 patients and using bimaxillary surgery comprised of BSSO setback and Le Fort I osteotomy maxillary advancement in 16 patients (Table 1).

After surgical correction, the patients were hospitalized for at least five days, following the protocols: rigid fixation was applied for two weeks, and afterwards the patients wore light elastics for another two weeks. All patients underwent clinical assessment and postoperative CBCT radiological evaluation six months after the treatment to evaluate the success of the surgical procedure.

Afterwards, in the postoperative QoL assessment, patients were again given the OHIP-14 questionnaire for disease-specific measurements, now with three additional questions based on orthognathic surgery results. Rustemeyer et al. [13] added questions highly specific to orthognathic surgery to the OHIP-14 questionnaire (Table 3). Three additional questions (AD-1 to AD-3) concern chewing function, aesthetics, and post-operative loss of sensitivity.

To summarize, every patient was given the OHIP-14 questionnaire pre- and six months postoperatively, and AD-1 to AD-3 questions postoperatively only.

Statistical analysis was performed using the Statistical Package for Social Sciences, Version 18.0 (SPSS Inc., Chicago, IL, USA). The Kolmogorov–Smirnov test was performed to determine if the samples were normally distributed. Differences between pre and postoperative data and correlations between variables were calculated by the Wilcoxon signed-rank test, and differences between the groups were calculated by using the independent sample t-test. Differences were considered significant for $p < 0.05$.

RESULTS

All 30 patients involved in this study had successful surgical outcomes without complications. Surgical correction of class III deformities provided a significant improvement independent of the type of surgery and the severity of the orofacial deformity, as well as gender and age.

Psychological preoperative assessment and the QoL showed no significant differences between the scores obtained by females and males, of different ages or comparing patients treated by mono- or bimaxillary surgery.

Results of the psychological assessment showed that all patients had at least one negative response. Nevertheless, only 26.67% of patients had more than 50% of negative responses – Group 1, in the initial psychological assessment, which suggests risk of BDD. However, high percentage (73.33%) of patients had more than 50% of positive responses – Group 2.

Table 4. Pre- and post-surgical mean item scores and correlation of changes

Item	Short description	Pre-operative mean ± SD	range	Post-operative mean ± SD	range	WSR Z-value	WSR p-value
OH-1	Trouble pronouncing words	1.3 ± 1.23	0–4	0.86 ± 1.1	0–4	-1.99[a]	0.046*
OH-2	Problem sensing taste	0.16 ± 0.38	0–1	0.43 ± 0.81	0–3	-1.9[b]	0.057
OH-3	Painful aching	0.8 ± 0.92	0–3	0.7 ± 1.08	0–4	-0.61[a]	0.54
OH-4	Uncomfortable to eat	1.5 ± 1.28	0–4	1.13 ± 1.33	0–4	-1.25[a]	0.21
OH-5	Self-conscious	0.86 ± 1.1	0–4	0.76 ± 1.25	0–4	-0.35[a]	0.72
OH-6	Feeling tense	0.7 ± 0.95	0–3	0.46 ± 0.86	0–3	-1.38[a]	0.166
OH-7	Unsatisfactory diet	0.46 ± 0.73	0–3	0.33 ± 0.6	0–2	-1.07[b]	0.28
OH-8	Interrupted meals	0.9 ± 0.92	0–3	0.63 ± 1.09	0–4	-1.33[b]	0.18
OH-9	Difficulty to relax	0.66 ± 0.84	0–3	0.56 ± 0.89	0–3	-0.61[b]	0.54
OH-10	Feeling embarrassment	0.9 ± 0.92	0–3	0.80 ± 1.21	0–4	-0.36[b]	0.72
OH-11	Agitated around people	0.43 ± 0.62	0–2	0.5 ± 0.82	0–3	-0.57[b]	0.56
OH-12	Working difficulties	0.7 ± 0.98	0–3	0.6 ± 1	0–3	-0.32[a]	0.74
OH-13	Less satisfying life	0.13 ± 0.43	0–2	0.16 ± 0.46	0–2	-0.26[a]	0.79
OH-14	Totally unable to function	0.66 ± 0.92	0–3	0.56 ± s0.49	0–2	-0.61[a]	0.54

WSR – Wilcoxon signed-rank test; SD – standard deviation;
[a]based on positive rank;
[b]based on negative rank;
*statistically significant at p < 0.05

Table 5. Differences in post-surgical scores of quality of life between patients with and without low score on the initial psychological assessment

Item	Description	Group 1 Mean ± SD	Group 2 Mean ± SD	p-value
OH-1	Trouble pronouncing words	1.05 ± 1.23	0.5 ± 0.7	0.13
OH-2	Problem sensing taste	0.6 ± 0.94	0.1 ± 0.31	0.041*
OH-3	Painful aching	0.4 ± 0.69	0.85 ± 1.22	0.21
OH-4	Uncomfortable to eat	1.2 ± 1.43	1 ± 1.15	0.68
OH-5	Self-conscious	1 ± 1.45	0.3 ± 0.48	0.062
OH-6	Feeling tense	0.6 ± 0.99	0.2 ± 0.42	0.13
OH-7	Unsatisfactory diet	0.2 ± 0.42	0.4 ± 0.68	0.4
OH-8	Interrupted meals	0.2 ± 0.43	0.6 ± 0.98	0.13
OH-9	Difficulty to relax	0.9 ± 1.25	0.1 ± 0.31	0.33
OH-10	Feeling embarrassment	0.75 ± 1.01	0.2 ± 0.42	0.013*
OH-11	Agitated around people	1.1 ± 1.37	0.2 ± 0.42	0.047*
OH-12	Working difficulties	0.7 ± 0.92	0.1 ± 0.31	0.013*
OH-13	Less satisfying life	0.75 ± 1.11	0.3 ± 0.67	0.015*
OH-14	Totally unable to function	0.25 ± 0.55	0 ± 0	0.056
AD-1	Discomfort while chewing	1.2 ± 1.11	1 ± 1.22	0.685
AD-2	Dissatisfying aesthetics	0.9 + 1.01	0.1 + 0.42	0.33
AD-3	Hypoesthesia	0.4 ± 0.69	0.85 ± 0.48	0.21

Group 1 – with low score in the initial psychological assessment; Group 2 – with satisfactory score in the initial psychological assessment; SD – standard deviation;
*statistically significant at p < 0.05

Pre- and post-surgical QoL scores showed positive correlation ranks for the following items: OH-1 (trouble pronouncing words), OH-3 (painful aching), OH-4 (uncomfortable with eating), OH-5 (self-consciousness), OH-6 (feeling tense), OH-12 (working difficulties), OH-13 (less satisfying life), OH-14 (totally unable to function). While items OH-2 (problem with sense of taste), OH-7 (unsatisfactory diet), OH-8 (interrupted meals), OH-9 (difficulty to relax), OH-10 (feeling embarrassment), and OH-11 (being agitated around people) showed negative correlation ranks. Only item OH-1 (trouble pronouncing words) showed statistically significant correlation before and after surgery (Figure 1, Table 4).

Comparison of postoperative QoL between the groups 1 and 2 (psychological assessment) showed significant differences. The statistical differences were noted in items OH-2 (problem with sense of taste), OH-10 (feeling embarrassment), OH-11 (agitated around people), OH-12 (working difficulties), OH-13 (less satisfying life). We have to emphasize that items concerning social disability OH-10, OH-12, and OH-13 showed significantly higher scores in patients with poor psychological assessment with p = 0.013*, p = 0.013*, and p = 0.015*, respectively (Figure 2, Table 5). No significant differences were noticed between the two groups regarding additional questions specific to orthognathic surgery AD-1 to AD-3.

DISCUSSION

In accordance with the hypothesis, this research aimed to evaluate the impact of psychological issues on postoperative QoL in patients who had successful surgical correction of class III deformities. Orthognathic surgery intends to improve the functional and aesthetic problems of class III deformities, as well as their psychological impact, with the help of tools such as OHIP-14. In general, the findings of this prospective study indicated that surgical procedures improved the QoL in all of the patients, as was previously observed by other authors in similar researches [3, 5–11, 14, 15]. Tan et al. [15] found that psychological well-being and social function are improved after orthognathic surgery, independent of the skeletal pattern of deformity and gender. Our findings suggest that general improvement in well-being is achieved regardless of severity of deformity or gender.

Pre- and post-surgical QoL assessment showed that only item OH-1 (trouble pronouncing words) showed a statistically significant correlation before and after surgery (Table 4). This implies that resolving phonetic problems made an important difference that improved QoL significantly.

In this study, results showed that 26.67% of patients had more than 50% of negative responses – Group 1 in the initial psychological assessment, which suggests the risk of BDD. These are the patients who would be advised to undergo additional psychological support treatment. Nevertheless, a high percentage (73.33%) of patients had more than 50% of positive responses – Group 2, which suggests that these patients would not need to be referred to additional psychological support treatment. Although orthognathic surgery corrections improve the QoL in patients with negative psychological scores, the improvements

are lesser, compared to the other group, especially in the domain of social disability.

Comparison of postoperative QoL between the groups showed significant differences in items OH-2 (problem with sense of taste), OH-10 (feeling of embarrassment), OH-11 (agitated around people), OH-12 (working difficulties), OH-13 (less satisfying life). With the highlight of the social disability items OH-10, OH-12, OH-13, with p = 0.013*; 0.013*; 0.015* respectively, as the ones with the strongest statistical differences. This implies that even though the surgical results were similar, patients with good psychological scores (Group 2) felt less embarrassed, were not as agitated around others, did not have as many difficulties at work, and overall had a much more satisfying life after surgery.

Consistent with our results, other authors have also found patients with negative psychological scores less improved after surgery [10, 11, 15]. This indicates that improvements in social QoL should be considered as an independent measure of success after orthognathic surgery, in addition to improvements in oral function and facial aesthetics [15–18].

This study has practical implications as results confirm that initial psychological assessment is related to orthognathic patients QoL after surgery [13]. This multidimensional problem cannot be assessed by a single score because each dimension is associated with a specific postoperative outcome [12]. However, some patients may experience good QoL despite a severe deformity, while others experience lower QoL with mild orofacial deformity [19]. In favor of our findings, a recent review by Cremona et al. [2] implied that psychological and social domains improved after orthognathic surgery, but QoL can temporarily deteriorate during the pre-surgical phase, so they advised that a standardized assessment tool needed to be developed to assess the QoL changes. Nevertheless, sometimes the variables for the assessment of postoperative improvement in QoL do not provide an objective representation. Therefore, preoperative psychological assessment is of great importance to estimate the psychological profile of concern – patients with low psychological scores – and refer them to further psychological support, so that the overall treatment would achieve better QoL.

CONCLUSION

Patients with lower preoperative psychological scores experienced lesser improvement in QoL, particularly in the domain of social disability, suggesting that psychological treatment of these patients could further improve the beneficial effects of orthognathic surgery on postoperative QoL.

Conflict of interest: None declared.

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Квалитет живота у корелацији са преоперативном психолошком проценом код хируршки лечених пацијената са деформитетима III скелетне класе

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САЖЕТАК

Увод/Циљ Квалитет живота пре и после мономаксиларне и бимаксиларне хирургије може да варира од пацијента до пацијента у зависности од резултата психолошке процене. Циљ овог истраживања био је да се упореди квалитет живота пре и шест месеци после хируршке интервенције, у корелацији са претхируршком психолошком проценом пацијената са деформитетима III класе, под претпоставком да пацијенти са лошијим резултатима психолошке процене могу имати нижи квалитет живота после операције, упркос успешним резултатима лечења.

Методе У ову проспективну студију укључено је 30 пацијената (19 жена и 11 мушкараца). Психолошка процена извршена је пре хируршког захвата, док је процена квалитета живота извршена пре и после хируршког захвата. Урађена је статистичка анализа података у стандардизованом програму Статистички пакет за социолошке науке – *SPSS*.

Резултати Свеукупан квалитет живота значајно се побољшао после операције код свих пацијената. Хируршка корекција деформитета III класе дала је значајно побољшање независно од врсте операције и тежине орофацијалног деформитета, као и од пола и старости. Постојале су значајне разлике у постхируршким оценама квалитета живота између пацијената који су имали позитивну и негативну психолошку процену, а тичу се социолошких потешкоћа ($p < 0,05$).

Закључак Пацијенти са негативнијом преоперативном психолошком проценом имали су мање побољшање у квалитету живота, посебно у домену социолошких потешкоћа. Може се истаћи да би психолошки третман тих пацијената додатно могао побољшати добре ефекте ортогнатске хирургије на постоперативни квалитет живота.

Кључне речи: квалитет живота; моно–бимаксиларна хирургија; деформитети скелета