Oral Health–Related Quality of Life in Patients Treated with Fixed, Removable, and Complete Dentures 1 Month and 6 to 12 Months After Treatment

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Purpose: This study described oral health–related quality of life (OHRQoL) before and after treatment in patients with fixed, removable, and complete dentures. ***Materials and Methods:*** OHRQoL was measured using the German version of the Oral Health Impact Profile (OHIP-G) in a convenience sample of 107 prosthodontic patients at baseline and 1 and 6 to 12 months after treatment. The sum of OHIP-G item responses (OHIP-G49, range 0 to 196) characterized OHRQoL impairment in 42 patients treated with fixed prosthodontics, 31 patients treated with removable dentures, and 34 patients treated with complete dentures. OHIP-G49 medians were compared with the OHRQoL level in a general population sample (n = 2,026). A multivariable binomial regression analysis, controlling for the effects of baseline OHRQoL and follow-up wave, was used to compare the level of impaired OHRQoL in different prosthodontic treatment groups at follow-ups. ***Results:*** OHRQoL improved in 96% of the subjects. OHIP-G49 medians reached the level of OHRQoL in the general population 1 month after treatment (fixed prosthodontics patients 6 OHIP-G units; general population subjects 5 units; removable denture patients 23 units, 15 units in general population subjects; complete denture patients 13 units, 23 units in general population subjects). OHIP-G49 medians were below population norms 6 to 12 months after treatment. In patients treated with removable/complete dentures, the expected posttreatment OHIP-G49 problem rate was 1.9 times the problem rate in patients treated with fixed prosthodontics, holding baseline OHIP-G49 and follow-up wave constant. ***Conclusion:*** OHRQoL changed substantially comparing pretreatment scores with 1 and 6 to 12 months of follow-up in patients treated with fixed, removable, and complete dentures. *Int J Prosthodont 2004;17:503–511.*

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Patients' perceptions of their oral health status are important outcomes in prosthodontics. Oral health–related quality of life (OHRQoL) characterizes patients' perceptions of oral health. Therefore, it should be able to measure patients' perceived benefits of prosthodontic treatment.

The Oral Health Impact Profile (OHIP) is one of the most technically sophisticated instruments to measure OHRQoL.[1] Besides the English-language original,[2] French,[3] Chinese,[4] Italian,[5] and Swedish versions[6] of this instrument have been developed, and cross-cultural equivalence has been demonstrated.[3] Recently, a German version, OHIP-G, was developed.[7] Normative population values are available for OHIP-G, allowing a comparison between the level of impaired OHRQoL in an individual patient or group of patients and the level

of impaired OHRQoL in the general population.[8] In a German population-based study, denture status had a greater influence on OHRQoL than did sociodemographic variables, accounting for a substantial part of the influence of age and socioeconomic status on OHRQoL.[9]

Although OHRQoL is anticipated to be an important outcome of prosthodontic therapy, cross-sectional and longitudinal data are mainly available for patients treated with complete dentures or implant-supported overdentures (eg, Allen et al,[10] Awad et al,[11] Heydecke et al[12]). Information is lacking on impaired OHRQoL among patients before and after treatment with fixed or removable dentures, yet these represent the majority of prosthodontic treatments.

This case series investigated impaired OHRQoL in patients treated with fixed, removable, and complete dentures before and 1 and 6 to 12 months after treatment. Because subjects in this study were not randomized to different treatments, efficacy of alternative therapies could not be analyzed. Instead, analyses focused on two questions relevant to treatment prognosis. First, the question, "Do patients receiving treatment with removable or complete prosthodontics have poorer OHRQoL than patients receiving fixed prosthodontic treatment, either before treatment or after treatment?" was addressed. Based on findings from a cross-sectional study,[8] large pretreatment differences between these groups were expected, but it is not known whether treatments of different modalities affect those differences. Second, the question, "How much improvement in OHRQoL can be expected from various prosthodontic treatments?" was addressed.

Materials and Methods

Subjects

A prospective, nonrandomized clinical trial compared changes in OHRQoL among patients receiving three types of prosthodontic treatment. A convenience sample of 107 adult patients aged 24 to 82 years was recruited at the Department of Prosthodontics, Martin Luther University Halle-Wittenberg, Germany (n = 57), and from a dental practice (n = 50); they comprised 42 patients who sought treatment with fixed prosthodontics (25 patients treated with crowns alone and 17 patients treated with fixed partial dentures [FPD]; mean age 43.8 ± 12.5 years; 52% women), 31 patients who wanted removable partial dentures (17 telescopic crown–retained dentures, 13 clasp-retained cast-frame prostheses, and 1 wire clasp–retained removable partial denture; mean age 60.5 ± 9.4 years; 61% women), and 34 patients seeking treatment with complete dentures (mean age 68.1 ± 7.1 years; 56% women).

Oral Health–Related Quality of Life

OHRQoL was measured using OHIP-G.[7] OHIP-G has 49 items derived from the English-language OHIP[2] and four items specific for the German population. For each OHIP question, subjects were asked how frequently they had experienced the impact in the past month. Responses were made on a five-point scale (0 = never; 1 = hardly ever; 2 = occasionally; 3 = fairly often; and 4 = very often). OHRQoL impairment was characterized by the OHIP-G summary score (OHIP-G49), the sum of all 49 item frequencies contained in the English-language OHIP (the four German-specific items were omitted to maintain international comparability). Higher scores imply poorer OHRQoL because the OHIP index measures the frequency of problems.

Patients were given the OHIP-G questionnaire to complete before prosthodontic treatment, 1 month after treatment was finished, and 6 to 12 months after therapy. OHIP-G summary scores in prosthodontic patients were compared with OHIP-G49 scores in the general population (norms).[8] These norms were available for three categories: *(1)* subjects with no (removable or complete) dentures (n = 1,541); *(2)* subjects with removable dentures (n = 389); and *(3)* subjects with complete dentures (n = 96).

Statistical Analyses

Descriptive data analysis was performed in two stages. First, OHIP-G scores at baseline and follow-up were plotted for each individual, stratified by gender and type of prosthodontic treatment. Second, central tendencies and variability of the OHIP-G49 at baseline and follow-ups were plotted using box plots for each treatment group. Results were compared with the distribution of OHIP-G49 scores in the general population.

To address the first research question ("Do patients receiving treatment with removable or complete prosthodontics have poorer OHRQoL than patients receiving fixed prosthodontic treatment, either before treatment or after treatment?"), multivariate analyses were used to evaluate differences in OHRQoL among treatment groups at each data collection period. Because observed levels of impaired OHRQoL at baseline differed among treatment groups, OHRQoL values were statistically adjusted at follow-up visits to allow for each subject's pretreatment OHRQoL. This was done through the construction of regression models that used the baseline OHIP-G49 as a covariate to hold OHRQoL statistically constant when analyzing OHIP-G49 scores at follow-up. A negative binomial regression model was used because OHIP-G49 was considered a count of problems/impacts (each of the 49 questions

is answered on a frequency scale, and OHIP-G49 is the sum of all questions).

Separate regression models were fitted for each follow-up period. Regression coefficients and their standard errors were exponentiated to estimate a problem rate ratio (PRR) and associated 95% confidence intervals (CI), adjusted for other factors included in the statistical model (ie, baseline OHIP-G49). PRR is a ratio of two OHIP summary scores, that is, the sum of all OHIP responses in a specific group of patients is the numerator and a second sum of all OHIP responses in a (different) specific group of patients is the denominator (the reference group). The interpretation of PRRs for count variables is similar to risk ratios or odds ratios for dichotomous variables. Specifically, PRR describes the ratio of OHIP-G49 problems for patients in either denture group relative to patients in the fixed prosthodontics group. For example, a PRR of 2.5 means that the expected count of OHRQoL problems for patients with complete dentures is 2.5 times the level of OHRQoL problems in patients with fixed prosthodontics, holding constant the effects of baseline OHIP-G. An interaction between baseline OHIP-G49 and dentures status was tested using a likelihood ratio test, allowing the course of OHRQoL in different denture status groups to be different depending on the level of OHRQoL at baseline.

Finally, data from both the 1-month and 6- to 12-month follow-ups were combined into one analysis using generalized estimating equations (GEE)[13] with an independent working correlation structure to account for intrasubject correlation. The final statistical model contained only the binary treatment group variable (removable or complete dentures vs fixed prosthodontics) because tests (χ^2[1 degree of freedom, *df*]) at both follow-up periods did not indicate any statistically significant differences between PRRs for removable and complete denture subjects. The model was adjusted for baseline OHIP-G49 and follow-up period. Goodness of model fit for these multivariate models was evaluated by comparing the observed proportion of subjects for each number of OHIP-G49 units with the predicted proportion by the statistical model. Based on the individual plots of OHIP-G49 at baseline and follow-up, subjects with deviant OHRQoL patterns were identified and removed from the analysis, or age (linear) and gender were included into the statistical model to check the robustness of the results.

To address the second research question ("How much improvement in OHRQoL can be expected from various prosthodontic treatments?"), change in OHRQoL was compared for subjects with different denture types. Linear regression models were used, with baseline OHIP-G49 as the covariate and change in OHIP-G49 score (ie, follow-up score – baseline score) at each follow-up as the dependent variable. In these models, the parameter estimates indicate OHRQoL change for all three treatment groups (the intercept is the mean change for a typical [mean OHRQoL impairment at baseline] patient receiving fixed prosthodontics because baseline OHIP-G49 was centered at the median). OHRQoL improvement is characterized by negative OHIP change scores because reported problems decrease. To handle heteroscedasticity of the residuals in the statistical model, STATA's robust regression was used with the Huber/White/sandwich estimator of variance, which produces consistent standard errors.[14–16]

Missing Data

Four subjects did not provide any data at the 6- to 12-month follow-up. Subjects were not included in the analyses when the amount of missing data compromised the calculation of a summary score. Exclusion criteria were: *(1)* subjects had more than five missing items per questionnaire; *(2)* more than two missing items in any of the seven English-language OHIP dimensions; or *(3)* more than one missing item among three questions referring to dentures only.[8] Not including these subjects left 103 subjects before treatment, 105 subjects at the first follow-up, and 101 subjects at the second follow-up for analyses.

Missing answers (n = 70) in these subjects were imputed using regression. Details about the imputation procedure are provided elsewhere.[8] All analyses were performed using the statistical software package STATA, release 7, with the probability of a type I error set at the .050 level.

Results

Clinic and dental practice patients had similar baseline characteristics. Statistically significant differences for age, gender, denture status, or baseline OHRQoL were not observed (all variables $P > .050$; *t* tests, Mann-Whitney test, or chi-square tests).

Pre- and Posttreatment Oral Health–Related Quality of Life in Individual Patients

For the majority of individuals, impaired OHRQoL decreased over time (96%). In the remaining 4%, the level of OHRQoL remained constant (Fig 1). For most individuals, impaired OHRQoL from pretreatment to the first follow-up (89%) or from the first follow-up to the second (81%) improved or remained constant (5% and 9%, respectively).

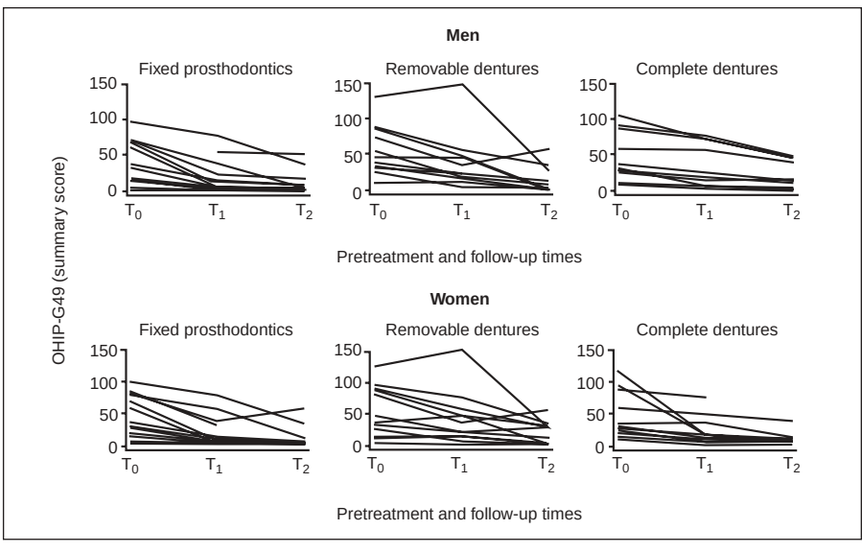


Fig 1 Pretreatment (T_0) and posttreatment (1 month, T_1, and 6 to 12 months, T_2) impaired OHRQoL described by OHIP-G49 for individual patients, categorized by treatment group and stratified by gender.

Pre- and Posttreatment Impaired Oral Health–Related Quality of Life in Treatment Groups Compared to General Population

Visual assessment of the plots of OHIP-G49 scores over time in individual patients indicated that OHRQoL can be summarized by describing the median OHRQoL score at baseline and follow-ups. In subjects treated with fixed prosthodontics (Fig 2), the pretreatment summary score median of 30 OHIP-G49 units declined to 6 units 1 month after treatment and decreased further, to 3 OHIP-G49 units, at the second follow-up. This was below the value in the general population of non–denture wearing individuals (5 OHIP-G49 units).

In subjects treated with removable dentures (Fig 3), the pretreatment summary score median of 38 OHIP-G49 units dropped to 23 units 1 month after treatment and decreased further, to 12 OHIP-G49 units, at the second follow-up. This was below the value in the general population of removable denture wearers (15 OHIP-G49 units).

In subjects treated with complete dentures (Fig 4), the pretreatment summary score median of 29 OHIP-G49 units dropped to 13 units 1 month after treatment and decreased further, to 6 OHIP-G49 units, at the second follow-up. This was below the value in the general population of complete denture wearers (23 OHIP-G49 units).

Differences in Oral Health–Related Quality of Life with Different Prosthodontic Treatments

Fitting separate statistical models for each follow-up revealed more impaired OHRQoL in patients treated with removable and complete dentures compared with patients treated with fixed prosthodontics. All PRRs were of substantial magnitude, and all were statistically significant (Table 1). In patients with removable or complete dentures, the expected posttreatment OHIP-G49 problem rate was at least 1.7 times the posttreatment problem rate in patients treated with fixed prosthodontics among patients with the same baseline OHIP-G49.

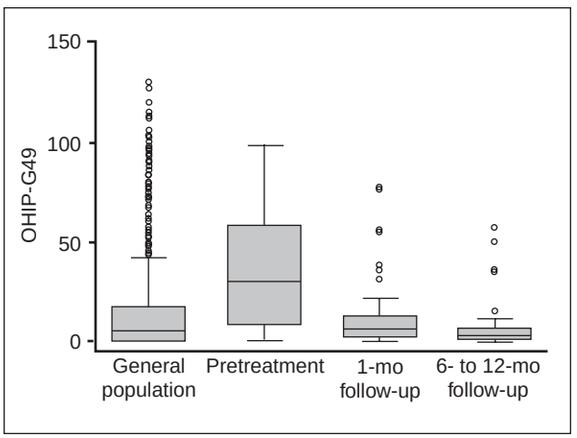
At the 1-month follow-up, PRR was highest for removable dentures. At the 6- to 12-month follow-up, PRR was highest for complete dentures. However, patients with removable dentures were not statistically different in their PRRs compared with patients with complete dentures at either follow-up, indicated by statistically nonsignificant test results for the comparison of the coefficients 1 month after treatment (χ^2[1 *df*] = 2.2; $P = .140$) or 6 to 12 months after treatment (χ^2[1 *df*] = 0.12; $P = .720$). Therefore, patients with removable and complete dentures were combined into one category for subsequent analyses.

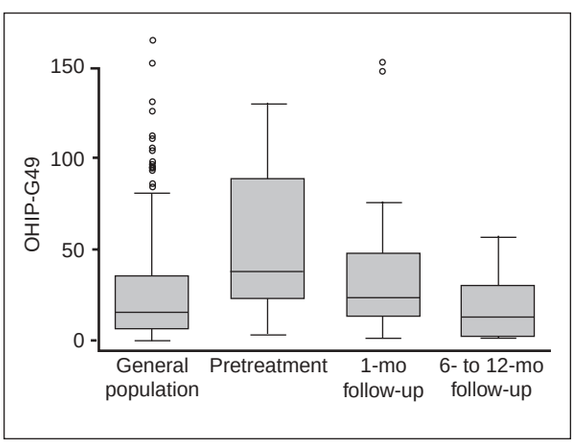
The binomial regression analysis for correlated data (GEE model) incorporated data from both follow-ups. Consistent with the above analyses, in patients treated with removable/complete dentures, the expected posttreatment OHIP-G49 problem rate was 1.9 times (95% CI 1.5 to 2.6) greater than the problem rate in patients treated with fixed prosthodontics, holding baseline OHIP-G49 and follow-up wave constant. A 10-unit increase in baseline OHIP-G49 increased the expected posttreatment OHIP-G49 symptom rate by a factor of 1.3 (95% CI 1.3 to 1.4), comparing subjects with the same type of prosthodontic treatment and at the same follow-up. At the second follow-up, OHIP-G49 scores were lower than at the first follow-up (PRR 0.5; 95% CI 0.4 to 0.6), holding the other model variables constant. PRRs increased slightly when age and gender were

Fig 2 *(right)* Impaired OHRQoL described by OHIP-G49 before treatment and 1 month and 6 to 12 months after treatment in 42 patients treated with FPDs, in comparison with 1,541 subjects of the general population.

Fig 3 *(below)* Impaired OHRQoL described by OHIP-G49 before treatment and 1 month and 6 to 12 months after treatment in 32 patients treated with removable dentures, in comparison with 389 subjects of the general population.

Fig 4 *(below right)* Impaired OHRQoL described by OHIP-G49 before treatment and 1 month and 6 to 12 months after treatment in 33 patients treated with complete dentures, in comparison with 96 subjects of the general population.





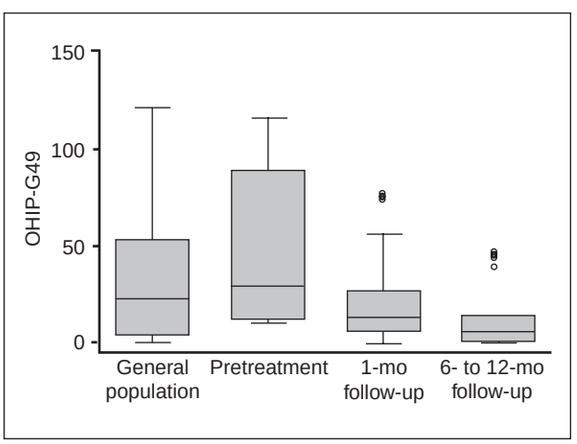


Table 1 Binomial Regression Models of Impaired Oral Health–Related Quality of Life (OHRQoL) as a Function of Prosthodontic Treatment and Baseline Level of OHRQoL

Variable	Problem rate ratio	95% confidence interval	*P* value
Model for 1-mo follow-up			
Treatment category removable dentures*	2.3	1.6 to 3.3	< .001
Treatment category complete dentures*	1.7	1.2 to 2.5	.002
Baseline OHIP-G49 (10 units)†	1.3	1.3 to 1.4	< .001
Model for 6- to 12-mo follow-up			
Treatment category removable dentures*	1.8	1.0 to 3.0	.033
Treatment category complete dentures*	1.9	1.2 to 3.1	.008
Baseline OHIP-G49 (10 units)†	1.4	1.3 to 1.5	< .001
Final model (follow-ups combined, removable and complete dentures combined into one category)			
Removable/complete dentures*	1.9	1.5 to 2.6	< .001
Baseline OHIP-G49 (10 units)	1.3	1.3 to 1.4	< .001
6- to 12-mo follow-up	0.5	0.4 to 0.6	< .001

*Reference: patients with fixed prosthodontic treatment.
†Interaction of baseline OHIP-G49 score and denture type was not statistically significant for 1-mo follow-up (likelihood ratio test χ^2[2 *df*] = 4.33; *P* = .110) or for 6- to 12-mo follow-up (likelihood ratio test χ^2[2 *df*] = 0.23; *P* = .890).

included in the statistical model (PRR of patients with removable/complete dentures 2.3; 95% CI 1.5 to 3.5), or when two subjects with extreme OHIP-G49 scores at the first follow-up were deleted from the analysis (PRR of patients with removable/complete dentures 2.0; 95% CI 1.5 to 2.6). In these models, the proportion of subjects predicted by the binomial regression model was not substantially different compared with the observed

Table 2 Linear Regression Models with Robust Standard Errors of Decrease in Impaired Oral Health–Related Quality of Life (OHRQoL) as a Function of Prosthodontic Treatment and Baseline Level of OHRQoL

Variable	Coefficient	95% confidence interval	*P* value
Model for 1-mo follow-up			
Intercept	−21.4	−25.6 to −17.1	< .001
Removable/complete dentures	8.9	2.9 to 14.8	.004
Baseline OHIP-G49 (10 units)	3.8	2.0 to 5.6	< .001
Model for 6- to 12-mo follow-up			
Intercept	−26.3	−29.3 to −23.3	< .001
Removable/complete dentures	4.7	0.3 to 9.0	.036
Baseline OHIP-G49 (10 units)	7.1	6.2 to 8.0	< .001

proportion of subjects with OHIP-G49 scores. This indicated a sufficient model fit of the binomial regression model.

Results of the analyses using the linear regression model with robust standard errors revealed differences among treatment groups that were of similar statistical significance (Table 2). Based on this model, the predicted mean change per patient in OHIP-G49 score from baseline to first follow-up was lower by 8.9 OHIP-G units (95% CI 2.9 to 14.8) in subjects receiving removable and complete dentures compared with subjects receiving fixed dentures, holding the baseline OHRQoL impairment constant. From baseline to second follow-up, the OHIP-G index dropped 4.7 fewer units (95% CI 0.3 to 9.0) in subjects receiving removable and complete dentures compared with subjects receiving fixed dentures, adjusted for baseline OHIP score.

Discussion

This is the first study providing longitudinal data about impaired OHRQoL in patients seeking prosthodontic treatment and receiving fixed and removable dentures in Germany. These patients had a considerably impaired level of OHRQoL before treatment. However, OHRQoL improved rapidly within 1 month after treatment and continued to improve within 6 to 12 months after treatment for subjects with fixed, removable, and complete dentures, as indicated by reduced median OHIP-G scores. The largest improvement was observed for patients treated with fixed prosthodontics.

Pretreatment Comparisons of Oral Health–Related Quality of Life

Compared with the OHRQoL level in the general population, subjects presenting for prosthodontic treatment had considerably more impairment. Subjects receiving complete dentures had the highest impairment, and patients receiving fixed prosthodontics had the lowest, consistent with the ranking in the general population.[8] A previous study of a clinical sample found that subjects with removable dentures have slightly less ($P >$ .050) impaired OHRQoL compared with subjects with fixed prosthodontics.[17] These findings are in contrast to our results. Different patient selection criteria in the two studies may be responsible for the differences.

Subjects with removable or complete dentures reported more problems than subjects with fixed prosthodontics, regardless of whether denture-specific items were included in the analysis. This is partly because 3 of the 49 OHIP questions ask specifically about denture-related problems. Yet, compared with non–denture wearing individuals in this study, denture-wearing patients also tended to report more severe impairments in response to OHIP questions not specifically related to dentures.

OHRQoL data for patients with fixed or removable prosthodontics have not previously been reported, and hence we cannot compare our results with previous studies. However, patient satisfaction is a related construct,[18] and results from a population-based survey in Germany demonstrated that patients with FPDs are more satisfied with their dentures compared with subjects wearing removable dentures.[19]

In other studies investigating patients with complete dentures, subjects with complete dentures consistently have poorer OHRQoL than implant patient groups.[11,12] Compared with our results, summary scores before and after prosthodontic treatment were higher, in absolute value, in a previous study[20] when mean OHIP values are compared. While this may indicate that the other study's patients had poorer overall OHRQoL than the German patients studied here, results from both studies are consistent in demonstrating improvements in OHRQoL following treatment.

Longitudinal Aspects of Oral Health–Related Quality of Life

Two time periods were investigated. The period of 1 month after treatment was considered the initial period

where immediate effects of prosthodontic therapy should be expected; the time 6 to 12 months after treatment was finished was considered the period when adaptation of prosthodontics would be complete. One previous study of German patients with removable dentures assessed OHRQoL using the Oral Impact on Daily Performance questionnaire.[21] A substantial improvement in OHRQoL after prosthodontic treatment was observed. However, this instrument has not been assessed for its cross-cultural adaptation[22,23] from the original English-language version.

Our finding that OHIP scores improved initially (ie, after 1 month) and further 6 to 12 months following treatment is consistent with previous findings among patients observed 2 and 6 months after treatment.[12,24] However, the magnitude of improvement in OHRQoL observed here was greater than the increase reported by the previous studies. Differences in patient populations and sampling variability may be responsible. Our results are different from the findings in the control group of a randomized trial comparing mandibular implant-supported overdentures with conventional dentures, where no statistically significant changes in OHRQoL were observed.[11] Again, differences in patient populations may be responsible for different study findings: Subjects in the previous study[11] were enrolled in a randomized controlled trial targeting individuals desiring replacement of their current complete dentures, whereas our subjects were a convenience sample of prosthodontic patients recruited from a clinic and a private dental practice.

We observed large differences in OHRQoL between fixed and removable/complete dentures at follow-up. This was not unexpected because OHIP-G49 differed by denture status before treatment, and the initial level of OHRQoL is a major predictor for the variable at follow-up. However, holding the baseline impairment constant, OHRQoL increased more in subjects with fixed prosthodontics.

Limitations and Strengths of the Study

We conceptualized OHRQoL using OHIP. Although this a widely used[25] and sophisticated instrument,[1] other instruments exist to measure OHRQoL.[26] The majority of instruments conceptualize OHRQoL as accumulation of problems, resulting in a summary score that is a problem index. When two different problem indices are used to compare OHRQoL measurement, studies' conclusions are essentially the same.[27,28] Some instruments (eg, UK OHRQoL measure,[29] Dental Impact Profile[30]) measure additional positive aspects of patients' perceptions of oral health as well as the negative aspects. However, conclusions about factors influencing OHRQoL are often similar, even when studies use different measures of OHRQoL.[31,32] Although further work is needed in this area, when evaluating outcomes from such fundamental treatments as prosthodontics, outcomes are likely to be pronounced; hence, evaluation of such treatments is likely to be relatively unaffected by the inclusion or exclusion of positive aspects of OHRQoL.

Case series studies rarely allow the investigation of cause-effect relationships. Therefore, causal interpretation of the finding that fixed prosthodontics were associated with a greater decrease of impaired OHRQoL than were removable/complete prosthodontics is not justified because of the study design and because the groups were not randomized at baseline. However, the analytic strategy allowed us to compare subjects with different types of prosthodontic treatments as though they had the same initial level of OHRQoL. Because tooth loss[29,33–35] and denture status[9] are strong predictors of OHRQoL, subjects with the same baseline OHIP values may indeed be comparable to a certain degree.

Although regression to the mean effects has been observed for OHIP,[36] the finding that OHRQoL increased in all treatment groups is plausible. Without intervention, an improvement of 3.2 OHIP points was observed over a period of 2 weeks.[7] OHIP-G changes of between 15 and 25 units (depending on the type of treatment) were observed in the present study for the period of prosthodontic treatment plus 1 month, much larger than anticipated regression to the mean effects.

Considering these limitations of the study design, our statistical analysis should be regarded as descriptive, not analytic, that is, the statistical model describes the course of OHRQoL over time in clinically relevant groups of prosthodontic patients, but it does not evaluate treatment efficacy.

It is a strength of our study that results could be compared to population-based norms[8] of groups of subjects similar to the patients treated with prosthodontics. Groups were identical for subjects with complete dentures. The composition of removable denture types in the clinical sample may be different compared to the general population. Our population group of subjects with no (removable or complete) dentures certainly contained a few subjects without any fixed prosthodontics (the population OHRQoL median for subjects with fixed prosthodontics, comparable with our clinical sample, should therefore be slightly higher). Our finding that posttreatment OHRQoL level in this group fell below that of the general population should not be compromised. Our results are in line with expectations that before prosthodontic treatment OHRQoL should be substantially more impaired compared with the general population and lower after treatment.

Although we found substantial differences between three clinically different groups of prosthodontic

patients, our groups of fixed prosthodontics and removable prosthodontics may contain distinct subgroups of subjects (eg, patients treated with crowns vs FPDs, patients treated with telescopic crown–retained dentures vs clasp-retained metal-frame prostheses). Our sample size was too small to investigate such subgroups.

Conclusion

Our analyses provided evidence for two clinically relevant questions. First, as expected, patients with removable or complete prosthodontics were different in terms of OHRQoL compared to patients with fixed prosthodontics when they first presented for treatment. After treatment, patients receiving removable or complete prosthodontics had poorer OHRQoL than did patients receiving fixed prosthodontic treatment. Second, we provided estimates about the magnitude of OHRQoL improvement measured with OHIP that can be expected from various prosthodontic treatments. Improvement was of substantial magnitude and was statistically significant. These results are relevant for clinicians who wish to draw on scientific evidence about the benefits of treatment when advising patients about whether treatment will improve their oral function and everyday lives.

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Literature Abstracts

Immediate occlusal loading of Osseotite implants in the lower edentulous jaw

This paper presented an interim analysis of the success rate of immediately loaded implants with hybrid prostheses in edentulous mandibles. Sixty-two patients (28 males and 34 females) with a mean age of 61.4 ± 11 years (33–83 years), were included in the study. Inclusion criteria were: *(1)* a completely edentulous mandible; *(2)* implant rehabilitation was considered as an elective treatment; *(3)* patient was physically able to tolerate procedures involved in implant therapy; *(4)* dense-normal bone quality; and *(5)* implants seated with ≥ 32 Ncm torque and showing good primary stability. Exclusion criteria included: *(1)* active infection in sites for intended placement; *(2)* systemic diseases; *(3)* radiation therapy within the last 12 months; *(4)* need for bone augmentation at proposed site; *(5)* radiographic evidence of unresorbed allograft at implant site; *(6)* severe bruxism; *(7)* pregnancy; and *(8)* consumption of more than 10 cigarettes a day. Success criteria were applied from Albrektsson et al, 1986. A metal-reinforced acrylic provisional prosthesis was placed within 4 hours of implant placement. Baseline orthopantograms and periapical radiographs were taken at implant placement. Recall procedures took place weekly for the first month and then monthly until the sixth month. Patient follow-up took place at 12, 18, and 24 months and yearly thereafter. Radiographs were repeated after 2, 6, and 12 months of occlusal loading and yearly thereafter. Two implants failed out of the 325 that were placed, representing a 99.38% success rate after 60 months. Patients found the treatment very favorable.

Testori T, et al. *Clin Oral Implant Res* 2004;15:278–284. **References:** 41. **Reprints:** Dr Tiziano Testori, Head of Implant Dentistry Section, Department of Odontology, Galeazzi Institute, University of Milan, Via R. Galeazzi 4 20161, Milan, Italy. e-mail: tiziano.testori@tin.it—*Esquivel-Upshaw, San Antonio, TX*

Implant design and interface force transfer: A photoelastic and strain-gauge analysis

The way that a dental implant and abutment are connected could affect the force distribution around the connection and may influence the amount and pattern of crestal bone loss. This study compared stress and strain magnitude of butt-joint (Brånemark) and internal-cone oral implants (Astra Tech and ITI) using photoelastic and strain-gauge analysis in a bone stimulant. Two models were fabricated for each implant. Photoelastic stress analysis was performed with vertical and 20-degree oblique forces of 100 N and 150 N applied on the abutment and observed isochromatic fringes on the resin. The strain-gauge analysis was performed separately to calculate principal strains induced around implants. Analysis of variance and Tukey/Kruskal-Wallis test were performed for statistics. In the photoelastic analysis, the differences between designs were not statistically significant under vertical and oblique loads. Also, the differences in strain-gauge analysis between different implants were not significantly different. The authors concluded that there were similar force distribution characteristics between butt-joint and internal-cone implants. It would not be a significant factor affecting stress and strain magnitudes in a bone stimulant.

Cehreli M, et al. *Clin Oral Implant Res* 2004;15:249–257. **References:** 47. **Reprints:** Prof Ignace Naert, Department of Prosthetic Dentistry, Kapucijnenvoer, 33, B-3000 Leuven, Belgium. e-mail: Ignace.Naert@med.kuleuven.ac.be—*Eunghwan Kim, Lincoln, NE*