Quality of Life of Patients with Maxillofacial Defects After Treatment for Malignancy

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> **Purpose:** The purpose of the study was to investigate how cancer patients with maxillofacial defects evaluate their quality of life after prosthodontic therapy, complemented by a retrospective interview for judging the various therapy steps. The results were compared with a nontumor control group (multiple tooth extractions) and with population-based norm data. Materials and Methods: A total of 34 patients were included in the study, 17 in each group. Patients first filled in a questionnaire and then answered additional questions in a standardized interview. Results: At the time of investigation, tumor patients did not significantly differ from nontumor patients regarding global quality of life. However, tumor patients had significantly less favorable values regarding role functioning, speech, mouth opening, and dry mouth, as well as pain and swallowing. In comparison with the reference data of the German population, tumor patients had considerable deficits (> 20 points) regarding role functioning, dyspnea, and financial difficulties. Other deficits (> 10 points) became apparent in global quality of life, fatigue, insomnia, and appetite. When reflecting the course of disease and recovery, tumor patients rated the diagnosis as the most stressful event and reported that the family was most instrumental in the recovery process. **Conclusion:** Patients with maxillofacial defects after treatment for malignancy suffer from numerous clearly definable quality of life-related symptoms and problems, even after prosthodontic treatment. These patients need psychologic care at the time of diagnosis to alleviate the burden of the cancer diagnosis and prepare for the demanding treatment. After completion of the prosthodontic treatment, therapy options for pain or speech problems should be offered. Int J Prosthodont 2004;17:657-665.

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n the Western world, about 5% of all tumors are located in the maxillofacial area.¹ The diagnosis of such a tumor is usually the onset of a long, invasive, and distressing therapy. Because of the complexity of this therapy, there is close cooperation among several disciplines, such as oral and maxillofacial surgery, otorhinolaryngology, therapeutic radiology, and dentistry (maxillofacial prosthodontics). The treatment can be life preserving, but it frequently results in both a visible defect (mutilation) and a functional defect.² The latter manifests itself in restrictions concerning mandibular mobility and phonetics, as well as swallowing, masticatory ability, taste, sensitivity, and mouth dryness.³⁻⁵ The outward disfigurements and the functional restrictions may reduce the quality of life of patients⁶ and are obstacles to their integration in the social environment.⁷

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In recent years, increasing attention has been paid to quality-of-life research in oncology. It has been proposed that quality-of-life parameters should be assessed in addition to conventional clinical criteria. Both classes of variables have to be considered, and their relative importance in a given clinical situation judged, to gain a complete picture of the patient and arrive at a treatment decision.^{8,9} Today, quality-of-life studies are also increasingly gaining acceptance in dentistry.¹⁰ Studies involving patients with maxillofacial defects have been conducted from the perspectives of maxillofacial surgery, otorhinolaryngology, and oncology.¹¹⁻¹⁵ However, these investigations have not taken into account the prosthetic and epithetic treatment, which is of great importance to the patient.

The present study investigated the quality of life of patients with maxillofacial defects from a prosthodontic point of view. Quality of life was measured using a standardized instrument after prosthodontic therapy was completed. This was complemented by a retrospective interview on the development of the quality of life over the course of time, ie, over the various therapy steps. This study focused on two broad sets of questions:

- How do patients with maxillofacial defects after the completion therapy judge their present quality of life, as compared to a control group (multiple tooth extraction patients) and to population-based reference data?
- 2. How do patients with maxillofacial defects retrospectively evaluate the course of the therapy, in comparison to patients with multiple tooth extractions?

It was hypothesized that patients with maxillofacial defects remaining after treatment suffer from *specific* symptoms, such as dry mouth and speech problems, that can be regarded as a consequence of the radical multimodel therapy. At the same time, it is known that patients experiencing severe life events are able to cope with their situation after some time; therefore, it was also hypothesized that evaluations of *global* quality of life would not be dramatically different from the control group or norm reference data.

Materials and Methods

Study Design and Patient Characteristics

This was a cross-sectional study comparing two groups of patients: (1) patients with malignant disease who were undergoing therapy that resulted in maxillofacial defects; and (2) patients with multiple tooth extractions. The two groups were comparable in that both had undergone an extensive, time-consuming surgical and prosthodontic treatment (up to 1.5 years). The crucial clinical difference between these two patient groups was that one group had received this treatment because of a malignant condition, whereas the other group had had a nonmalignant condition. Furthermore, patient quality-of-life scores were compared with German population-based norm data.¹⁶ All patients were investigated according to a study protocol approved by the local ethics committee.

From January 1995 to December 1999, a total of 42 patients who had undergone tumor surgery in the maxillofacial area received prosthetic and/or epithetic treatment at the Philipps University Department of Preclinical and Maxillofacial Prosthodontics in Marburg, Germany. Of these 42 patients, 11 had died, 2 were not available, 5 felt unable to participate in the study for health reasons, 6 refused to participate, and 1 discontinued the questioning procedure without giving any reasons. In the end, 17 of the 42 patients were enrolled in this study.

The control group consisted of 17 persons affected with a nonmalignant condition, namely poor dental health status, that led to multiple tooth extractions (≥ three teeth per patient). These patients also received prosthetic treatment from January 1995 to December 1999. Directly after the extractions, interim prostheses were placed to allow the extraction wounds to completely heal before definitive treatment.

Patient characteristics of the two groups are presented in Table 1. Patients with maxillofacial defects were older (P < .010) and had a higher education level (P < .050), and the majority of them were retired (P < .010). The therapy lasted longer for the patients with multiple tooth extractions (11.6 months) than for the patients with maxillofacial defects (7.8 months) (P < .050). The time span between the end of therapy and the date of this investigation was longer for the patients with maxillofacial defects (22.4 months) than for the patients with multiple tooth extractions (8.4 months) (P < .010).

Patients were contacted by the study center and invited to take part in a follow-up study that consisted of a thorough clinical investigation and a self-administered questionnaire. If the patient consented, an appointment was scheduled at the Department of Preclinical and Maxillofacial Prosthodontics. Upon arrival at the department, the patient was informed about the nature and course of the investigation. The patient then signed an informed consent form. Then, the selfadministered questionnaire was handed out. The testing situation was standardized. The patient was seated at a separate desk in a guiet corner and had to fill in the questionnaire by him- or herself, without the presence of the study physician or any other person.⁷ After completion of the questionnaire, the structured interview was conducted.

Characteristic m	Patients with naxillofacial defects ($n = 17$)	Patients with multiple tooth extractions (control; $n = 17$)		
Age (y)				
Mean	61.7 (SD 6.3)	53.4 (SD 8.3)		
Range	52-78	39–68		
Gender				
Male	14	13		
Female	3	4		
Tumor type				
Ameloblastoma	2	Not available		
Squamous cell carcinoma	8	Not available		
Adenoid cystic carcinoma	1	Not available		
Alveolar process carcinoma	3	Not available		
Cystadenoma	1	Not available		
Other	2	Not available		
Marital status				
Married	15	15		
Divorced	1	1		
Widowed	1	1		
General school-leaving qualification	1			
"Basic" secondary school	10	14		
"Modern" secondary school	2	2		
Technical college entrance qualif	ication 2	0		
University entrance qualification	3	1		
Retired				
Yes	14	6		
No	3	11		
Period from diagnosis to end of therapy (mo)				
Mean	7.8	11.6		
Range	1–19	1–21		
Period from end of therapy to investigation (mo)				
Mean	22.4	8.4		
Range	1–57	1–18		

Table 1 Patient Characteristics

SD = standard deviation.

EORTC Quality-of-Life Questionnaire

The quality-of-life assessment system of the European Organisation for Research and Treatment of Cancer (EORTC) was used; it consisted of the EORTC QLQ-C30 plus the symptom module HN35.^{17,18} The QLQ-C30 questions are applicable to cancer patients across various diagnoses and tap into the following functioning domains: physical, role, emotional, social, cognitive, and global quality of life. Other questions relate to common cancer- and therapy-related symptoms such as nausea/vomiting, appetite loss, or pain. This 30item core questionnaire was supplemented by a 35item head and neck module that comprises symptoms and modules specific for this patient group (EORTC QLQ-HN35).¹⁹ The following areas are considered: pain, swallowing, senses problems, speech problems, trouble with social eating, trouble with social contact, and less sexuality, and numerous single sensations such as dry mouth, sticky saliva, or coughing.

The questionnaires were filled in by the patients themselves using four-point Likert scales (not at all, a little, quite a bit, very much) to respond to the questions. The EORTC questionnaires underwent a standardized development process and rigorous psychometric testing. The questionnaires are available in all major international languages.²⁰ Norm data reflecting scores of the German population have been published.¹⁶

Standardized Interview

Patients were presented a time axis indicating critical steps of the course of the therapy, such as tumor surgery or tooth extractions, radiotherapy (patients with maxillofacial defects only), and prosthetic treatment. First, patients had to indicate their actual global quality of life using a Cantril scale²¹ that asked for a judgment ranging from 0 (worst possible quality of life) to 10 (best possible quality of life). Then, patients used the time axis to retrospectively judge their quality of life at the various critical steps in the course of the therapy. Finally, the patients were asked to answer the following open questions:

- 1. Apart from the medical treatment, what was most helpful for you in the course of the therapy?
- 2. In what respect was the medical treatment a burden to you?

	Patients with	Patients with		German population	Men aged 60–69 y ¹⁶
Parameter	defects (n = 17)	extractions (n = 17)	Р	(N = 2,028)	$(n = 193, part of German population)^{\dagger}$
Global quality of life [‡]	61 (SD 22)	74 (SD 23)		71 (SD 22)	66
Functional scores [‡]					
Physical	82 (SD 17)	92 (SD 15)	*	90 (SD 17)	87
Role	69 (SD 32)	93 (SD 15)	***	88 (SD 23)	85
Emotional	76 (SD 26)	76 (SD 23)		79 (SD 21)	81
Cognitive	84 (SD 22)	91 (SD 18)		91 (SD 17)	88
Social	80 (SD 28)	81 (SD 24)		91 (SD 19)	87
Symptom scores [§]					
Fatigue	30 (SD 32)	13 (SD 20)	*	17 (SD 22)	19
Nausea/vomiting	3 (SD 9)	3 (SD 12)		3 (SD 10)	2
Pain	22 (SD 25)	17 (SD 21)		15 (SD 24)	20
Dyspnea	29 (SD 41)	14 (SD 24)		8 (SD 20)	13
Insomnia	29 (SD 39)	12 (SD 20)		16 (SD 27)	20
Appetite loss	24 (SD 39)	14 (SD 34)		5 (SD 16)	6
Constipation	2 (SD 8)	0 (SD 0)		4 (SD 14)	4
Diarrhea	2 (SD 8)	2 (SD 8)		3 (SD 12)	2
Financial difficulties	35 (SD 40)	12 (SD 29)	*	6 (SD 18)	10

Table 2 Mean Values Obtained with EORTC QLQ-C30 Questionnaire

[†]Standard deviations (SD) not reported.

[‡]Scores range from 0 (very bad) to 100 (very good).

§Scores range from 0 (no symptom distress) to 100 (high symptom distress).

***P < .010; *P < .100. P values refer to differences between the two patient groups (maxillofacial defects vs multiple tooth extractions).

To check how well the patients remembered the course of their therapy, they were asked about the dates of various specific therapy steps according to a fixed catalogue of questions; these answers were cross-checked with medical chart information. In addition, the patients were asked to judge their subjective memories on a scale ranging from 0 (cannot remember well) to 5 (can remember very well).

Statistical Analyses

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Quality-of-life scores were computed according to the EORTC scoring manual.¹⁸ Comparisons between the patients with maxillofacial defects and patients with multiple tooth extractions were computed with unpaired *t* tests. These univariate analyses were supplemented by hierarchic regression analyses. Given that population-based studies report age and gender differences in quality of life,^{16,20} age and gender were entered in a first step, and the grouping variable (patients with maxillofacial defect vs patients with multiple tooth extractions) was entered in the second step. The change in R^2 obtained through the grouping variable was of major interest.

The study sample (N = 34; n = 17 vs n = 17) allowed detection of differences of 20 score points (standard deviation [SD] 20) when alpha was set at 5% and beta at 20%. In reporting the results, significance levels of P < .010 and P < .050 were applied, but for informative reasons, differences that fell just short of these conventional levels (P < .100) were also reported. The aim of the analyses was to explore a pattern of quality-of-life

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variables that differentiated between the two groups rather than test an overall null hypothesis (ie, there are no differences whatsoever between the two groups). Therefore, Bonferroni adjustment was not used.²² Furthermore, the quality-of-life scores from the EORTC QLQ-C30 were compared with the reference data for the German population¹⁶; the suggestion that score differences of > 10 points are clinically significant was followed.²³ Differences > 20 were regarded as highly clinically significant.

In addition to this questionnaire-based quality-of-life assessment, remarkable events in the course of the treatment were explored in the form of a standardized interview. The Cantril scale²¹ was used for retrospectively quantifying changes in quality of life. Group differences were computed using the *t* test. Responses to the two open questions (eg, "What helped you most in the course of the treatment?") were coded and then analyzed using the chi-square test. All statistical analyses were performed with SPSS software (SPSS).²⁴

Results

Quality of Life Measured with EORTC Questionnaires

According to the EORTC QLQ-C30, patients with maxillofacial defects had significantly lower role functioning than the control group with multiple teeth extractions (P< .010; Table 2). The difference in global quality of life was not statistically reliable (P > .100). Comparisons between the group of maxillofacial defect patients and the

Head/neck symptom [†]	Patients with maxillofacial defects (n = 17)	Patients with multiple tooth extractions (n = 17)	Р
Pain	20 (SD 20)	7 (SD 10)	**
Swallowing	17 (SD 23)	3 (SD 4)	**
Senses problems	19 (SD 28)	5 (SD 11)	*
Speech problems	17 (SD 15)	5 (SD 8)	***
Trouble with social eating	31 (SD 33)	12 (SD 26)	*
Trouble with social contact	9 (SD 17)	1 (SD 4)	*
Less sexuality	25 (SD 40)	10 (SD 26)	
Teeth	26 (SD 40)	25 (SD 39)	
Opening mouth	33 (SD 43)	2 (SD 8)	***
Dry mouth	35 (SD 34)	4 (SD 11)	***
Sticky saliva	28 (SD 36)	14 (SD 21)	
Coughing	20 (SD 27)	10 (SD 16)	
Felt ill	22 (SD 31)	12 (SD 26)	
Painkillers	10 (SD 20)	14 (SD 27)	
Nutritional supplements	16 (SD 31)	12 (SD 26)	
Weight loss	18 (SD 34)	16 (SD 29)	
Weight gain	20 (SD 29)	2 (SD 8)	*

Table 3 Mean Values Obtained with EORTC QLQ-HN35 Questionnaire

[†]Scores range from 0 (no symptom distress) to 100 (high symptom distress).

***P < .010; **P < .050; *P < .100; SD = standard deviation.

Table 4	Hierarchic	Regression	Analyses [†]

Parameter	Model 1 (age, sex): R ²	Model 2 (age, sex plus patient group): <i>R</i> ²	R ² change
Functional scores			
Role	0.07	0.21	0.14**
Symptom scores			
Dyspnea	0.01	0.10	0.09*
Insomnia	0.01	0.12	0.11*
Financial difficulties	0.10	0.19	0.09*
Head/neck symptoms			
Pain	0.03	0.13	0.10*
Swallowing	0.07	0.17	0.11*
Senses problems	0.03	0.16	0.13**
Speech problems	0.11	0.32	0.21***
Trouble with social contact	0.01	0.14	0.13**
Opening mouth	0.02	0.30	0.28***
Dry mouth	0.05	0.33	0.28***
Weight gain	0.04	0.23	0.19**

[†]Performed by entering age and sex in the first step. In the second step, the patient group variable (patients with maxillofacial defects vs patients with multiple tooth extractions) was entered additionally. Only scores for which statistically significant or almost significant (P < .100) changes in R^2 were detected are reported. R^2 change denotes the gain in the amount of variance explained by the inclusion of the group variable. ***P < .010; **P < .050; *P < .100.

reference data of the total German population (N = 2,028)¹⁶ revealed highly clinically relevant differences of > 20 points in the domains of role functioning, dyspnea, and financial difficulties. Differences of > 10 points became apparent with regard to global quality of life, fatigue, insomnia, and appetite loss. Furthermore, comparisons with the age-relevant group of men (60 to 69 years, n = 193) were made. Considerable score differences occurred with regard to financial difficulties (> 20 points) and role functioning, and fatigue, dyspnea, insomnia, and appetite loss (> 10 points).

For the head- and neck-specific symptoms assessed with the EORTC QLQ-HN35, the group of maxillofacial patients was significantly (P < .010) more impaired than

the control group regarding speech, mouth opening, and mouth dryness (Table 3). Furthermore, differences were detected regarding pain and swallowing (P < .050).

Maxillofacial defect patients were older than control group patients (Table 1). Large-scale population-based studies have shown that the variables age and gender influence quality-of-life scores.^{16,20} Thus, one might suspect that the differences between maxillofacial defect patients and the control group were due to demographic factors rather than type of disease and treatment. Therefore, hierarchic multiple regression analyses controlling for demographic variables were computed. The relative effect of the grouping variable (patients with



Fig 1 Development of global quality of life during therapy and aftercare. 1 = "before" (state before diagnosis); 2 = diagnosis; 3 = operation; 4 = radiotherapy (*dotted line* = patients with multiple tooth extractions, who did not undergo radiotherapy); 5 = time of definitive treatment; 6 = end of definitive treatment; 7 = state at time of investigation; significant differences at points 1 and 2 (***P < .001; **P < .050).

Question	Patients with maxillofacial defects (n = 17)	Patients with multiple tooth extractions (n = 17)
Apart from the medical treatment, what was most helpful for you in the course of the therapy?		
Family	12	2
Care	1	5
Ability to eat	1	0
Conversation (with patients/students)	0	3
Hope for good teeth	0	1
Rest	0	2
No answer	2	4
In what respect was the medical treatment a burden to you? [†]		
Anxiety/depression	4	1
Diagnosis	1	0
Occupation	1	0
Eating/swallowing	3	2
Speech problems	2	0
Pain	2	2
Discomfort	2	0
Loss of teeth	0	2
No answer	4	10

Table 5Open Questions

[†]More than one answer was possible.

maxillofacial defects vs patients with multiple tooth extractions) is shown in the R^2 change column of Table 4.

Development of Quality of Life During Therapy and Follow-up

According to the retrospective quality-of-life reports (Cantril scale), at the time of the investigation, there

was no difference in the mean quality of life between the group of patients with maxillofacial defects (8.4, SD 2.1) and the control group (8.7, SD 1.5). The comparison between the two groups showed significant differences at the measuring points "before the illness/treatment" (P < .001) and "diagnosis" (P < .030) (Fig 1), in the sense that the maxillofacial defect cancer patients indicated higher overall quality of life "before" and worse quality of life at "diagnosis."

When asked to rate their subjective memories of the course of the treatment (range 0 to 5), the patients with maxillofacial defects showed a mean value of 4.3 (SD 0.8), whereas the mean value of the control group was 4.4 (SD 0.7). This indicates that both groups had good subjective memories.

During the open questions, 12 of the 17 maxillofacial defect patients answered that the family was most helpful in the course of their therapy, whereas only 2 of the 17 control group patients indicated the same. This difference was statistically significant (chisquare 12.1; P < .001). Regarding treatment burden, patients with maxillofacial defects mentioned a variety of different problems, whereas 10 of the 17 patients in the control group did not indicate any explicit distress (Table 5).

Discussion

As hypothesized, global quality of life of the maxillofacial defect patients did not differ significantly from that of the control group. The phenomenon that supposedly very ill patients differ from less ill or healthy persons to only a negligible or relatively small extent with regard to their overall quality of life has already been described in various quality-of-life studies.^{7,25} This can be attributed to the fact that in a long case history, reevaluation processes take place, allowing patients to adapt their aspiration levels and evaluative criteria to the new life situation.²⁶⁻²⁸

We expected that numerous specific problems would be presented, and this also turned out to be the case. The patients with maxillofacial defects showed considerable restrictions in terms of mouth opening, speech, and swallowing.^{5,15} This is understandable in the case of defect-producing operations in the oral area, since these operations not only involve the loss of tissues or organs, but also a functional defect.³ Mouth dryness as a late sequela of radiotherapy is also plausible from a clinical point of view, just as much as the fact that many of these patients suffer from pain. In comparison with population-based German norm data, maxillofacial defect patients had particularly poor scores in role functioning, dyspnea, and financial difficulties. Multivariate analyses of the results showed that these differences cannot be simply attributed to age- and gender-specific effects, but are actually due to the grouping variable (ie, patients with maxillofacial defects vs patients with multiple tooth extractions).

The assessment of the quality of life by means of a standardized questionnaire at one point of measurement provides a single snapshot, but it does not tell anything about its variations in the course of the treatment. For this reason, a standardized interview was conducted. Again, ratings of present overall quality of life were not different between the two patient groups. However, there were considerable differences in the judgments of the course of the treatment. For maxillo-facial defect patients, the diagnosis of a malignant tumor suddenly interrupted a state of relative well-being and caused an extreme decrease in the quality of life. This was followed by a slow but steady adaptation to the changing life situation. Multiple tooth extraction patients did not recollect such a sudden drop in quality of life. In retrospect, their quality of life was low before diagnosis and beginning the treatment, a finding supported by the literature.^{29,30}

The retrospective report of a sudden drop in quality of life at the time of diagnosis in our tumor patient group may either reflect an accurate account of the shock of a life-threatening diagnosis or may be due to a contrast effect (idealizing the past after experiencing threatening diagnosis and burdensome treatment). The study design does not allow us to choose between the two interpretations. However, the reporting of a relatively large number of burdensome experiences in the course of the treatment indicates that patients with maxillofacial defects had to undergo a more extensive reevaluation process until they reached an acceptable quality of life than did the control group.^{31,32} In adjusting to their illness and treatment, maxillofacial defect patients found their family members and friends most helpful.³³

The value of retrospective reports is controversial, particularly because they are vulnerable to numerous cognitive distortions, such as hindsight bias or morethan-we-know effect.34,35 This caveat is important as long as one is interested in the accuracy of reporting. However, accuracy of the retrospective reports was not the main issue in the present study (although the checking procedure revealed that patients could well remember the timing and dates of specific therapy-related events). We were interested in how patients recollected and evaluated the whole course after the therapy had been completed. Such recollections and evaluations are part of everyday communication, particularly between patients and doctors or patients and fellow patients. Therefore, such recollection and communication patterns are an important research issue in their own respect.

The study design (comparison with a nonmalignant control group and with quality-of-life norm reference data) and assessment method (combination of standardized questionnaire and structured interview with ratings and open questions) allowed us to collect detailed information about the patient group of interest. A critical issue is the relatively small number of patients examined, and therefore no subgroup analyses were possible with regard to surgical procedure and type of prosthetic rehabilitation.²⁸ It must be noted, however, that tumors in the head and neck region are rare and involve high mortality (in fact, 11 of our 42 target patients had died). This makes the investigation of this patient group notoriously difficult.^{12,36} The high percentage of deceased patients may have introduced a positive selection bias (ie, patients who were critically ill did not take part in the study³⁷). Therefore, the prevalence of specific quality of life-related problems revealed in this study may in reality be even more pronounced when the entire cohort of maxillofacial defect patients is considered. Nevertheless, the present study results provide a first orientation, which can be tested in a confirmatory manner in prospective longitudinal studies involving a larger cohort of patients.

Conclusion

This study demonstrated that patients with maxillofacial defects face numerous quality of life–related problems, even after prosthodontic treatment has been completed. Clinical experience suggests that complete elimination of these problems is not possible, and therefore patients have to be properly informed before treatment. Psychologic care should be considered as early as at the time of diagnosis. Quality of life–oriented aftercare should be multifaceted and include pain management, speech therapy, psychotherapy, and regular examination of prosthodontic devices.⁹ In addition, attempts should be made to involve the patient's family and social environment in the treatment and recovery process.

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Literature Abstract

Early loading (2 or 6 weeks) of sandblasted and acid-etched (SLA) ITI implants in the posterior mandible. A 1-year randomized controlled clinical trial

The aim of this prospective controlled 1-year clinical trial was to evaluate the effect of early loading of ITI solid-screw titanium implants with a sand-blasted and acid-etched surface on clinical and radiographic parameters. Twenty-seven consecutively admitted patients presenting bilateral edentulous posterior mandibular areas and in need of prosthetic reconstruction were recruited. Sixty-seven ITI standard solid-screw implants with a diameter of 4.1 mm and lengths of 8, 10, or 12 mm were installed bilaterally in molar and premolar areas according to one-stage surgical protocol. Using a randomized split-mouth design, 31 implants were placed on one side (test) and 36 implants on the contralateral side (control) of the mandible. One week (test) and 5 weeks (control) after implant placement, solid ITI prosthetic abutments were connected using a torque of 35 Ncm. No provisional restoration was fabricated. Two weeks (test) and 6 weeks (control) after implant placement, porcelain-fused-to-metal single-tooth crowns were cemented. Clinical measurements were obtained at day 0 and 2, 6, 12, 24, and 52 weeks thereafter. Periapical radiographs were taken immediately after implant placement, after 6 weeks and at the 1-year examination. Implant survival was 100% after 1 year. One control and two test implants rotated at the time of abutment connection and were left unloaded for 12 additional weeks. At the 1-year examination, no statistically significant differences were found between the test and control sites with respect to pocket probing depths (2.6 mm ± .5 vs 2.7 mm ± .5 mm), mean clinical attachment levels (3.1 mm ± .4 vs 3.2 mm ± .5), mean percentages of sites bleeding on probing (9.7% vs 8.3%), mean width of keratinized mucosa (1.8 mm ± .4 vs 1.9 mm ± .5), mean Periotest values (-1.4 PTV \pm .9 vs -1.6 PTV \pm .8) or mean crestal bone loss measurements (.57 mm \pm .49 vs .72 mm \pm .50). Based on these results, loading of titanium implants with sand-blasted and acid-etched surface as early as 2 weeks did not appear to jeopardize the osseointegration healing process in the posterior mandible, although the success rate is less than 100%, considering the two implants that rotated at the time of abutment connection. This study further shows that implants rotating at 35 Ncm, if left unloaded for additional 12 weeks, did not negatively affect clinical and radiographic outcomes.

Salvi GE, Gallini G, Lang NP. Clin. Oral Implants Res. 2004;15:142–149. Reference: 38. Reprints: Dr Giovanni E. Salvi, University of Berne, School of Dental Medicine, Freiburgstrasse 7 CH-3010 Berne, Switzerland. e-mail: Giovanni.salvi@zmk.unibec.ch—Tee-Khin Neo, Singapore Copyright of International Journal of Prosthodontics is the property of Quintessence Publishing Company Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.