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Outcome of implant therapy in relation to experienced loss of periodontal bone support

A retrospective 5-year study

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Abstract: *Purpose:* The aim of this retrospective study was to analyse bone level alterations over a 5-year period at implants in the maxillary posterior segments in patients with varying experience of periodontal bone loss in the natural dentition before implant placement.
Material and methods: 97 partially dentate patients with a total of 346 Brånemark® oral implants in the maxillary posterior segments were included. By assessing the degree of radiographic marginal bone loss in the remaining natural dentition at time of the implant therapy, an age-related bone loss score (ArB-score) was calculated for description of the patient's experience of periodontal destruction. The two end quartiles of the distribution of the subjects with regard to the ArB-score were defined as Non-Perio subjects and Perio subjects, respectively. The primary outcome variables were implant losses (implant failures) and radiographic peri-implant bone loss over the 5-year observation period.
Results: A total of 18 implants were lost during the 5 years, resulting in an overall failure rate of 5.2%. The corresponding failure rate was 3.3% for the Non-Perio and 8.0% for the Perio patients. The peri-implant bone loss from the time of abutment connection to 5 years averaged 1.8 mm (SD 0.7). Of the patients, 34% showed a mean bone loss of > 2 mm and 39% of all implants had experienced a bone loss of 2 mm at the 5-year examination. The Non-Perio and Perio patients showed a mean bone loss of 1.7 mm (0.8) and 2.2 mm (0.8), respectively. Multiple regression analysis revealed a statistically significant relationship between the ArB-score and the peri-implant bone level change from abutment connection to 5 years ($P < 0.05$). In all, 64% of Perio patients had a mean peri-implant bone loss of > 2 mm from the time of abutment connection, compared to 24% for the Non-Perio patients ($P < 0.01$). The percentage of implants showing 2 mm of bone loss between abutment connection and 5 years was 62% and 44% in the Perio and Non-Perio groups, respectively ($P = 0.055$).
Conclusion: The results indicate that longitudinal bone loss around implants is correlated to previous experience of loss of periodontal bone support and that periodontitis susceptible subjects may show an increased implant failure rate.

Implant therapy has become a common treatment alternative for oral rehabilitation of the periodontitis patient who has experienced loss of parts of the dentition. A pertinent question in relation to implant therapy in patients susceptible to periodontitis is whether these patients may also show an elevated risk for peri-implant tissue destruction. It has been demonstrated that implants are rapidly colonised by indigenous periodontal pathogens in partially dentate patients harbouring periodontal lesions (Apse et al. 1989; Leonhardt et al. 1993; Papaioannou

et al. 1996; Ellen 1998; Sbordone et al. 1999), suggesting that periodontal pockets may act as reservoirs for microbial colonisation of inserted implants. Hence, since there is no evidence that the host response to microbial challenges may be altered if a tooth is substituted by an implant, one may anticipate that a periodontitis-susceptible individual who is not subjected to proper infection control may experience a similar risk for inflammatory induced bone loss at implants and teeth.

Only limited data are available on the prognosis of implant therapy in periodontitis-susceptible patients. Ellegaard et al. (1997) presented follow-up data (varying from 3 to 84 months) on 75 patients who, following successful periodontal treatment, received single or partial prosthetic reconstructions supported by implants, indicating that periodontally compromised patients can be successfully treated with implants. Nevins & Langer (1995) reported an overall implant survival rate of about 97% in a 1–8-year follow-up study of 59 patients whose periodontal disease had been categorized as recalcitrant. Brocard et al. (2000) showed less favourable outcome of implant therapy in periodontal patients than was reported in the previous two studies. In their multicentre study, in which the 5-year overall cumulative survival rate was 95% (success rate 94%), implants placed in 'periodontally maintained patients' showed a success rate of 89%. Hence, although these data indicate a high rate of success with implant therapy in the periodontally compromised patient, the study by Brocard et al. (2000) discloses a potential risk for a higher failure rate than indicated by the global data on implant therapy.

The aim of this retrospective study was to analyse implant failure rate (implant losses) as well as peri-implant bone level alterations over a 5-year period in patients with varying experience of periodontal bone loss in the natural dentition before implant placement. Since evidence exists in the literature that implant success/survival rates vary depending on intraoral location (maxilla or mandible, anterior or posterior) (Sennerby & Roos 1998), the study was confined to fixed partial dentures in the posterior segments of the maxilla to reduce the variance in the outcome variables.

Material and methods

The target population for the study was all patients with a partially dentate maxilla who had been treated with implant-supported fixed bridges at the Brånemark Clinic, Public Dental Service, Göteborg, Sweden, during the period 1985–1991. The patients' records were analysed to identify those patients who had a panoramic radiograph, displaying the remaining natural dentition, taken at the time for the implant treatment. A total of 244 records were identified. These records were then evaluated based on the following inclusion criteria:

- implant-supported prosthesis without posterior cantilever in the canine to molar region;
- intraoral radiographs of the implants after abutment connection, bridge insertion and 1 and 5 years of follow-up;
- systemically healthy individual.

Patients subjected to bone augmentation procedures and single implant cases were excluded. Of the 244 initially identified patients, 147 did not meet the inclusion criteria. Hence, the records of 97 patients made up the final sample to be evaluated.

From the patients' files, data were extracted with regard to (i) gender, (ii) age, (iii) implant positions, (iv) length and diameter of implants and (v) loss of implants.

Radiographic assessments

All the radiographic examinations were performed at the Department of Oral & Maxillofacial Radiology.

Assessment of remaining periodontal bone support

The panoramic radiograph obtained at the time for planning the implant therapy was utilised for assessments of the level of bone support around the remaining teeth. The bone level was determined at the mesial and distal aspects of all teeth by assessing the most coronal position of the supporting bone in relation to the root length with the use of a transparent ruler scaled in 10% units (Björn et al. 1969). The most coronal position of the supporting bone was defined as the level where the periodontal ligament space was considered to have a normal width. If the cement–enamel junction (CEJ) was masked due to crown restorations, its location was estimated to a level corresponding to a connecting line between the CEJ of the neighbouring teeth. The measurements were performed by one examiner (C.H.). The error of the method used for recording the alveolar bone level was assessed through duplicate measurements performed in panoramic radiographs of 15 randomly selected patients. For 93% of the assessments, the data were identical. No tooth showed a difference of more than one 10%-scale unit.

To generate an overall descriptor of the patient's experience of periodontal destruction before the time of implant therapy, which also took into account the age of the patient, an age-related periodontal bone loss score (ArB-score) was calculated:

$$\text{ArB-score} = \frac{\Sigma\,(100 - \text{"Tooth bone level"})}{\text{No. of teeth} \times \text{Age}}$$

The lowest percentage marginal bone level value for each tooth (mesial or distal site) was used for this calculation ('Tooth bone level').

Assessment of bone quality and quantity at implant sites

Bone quality and bone quantity at the implant sites were assessed according to the index described by Lekholm & Zarb (1985). The evaluations were performed by one examiner (U.L.) using panoramic radiographs, tomographic images and information provided through notes made by the surgeon in the patient's record.

Bone level assessments at implants

Intraoral radiographs were taken with a standardised paralleling technique using a rigid film-holder with a beam guiding rod (Gröndahl et al. 1996). The radiographs were examined with a ×7 magnification (Peal® Scale Lupe ×7). The distance between the implant platform (implant–abutment junction) and the bone to implant contact at the mesial and distal aspect of each implant was recorded to the nearest 0.1 mm. The bone level assessments were carried out by one observer (K.G.) and without having access to the radiographs obtained at the preoperative examination or information about the purpose of the study. The intraobserver variability in radiographic bone level assessments at Brånemark implants has been reported by Gröndahl et al. (1998) and found to be 0.05–0.09 mm depending on the distance between the reference point and bone level.

Data analysis

For data description, the two tail quartiles of the distribution of the individual age-related marginal bone loss scores (ArB-score) were chosen to represent individuals with minimal experience of periodontal breakdown (*Non-Perio group*) and subjects considered to be susceptible to periodontitis (*Perio group*). The primary outcome variables were implant losses (implant failures) and radiographic peri-implant bone loss during the 5-year period. Mean values and standard deviations were calculated for the various variables using the patient as the statistical unit. Multiple regression analysis was used to statistically evaluate relationship between ArB-score and longitudinal bone loss around implants. Statistical analysis of differences in frequency of subjects and implants with a certain threshold value for bone level change was performed with the use of the Mann–Whitney*U*-test.

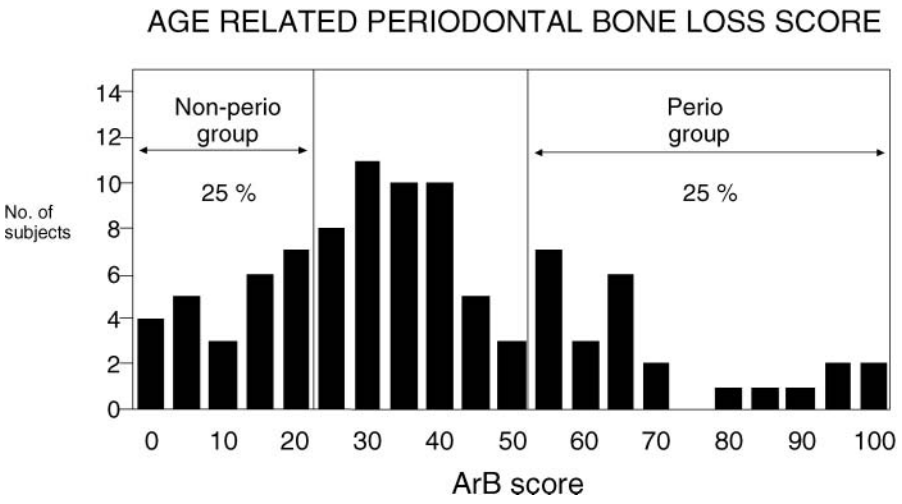

Fig. 1. Distribution of the patient sample based on the age-related periodontal bone loss score (ArB score). The two tail quartiles were selected to represent subjects non-susceptible (Non-Perio; ArB score <25) and susceptible (Perio; ArB score $=55$) to destructive periodontal disease.

Results

The characteristics of the patient sample are presented in Table 1. The total sample comprised 97 patients (41 males and 56 females) with an age range of 20–83 years (mean 57.6 years, SD 14.6) at the time of implant installation. The average number of remaining teeth was 16 (SD 5.0) with a mean marginal bone level of 77% (12.2). The mean percentage of teeth with a bone level $<50\%$ was 9% (14.0).

The frequency distribution of the total sample with regard to age-related bone loss score (ArB-score) is shown in Fig. 1. The ArB-score showed a skewed distribution with a median value of 38 (range 5–100); mean 41 (SD 23). The two end quartiles of the distribution were defined as Non-Perio subjects (ArB-score <25) and Perio subjects (ArB-score ≥ 55), respectively. As shown in Table 1, the patients of the two groups differed markedly with respect to mean periodontal bone level (92% vs. 63%) and proportion of teeth with a bone level of less than half of the root length (1% vs. 26%) but were comparable with respect to average number of remaining natural teeth (16 teeth). Furthermore, the mean age of the patients in the Perio group was slightly lower than that for the Non-Perio group (53.5 vs. 57.3 years).

The data describing bone quantity and bone quality of the jaw area for implant placement are presented in Fig. 2. With respect to the quantity of bone, the Perio group showed a higher proportion of subjects with a poor quantity (grade D) than the Non-Perio group (20% vs. 0%), and a lower proportion of subjects with grade A or B (20% vs. 48%). About 80% of the patients were judged to have a bone quality of score 3 and about 20% score 4 in both the Perio and the Non-Perio group.

Table 2 describes the number of implants inserted and lost in the patient sample. A total of 346 standard Brånemark implants were inserted in the 97 patients (average 3.6 implants per patient). The length of the implants varied between 6 and 20 mm. The great majority of the implants had a diameter of 3.75 mm, while 10% were 4 mm and 5% were 5 mm. There was no major difference between Non-Perio and Perio patients with regard to the extent of bone anchorage for the fixed partial dentures, as judged by mean number of implants (3.7 vs. 4.0 implants) and average implant length (12.7 mm [SD 1.7] vs. 11.8 mm [2.4]).

A total of 18 implants in 15 patients had been removed during the 5-year observation period, out of which 11 (61%), distributed among 10 subjects, had been lost within the first year of loading (Table 2). Thus, the 5-year implant survival rate in the total sample was 94.8%, i.e. an overall implant failure rate of 5.2%. Of the implants lost, nine (50%) had a length of 13–15 mm and four (22%) were shorter than 10 mm.

In the Non-Perio group, three implants (3%) were lost from the time point of bridge installation to 5 years as compared to eight (8%) in the Perio group. Hence, the 5-year survival rate was 97% in the Non-Perio and 92% in the Perio patients. Further analysis of the data disclosed different patterns regarding the distribution of the implant losses over time in the two categories of patients. While the number of implants lost during the first year (early failures) were similar in the two groups, there was subsequently only one implant lost in the Non-Perio group compared to five implants (four patients) in the Perio group, all with a length of ≥ 10 mm.

Table 1. **Baseline characteristics of the patient sample; mean values (standard deviation)**

	Total sample	Non-Perio group	Perio group
No. of patients	97	25	
Ratio male/female	41/56	9/16	12/13
Age	57.6 (14.6)	57.3 (19.1)	53.5 (12.5)
No. of teeth	16.2 (5.0)	16.5 (5.7)	16.1 (4.3)
Periodontal bone level (%)	77.0 (12.2)	91.6 (5.8)	62.7 (8.4)
% of teeth with a bone level $<50\%$	8.8 (14.0)	1.1 (3.1)	25.7 (17.2)

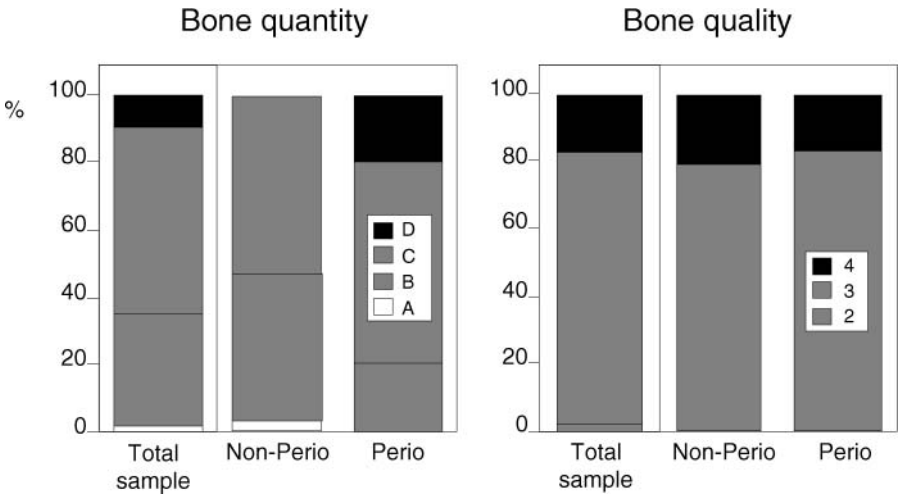

Fig. 2. Frequency distribution of the patients with respect to bone quantity and bone quality according to the criteria defined byLekholm & Zarb (1985).

The data with regard to bone level changes are presented in Table 3. In the total sample a mean bone loss of 0.7 mm (0.5) took place during the period from abutment connection to insertion of the prosthetic construction (average 1.8 months). Between loading and the 5-year follow-up examination an additional 1.0 mm (0.7) of bone was lost. Thus, the total amount of bone loss from the time point of abutment connection to 5 years averaged 1.8 mm (0.7). In all, 33 patients (34%) of the total sample showed a mean bone loss of >2 mm and 39% of all implants had experienced a bone loss of 2 mm at the 5-year examination.

The comparison between the Non-Perio and Perio groups revealed a total mean bone loss of 1.7 mm (0.8) for the Non-Perio patients and 2.2 mm (0.8) for the Perio patients. There was no difference between the groups in amount of bone loss during the period from abutment connection to loading. Multiple regression analysis with total implant bone level change as the dependent variable, based on the entire sample (97 subjects), and ArB-score, mean implant length, number of implants and bone quality as explanatory variables, revealed a statistically significant relationship between the implant bone level change from abutment connection to 5 years and the ArB-score (coefficient −0.69, $P = 0.029$) and bone quality (coefficient −0.47, $P = 0.010$), but not for the other variables. However, since there were no differences with regard to 'bone quality' assessments between the Non-Perio and Perio groups (Fig. 2), this factor did not account for the observed difference in peri-implant marginal bone loss between the two subgroups of patients. Furthermore, while 64% of Perio patients had a mean bone loss of >2 mm from the time of abutment connection, the corresponding figure for the Non-Perio patients was 24% ($P < 0.01$). The percentage of implants showing 2 mm of bone loss between abutment connection and 5 years was 62% and 44% ($P = 0.055$) in the Perio and Non-Perio groups, respectively.

Table 2. **Number of implants placed in the maxillary jaw and number of lost implants (n = number of subjects)**

	Total sample group (n = 97)	Non-Perio (n = 25)	Perio group (n = 25)
No. of implants placed	346	92	100
No. of implants/patient mean (SD)	3.6 (1.4)	3.7 (1.5)	4.0 (1.2)
No. of explanted implants (no. of patients)			
< 1 years	11 (10)	2 (2)	3 (3)
1–5 years	7 (6)	1 (1)	5 (4)
Implant failure rate (5 years)	5.2%	3.3%	8.0%

Table 3. **Individual mean values (S.D.) for bone level change and percentage of patients and implants showing a mean bone loss of >2 mm over the 5-year follow-up period (n = number of subjects)**

Bone level change (mm)	Total sample (n = 97)	Non-Perio group (n = 25)	Perio group (n = 25)
Abutment connection → loading	− 0.7 (0.5)	− 0.8 (0.5)	− 0.9 (0.5)
Loading → 5 years	− 1.0 (0.7)	− 0.9 (0.7)	− 1.3 (0.7)
Abutment connection → 5 years	− 1.8 (0.7)	− 1.7 (0.8)	− 2.2 (0.8)
No. (%) of patients with a mean bone loss > 2 mm	33 (34%)	6 (24%)	16 (64%)
% of implants with a mean bone loss ≥ 2 mm	39%	44%	62%

Discussion

The results of the present 5-year retrospective study demonstrated that

- the amount of longitudinal peri-implant bone loss was related to pretreatment experience of loss of periodontal bone support, and;
- the overall implant failure rate was higher for 'periodontitis-susceptible' subjects (8%) than for 'nonperiodontal' subjects (3%).

Due to the retrospective design of the present study the classification of the patients with respect to their experience of periodontal disease could be based only on preoperative radiographic data describing the amount of bone support at remaining teeth, since clinical data regarding the actual periodontal conditions at time for implant therapy, or at the 5-year follow-up, were not retrievable. Using the periodontal bone level data and the age of the patient, an 'age-related bone level score' (ArB score) was calculated for description and stratification of the subjects with regard to degree of 'susceptibility for periodontal destruc-

tion (disease)'. The feasibility of the calculated ArB score for characterization of the subjects was evidenced by marked differences between the two tail quartiles of the patient sample in terms of mean periodontal bone level (92% vs. 63%) and mean percentage of teeth with a remaining bone support of less than half the root length (1% vs. 26%). In an epidemiological study by Hugoson et al. (1998), in which subjects were grouped according to experienced periodontal bone loss, subjects showing an overall bone loss of more than 1/3 of the root length were characterized as having 'severe periodontal disease'. Accordingly, it seems justified to consider the patients belonging to the worst quartile (Perio group), based on the ArB score, as subjects susceptible to periodontitis. In the interpretation of the results of the present study one may also keep in mind that although the Perio subjects showed a mean number of remaining teeth that was the same as for the entire sample (16 teeth), the more pronounced bone loss in the natural dentition may have entailed differences in loading conditions for the implant supported fixed partial prosthesis.

The overall implant failure rate (implant losses) for the 5-year period was in the present patient sample 5.2%, a figure that is comparable to published treatment outcome data for partially dentate individuals with corresponding follow-up periods (Naert et al. 1992; Jemt & Lekholm 1993; Nevins & Langer 1993; Lekholm et al. 1994, 1999; Bahat 2000; Behneke et al. 2000). Lindh et al. (1998) presented a meta-analysis of 7 studies including a total 923 implants supporting fixed partial dentures and reported a 5-year failure rate of 6.4%. The outcome of implant therapy in periodontally compromised patients has been addressed in a few case series (Nevins & Langer 1995; Ellegaard et al. 1997). Ellegaard *et al.* (1997) reported an implant failure rate of 5% during an average of 3 years in patients who had received single or partial implant-supported prosthetic reconstructions, while a study by Nevins & Langer (1995) showed an overall implant failure rate of 3% for various types of implant supported prostheses in a patient material followed for 1–8 years. In our study, evidence of previous experience of destructive periodontal disease was not included as a criterion for patient selection. The target population was all patients who during a defined period of time had received treatment with an implant supported fixed partial denture in the posterior segments of the maxilla at the Brånemark Clinic, Göteborg, and the characterization of the patients according to degree of periodontal disease 'susceptibility' was performed first after inclusion. Hence, in contrast to the studies referred to above, our patient sample comprised large variability with regard to previous experience of destructive periodontal disease. Interestingly, the data revealed that the quartile of the subjects who showed the highest ArB score (Perio group) demonstrated an implant failure rate of 8%, compared to 4% for the rest of sample and 3% for the Non-Perio subgroup. The finding of a higher implant failure rate in the Perio subgroup corroborates results recently reported by Brocard et al. (2000), showing significantly lower success rate for a subgroup of 'periodontally maintained patients' than for their entire patient sample. In our study, the difference was particularly evident for late failures, i.e. implants lost after the first year of loading. Out of a total of seven implants lost in the entire patient sample after the first year of loading, five implants (four subjects) belonged to the quartile of the patient sample that had the greatest experience of loss of periodontal bone support. Although one should be cautious in the interpretation of these findings due to the low overall frequency of adverse events, the fact that all but one of the lost implants had a length of 13–15 mm does not speak in favour of limited bone quantity as a reason for the higher implant failure rate observed in 'periodontitis-susceptible' subjects.

The peri-implant bone loss from time of abutment connection to the 5-year follow-up was in the present patient material on the average 1.8 mm, out of which 0.7 mm occurred between abutment connections and loading (bridge insertion). Hence, the bone loss during the 5-year of loading averaged 1.0 mm, a figure that is in accordance with findings reported in other studies on free-standing implant supported prostheses in the maxilla (0.8 mm; Jemt & Lekholm 1993; Lekholm et al. 1994, 1999). Although the overall mean peri-implant bone loss in the present patient sample may be considered to be of a limited magnitude, our data disclosed a statistically significant correlation between the degree of peri-implant bone loss and experienced periodontal bone loss in the natural dentition before the implant therapy. In fact, the individuals who belonged to the quartile with the most severe ArB score showed about 30% greater mean loss of peri-implant bone support during the 5 years of loading than the rest of the patient sample. Whether the rate of deterioration had been greater also in their remaining natural dentition could not be evaluated since no follow-up radiographs of the teeth were available for the present analysis. Furthermore, due to lack of retrievable pertinent clinical data, the question whether adequate periodontal/peri-implant supportive therapy for the control of plaque-induced lesions had been provided could not be determined. The influence of smoking on the rate of peri-implant bone loss, as demonstrated in studies by, e.g.Weyant & Bert (1993) and Lindquist et al. (1996), could neither be evaluated since information on smoking habits had not been routinely recorded. Hence, the observed relationship between previous experience of periodontal tissue breakdown and peri-implant bone loss warrants further evaluation in prospectively designed longitudinal studies.

Résumé

Le but de cette étude retrospective a été d'analyser les altérations du niveau osseux sur une période de cinq années au niveau d'implants placés dans les segments postérieurs du maxillaire chez des patients ayant une perte osseuse parodontale variable de leur dentition naturelle avant le placement des implants. Nonante-sept patients partiellement dentés avec un total de 346 implants *ad modum* Brånemark dans les segments postérieurs du maxillaire ont été inclus dans cette étude. En estimant le degré de la perte osseuse marginale radiographique dans la dentition naturelle restante au moment du placement des implants, un score de perte osseuse en relation avec l'âge (score-ArB) a été calculé pour décrire l'expérience du patient en ce qui concerne la destruction parodontale. Les deux cas les plus extrêmes de la distribution des sujets en ce qui concerne le score ArB étaient définis comme sujets non-paro et sujets paro. Les variables de guérison principale ont été l'échec implantaire et la perte osseuse paroïmplantaire radiographique sur une période d'observation de cinq années. Un total de dix huit implants ont été perdus durant ces cinq années résultant en un taux d'échec global de 5,2%. Le taux d'échec était de 3,3 % pour les patients non-paro et de 8,0 % pour les paro. La perte osseuse paroïmplantaire entre le moment du placement du pilier et jusqu'à cinq ans après était en moyenne de 1,8±0,7 mm. Trente-quatre pour cent des patients accusaient une perte osseuse moyenne de 2 mm et 39 % de tous les implants avaient une perte osseuse supérieure ou égale à 2 mm après l'examen des cinq années. Les patients non-paro et paro accusaient respectivement une perte osseuse moyenne de 1,7±0,8 mm et de 2,2 ±0,8

mm. L'analyse de régression multiple a révélé une relation significative entre le score ArB et la variation du niveau osseux paroïmplantaire depuis le placement du pilier jusqu'à cinq ans après (P<0,05). Soixante-quatre pour cent des patients paro avaient une perte osseuse paroïmplantaire moyenne > 2 mm au moment de la connexion du pilier comparés à 24% pour les non-paro (p<0,001). Le pourcentage d'implants accusant une perte osseuse ≥2 mm entre le placement du pilier et cinq ans après était respectivement de 62 et 44% (P=0,055). Les résultats indiquent que la perte osseuse longitudinale autour des implants est en corrélation avec l'expérience de perte osseuse parodontale et que les sujets qui sont sensibles à la parodontite montrent aussi un taux d'échecs implantaire plus important.

Zusammenfassung

Das Ziel dieser Langzeitstudie war, die Veränderungen im Knochenniveau von Implantaten im hinteren Oberkieferbereich über 5 Jahre zu beobachten. Die beteiligten Patienten hatten vor der Implantation sehr unterschiedliche Vorgeschichten bezöglich Attachmentverlust der Eigenbezahnung.

97 teilbezahnte Patienten mit total 346 Brånemark-ImplantatenÆ im hinteren Oberkieferbereich nahmen an der Studie teil. Man hielt zum Zeitpunkt der Implantattherapie das Ausmass des marginalen Knochenverlustes der Restbezahnung röntgenologisch fest und errechnete einen altersbezogenen Wert (ArB-score), um die Vorgeschichte der parodontalen Zerstörung jedes Patienten in einem Zahlenwert ausdrücken zu können. Die beiden Extreme bei der Normalverteilung des ArB-Wertes wurden definiert als "Paro"- oder "Nicht-Paro"-Patienten. Die wichtigsten Ergebnisse waren: 1. die Anzahl verlorener Implantate (Misserfolge) und 2. der röntgenologische festgehaltene periimplantäre Knochenverlust über eine 5-jährige Beobachtungszeit.

Man verlor während den 5 Jahren insgesamt 18 Implantate, was einer totalen Misserfolgsrate von 5.2% entspricht. Die entsprechende Misserfolgsrate für die "Nicht-Paro"-Patienten war 3.3% und für die "Paro"-Patienten 8.0%. Der periimplantγre Knochenverlust ab dem Zeitpunkt der Sekundärteilmontage bis nach 5 Jahren betrug im Mittel 1.8 mm (SD 0.7). 34% der Patienten zeigte einen mittleren Knochenverlust von <2 mm und 39% aller Implantate hatten bei der 5-Jahresuntersuchung einen Knochenverlust von >2 mm erlitten. Die "Nicht-Paro"- und die "Paro"-Patienten zeigten einen mittleren Knochenverlust von 1.7 mm (0.8) beziehungsweise 2.2 mm (0.8). Die multiple Regressionsanalyse zeigte 5 Jahre nach der Sekundärteilmontage eine statistisch signifikante Beziehung zwischen ArB-Wert und periimplantärer Knochenniveauveränderungen (P<0.05). 64% der "Paro"-Patienten hatten einen mittleren periimplantären Knochenverlust von >2 mm ab der Sekundärteilmontage, verglichen mit 24% bei den "Nicht-Paro"-Patienten (P<0.01). Der Prozentsatz der Implantate mit >2 mm Knochenverlust während den 5 Jahren nach der Sekundärteilmontage betrug 62% bei den "Paro"- und 44% bei den "Nicht-Paro"-Patienten (P=0.055).

Die Resultate zeigen, dass der längerfristige Knochenverlust um Implantate mit dem zurückblickend bereits verlorengegangen parodontalen Attachmentverlust korreliert, und dass parodontal gefährdete Patienten wahrscheindlich eine erhöhte Misserfolgsrate haben.

Resumen

Propósito: La intención de este estudio retrospectivo fue analizar las alteraciones del nivel óseo a lo largo de un periodo de 5 años en implantes en los segmentos posteriores del maxilar en pacientes con una experiencia variable de pérdida ósea periodontal en dentición natural antes de la colocación de los implantes.

Material y Métodos: Se incluyeron 97 pacientes parcialmente edéntulos con un total de 346 implantes orales Brånemark en los segmentos posteriores del maxilar. Se calculó un valor de pérdida ósea relacionada con la edad (ArB-score) por la descripción de la experiencia del paciente de la destrucción periodontal valorando el grado de pérdida ósea marginal radiográfica en la dentición natural remanente en el momento del tratamiento de implantes. Los dos cuartiles finales de la distribución de los sujetos en relación con el ArB-score se definieron como sujetos 'No-Perio' y sujetos Perio respectivamente. Las primeras variables resultantes fueron pérdida de implantes (implantes fracasados) y pérdida ósea periimplantaria a lo largo del periodo de observación de 5 años.

Resultados: Se perdieron un total de 18 implantes durante los 5 años, resultando en una tasa total de fracaso del 5.2%. El índice correspondiente de fracaso fue de 3.3% para los pacientes 'No-Perio' y 8.0% para los Perio. La pérdida ósea periimplantaria desde el momento de la colocación del pilar hasta los 5 años fue de 1.8 mm de promedio (SD 0.7). El 34% de los pacientes mostró una pérdida de hueso media de>2 mm y el 39% de todos los implantes experimentaron una pérdida de hueso de≥2 mm en el examen de los 5 años. Los pacientes 'No-Perio' y los Perio mostraron una pérdida de hueso media de 1.7 mm (0.8) y 2.2 mm (0.8), respectivamente. El análisis de regresión múltiple reveló una relación estadísticamente significativa entre el ArB-score y los cambios del nivel de hueso periimplantario desde la colocación del pilar hasta los 5 años (*P*<0.05). El 64% de los pacientes Perio tuvieron una pérdida de hueso periimplantario media de>2 mm desde el momento de la colocación del pilar comparado con el 24% de los pacientes 'No-Perio' (*P*<0.01). El porcentaje de implantes mostrando con≥2 mm de pérdida ósea entre la colocación del pilar y los 5 años fue del 62% y 44% en los grupos Perio y 'No-Perio', respectivamente (*P*=0.05).

Conclusión: Los resultados indican que la pérdida de hueso longitudinal alrededor de los implantes están correlacionadas con la experiencia previa de pérdida de soporte óseo periodontal y que los sujetos susceptibles de periodontitis pueden mostrar un índice de fracaso de implantes aumentado.

要旨

目的：本後ろ向き研究の目的は、インプラントを入れる前の天然歯列において様々な程度の骨吸収を呈していた上顎臼歯部にインプラントを埋入した後の、５年間のインプラント周囲骨レベルの変化を分析することであった。

材料と方法：本研究には９７名の部分無歯顎患者において上顎臼歯部に埋入した合計３４６本のBranemark® 口腔インプラントが含まれた。インプラント埋入時に、レントゲン像で残存天然歯列の辺縁骨喪失の程度を評価することによって、加令的な骨喪失スコア（ArBスコア）を計算し、患者のそれまでの歯周組織破壊の指標とした。被験者の両極端の四分位を、Non-Perio患者及びPerio患者と定義した。一次評価の変数は、５年の観察期間中のインプラント喪失（インプラント失敗）とレントゲン像によるインプラント周囲骨の喪失であった。

結果：合計１８本のインプラントが５年間に失われ、総失敗率は５．２％であった。各群の失敗率は、Non-Perio 患者群が３．３％、Perio 患者群が８．０％であった。アバットメント連結時から５年間のインプラント周囲骨の喪失は、平均１．８ｍｍ（SD０．７）であった。患者の３４％が平均＞２ｍｍの骨喪失を示し、全インプラントの３９％が５年後の検査時に≧２ｍｍ以上の骨喪失を示した。Non-Perio 群と Perio 群の骨喪失量は、各々平均１．７ｍｍ（０．８）と２．２ｍｍ（０．８）であった。多変量回帰解析は、アバットメント連結時から５年間に ArB スコアとインプラント周囲骨レベルの変化の間に統計的に有意な相関性があることを示した（ｐ＜０．０５）。Non-Perio 患者の２４％に比べ、Perio 患者の６４％が、アバットメント連結時から平均＞２ｍｍのインプラント周囲骨の喪失を示した（ｐ＜０．０１）。アバットメント連結時から５年間に２ｍｍの骨を喪失したインプラントの比率は、Perio 群が６２％、Non-Perio 群が４４％であった（ｐ＝０、０５５）。

結論：本結果は経時的なインプラント周囲骨の喪失は、術前の骨喪失の程度と相関しており、歯周炎に罹患しやすい被験者はインプラントの失敗率が高まる可能性があることを示唆している。

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