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- One year results.

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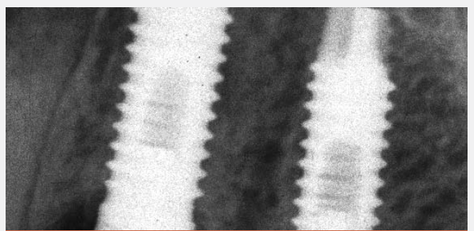

Keep it Simple

Radiographic Changes of Immediately Restored Implants in Periodontally Susceptible Patients.

- One year results.

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Abstract

Objectives: 1. To evaluate the radiographic bone level changes (△CB) of immediately restored (R) vs. non-restored (NR) dental implants. 2. To compare radiographic bone level changes between jaws and between healed and extraction sites in periodontally compromised patients. Materials & Methods: Chronic periodontitis patients with hopeless teeth received periodontal therapy after which implant surgery was performed and a provisional restoration immediately provided on part of the implants. Results are reported in mm as mean ±SE of bone level changes between insertion, 6 and 12 months. Results: 74 MIS® implants were inserted in 19 patients, receiving 3 maxillary and 2 mandibular full arch cases, 7 maxillary and 5 mandibular partial arch cases and 5 single tooth cases, one of which was mandibular. 12 implants failed, resulting in an overall 84% survival rate, 78% in the maxilla and 94% in the mandible. R implants in extraction sites had a 65% survival rate vs. 94% in healed non-extraction sites. NR implants placed in extraction sites had a 86% survival rate vs. 100% in healed non-extraction sites. For R vs. NR groups △CB0-6 months was -0.99±0.13 vs. -0.81±0.16 (p>0.05), △CB6-12 months was -0.24±0.13 vs. -0.81±0.13(p≤0.05) and △CB0-12 months was -1.27±0.18 vs. -1.67±0.17 (p>0.05). There were no differences in △CB between any time-point in extraction vs. non-extraction or in maxillary vs. mandibular implants. Conclusions: 1. First year bone level changes of immediately restored implants do not differ from those of non-restored implants. 2. First year bone changes around immediately restored dental implants in periodontally susceptible patients were slightly higher than most reports in the literature. This indicates a potential influence of periodontal susceptibility and previous disease on the success rate of dental implants.

Introduction

Implant therapy serves as an acceptable treatment for the replacement of periodontally hopeless teeth. In a recent review of the literature (van der Weijden et al. 2005), implant patients that were previously treated for periodontitis were shown to run a greater risk for developing complications, evidenced by loss of supporting bone and implant loss, as compared to individuals without such a history. Likewise, Hardt (Hardt et al. 2002) also implicated a higher failure rate in patients who experienced loss of alveolar-bone support. There are, however, other reports demonstrating survival rates in periodontally compromised patients that are not different from healthy patients (Baelum & Ellegaard 2004). Immediate restoration of dental implants has been gaining popularity in the last years (Jaffin et al. 2000, 2004; Gapski et al. 2003; Nikellis et al. 2004; Drago & Lazzara 2004, Tarnow et al. 1997). Survival and success rates in these publications seem to be similar to those of the traditional protocol of loading at 3-6 months after implant insertion. Obviously, patients with hopeless teeth due to periodontal disease would benefit from such a treatment modality, especially if those teeth could be extracted and immediately restored with implant supported crowns and/or bridges. Crestal bone loss is often used as a tool to evaluate implant status and, particularly, its success (Bragger 2000). Conventional radiography using the long-cone paralleling technique, supported by positioning devices is generally used to evaluate marginal bone changes at interproximal sites of osseointegrated implants (Salvi & Lang 2004). More specifically, Crestal bone loss ≤1.5mm in the first year is considered a criterion for implant success (Albrektsson et al. 1986). There is, as yet, little available information about radiographic bone changes in immediately restored implants in periodontally compromised patients, both short and long term.

Aims

1. To evaluate the influence of immediate restoration on radiographic bone changes around dental implants. 2. To compare radiographic bone changes between the maxilla and the mandible and between healed and extraction sites in periodontally compromised patients.

Materials and Methods

Inclusion criteria:

1. Healthy non pregnant patients with periodontitis aged 18-75. 2. Need a full or partial arch fixed implant restoration. 3. Had no contraindications for surgical periodontal treatment and implant treatment. Study models and CT radiographs were used for planning. A surgical stent and a screw retained metal reinforced acrylic provisional fixed restoration were prefabricated. Patients received periodontal treatment as needed. Screw type external-hex sand-blasted acid-etched implants were used[1]. At least 3 implants were selected as abutments in full arch cases and 2-3 Implants were selected in partial arch cases. Implants were selected to serve as abutments according to location and stability, measured by Resonance Frequency Analysis (RFA)[2]. We had three groups of implants: immediately restored (R), Submerged (S) and non-submerged non-restored (NR). Periapical radiographs using a parallelism appliance[3] were taken at implant surgery, at 6 and 12 months post surgery. All radiographs were digitized and stored electronically using a scanner[4]. Next, using a computer-software for digital measurement[5], the distance between the alveolar crest and the implant shoulder was measured. Radiographic data is reported as the distance in mm between implant shoulder and alveolar bone crest (mean ± SE), both separately for the mesial (CBM) and distal (CBD) aspects of the implants and as a calculated mean of mesial and distal values (CB mean) (Figure 1).

Data Management and Analysis

Data analysis was performed in two ways using a statistical software program[6]. Student t-test for paired observation was utilized to assess the changes from baseline to 6 (△CBM 0-6m and △CBD 0-6m) and 12 months (△CBM 0-12m and △CBD 0-12m) and from 6 to 12 months (△CBM 6-12m and △CBD 6-12m) within the same treatment group. Student t-test for unpaired observations was used to compare those variables in the maxilla and mandible and in extraction and non-extraction sites. Analysis of variance (ANOVA) was used to compare data between the three loading groups, namely R, S and NR. A 95% significance level was used.

Results

74 MIS® implants were inserted in 19 patients, 17 females, receiving 3 maxillary and 2 mandibular full arch cases, 7 maxillary and 5 mandibular partial arch cases and 5 single tooth cases, one of which was mandibular (Tables 1). 12 implants failed, resulting in an overall 84% survival rate, 78% in the maxilla and 94% in the mandible. R implants in extraction sites had a 65% survival rate vs. 94% in healed non-extraction sites. NR implants placed in extraction sites had a 86% survival rate vs. 100% in healed non-extraction sites. Baseline bone levels were comparable in failed and surviving implants, mean bone levels ranging between 0.33±0.1mm and 0.52±0.24mm, (p>0.05). Mean baseline bone height was 0.52±0.14mm, 0.09±0.06 mm and 0.34±0.21 mm in the R, S and NR groups. There was a statistically significant difference in △CBM 6-12m between R and S groups (-0.27mm±0.17mm and -0.99mm±0.18mm respectively, p=0.0219) as well as a difference in △CB mean 6-12m between those same groups (-0.24±0.13 vs. -0.85±0.12, p=0.0096). Mean bone level changes ranged between -1.19±0.19 and -1.88±0.3mm in the various treatment groups with no difference between them (Table 2). Data from the S and NR groups was combined to form a Non Restored group, which was compared to the R group. There were statistically significant differences (p<0.05) between R and NR groups in baseline CBD and CB mean (0.50±0.13mm vs. 0.15±0.1mm and 0.52±0.11mm vs. 0.18±0.08mm) and in △CBM 6-12m (-0.27±0.17mm vs.-0.91±0.16mm), △CBD 6-12m (-0.32±0.13mm vs. -0.77±0.15mm) and △CB mean 6-12m (-0.24±0.13mm vs. -0.81±0.13mm). No difference between groups was found for △CB 0-12m (Table 3). Baseline bone level was higher in non-extraction vs. extraction sites (0.17±0.08mm vs. 0.57±0.15mm for CBM, 0.1±0.09mm vs. 0.56±0.13mm for CBD and 0.13±0.06mm vs. 0.58±0.12mm for CB mean, p<0.05). A significant difference in △CBD 0-12m (-1.81±0.16 vs. -1.25±0.21mm, p<0.05) was found (Table 4).

Discussion

In the present study mean baseline bone level was higher for submerged two-stage implants (S group). Obviously, the implant shoulder in this group was placed more apically than non-submerged implants to allow primary flap closure. 6-month bone loss, however, was similar in both the submerged and non-submerged groups. In the 6-12 month period the rate of bone loss in the R group decreased to 0.27-0.32mm while in the S group, in which second stage surgery was performed, it was higher (0.69-1.01mm). Interestingly, first year bone loss in the S group was slightly higher than in the R group despite a shorter exposure to the oral environment, corroborating Lorenzoni et al. (2003) who found that bone loss was lower in immediately restored vs. conventionally restored implants. Second stage surgery, accountable for 40% of initial bone loss (Weber et al. 1996) may partly explain this phenomenon. First year mean bone loss in the present study ranged between 1.19 and 1.88mm in the various study groups. This amount of bone loss corroborates results from some previous publications (Albrektsson et al. 1986; Payne et al. 2004). More specifically, De Bruyn (De Bruyn et al. 2001), in a study with similar loading groups, found an average marginal bone loss at 1 year of 1.6 mm, which is similar in magnitude to the present study. Results in the literature, however, vary widely. In view of these figures we interpret first year bone loss in the present study as slightly higher than in most reports. This may be the result of various parameters, most notably, the influence of the patients' periodontal disease history. The effect of this parameter on implant survival rates has been previously described (Karoussis et al. 2003, Evian et al. 2004, Hänggi et al. 2005) and reviewed (van der Weijden et al. 2005) and may be the most significant factor affecting bone levels and not only survival rates.

Conclusions

First year bone level changes around immediately restored dental implants in periodontally susceptible patients were found to be slightly higher than most reports in the literature. This indicates a potential influence of periodontal susceptibility on the success rate of dental implants. Further long term studies and studies on larger cohorts are necessary to further investigate the relationship between periodontal disease and immediate restoration of dental implants.

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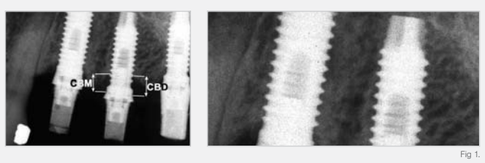

Fig 1.

Table 1
General Data: Maxillary vs. mandibular implants

	Maxillary implants. (patients)	Mandibular implants. (patients)	Total (patients)
Single Tooth	4 (4)	1 (1)	5 (5)
Partial Arch	21 (7)	13 (5)	34 (10)
Full Arch	21 (3)	14 (2)	35 (5)
Total	46 (14)	28 (8)	74 (19)

Table 2
Restoration type, Analysis of Variance between groups (mean ± SE)

variable	R	S	NR	P
CBM Baseline	0.52±0.14	0.03±0.07	0.54±0.23	0.0646
CBD Baseline	0.50±0.15	0.15±0.10	0.14±0.25	0.1448
CB Baseline mean	0.52±0.11	0.09±0.06	0.34±0.21	0.0637
△ CBM 0-6m	-0.873±0.15	-0.69±0.20	-0.62±0.31	0.6227
△ CBD 0-6m	-1.09±0.16	-1.01±0.27	-0.80±0.30	0.7293
△ CB mean 0-6m	-0.99±0.13	-0.88±0.21	-0.71±0.26	0.609
△ CBM 6-12m	-0.27±0.17	-0.99±0.18	-0.66±0.38	0.0219
△ CBD 6-12m	-0.32±0.69	-0.718±0.15	-0.91±0.42	0.0659
△ CB mean 6-12m	-0.24±0.13	-0.85±0.12	-0.79±0.40	0.0096
△ CBM 0-12m	-1.19±0.19	-1.72±0.23	-1.29±0.36	0.2476
△ CBD 0-12m	-1.33±0.16	-1.70±0.27	-1.88±0.30	0.2881
△ CB mean 0-12m	-1.27±0.18	-1.71±0.21	-1.59±0.28	0.2693

Table 3
Restored vs. Non-Restored implants (Mean±SE)

Variable	Restored	Non-Restored	P
CBM Baseline	0.52±0.14	0.20±0.10	0.0927
CBD Baseline	0.50±0.13	0.15±0.10	0.0485
CB Baseline mean	0.52±0.11	0.18±0.08	0.0318
△ CBM 0-6m	-0.87±0.15	-0.66±0.17	0.3382
△ CBD 0-6m	-1.09±0.16	-0.94±0.2	0.5568
△ CB mean 0-6m	-0.99±0.13	-0.81±0.16	0.3974
△ CBM 6-12m	-0.27±0.17	-0.91±0.16	0.0082
△ CBD 6-12m	-0.32±0.13	-0.77±0.15	0.0235
△ CB mean 6-12m	-0.24±0.13	-0.81±0.13	0.0023
△ CBM 0-12m	-1.19±0.19	-1.59±0.20	0.1646
△ CBD 0-12m	-1.33±0.20	-1.76±0.17	0.1257
△ CB mean 0-12m	-1.27±0.18	-1.67±0.17	0.1099

Table 4
Non-extraction vs. Extraction sites, comparison between groups (Mean ± SE)

Variable	Non Extr.	Extr.	P
CBM Baseline	0.17±0.08	0.57±0.15	0.0322
CBD Baseline	0.10±0.09	0.56±0.13	0.0071
CB Baseline mean	0.13±0.06	0.58±0.12	0.0035
△ CBM 0-6m	-0.92±0.16	-0.65±0.15	0.209
△ CBD 0-6m	-1.11±0.168	-0.93±0.18	0.4775
△ CB mean 0-6m	-1.03±0.14	-0.80±0.14	0.2694
△ CBM 6-12m	-0.59±0.15	-0.57±0.20	0.3182
△ CBD 6-12m	-0.72±0.14	-0.35±0.13	0.0664
△ CB mean 6-12m	-0.63±0.13	-0.44±0.15	0.3469
△ CBM 0-12m	-1.51±0.15	-1.23±0.23	0.3182
△ CBD 0-12m	-1.81±0.16	-1.25±0.21	0.0388
△ CB mean 0-12m	-1.66±0.14	-1.23±0.20	0.0896