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ORIGINAL ARTICLE

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Evaluation of the quality of life and the satisfaction level after reconstruction with anterior iliac crest graft and implant-supported fixed prosthesis treatment

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Abstract

Purpose: To evaluate oral health-related quality of life (OHRQoL) and satisfaction levels related to treatment in patients who have complete implant treatment and prosthetic rehabilitation after anterior iliac crest grafting.

Materials and methods: Fifty-four patients (37 F, 17 M) with a total of 487 implants placed and implant-supported fixed prosthesis treatment completed were included in the study. OHIP-14OHIP-14 scale and satisfaction Likert scale questions were used to evaluate the OHRQoL and the satisfaction levels related to the treatment applied, respectively. To compare the outcomes, the significance test and the Mann–Whitney *U*-test were used. One-way analyses of variance and Kruskal–Wallis were used to assess the significance of differences among or between the groups.

Results: The quality of life (QoL) was higher, and the mean OHIP-14 scores were lower in women, older patients, and cases with a longer follow-up period, recorded as 13.6 ± 10.3 (p: 0.263), 12.9 ± 11.3 (p: 0.079), and 11.8 ± 9.6 (p: 0.015*), respectively. Moreover, satisfaction levels of the patients related to the treatment were 83.3%.

Conclusions: The treatment of severely atrophic jaws with anterior iliac crest for the implant and prosthetic rehabilitation has a positive effect on the QoL. This effect has increased with time, and the satisfaction levels of the patients related to this procedure were high, and their expectations regarding this treatment were met at a high level.

KEYWORDS
iliac graft, implant, quality of life, reconstruction, satisfaction questionnaire

Alveolar ridge augmentation procedures are expected to increase bone height and width for implant placement, providing more favorable functional and esthetic results. Autogenous bone grafts have been considered the gold standard for biological reasons.[1] An autogenous bone graft can be cortical, cancellous, or corticocancellous depending on the donor site. Cortical bone grafts have poor integration quality due to low vascularity, although they provide more rigid fixation and less bone resorption. Corticocancellous bone grafts harvested from the iliac crest have the mechanical advantages of the cortical bone and the biological advantages of the cancellous bone.[2]

Iliac bone graft harvesting is associated with several complications including: chronic pain, hemorrhage, hematoma, seroma, sensory loss, contour defect, pathologic fracture, wound dehiscence, gain disturbance, urethral injury, adynamic ileus, and sacroiliac instability.[3] Despite the surgical morbidity associated with autogenous bone graft harvesting, the use of autogenous bone blocks from the iliac crest has some advantages, including large volume, and easy and relatively safe accessibility.[4]

The success of a dental implant is usually identified as immobility, and absence of peri-implant radiolucency, persistent pain, discomfort, or infection.[5] From this point of view, the clinical success of dental implants refers to the practitioner's operational skills and osseointegration of the implants; however, this does not infer treatment effects on patients. As these criteria are insufficient to evaluate success, patient-oriented assessments have become popular in recent years.[6,7]

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Health was defined by the World Health Organization in 1946 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[8] This statement highlighted the association between health and quality of life (QoL) and generated the term health-related QoL (HRQoL). Oral health-related QoL (OHRQoL) is a concept that includes the subjective evaluation of perceived physical, psychological, and social aspects of oral health.[9] The use of OHRQoL measures has important implications in research, public health, and clinical practice. Health measure outcomes help promote health, evaluate the effectiveness and efficiency of healthcare systems, and serve as medical audits.[10]

Assessment of OHRQoL and satisfaction levels of a patient are of great importance in evaluating posttreatment success. It is assumed that the patient is the best person to evaluate the process. Self-administered questionnaires are widely used for this purpose.[11]

The outcomes of reconstruction and implant-supported fixed prosthesis treatment are considered the most significant factors in treatment decisions, and postoperative QoL measurement provides information about the perceptions of patients. The iliac grafting procedure provides rehabilitation for patients with severely atrophic jaws, but it is a very challenging process for patients.[12] In the literature, only one study evaluated the QoL and satisfaction levels of patients who had atrophic jaws reconstructed with iliac graft.[13] Therefore, this study aimed to evaluate the OHRQoL and satisfaction levels related to treatment in patients with a severely atrophic crest who were treated with iliac bone graft and dental implants. The null hypothesis was that there will be no significant differences in OHRQoL and satisfaction level of different subgroups of patients treated with iliac bone graft and dental implants.

MATERIALS AND METHODS

Ethical approval for this study was given by the Non-interventional Clinical Researchers Ethics Board of Hacettepe University (Case number: GO 19/1040). Additionally, the study complied with the Helsinki Declaration and guidelines.

Fifty-four patients (37 F, 17 M) with a total of 487 implants placed and completed implant-supported fixed prosthesis treatment were selected for this retrospective study. The inclusion criteria were as follows: (1) 18 to 80 years of age; (2) no systemic disease or pregnancy; (3) completed treatment protocol (reconstruction, dental implant placement, loading implants that meet the success criteria defined by Albrektsson et al.,[5] and prosthetic rehabilitation); (4) patients with minimum 1-year follow-up; (5) adequate cognitive ability to understand and answer questions; and (6) no medical issues that would preclude participants from understanding the questionnaire. All participants were informed of the aims of the study, and consent was obtained regarding their voluntary participation to fill in the questionnaires.

TABLE 1 Baseline characteristics of the patients.

		n (%)
Sex	Female	**37** (68.5%)
	Male	**17** (31.5%)
Age (22–69 years) (mean-S_x: 49.72 ± 12.96)	0–35	**10** (18.5%)
	36–55	**24** (44.5%)
	56+	**20** (37%)
Follow-up period (2–7 years) (mean-S_x: 4.91 ± 1.62)	<5 years	**20** (37%)
	≥5 years	**34** (63%)
Reconstructed jaw	Single jaw	**29** (54%)
	Double jaw	**25** (46%)
Edentulism	Partial	**23** (43%)
	Total	**31** (57%)
Smoking	Yes	**20** (37%)
	No	**34** (63%)

The recorded general parameters, including sex, age, follow-up period, reconstructed jaw, edentulism, and smoking, were obtained from the archives of the department (Table 1). Three different age ranges were determined as 0 to 35, 36 to 55, and 56 years and more; the follow-up period was divided into 2 groups as lesser or equal to a 5-year follow-up and greater than a 5-year follow-up.

The Oral Health Impact Profile questionnaire, consisting of 14 questions (OHIP-14), was used to assess the OHRQoL in patients who voluntarily agreed to participate in the study when they attended their regular control appointments. The Turkish version of the OHIP-14 questionnaire (OHIP-14 TR), a reliable, valid, and comprehensible scale for measuring OHRQoL in the Turkish population, was used.[14] Patients responded to each question using a 5-point Likert scale ranging from 0 to 4. The total score ranged from 0 to 56, with lower scores indicating better OHRQoL. They then filled out a satisfaction Likert Scale Questionnaire consisting of 10 questions to assess their satisfaction levels related to the treatment. The patients responded to each question using a 3-point Likert Scale ranging from 0 to 2.

The results of the Shapiro–Wilk test, histogram, box plots, and Q–Q plots were evaluated to test the normality of the continuous data. To compare the means of two independent groups, the significance test was used for normally distributed groups, and the Mann–Whitney *U*-test was used for non-normally distributed groups. One-way analysis of variance was used when the assumptions of normality and homogeneity of variances were met for more than two independent groups, and Kruskal–Wallis analysis was used when the assumptions of variances were not met. The marginal models were carried out using package "GEE" package (Carey et al, 2015) in the R software program (R core team, 2018). GEE models were used to identify the factors affecting pocket depth, plaque index, and gingival index. The significance level was set to 0.05. Statistical analyses were performed using IBM SPSS Statistics version 23.

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TABLE 2 General parameters and overall oral health-related quality of life (OHRQoL).

			OHIP-14			
		***n* (%)**	**Min-Max**	**Mean ± S_x**	**Median (interquartile range)**	***p* Value**
Sex	Female	37 (68.5)	0–35	13.6 ± 10.3	9 (5.5–21.5)	0.263
	Male	17 (31.5)	0–45	18.8 ± 14.4	17 (7–32.5)	
Age (22–69 years) (mean-S_x: 49.72 ± 12.96)	0–35	10 (18.5)	8–42	21.9 ± 11.8	17.5 (11.75–33.5)	0.079
	36–55	24 (44.5)	0–40	14.4 ± 11.8	11.5 (4.25–21.75)	
	56+	20 (37)	0–45	12.9 ± 11.3	8.5 (4.75–17.75)	
Follow-up period (2–7 years) (mean-S_x: 4.91 ± 1.62)	<5 years	20 (37)	0–42	20.9 ± 13.3	20.5 (8.25–32.75)	0.015*
	≥5 years	34 (63)	0–45	11.8 ± 9.6	9 (4–16.25)	
Reconstructed jaw	Single jaw	29 (54)	0–45	14.6 ± 11.7	11 (6–19)	0.788
	Double jaw	25 (46)	0–42	15.9 ± 12.2	13 (7–25.5)	
Edentulism	Partial	23 (43)	3–42	16.9 ± 11.7	15 (7–23)	0.274
	Total	31 (57)	0–45	14 ± 12	11 (4–22)	

RESULTS

The demographic characteristics of the patients are summarized in Table 1. Fifty-four patients (37 female and 17 male) were divided into three groups according to age: the youngest age group included 10 patients, the middle age group included 24 patients, and the oldest age group included 20 patients. The mean age was 49.72 years (S_x ±12.96). The follow-up period was divided into 2 groups; group <5 years included 20 patients and group ≥5 years included 34 patients. The follow-up period of the patients was between 2 and 7 years, and the mean time of the implant-supported fixed prosthesis wearing was 4.91 years (S_x ±1.62).

The overall OHRQoL scores of the patients are summarized in Table 2. The median OHIP-14 score of 54 patients was 11.5. The median OHIP-14 score of female patients was 9, and that of male patients was 17. The OHIP-14 scores were lower in female patients, but the difference was not statistically significant ($p > 0.05$).

The median OHIP-14 scores of the three age groups were evaluated. The median value of the OHIP-14 scores for the 0–35 age group was 17.5; for the 36–55 age group it was 11.5; and for patients aged 56 years and over, it was 8.5. However, this difference was not statistically significant.

The relationship between the follow-up period and OHIP-14 scores was evaluated. The median OHIP-14 score of the 20 patients with a follow-up period of <5 years old was measured as 20.5. The median OHIP-14 score of the 34 patients with a follow-up period of 5 years or more was 9, and this difference was statistically significant ($p < 0.05$).

The median OHIP-14 score of the patients who underwent double-jaw reconstruction surgery (*n*: 25) was 13, and the median OHIP-14 score of the patients who underwent single-jaw reconstruction surgery (*n*: 29) was 11. No statistically significant difference was found between the reconstructed jaw and OHIP-14 scores ($p > 0.05$).

The median OHIP-14 score of completely edentulous patients (*n*: 31) was 11, whereas the median OHIP-14 score of partially edentulous patients (*n*: 23) was 15. No statistically significant difference was found between the OHIP-14 scores of the two groups ($p > 0.05$).

The answers provided by 54 patients to 10 questions in the satisfaction questionnaire (overall satisfaction levels) are summarized in Table 3. When each question was evaluated separately in terms of general parameters, no statistically significant difference was observed. These detailed results are not included in the main text; they are uploaded as a table in the Supporting Information section (Table S1).

DISCUSSION

QoL is a broad, multidimensional concept that usually includes subjective evaluations of both the positive and negative aspects of life.[15] Therefore, the evaluation of the OHRQoL is important in the clinical practice of dental research.[9]

Recent studies have reported that the OHRQoL of patients decreases with the use of conventional removable prostheses.[16,17] On the other hand, implant-supported overdentures significantly improve the OHRQoL of patients compared with conventional removable dentures.[18,19] In a previous study, Gjerde et al. evaluated the QoL and satisfaction levels of 44 Norwegian patients who had atrophic jaws reconstructed with iliac graft, and the mean OHIP-14 score was recorded as 8.4.[13] In the present study, the mean OHIP-14 score of 54 Turkish patients was 11.5. Despite the poorer OHRQoL of the patients, considerably higher satisfaction levels were obtained. This can be explained by the patients' prior oral health status, with almost no alveolar ridge to retain or support a prosthetic construction. After the treatment with iliac bone graft and dental implants, patients had

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TABLE 3 The general satisfaction levels of the patients for all treatment stages.

	Satisfied (%)	Neutral (%)	Dissatisfied (%)
Q1: Are you satisfied with your implant-supported fixed prosthesis?	83.3	5.6	11.1
Q2: Did the implant therapy fulfill your expectations?	92.5	1.9	5.6
Q3: Are you satisfied with the aesthetic result?	81.5	11.1	7.4
Q4: Are you satisfied with the information given before the treatment?	81.5	13	5.5
Q5: Considering the satisfaction level, do you think that the postoperative iliac surgery period was uncomfortable?	57.4	29.6	13
Q6: Are you satisfied with the scar at the site of iliac surgery, aesthetically?	83.3	13	3.7
Q7: Are you satisfied with the duration of the treatment (from iliac surgery to the prosthetic rehabilitation)?	68.5	11.1	20.4
Q8: Considering the satisfaction level, have you ever worried about the post-iliac surgery period?	66.7	16.7	16.6
Q9: Considering the satisfaction level, would you recommend this treatment to friends and relatives?	83.3	13	3.7
Q10: Considering the satisfaction level, would you be willing to accept this treatment again if it was indicated?	70.4	16.6	13

fixed prosthetic rehabilitation that increased their satisfaction level.

The QoL and satisfaction levels for each individual vary depending on sex, age, and cultural differences, among other things.[20] In the present study, the OHRQoL was higher in female patients, similar to previous studies,[21] but this difference was not statistically significant. It may be related to the unequal sex distribution in this study. Moreover, the higher prevalence of female patients indicates that women are more likely to be concerned about their oral health and receive treatment for edentulism.[18] When OHRQoL was evaluated in terms of age, the highest OHIP-14 score was measured in the youngest group, and the lowest score was measured in the oldest group. Many studies in the literature support the conclusion that QoL increases with age.[20,22,23] This may be because younger patients are more involved in establishing their careers and try to adapt more to social influences, and their expectations and demands are higher than those of older patients.[24]

In the present study, median OHIP-14 score of the patients who had less than a 5-year follow-up was 20.5, and the score of those who had more than or equal to a 5-year follow-up was 9; this difference was statistically significant. This might be related to the fact that complications after surgery, as well as failure and loss of implants and implant-supported prostheses, occur more frequently in the earlier years. At the same time, it may be related to patients adapting to their prostheses more over time.

In this study, the median OHIP-14 score of patients who underwent double-jaw reconstruction surgery was slightly higher than that of patients who underwent single-jaw reconstruction surgery. This difference was not statistically significant and may be related to the shorter operation time and postoperative recovery time, lower morbidity rate as less volume of bone graft harvested from the ilium, and simpler treatment planning because of the presence of teeth in the opposite jaw.[25,26]

Celebić et al. reported that OHRQoL and patient satisfaction should be evaluated together.[27] The OHIP-14 scale is frequently used in many studies that make patient-oriented assessments, to evaluate the OHRQoL of individuals. However, it is insufficient to evaluate the posttreatment satisfaction level of patients. Therefore, in this study, the Satisfaction Likert Scale Questionnaire was used together with the OHIP-14 scale.

Advanced surgical techniques are required before implant surgery in patients with insufficient bone volume owing to long-term edentulism. Reconstruction using anterior iliac bone graft is one of the most commonly used techniques among these techniques. According to the studies in the literature, the acceptance and satisfaction rate of anterior iliac bone graft and reconstruction surgery by patients varies between 85% and 100%.[3,13,28–33] In the present study, the satisfaction levels in all terms among the patients were similar to those reported in the literature. Additionally, the expectations of patients from this treatment were met at a high level.

To the best of our knowledge, no study in the literature has evaluated the satisfaction level of patients who underwent implant rehabilitation after jaw reconstruction surgery, considering all treatment stages. In this study, patients who were rehabilitated with the implant after reconstruction surgery with anterior iliac bone graft were asked to evaluate their satisfaction level with the reconstruction surgery (Questions 4, 5, 7, and 8), implant surgery (Question 2), and

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implant-supported fixed prosthesis (Question 1). The satisfaction levels for reconstruction surgery (Q5, Q7, and Q8; 57.4%, 68.5%, and 66.7%, respectively) were not as high as the satisfaction level of patients regarding overall treatment in the present study. Although there is no similar study in the literature that can be compared to these values (57.4%, 68.5%, and 66.7%), these results can be regarded as low but acceptable when considering the difficulty of the postoperative recovery period after reconstructive surgery. Question 4 was asked to evaluate whether the information given to the patients before the procedure was sufficient or not and 81.5% of patients answered "Information was sufficient." Considering these results, it was concluded that although the patients were adequately informed before the surgery, and the postoperative process was explained in detail, reconstruction surgery is still not an easy procedure for patients to tolerate.

The satisfaction levels for implant surgery (Q2) and implant-supported fixed prostheses (Q1) were 92.5% and 83.3%, respectively. Similar to this study, in a study evaluating QoL and satisfaction level in patients who underwent iliac bone graft reconstruction, the overall satisfaction level (after prosthesis) was reported as 90.5%.[13] Derks et al. reported the satisfaction level with implant-supported prostheses as 93.6%.[34] In a study evaluating satisfaction level after augmentation of atrophic posterior mandibles with intraoral onlay block bone grafts, satisfaction levels of patients in terms of aesthetic and chewing were scored as 8.42 and 8.68 out of 10, respectively.[35] Few studies have evaluated the expectations of the patients from the implant treatment, but positive results could not be obtained after the treatment, and posttreatment satisfaction was lower than the pretreatment expectations.[36,37] Thus, when compared with other studies in the literature, we observed that the satisfaction level of patients regarding overall treatment was high in this study.

In the present study, patients were asked to evaluate the esthetic satisfaction levels of their prostheses and scars in the iliac region (Questions 3 and 6), and the results were recorded as 81.5% and 75.9%, respectively. In the literature, esthetic satisfaction levels for implant-supported prostheses were 80%–95% [13,34,38] and 60%–90% for scars in the iliac region.[13,29] In this study, the esthetic and total satisfaction levels were lower or close to the literature, and the results showed that the expectations of the patients from this treatment were met.

Finally, in the last two questions evaluating the satisfaction level of the patients with this treatment (Questions 9 and 10), it was observed that 83.3% of the patients recommended this treatment to others, but 70.4% of the patients agreed to operate again, if indicated. In a similar study, these rates were found to be 91.8% and 85.6% for the same questions, respectively.[29] In another study, Aloy-Prósper et al. evaluated the satisfaction level after using intraoral block bone grafts and the patients gave 9.71 points out of 10 for the question of "Would you undergo the same therapy again?."[35] Thus, it was observed that the satisfaction level of patients regarding bone graft harvesting from the anterior iliac crest and rehabilitation with implant-supported fixed prosthesis was lower than that reported in the literature, but tolerable.

CONCLUSION

Based on these results, this treatment had a positive effect on the QoL, and this effect increased with time. The satisfaction levels of the patients related to this procedure were high, and their expectations regarding this treatment were met at a high level. This study is limited by its retrospective nature, lack of preoperative OHIP-14 scores, inability to compare preoperative and postoperative OHIP-14 scores, and limited number of patients.

CONFLICT OF INTEREST STATEMENT

The authors report no conflict of interests.

DISCLOSURE

This research article was presented as an oral presentation at AÇBİD 14th International Congress, Antalya, Turkey, May 7-9, 2022.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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