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Patient-Centred Outcomes of Periodontal Surgeries in Turkish Adults

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Abstract
Background: *Today, the effects of the oral health conditions on the treatment efficiency and patient well-being are the central focus of dental enquires.This study was designed to evaluate the effects of the surgeries most frequently performed in periodontal clinics on the preoperative anxiety, Oral Health Impact Profile-14 (OHIP-14) and postoperative pain levels.*
Methods: *A total of 97 patients undergoing periodontal surgery were included in this study. The patients were divided into 4 groups according to their indications: free gingival grafts (FGGs) (n=23), subepithelial connective tissue grafts (SCTGs) (n=23), open flap debridements (OFDs) (n=26) and gingivectomies (Gs) (n=25). The patients were evaluated preoperative anxiety, VAS (during 7 days) and OHIP-14 (1 month and 3 months after surgery).*
Results: *Anxiety levels were found statistically significantly correlated with pain levels only after the 1st and 2nd days of operation (p<0.05). In the FGG, SCTG and OFD groups, there was no significant difference between the preoperative values and those at 1 month postoperatively (p>0.05), but there was a significant improvement at 3 months in terms of the OHIP-14 score (p<0.05). The shortest pain duration was observed after the G operations, with significant increases seen in OHIP-14 in both the first and third months (p<0.05).*
Conclusions:*This is the first study in which the oral health-related quality of life, VAS and anxiety levels of different periodontal surgical procedures were widely evaluated. As a result of this study, after periodontal surgeries improvement of oral health related quality of life was seen after three months.*
Keywords: *oral health related quality of life, periodontal surgery, OHIP-14, anxiety*

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I. Introduction

Today, a large number of patients are referred to periodontal clinics due to a variety of problems associated with the supporting structures of teeth. While some of these patients are treated with non-surgical treatment methods, periodontal surgery may be necessary in some cases. [1-6] The success of periodontal treatments is usually assessed by the clinical outcomes, but conventional measures of treatment success are insufficient for explaining the effects of the disease and treatment on the patient.[7]

The relationship of the oral health status with the treatment efficiency and patient well-being is the central focus of dental enquiries today. Thus, in recent years, the concept of the quality of life has become important and the quality of life in association with oral hygiene has been introduced to the dental literature. The oral health-related quality of life (OHRQoL) has been accepted as a key item to assess the individual's perception of oral health. [8,9] Surveys are commonly used to assess theOHRQoL and one of the most frequently used OHRQoL scales in the literature is the Oral Health Impact Profile (OHIP).

The experienced levels of anxiety, fear, and pain are other factors compromising patient satisfaction. In the majority of patients, anxiety and fear are observed at different levels before surgery. [10] In order to assess the levels of anxiety, a Likert-type of scale, namely Anxiety Specific to Surgery Questionnaire (ASSQ) was developed by Karancı and Dirik in Turkish. [11] Periodontal diseases are not painful generally, however, treatment procedures are usually perceived as painful by many patients. [12] In addition, it was stated that after periodontal surgeries, the patients have experienced minor discomfort and pain. [13] One of the methods used to quantify the level of the postoperative pain and monitor its intensity is the administration of visual analogue scale (VAS) to patients.[14]

There are few studies in the literature investigating the OHRQoL outcomes of periodontal surgery procedures. [7,15,16] Therefore, we performed this single-centre clinical study to evaluate and compare the impacts of periodontal surgical operations on OHRQoL. This is the first study in which the OHRQoL, VAS, and anxiety levels were quantified and evaluated in detail for different periodontal surgical procedures.

The aim of this study was to determine the effects of different periodontal surgical treatment methods on the preoperative levels of anxiety, the OHRQoL scores, and the postoperative pain in patients having an indication for periodontal surgery. The study also aimed to determine the relationships between the pain, anxiety, and time-related changes in the OHRQoL.

II. Materials And Methods

Respondents

A total of 97 (47 males and 50 females) patients participated in the study, filling in the forms for all of the four surveys employed in this study. Table 1 provides an overview of the demographic and habitual data of the study participants. The ages of the patients ranged from 18 to 60 years old [30.25±7.24 years]. Twenty-three of the patients were treated with free gingival grafts (FGG), 23 were treated with subepithelial connective tissue grafts (SCTG), 26 were treated with open flap debridement (OFD), and 25 were treated with Gs.Only patients having a single tooth defect on the upper or lower anterior teeth were included in this study. The patients with multiple defects in their teeth were excluded.

The inclusion criteria were as follows: To be at an age between 18 and 60 years old, to be systemically healthy, to agree to participate in the study, and to have no history of previous surgery in the oral region. Breastfeeding patients; patients with active caries/other oral diseases/endodontic lesions; and patients needing periodontal surgery on more than one tooth were excluded from this study. In addition, the patients who needed bone surgery were excluded from this study.

Study Design and Interventions

The study procedures were accepted by all of the participants and signed informed consent forms were collected from the participants. The study was approved by the Van Yuzuncu Yil University Ethics Committee and it was found to conform to the guidelines issued in the Declaration of Helsinki.

All of the surgical procedures in the study were conducted by the same surgeon, who had 8 years of experience in periodontal surgery. The patients were operated between the dates September 2017 and February 2018. Infiltrative local anaesthesia (Maxicaine Fort, Vemİlaç San ve Tic AS, Ankara, Turkey) was used in all operations.The teeth with non-keratinized gingiva were included in the FGG group, in which the operation was performed as described by Sullivan and Atkins. [17] In the SCTG group, the Langer and Langer technique was used for treating isolated recession type 1 (RT1) defects. [18,19] In the OFD group, the papilla preservation technique described by Takei et al. was used. [20] In the G group, the gingival overgrowth area was removed by using surgical blades (no.15). [21] Hand instruments (scalers and curettes (Hu friedyMfg. Co., LLC, Chicago, USA)) were used for calculus removal and root planing in OFD group. If necessary, in FGG and SCTG groups, root planing was performed with the same curettes for in each intervention. For primary closures, 4.0 silk sutures (Dogsan Ltd Sti, Turkey) were applied in FGG, SCTG, and OFD groups. The patients were not prescribed any medications postoperatively.

Procedure and Assessment Tools

Upon providing their written consents, each patient responded to the study forms administered at the study baseline (demographic data and habits form, ASSQ, OHIP-14) before starting their scheduled treatment. At the end of the surgery, a 10-cm VAS form was delivered to the patients, asking them to score the severity of the pain they experienced during the first 7 days following the surgery. They were asked to make a note when the pain would be resolved completely.

In the 1st-month follow-up visit, each patient was asked to respond to the first follow-up OHIP-14 survey. If the patient was not able to complete the survey on the 1st month and 3rd-month follow-up visits, or if they did not appear at the follow-up visit, they were contacted by phone.

The Turkish OHIP-14 consists of 14 questions about functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and being handicapped (disability). [22] The patients are asked to score each of these 14 questions, using the following scale: 1 = very few, 2 = occasional, 3 = fairly frequent or 4 = frequent.The ASSQ assessment is scored by using a 5-point Likert-type scale, and the patients are asked to score the 10 questions with one of the following: 1= I never agree, 2 = I disagree, 3 = I agree partially, 4 = I agree or 5 = I agree completely. All forms were filled in using a face-to-face interview method and the completeness of the questionnaires was checked by the same investigator.

III. Statistical Analysis

The data were entered into IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY, USA). Proofreading was performed to eliminate mistakes in data entry. The demographic characteristics of the groups were compared using analyses of variance, and the data were arranged using frequency tables. A normality test was performed to determine if the data were normally distributed. Non-parametric tests were used

in the statistical analysis because the data were not normally distributed. The Kruskal-Wallis test was used for determining whether there were differences between the groups. The Mann-Whitney U test was used to identify the differences specifically between the groups when differences were detected between them. The Friedman test was used to determine the differences between the OHIP-14 scores and the Wilcoxon signed-rank test was used to determine the differences between the durations. In order to highlight the most correlated variables, a correlogram was created to illustrate the correlation matrix. For this, the corrplot library in RwithSpearman`scor relation option was used. A generalized linear mixed model analysis strategy was employed for analysing the scores of OHIP and VAS byusing PROC GLIMMIX in SAS (SAS 9.4) to incorporate correlations for all of the observations arising from the same person. OHIP and VAS data were assumed to conform to normal and multinomial distributions, respectively, and their like lihoodwas maximized to estimate the model parameters. In terms of Bayesian information criteria (BIC), an unstructured covariance specification was used to compute the covariance structure among the repeated measurement.

IV. Results

The demographic and habitual characteristics of the study patients are presented in Table 1. There were no statistically significant differences between the study groups in terms of the demographic-habitual variables ($p>0.05$).

The VAS scores gradually decreased starting from the first postoperative day until the seventh day in all of the study groups (Figure 1). Overall, the FGG and SCTG patients felt much more pain than the OFD and G patients during the first 7 days after the operation. There was a statistically significant difference between the FGG/SCTG groups and OFD/G groups in terms of the pain levels during the first postoperative 7 days and on the day when the pain was resolved (when the VAS score was zero) ($p<0.05$) (Table 2). According to the analysis, VAS values were statistically significantly related with the study group, age, gender, educational status, monthly income, tooth brushing habits, and smoking ($p<0.05$) (Figure 2).

There was not a statistically significant difference between the groups in terms of the total ASSQ score as shown in Table 2 ($p>0.05$). The mean total ASSQ score for all the patients was 23.37±0.58.

OHIP values were statistically significantly related to the study group, age, educational status, and monthly income ($p<0.05$). In addition, there were no statistically significant differences among the four surgery groups in terms of the preoperative OHIP-14 scores ($p>0.05$). In all four groups, the total OHIP-14 scores did not show a statistically significant difference between the preoperative and the 1st month postoperative scores ($p>0.05$), but statistically significant differences were determined between the preoperative and 3rd month postoperative scores and between the postoperative 1st month and 3rd-month scores ($p<0.05$) (Table 2). In addition, Table 3 exhibited the results of the seven dimensions of the OHIP-14 questionnaire according to the study groups.

Table 1: Study group profile.

	FGGs	SCTGs	OFDs	G	p
Gender					
Female	12	11	14	13	0.17
Male	11	12	12	12	0.19
Average age	32.21±5.7	35.43±7.41	34.23±6.88	32.12±4.99	0.09
Educational status					
Uneducated	3 (13.04%)	2 (11.75%)	2 (7.69%)	2 (8.00%)	0.09
Primary school	5 (21.73%)	3 (17.65%)	7 (26.93%)	7 (28.00%)	0.06
High school	6 (26.10%)	6 (35.30%)	8 (30.76%)	7 (28.00%)	0.08
University	9 (39.13%)	6 (35.30%)	9 (34.62%)	9 (36.00%)	0.06
Monthly income					
<3000 TL/per month	10 (43.48%)	9 (39.13%)	13 (50.0%)	11 (44.0%)	**0.09**
3000≤ TL/per month	13 (56.52%)	14 (60.87%)	13 (50.0%)	14 (56.0%)	**0.11**
Marital status					
Married	18 (78.26%)	10 (58.82%)	18 (69.23%)	20 (80.0%)	0.05
Single	5 (21.74%)	7 (42.18%)	8 (31.77%)	5 (20.0%)	0.05
Smoking habit	3 (13.04%)	2 (11.76%)	3 (11.53%)	4 (16.0%)	0.07
>10 cigarettes per day	2 (8.69%)	1 (5.88%)	2 (7.69%)	2 (8.0%)	0.08
<10 cigarettes per day	1 (4.34%)	1 (5.88%)	1 (3.84%)	2 (8.0%)	0.08
Tooth Brushing habit:	23 (%100)	17 (%100)	26 (%100)	25 (%100)	0.61
2 times> per day	5 (%21.73) 18	7 (%42.16) 10	7 (22.93)	9 (%36.0) 16	0.07
2 times≤ per day	(%78.27)	(%58.82)	19 (%73.07)	(%64.0)	0.07
N (%)	23 (25.3%)	17 (18.7%)	26 (28.6%)	25 (27.5%)	0.61

*FGG: free gingival graft, SCTG: subepithelial connective tissue graft, OFD: open flap debridement, G: gingivectomy. [a,b] Statistical difference in the horizontal direction. * Statistically significant ($p<0.05$).*

Table 2: Preoperative (T0), postoperative 1st month (T1) and postoperative 3rd month (T3) total OHIP-14 scores, total ASSQ scores, pain end days (day when VAS score = 0) and operation times (minutes).

	FGGs	SCTGs	OFDs	G	p
Preoperative total OHIP-14 score (T0)	22.39±5.67[a,#]	20.88±5.22[a,#]	20.80±3.99[a,#]	20.00±4.86[a,#]	0.935
Postoperative 1st month total OHIP-14 score (T1)	20.00±6.01[a,#]	20.29±4.79[a,#]	20.12±3.97[a,#]	17.42±4.84[b,&]	0.049*
Postoperative 3rd month total OHIP-14 score (T3)	17.26±2.89[a,&]	16.35±2.97[a,&]	17.26±3.03[a,&]	15.20±4.06[b,¥]	0.041*
p for OHIP-14 scores	0.001*	0.002*	0.001*	0.001*	
Total ASSQ score	23.91	25.58	24.44	22.08	0.743
Operation time (minute) (min-max)	76.74±28.26[a] (30-120 min)	88.24±19.76[a] (60-120 min)	71.15±32.72[a] (20-120 min)	25.40±11.26[b] (16-60 min)	0.001*
Pain end day (days)	6.04±0.78[a]	6.88±1.12[a]	4.84±0.75[b]	4.36±0.61[b]	0.041*

FGG: free gingival graft, SCTG: subepithelial connective tissue graft, OFD: open flap debridement, G: gingivectomy, OHIP-14: Oral Health Impact Profile-14, ASSQ: Anxiety Specific to Surgery Questionnaire, VAS: visual analogue scale

[a,b]Statistical difference in the horizontal direction

[#, &, ¥] Statistical difference in the vertical direction, Statistically significant (p<0.05)

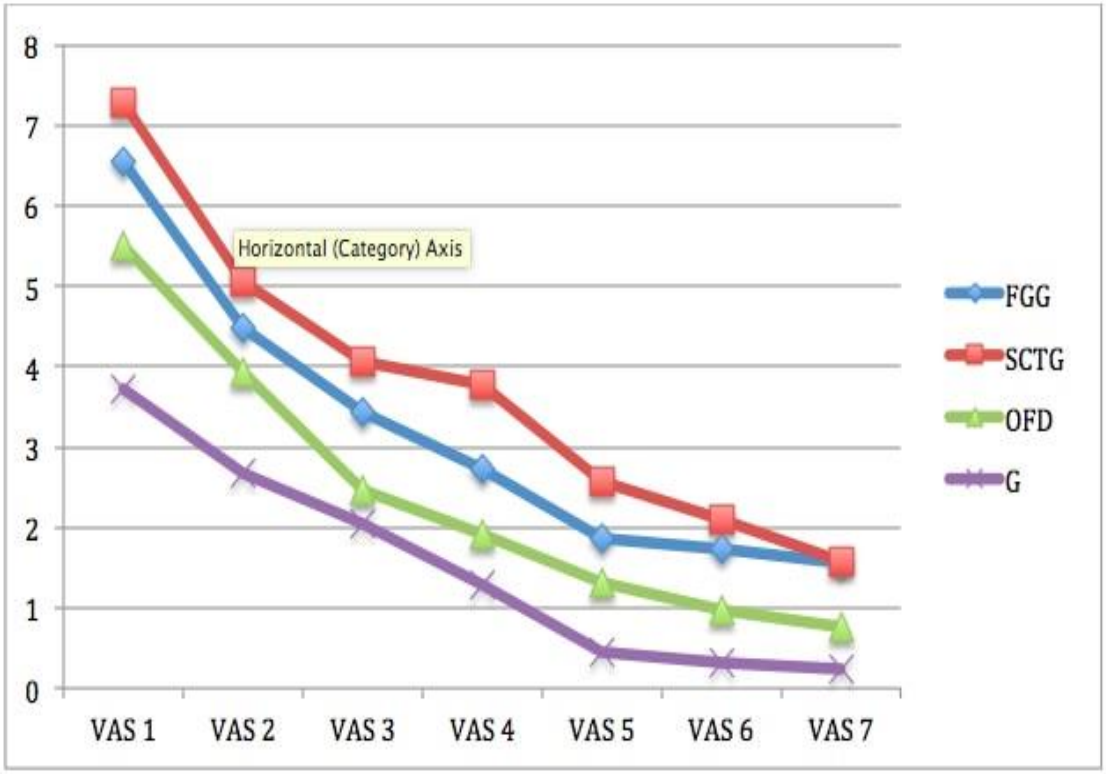

Figure 1: VAS values from the first day to the seventh day for all the groups

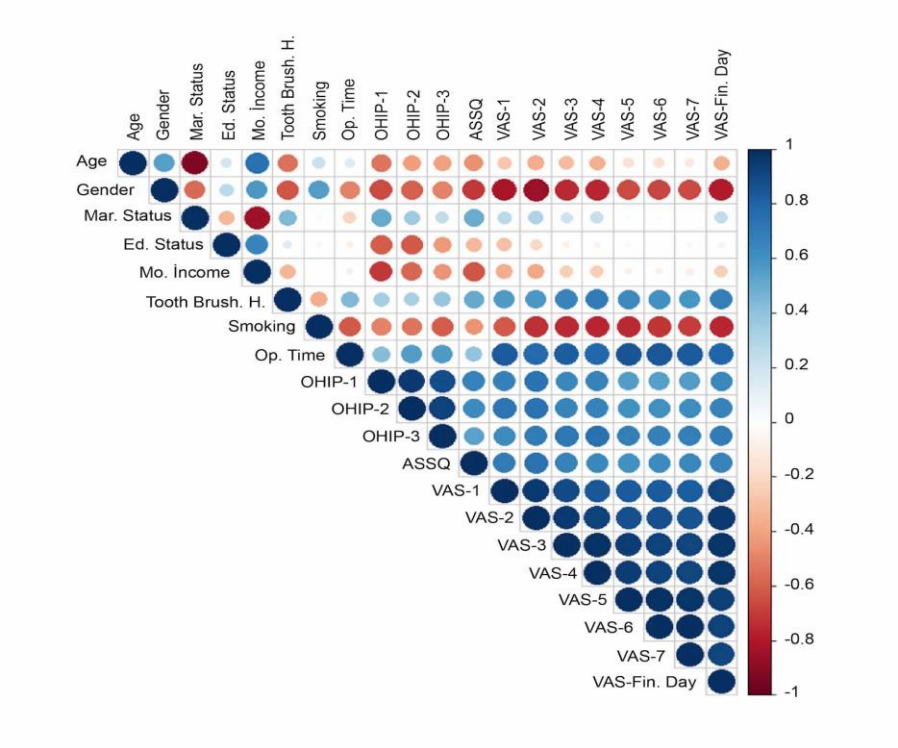

Figure 2: Correlations of variables

Table 3: Results of the seven dimensions of the OHIP-14 questionnaire according to the study groups
T0: preoperative, T1: postoperative 1st month, T3: postoperative 3rd month, FGG: free gingival graft, SCTG: subepithelial connective tissue graft, OFD: open flap debridement, G: gingivectomy, SD: standard deviation, [a,b,c] In-group statistical difference in the horizontal direction

Group	Group 1 (FGG)			Group 2 (SCTG)			Group 3 (OFD)			Group 4 (G)		
Time	T0 (mean ± SD)	T1 (mean ± SD)	T3 (mean ± SD)	T0 (mean ± SD)	T1 (mean ± SD)	T3 (mean ± SD)	T0 (mean ± SD)	T1 (mean ± SD)	T3 (mean ± SD)	T0 (mean ± SD)	T1 (mean ± SD)	T3 (mean ± SD)
Functional limitation	2.86± 0.91^{a}	2.69± 0.74^{a}	2.43± 0.55^{b}	2.23± 0.64^{a}	2.21± 0.56^{a}	1.62± 0.57^{b}	2.42± 0.56^{a}	2.40± 0.82^{a}	2.01± 0.19^{b}	2.40± 0.49^{a}	2.22± 0.29^{a}	1.96± 0.11^{b}
Physical pain	2.25± 0.72^{a}	2.20± 0.97^{a}	1.72± 0.41^{b}	2.59± 0.61^{a}	2.45± 0.91^{a}	1.21± 0.29^{b}	2.57± 0.43^{a}	2.46± 0.79^{a}	2.17± 0.69^{b}	2.55± 0.68^{a}	2.31± 0.83^{a}	1.12± 0.28^{b}
Psychological discomfort	2.82± 0.56^{a}	2.51± 0.63^{b}	1.81± 0.34^{c}	2.76± 0.85^{a}	2.52± 0.39^{b}	1.43± 0.62^{c}	2.69± 0.88^{a}	2.60± 0.92^{b}	1.92± 1.01^{c}	2.69± 0.99^{a}	2.62± 0.11^{b}	1.58± 0.41^{c}
Physical disability	2.43± 0.71^{a}	2.41± 0.81^{a}	2.21± 0.42^{b}	2.48± 0.79^{a}	2.41± 0.29^{a}	1.18± 0.29^{b}	2.41± 0.70^{a}	2.35± 0.53^{a}	1.12± 0.89^{b}	2.39± 0.47^{a}	2.31± 0.45^{a}	1.09± 0.37^{b}
Psychological disability	2.65± 0.44^{a}	2.53± 0.79^{a}	2.12± 0.55^{b}	2.64± 0.94^{a}	2.49± 0.81^{a}	1.21± 0.31^{b}	2.63± 0.71^{a}	2.55± 0.56^{a}	1.32± 0.76^{b}	2.58± 0.49^{a}	2.47± 0.36^{a}	1.15± 0.25^{b}
Social disability	2.35± 0.43^{a}	2.26± 0.53^{a}	2.09± 0.73^{b}	2.37± 0.81^{a}	2.25± 0.67^{a}	1.13± 0.43^{b}	2.37± 0.42^{a}	2.22± 0.41^{a}	1.17± 0.65^{b}	2.32± 0.81^{a}	2.26± 0.78^{a}	1.08± 0.21^{b}
Handicap	2.30± 0.66^{a}	2.25± 0.42^{a}	1.93± 0.89^{a}	2.32± 0.71^{a}	2.21± 0.61^{a}	1.27± 1.12^{a}	2.26± 0.67^{a}	2.25± 0.55^{a}	1.22 0.97^{a}	2.22± 0.58^{a}	2.19± 0.61^{a}	1.17± 0.83^{a}

There was a statistically significant difference between the groups in the duration of the operations ($p>0.05$). Table 2 shows that the SCTG procedure took the longest operation duration while the G procedure had the shortest duration. The duration of the operation in the G group was statistically significantly different from the remaining 3 groups ($p<0.05$).According to the Spearman'srho correlation analysis, there was a statistically significantly positive correlation between the ASSQ score and the scores of VAS on day 1, day 2, and preoperative OHIP-14 scores ($p<0.05$). Additionally, a statistically significantly positive correlation was found between the preoperative OHIP-14 scores and the VAS scores onday 1 and on day 2 ($p<0.05$) (Table 4).Overall correlations between the variables are presented in Figure 2.

Table 4: Spearman's rho correlation analysis of the ASSQ scores, VAS values (from the first day to the seventh day and the pain end day) and preoperative OHIP-14 scores.

	ASSQ	VAS 1	VAS 2	VAS3	VAS 4	VAS 5	VAS 6	VAS 7	Pain end day	Preop. OHIP-14
ASSQ **r** **p**	1	0.306 0.003*	0.274 0.009	0.184 0.081	0.163 0.122	0.122 0.248	0.113 0.285	0.153 0.147	0.205 0.052	0.321 0.009
Preop. OHIP-14 **r** **p**	0.321 0.009*	0.282 0.007*	0.186 0.008*	0.196 0.211	0.184 0.203	0.138 0.249	0.132 0.269	0.111 0.342	0.289 0.061	1

*OHIP-14: Oral Health Impact Profile-14, ASSQ: Anxiety Specific to Surgery Questionnaire, VAS: visual analogue scale, r: correlation coefficient. * Statistically significant ($p<0.05$)*

V. Discussion

Although an OHRQoL assessment is an accepted doctrine in the literature as an actual endpoint in determining the efficacy of periodontal therapy [8], very few studies have evaluated the subjective outcomes of periodontal surgical therapy. [7,15,16,23] This study reflects a part of our ongoing effortsin delineating the impacts of various frequently used periodontal surgical treatment modalities on the patients' perception of the treatment.

Periodontal surgery techniques are improved, and new interventional approaches are introduced perpetually. The most commonly used techniques in the current periodontal plastic surgery include FGGs, SCTGs, OFDs, and Gs. In this perspective, the authors focused on soft tissue management.The preoperative anxiety, postoperative pain,and the time-related changes in the postoperative quality of life were examined in this study. Additionally, the face-to-face interview method was used for filling in the study forms; however, this method was not free of limitations as patients may feel vulnerable and restricted. [24]

The OHIP-49 questionnaire is commonly used in the assessment of the OHRQoL. The short form of OHIP-49, OHIP-14, was used in this study as it has been reported that long questionnaires take more time, may be perceived as time-consuming by the patients, and therefore they may be difficult to apply.[25]

In the literature, root surface instrumentation has been associated with pain and discomfort. [26] In this present study, standardized hand instruments were used. Naturally, in the OFD group, the instrumentation on the denuded root surface was more extensive compared to the FGG and SCTG groups. This may explain the differences observed in the VAS scores by the operations.

Anxiety is a defined as a fearful response to a poorly defined threat and it is related to an increase in the postoperative pain levels. Interestingly, the results of this present study indicated that anxiety levels were independent of the type of the operation in the preoperative period; however, the preoperative level of anxiety and VAS scores were found to be directly related during the first 2 days after the operations. Although all patients were informed about the procedures to be performed before the operation, it was determined that the anxiety levels of the patients were not related to the extent of the surgery.

As it is very well known, pain is a psychobiological phenomenon with a physiological and psychological basis. [27] In this present study, the pain and discomfort were evaluated from both a physiological and a psychological perspective after the periodontal surgical operations, by administering VAS and OHIP-14 to the patients. In the FGG and SCTG groups, there were two operation sites. This is an important point to explain the longer operation duration and higher VAS scores in these two groups. The highest scores of VAS occurring on day 1 after the periodontal surgery and the declining VAS scores towards the postoperative day 7 were evaluated as findings consistent with the study results reported in the literature. [16] In addition, it has been reported in the literature that FGGs are more painful than SCTGs, which is in accordance with our study results. [28]

Another factor involved in the perception of pain is gender, which is reported as an important factor in pain memory and pain prediction. Eli et al. reported that females expected less pain preoperatively than males in periodontal surgery. [29] Baudette et al. reported that patients tended to anticipate more pain than they experienced

in periodontal surgeries. In the results of their study, the authors reported that the actual pain and the anticipated pain were correlated. In accordance with our study; in Baudette et al.'s study,the highest pain severity was noted on the day of the surgery and the pain tended to decrease in the following days. [30] As opposed to a previous study, we found a significant relationship between the VAS scores and smoking habits/gender. On the other hand, in terms of gender, our results might be considered parallel with Eli et al.'s study. [29] However, it must be remembered that there are studies in the literature, reporting that smoking may exacerbate the levels of pain and may interfere with periodontal tissue healing. It is also reported that non-smokers experience lesser pain than smokers after extraction of the third molar. [31,32] In our study, a significant negative correlation was found between smoking habits and VAS scores. However, a small number of smoking patients was included in this study.

When the 7 subdimensions of the OHIP-14 questionnaire were analysed, it was observed that there were statistically significant improvements in a total of 5 subdimensions (functional limitations, physical pain, physical disability, psychological disability, and social disability) in all operation types. There are very few studies evaluating OHRQOL after periodontal surgeries in the literature. Generally, they reported statistically significant improvements after periodontal surgeries, being consistent with the results of the present study.[7,15, 16]

This present study is considered to be an important preliminary study to determine how a patient perceives periodontal surgery operations and it provides baseline data on the OHRQoL levels in association with periodontal surgical operations.

Health-related quality of life scales are important in terms of assessing the treatment outcomes and healthcare system policies, as well as identifying treatment needs. In addition, further studies are needed to provide insight into patient-centred outcomes in periodontics. In general, many factors such as age, gender, type or duration of the surgery, anaesthesia methods or materials, and instrumentation etc. can be considered as the factors affecting the health-related quality of life in this study. Even so, this study is considered an important step taken towards the overall evaluation of patient-centred outcomes in periodontal surgeries. The clinicians should always consider the patients' perceptions when planning a periodontal surgical operation. Further similar studies conducted on different populations of patients will also provide beneficial information. Future studies should focus on the effects of different periodontal surgical methods on patient perception and clinical outcomes including psychological factors.

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