



Original Research

Changes in Oral Health-related Quality of Life before and after Orthognathic Surgery and Predictors of Outcome

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ABSTRACT

Aim: There is good evidence that orthognathic surgery improves quality of life (QoL), but it is uncertain whether QoL outcomes differ for patients with different dentofacial deformities. The aim of this study was to (i) assess changes in QoL before and after orthognathic surgery; (ii) compare QoL between deformity classes; and (iii) establish predictors of QoL.

Methods: This was a prospective, longitudinal, observational study of adult patients seeking orthognathic treatment. Patients were classified into class II or class III dentofacial deformities. The paired *t*-test was used to compare Orthognathic Quality of Life Questionnaire (OQLQ) scores before and after surgery, and multivariable linear regression was used to identify predictors of post-operative OQLQ score.

Results: Of the 50 participants, 36 (72%) were female, and the average age was 29.9 ± 4.2 years. Overall and domain OQLQ scores were significantly lower after surgery ($p < 0.0001$). The mean change in QoL score was significantly greater for class II patients ($p = 0.003$). Age and baseline OQLQ score were significantly associated with post-operative OQLQ score.

Conclusions: This study confirms that orthognathic surgery has a very positive impact on QoL. The novel finding that age and baseline QoL predict subsequent QoL outcomes paves the way for targeted interventions in specific patients.

Keywords: Dentofacial deformity; Orthognathic Quality of Life Questionnaire (OQLQ); orthognathic surgery; quality of life.

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INTRODUCTION

Orthognathic treatment describes the correction of dentofacial deformities and malocclusion with combined orthodontic and surgical management.^[1] Usually, patients undergo pre-surgical orthodontic treatment to achieve correct occlusion through cephalometric prediction, surgery to correct the facial profile, and post-surgical treatment to maintain the final occlusion and its long-term stability.^[2, 3] Using this comprehensive orthodontic and surgical approach to achieve the desired clinical outcomes of harmonizing the occlusion, improving jaw function and esthetics, and ensuring long-term stability takes month to years.^[2] This lengthy treatment process – and its cost - can have a psychosocial impact on patients,^[4] who already suffer from the psychosocial morbidity of their dentofacial deformity; indeed, many patients do not even want to undergo treatment.^[5] When discussing and planning the management of orthognathic treatment with patients, it is therefore necessary to have a sound evidence base of treatment efficacy based not only on clinical metrics but also in terms of how the treatment will affect the patient's overall wellbeing, i.e., their quality of life (QoL).^[6, 7]

The Orthognathic Quality of Life Questionnaire (OQLQ) was developed just over twenty years ago to measure QoL changes in patients with dentofacial deformities undergoing orthognathic surgery,^[8, 9] and it remains the only questionnaire for this purpose.^[10] As a result, it has been used extensively in observational studies evaluating the impact of orthognathic surgery on the QoL of patients with dentofacial deformities, with recent systematic reviews and meta-analyses confirming the generally positive impact of the procedure.^[11-13] Although Arabic versions of the OQLQ had previously been used to assess QoL before or after surgery in patients in Middle East and North African (MENA) countries,^[14-20] none of these studies performed formal psychometric evaluations of the translated versions. We therefore recently validated an Arabic version of the OQLQ developed using an established method of translation and back-translation by bilinguals with subsequent consultation with professionals, and it showed excellent internal consistency (Cronbach's α 0.92) and test-retest reliability, paving the way for OQLQ studies in Arabic-speaking nations that are comparable to the published literature.^[21] With our new validated tool in hand, we sought not only to confirm that QoL improves after orthognathic surgery but also explore two knowledge gaps in the field: first, whether there are differences in QoL outcomes in patients with class II and class III dentofacial deformities; and second, establish whether there were any baseline predictors of post-operative QoL in patients undergoing orthognathic surgery. The null hypotheses were that orthognathic surgery would not improve the QoL of recipients, that there would be no differences in QoL in patients with class II and class III dentofacial deformities, and that there are no baseline (pre-operative) predictors of post-operative outcomes.

To this end, this study aimed to (i) assess changes in QoL before and after orthognathic surgery; (ii) compare QoL between deformity classes; and (iii) establish predictors of QoL, since this could identify specific areas or populations for improvement in management or counselling.

MATERIALS AND METHODS

Study design, participants, and ethical approval

This study is reported according to the STROBE statement for cohort studies.^[22] This was a prospective, longitudinal study of adult patients (>18 years) seeking orthognathic treatment for moderate to severe

malocclusions. Other inclusion criteria were agreement to participate and mentally competent to complete a questionnaire. Exclusion criteria were cleft lip or palate, a temporomandibular disorder, or previous treatment for trauma. The Institutional Review Board of [redacted for peer review] approved the study protocol. All participants were fully informed of the study protocol and provided written informed consent. Based on power analysis and using α level of 0.05 and 80% power and effect size equal to 0.6, a minimum of 19 subjects was required in total to assess before and after treatment changes.

Recruitment was carried out between January 2021 and December 2022 in a private orthodontic practice in the city of Jeddah, Saudi Arabia. All patients who were planned for orthognathic treatment during this period and agreed to participate in the study were recruited. All surgeries were performed by the same team. Each patient was invited to complete a questionnaire that included basic information about the reasons for surgery, the Orthognathic Quality of Life Questionnaire (OQLQ; see below), and four questions asking to what extent pain/discomfort, chewing, appearance, and speaking had been affected by the surgery on a four-point Likert scale of “a lot worse”, “no change”, “a little better”, or “a lot better”. Patients were asked to complete the questionnaire before starting treatment and at follow-up a minimum of six month after surgery.

Patients were classified into class II or class III dentofacial deformities based on cephalometric evaluation. A cephalostat was used to position the subjects with a natural head position, teeth in centric occlusion, and lips relaxed. Dolphin Image Management Solutions 11.9 software was used to trace and analyze cephalometric radiographs. The ANB angle was used to define skeletal jaw discrepancies (**Figure 1**). Cases with angles greater than 4° were classified as class II, while cases with ANB angles $<0^\circ$ were classified as class III.

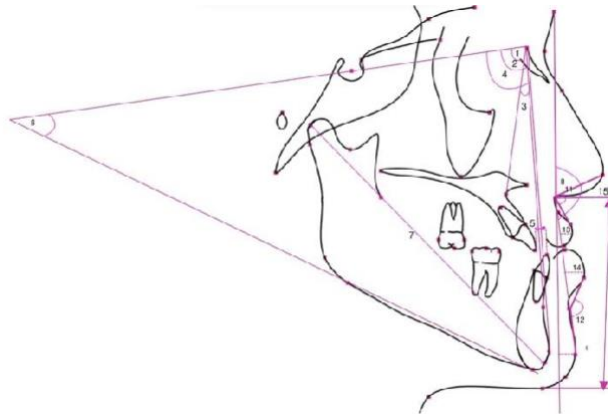


Figure 1. The cephalometric measurements employed in the study. (1) SNA, (2) SNB, (3) ANB, (4) facial angle (SN-NPog), (5) OJ, (6) mandibular plane angle (SN-MP), (7) mandibular length (Co-Gn), (10) lower face height (Sn- Me’).

The Orthognathic Quality of Life Questionnaire (OQLQ)

The OQLQ instrument comprises 22 items and is divided in four dimensions: social aspect of dentofacial deformity (eight items); facial aesthetics (five items); oral function (five items); and awareness of dentofacial aesthetics (four items).^[8, 9] The items are rated on a four-point Likert scale, and the total score ranges from 0 to 88. A higher score indicates lower quality of life.^[8, 9] This study used our recently validated Arabic version of

the OQLQ, which was developed using translation and back-translation by bilinguals with subsequent consultation with professionals and showed excellent internal consistency (Cronbach's α 0.92) and test-retest reliability (see Appendix and [21]).

Statistical analysis

Data were analyzed using SPSS v22 (IBM Statistics, Chicago, IL). Normality of continuous data was assessed with the Shapiro Wilk test. Means \pm standard deviation (SD) are presented for quantitative data. The paired Student's *t*-test was used to compare QoL scores before and after surgery, and one-way ANOVA was used to compare differences in overall OQLQ scores according to perceived changes in appearance, pain, chewing, and speaking after surgery. Multivariable linear regression was used to identify predictors of post-operative overall OQLQ QoL score. A *p*-value <0.05 was considered statistically significant.

RESULTS

Baseline characteristics of the study population

The baseline characteristics of the study population are shown in **Table 1**. Of the 50 participants, 36 (72%) were female, and the average age was 29.9 ± 4.2 years (range 23 – 39). Patients were seeking treatment due to concerns with orofacial appearance, confidence, and sometimes function, which necessitated a range of surgical solutions to one or both jaws (80% of cases).

Table 1. Baseline characteristics of the study population (n=50).

| Variable | | Frequency | Percent |
|---|---------------------------|------------------------|---------|
| Sex | Male | 14 | 28 |
| | Female | 36 | 72 |
| Age (Years) | Mean \pm SD (range) | 29.9 \pm 4.2 (23-39) | |
| Skeletal classification of deformity based on ANB | Class II | 28 | 56 |
| | Class III | 22 | 44 |
| Facial type | Mesocephalic | 18 | 36 |
| | Brachycephalic | 3 | 6 |
| | Dolichocephalic | 18 | 36 |
| No. jaws operated on | One jaw | 2 | 4 |
| | Both jaws | 40 | 80 |
| Reasons for surgery | Appearance | 10 | 20 |
| | Function | 2 | 4 |
| | Confidence | 1 | 2 |
| | Appearance and function | 2 | 4 |
| | Appearance and confidence | 11 | 22 |
| | Function and confidence | 1 | 2 |
| | All | 14 | 28 |

Changes in OQLQ item scores before and after surgery

Changes in OQLQ before and after surgery for patients with class II and class III deformities are shown in **Table 2**. For both groups of patients, overall OQLQ scores were significantly lower after surgery than before surgery (for class II, 39.3 ± 23.2 before surgery to 13.3 ± 13 after surgery, $p < 0.0001$; for class III, 32.8 ± 19.2 before surgery to 13.3 ± 15 after surgery, $p < 0.0001$). These decreases were also apparent across all four QoL domains of social impediment, facial esthetics, oral function, and awareness of dentofacial deformity (all $p < 0.0001$; see **Table 2**).

Table 2. Changes in OQLQ item scores before and after surgery.

| | Class II (n=28) | | | Class III (n=22) | | |
|------------------------------------|---------------------------------------|--------------------------------------|-------------------|---------------------------------------|--------------------------------------|-------------------|
| | Before surgery, mean \pm SD (range) | After surgery, mean \pm SD (range) | p-value | Before surgery, mean \pm SD (range) | After surgery, mean \pm SD (range) | p-value |
| Overall | 39.3 ± 23.2 (7 - 80) | 13.3 ± 13 (0 - 50) | <0.0001 | 32.8 ± 19.2 (3 - 80) | 13.3 ± 15 (0 - 50) | <0.0001 |
| Social aspects of deformity | 13.2 ± 10.5 (2 - 32) | 2.7 ± 3.1 (0 - 13) | <0.0001 | 10.5 ± 7.3 (2 - 30) | 2.1 ± 3.1 (0 - 8) | <0.0001 |
| Facial esthetics | 11.5 ± 5.9 (2 - 20) | 4.4 ± 4.2 (0 - 7) | <0.0001 | 11.7 ± 5.4 (2 - 20) | 3.5 ± 4.0 (0 - 10) | <0.0001 |
| Oral function | 7.9 ± 5.3 (1 - 20) | 2.8 ± 2.2 (0 - 7) | <0.0001 | 8.7 ± 5.0 (1 - 16) | 2.7 ± 3.4 (0 - 10) | <0.0001 |
| Awareness of dentofacial deformity | 7.5 ± 4.0 (1 - 14) | 2.7 ± 3.6 (0 - 11) | <0.0001 | 7.5 ± 4.2 (1 - 14) | 3.1 ± 3.7 (0 - 14) | <0.0001 |

The mean change in overall QoL score was -26 ± 6.8 for patients with class II deformities and -19.5 ± 7.5 for patients with class III deformities, which was significantly different ($p = 0.003$).

Patients were also asked to state to what extent pain/discomfort, chewing, appearance, and speaking had been affected by the surgery (on a Likert scale of a lot worse, no change, a little better, or a lot better). Overall OQLQ scores were significantly higher in patients perceiving that their appearance (one-way ANOVA, $p=0.02$), speaking (one-way ANOVA, $p=0.02$), and pain (one-way ANOVA, $p<0.001$) but not chewing (one-way ANOVA, $p=0.31$) had got worse after surgery (**Table 3**).

Table 3. Differences in overall OQLQ QoL scores according to perceived changes in appearance, pain, chewing, and speaking after surgery.

| Self-assessed xxx | | Overall QoL |
|--------------------------|-----------------|------------------|
| Appearance after surgery | A lot worse | 17.4 ± 13.2 |
| | No change | 18.8 ± 6.4 |
| | A little better | 6.5 ± 8.9 |
| | A lot better | 9.0 ± 2.8 |
| | p-value | 0.02 |
| Speaking after surgery | A lot worse | 21.0 ± 16.3 |
| | No change | 7.4 ± 13.5 |
| | A little better | 18.0 ± 4.2 |
| | A lot better | 10.0 ± 2.6 |
| | p-value | 0.02 |
| Pain after surgery | A lot worse | 22.5 ± 17.5 |
| | No change | 21.4 ± 13.3 |
| | A little better | 2.9 ± 1.4 |
| | A lot better | 12.8 ± 5.9 |
| | p-value | <0.001 |
| Chewing after surgery | A lot worse | 19.8 ± 17.4 |
| | No change | 10.8 ± 15.2 |
| | A little better | 10.0 ± 0.0 |
| | A lot better | 9.0 ± 2.8 |
| | p-value | 0.31 |

Predictors of post-operative QoL

We next sought to establish whether any baseline demographic or clinical variables predicted post-operative quality of life (**Table 4**). In a multivariable linear regression model including sex, age, baseline overall OQLQ score, and type of deformity as independent variables, age (B=0.865, 95%CI 0.026-1.704; p=0.044) and baseline overall OQLQ score (B=0.271, 95%CI 0.111-0.431; p=0.001) were positively and significantly associated with post-operative overall OQLQ score, i.e., older age and poorer QoL prior to surgery were associated with worse post-operative QoL outcomes. The type of deformity (class II or class III) was not significantly associated with post-operative QoL.

Table 4. Multivariable linear regression to identify independent predictors of QoL after surgery.

| Model | Unstandardized Coefficients | | Significance | 95.0% Confidence Interval for B | |
|--------------------|-----------------------------|------------|--------------|---------------------------------|-------------|
| | B | Std. Error | | Lower Bound | Upper Bound |
| Constant | -6.254 | 14.895 | 0.677 | -36.255 | 23.746 |
| Sex | -8.666 | 4.428 | 0.057 | -17.585 | 0.253 |
| Age | 0.865 | 0.417 | 0.044 | 0.026 | 1.704 |
| Baseline QoL score | 0.271 | 0.080 | 0.001 | .111 | 0.431 |
| Type of deformity | -2.446 | 4.030 | 0.547 | -10.563 | 5.671 |

DISCUSSION

The purpose of this study was to (i) assess changes in QoL before and after orthognathic surgery; (ii) compare QoL between deformity classes; and (iii) establish predictors of QoL, since this could identify specific areas for improvement in management or counselling. This analysis provides new, quantitative evidence – using the validated Arabic version of the OQLQ – that orthognathic surgery improves the QoL of patients, that this improvement depends on the type of deformity, and that age and baseline QoL predict subsequent post-operative QoL outcomes. The cohort represented a range of clinical presentations and motivations for undergoing orthognathic treatment and, confirming the results of previous studies, showed an overall positive effect on QoL from surgery, with a mean improvement of 26-points for class II deformities and 19.5 for class III deformities, similar to the mean difference of 20 OQLQ points resulting from treatment reported in a previous meta-analysis.^[11] However, in contrast to previous studies,^[16, 23-25] the QoL change after the procedure was greater for patients with class II deformities than those with class III deformities, although deformity class was not significantly associated with post-operative QoL outcomes in multivariable analysis.

The OQLQ was developed just over twenty years ago to measure QoL changes in patients with dentofacial deformities undergoing orthognathic surgery,^[8, 9] and it remains the only dedicated questionnaire for this purpose.^[10] As a result, it has been used extensively in observational studies evaluating the impact of orthognathic surgery on the QoL of patients with dentofacial deformities. This study adds to a body of evidence from the MENA region showing that orthognathic treatment improves QoL. Previous studies from Saudi Arabia,^[14] Kuwait,^[15] Morocco,^[16] Egypt,^[20] and Jordan^[17] all found that OQLQ total and subdomain scores improved after orthognathic surgery. Other comparisons using the OQLQ in the MENA region included a report of higher OQLQ scores in Jordanian patients with post-surgical temporomandibular disorders.^[19]

Relatively few studies have examined diagnostic group-specific differences in QoL after surgery. In contrast to three other studies that used the OQLQ to examine difference in QoL in class II and class III patients after surgery,^[23-25] this study detected a greater quantitative improvement in QoL for patients with class II deformities than those with class III deformities. All three papers, similar to our study design, administered the OQLQ approximately six months after surgery and, in all cases, saw greater improvements in overall OQLQ in class III patients than in class II patients. The reasons for these differences between studies are unclear but are likely to be due to the relatively small number of patients in each subgroup in the current analysis and because,

unusually, our class III cohort had slightly better pre-operative QoL than the class II group (post-operative QoL was the same in both groups). Class III patients are known to feel significantly less attractive, report higher attention and insecurity regarding their physical appearance, and report higher depression scores than class II patients.^[26-29] Therefore, regardless of whether the dynamics of QoL changes differ according to dentofacial deformity, practitioners must still be aware that class III patients may carry a greater psychosocial burden and factor this into joint decision-making, noting that QoL outcomes are still excellent for the class III subgroup. Furthermore, in multivariable analysis, deformity class was not significantly associated with post-operative QoL outcomes, with the QoL score a more important and significant predictor of a positive clinical result. In addition, the differences might be explained by the relatively short follow-up period of six months. Patients might need longer period to adjust to their new appearance following orthognathic treatment.

Studies of associations between occlusal/skeletal and patient-specific traits and pre-operative QoL in patients preparing for orthognathic surgery have shown that females are more severely impacted by their facial deformity and the size of overjet is associated with poorer pre-operative QoL.^[30] We detected no sex-specific difference in QoL. There have been relatively few studies examining predictors of post-operative QoL in patients undergoing orthognathic surgery. Gabardo et al. examined a similar population of 102 patients undergoing orthognathic surgery and completing the abbreviated World Health Organization Quality of Life questionnaire (WHOQOL-BREF) one week before and six months after surgery and determined that, in contrast to our data, older age (individuals aged ≥ 30 years; along with female sex and polymorphisms in *ANKKI*) was related to a positive impact on QoL.^[31] Similarly, Brunault et al. reported that younger age and depression were both associated with a lower physical and psychological QoL (also assessed with the WHOQOL-BREF).^[32] Conversely, using the Japanese version of the Oral Health Impact Profile (OHIP-J54) before and six months after surgery, Kurabe et al. found that older patients (aged ≥ 23 years) had significantly higher postoperative scores (i.e., worse QoL) than younger patients.^[33] Using the OQLQ, Sun et al. found that postoperative OQLQ total scores were higher in older patients than in younger patients.^[25] We similarly found that older age was associated with worse post-operative QoL outcomes. The reasons for these differences in results in different studies are unclear, and it is difficult to directly compare the results of studies using different instruments to assess QoL. However, it is certainly possible that age does impact self-perception, since QoL is a dynamic construct influenced by personal adaptation, coping, expectancy, optimism, self-control, and self-concept, all of which change over time.^[34] Further work is needed to confirm the direction of the effect of age on QoL outcomes after orthognathic surgery.

Our finding that higher pre-operative OQLQ scores were associated with higher OQLQ scores after surgery suggests that patients experiencing poor QoL at the start of their treatment journal may be relatively resistant to therapy. To our best knowledge, this is the first explicit description of pre-operative QoL predicting post-operative QoL outcomes, and, if validated independently, would suggest that patients with very high OQLQ scores might require additional counseling, psychological input, or intervention to improve or manage patient expectations. Furthermore, a better QoL after surgery was associated with perceived improvements in speaking, pain, and appearance after surgery - but not chewing - consistent with the motivation for many patients being esthetic and psychosocial rather than functional.

This study has several limitations. The sample size was relatively small, which may have underpowered the subgroup (class II and III) analysis. Furthermore, the sex distribution was unbalanced, with a greater number of females than males, which may have biased the results. QoL was not measured throughout the treatment trajectory, so the influence of the orthodontic management on the overall QoL outcome could not be determined. Patients cited appearance, function, and confidence as reasons for surgery, but these were not considered as separate groups in the analysis due to the small sample sizes. Finally, the sample was taken from one private practice in Saudi Arabia and therefore may not be representative of the wider population.

In conclusion, this study confirms that orthognathic surgery and management generally have a very positive impact on QoL. The finding that age and baseline QoL predict subsequent post-operative QoL outcomes paves the way for targeted interventions in specific subgroups of patients to address specific concerns and manage expectations to ultimately improve their QoL.

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Nil.

CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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AUTHOR CONTRIBUTIONS

SHA conceived and conducted the study, analyzed the data, and wrote the paper.

REFERENCES

1. Khechoyan, D.Y., 2013, August. Orthognathic surgery: general considerations. *Semin Plastic Surg* (Vol. 27, No. 03, pp. 133-136). Thieme Medical Publishers.
2. Rizzato SM, de Menezes LM, da Cunha Filho JJ, Allgayer S. Conventional surgical-orthodontic approach with double-jaw surgery for a patient with a skeletal Class III malocclusion: Stability of results 10 years posttreatment. *Am J Orthod Dentofacial Orthop*. 2018 Jul 1;154(1):128-39.
3. Sabri R. The role of orthodontics, orthognathic surgery and adjunct surgical procedures in the esthetic rehabilitation of the face and smile: potential and limitations. *Semin Orthod* 2023 Sep 1 (Vol. 29, No. 3, pp. 300-307). WB Saunders.
4. Agou S, Locker D, Streiner DL, Tompson B. Impact of self-esteem on the oral-health-related quality of life of children with malocclusion. *Am. J. Orthod. Dentofacial Orthop*. 2008;134(4):484-9.
5. Myrberg N, Thilander B. Orthodontic need of treatment of Swedish schoolchildren from objective and subjective aspects. *Scand. J. Dent. Res*. 1973;81(2):81-4.

6. O'Brien K, Kay L, Fox D, Mandall N. Assessing oral health outcomes for orthodontics--measuring health status and quality of life. *Community Dent. Health.* 1998;15(1):22-6.
7. Phillips C. Patient-centered outcomes in surgical and orthodontic treatment. *Semin Orthod* 1999 Dec 1 (Vol. 5, No. 4, pp. 223-230). WB Saunders.
8. 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 Jun;28(3):195-201.
9. 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 Apr;30(2):81-90.
10. Kanatas AN, Rogers SN. A systematic review of patient self-completed questionnaires suitable for oral and maxillofacial surgery. *Br J Oral Maxillofac Surg.* 2010 Dec 1;48(8):579-90.
11. 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.
12. Li X, Zheng W, Zhang X, Zhang Y. Meta-analysis of outcomes related to the quality of life after orthodontic-surgical treatment. *Adv Clin Exp Med.* 2023;32(10):1099-111.
13. Zamboni R, de Moura FR, Brew MC, Rivaldo EG, Braz MA, Grossmann E, Bavaresco CS. Impacts of Orthognathic Surgery on Patient Satisfaction, Overall Quality of Life, and Oral Health-Related Quality of Life: A Systematic Literature Review. *Int J Dent.* 2019;2019(1):2864216.
14. Abdullah WA. Changes in quality of life after orthognathic surgery in Saudi patients. *Saudi Dent J.* 2015;27(3):161-4.
15. Al-Asfour A, Waheedi M, Koshy S. Survey of patient experiences of orthognathic surgery: health-related quality of life and satisfaction. *Int. J. Oral Maxillofac. Surg.* 2018;47(6):726-31.
16. Elmouden L, Ousehal L. Assessment of the Quality of Life in Moroccan Patients Undergoing Orthognathic Surgery. *Turk J Orthod.* 2018;31(3):79-85.
17. Al-Ahmad HT, Al-Sa'di WS, Al-Omari IK, Al-Bitar ZB. Condition-specific quality of life in Jordanian patients with dentofacial deformities: a comparison of generic and disease-specific measures. *Oral Surg Oral Med. Oral Pathol. Oral Radiol. Endod.* 2009;107(1):49-55.
18. Al-Bitar ZB, Al-Omari IK, Al-Ahmad HT, El Maaytah MA, Cunningham SJ. A comparison of health-related quality of life between Jordanian and British orthognathic patients. *Eur J Orthod.* 2009;31(5):485-9.
19. Al-Ahmad HT, Al-Bitar ZB. The effect of temporomandibular disorders on condition-specific quality of life in patients with dentofacial deformities. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2014;117(3):293-301.
20. Hanafy M, Abou-Elfetouh A, Mounir RM. Quality of life after different approaches of orthognathic surgery: a randomized controlled study. *Minerva Stomatol.* 2019;68(3):112-7.
21. Agou SH. Validation of the Arabic version of the Orthognathic Quality of Life Questionnaire. medRxiv. 2024:2024-01.

22. von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453-7.
23. Duarte V, Zaror C, Villanueva J, Werlinger F, Vidal C, Sole P, et al. Changes in health-related quality of life after orthognathic surgery: a multicenter study. *Clin. Oral Investig*. 2022;26(4):3467-76.
24. 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.
25. Sun H, Shang HT, He LS, Ding MC, Su ZP, Shi YL. Assessing the Quality of Life in Patients With Dentofacial Deformities Before and After Orthognathic Surgery. *J Oral Maxillofac Surg* 2018;76(10):2192-201.
26. Gerzanic L, Jagsch R, Watzke IM. Psychologic implications of orthognathic surgery in patients with skeletal Class II or Class ill malocclusion. *Int J Adult Orthod Orthognath Surg*. 2002;17(2):75-81.
27. Takatsuji H, Kobayashi T, Kojima T, Hasebe D, Izumi N, Saito I, et al. Effects of orthognathic surgery on psychological status of patients with jaw deformities. *Int J Oral Maxillofac Surg* 2015;44(9):1125-30.
28. Rivera SM, Hatch JP, Rugh JD. Psychosocial factors associated with orthodontic and orthognathic surgical treatment. *Semin Orthod* 2000 Dec 1 (Vol. 6, No. 4, pp. 259-269). WB Saunders.
29. Moon W, Kim J. Psychological considerations in orthognathic surgery and orthodontics. *Semin Orthod* 2016 Mar 1 (Vol. 22, No. 1, pp. 12-17). WB Saunders.
30. Stagles C, Popat H, Rogers S. Factors influencing patient-reported quality of life in pretreatment orthognathic surgery patients. *Angle Orthod*. 2016;86(2):331-6.
31. Gabardo M, Zielak J, Tortora 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.
32. Brunault P, Battini J, Potard C, Jonas C, Zagala-Bouquillon B, Chabut A, et al. Orthognathic surgery improves quality of life and depression, but not anxiety, and patients with higher preoperative depression scores improve less. *Int J Oral Maxillofac Surg* 2016;45(1):26-34.
33. Kurabe K, Kojima T, Kato Y, Saito I, Kobayashi T. Impact of orthognathic surgery on oral health-related quality of life in patients with jaw deformities. *Int J Oral Maxillofac Surg* 2016;45(12):1513-9.
34. Allison PJ, Locker D, Feine JS. Quality of life: a dynamic construct. *Soc. Sci. Med*. 1997;45(2):221-30.



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