# The effect of plaque control and root debridement in molar teeth

**Peter Nordland, Steven Garrett, Robert Kiger, Rik Vanooteghem, L. H. Hutchens and Jan Egelberg**
School of Dentistry, Loma Linda University, Loma Linda, CA, USA

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*Abstract.* The healing response of non-molar sites, molar flat surface sites, and molar furcation sites was investigated in 19 adult periodontitis patients following a periodontal therapy of plaque control and root debridement. A total of 2472 sites were monitored by recordings of dental plaque, bleeding on probing, probing depth, and probing attachment levels every 3rd month for 24 months. The results demonstrated that in sites with initial probing depth of 4.0 mm or greater, molar furcation sites responded less favorably to the therapy as compared to molar flat surface sites or non-molar sites. This was demonstrated by higher mean scores for bleeding on probing, less reduction in probing depth, and a mean loss of probing attachment of 0.5 mm over 24 months. Site analyses using linear regression showed a higher % of deeper sites with probing attachment loss for the molar furcations than either molar flat surface or non-molar sites. Among sites initially 7.0 mm or deeper, 21% of molar furcations were identified as showing probing attachment loss as compared to 7% of the molar flat surface sites and 11% of the non-molar sites.

Key words: Plaque control – root debridement – molar teeth.

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Several studies have shown that root debridement coupled with effective oral hygiene results in significant improvement of gingival conditions in adult periodontitis (Tagge et al. 1975, Hughes & Caffesse 1978, Listgarten et al. 1978, Helldén et al. 1979, Torfason et al. 1979, Morrison et al. 1980, Badersten et al. 1981, 1984a, b, 1985a, Caton et al. 1982, Proye et al. 1982, Cercek et al. 1983, Echeverria & Caffesse 1983, Magnusson et al. 1984, MacAlpine et al. 1985). Studies comparing root planing alone with root planing combined with various surgical procedures have demonstrated again that root planing is successful in controlling periodontal disease (Waite 1976, Hill et al. 1981, Lindhe et al. 1982, 1984, Pihlstrom et al. 1983, Isidor et al. 1984, Lindhe & Nyman 1985, Westfelt et al. 1985).

Clinical investigations evaluating the results of plaque control and root debridement in molar furcation pockets seem limited. The anatomical configuration and reduced accessibility of molar furcations may limit the efficacy of nonsurgical therapy in these sites. Lindhe et al. (1982, 1984) measured the buccal interradicular area for molar teeth studied. However, results of treatment were not reported separately for these sites. Results indicated that molars in general, responded similarly to non-molar teeth in terms of probing attachment changes. Pihlstrom et al. (1984) reported similar results 6½ years following treatment of molar and non-molar teeth with either root planing or root planing plus a modified Widman flap procedure. Both treatments were effective in maintaining probing attachment levels. Again, furcation measurements were not reported separately. Rosling et al. (1984), in a research abstract, reported gains in probing attachment in furcation sites treated both surgically and nonsurgically.

This study was designed to compare the effects of plaque control and root debridement in non-molar sites, molar flat surface sites, and molar furcation sites.

## Material and Methods

### Subjects

19 patients, 14 male and 5 female, participated. Their median age was 45 years with a range of 29 to 68 years. The patients met the following criteria for inclusion in the study: (1) no periodontal treatment within 5 years; (2) generalized periodontitis characterized by bleeding on probing, loss of periodontal attachment, and subgingival calculus; (3) at least 2 molars with clinically detectable furcation involvement.

All available teeth in the patients were included in the study, except for third molars and teeth with periodontal pockets extending to the apex of the roots.

### Therapy

Following baseline examination, all patients were instructed in oral hygiene including a sulcular brushing technique and interdental cleaning with dental floss and/or interdental brushes (Proxa Brush®, J. Butler Co., Chicago, IL, USA; and/or Spiral Interdental Brush®, Dental Hygiene Corps., Inc., Santa Clara, CA, USA). The Perio Aid® was introduced for subgingival use in some patients (Marquis Dental MFG. Co., Aurora, CO, USA). Reinforcement and reinstruction was provided for a variable number of times, based on individual needs, for the first 6 months of the study. Subsequently, reinforcement was limited to some of the recording visits every third month.

An initial, single episode of crown and root debridement was provided us-

ing 2 separate appointments; 1 for each half of the dentition. All instrumentations were done under local anesthesia using ultrasonic instruments (Dentsply®-Cavitron®, Model 200, with TFI-10 tips, Cavitron Ultrasonics Inc., Long Island, NY, USA) or various hand instruments. 2 operators participated using an average time of active instrumentation amounting to 3.2 min/tooth for non-molar teeth and 6.7 min tooth for molars.

Carious lesions were excavated and provided temporary or permanent restorations and overhanging restoration margins were corrected during the initial treatment phase. Occlusal alteration was limited to reducing patient discomfort caused by tooth mobility.

Dental scaling, polishing, and isolated root debridement of deep and/or bleeding sites were carried out during ½–1 h appointments at 15, 18, and 21 months.

#### Clinical measurements

Clinical parameters were recorded at baseline and every 3rd month throughout the 24-month study. 11 of the patients were measured by 1 examiner. The remaining 8 were measured by a second examiner. Measurements were taken from 6 sites around each non-molar tooth: mesiobuccal, midbuccal, distobuccal, distolingual, midlingual, and mesiolingual. In maxillary molars, 8 sites were measured: mesiobuccal, midbuccal of mesial and distal roots, buccal furcation, distobuccal, distolingual furcation, midlingual of palatal root, and mesiolingual furcation. In mandibular molars, 10 sites were measured: mesiobuccal, midbuccal of mesial and distal roots, buccal furcation, distobuccal, distolingual, midlingual of mesial and distal roots, lingual furcation, and mesiolingual. Records of dental plaque, bleeding on probing, probing depth, and probing attachment level were obtained as follows.

*Dental plaque*. Presence or absence of dental plaque was scored after rinsing with a disclosing solution (Erythrosine 2%, Oral Health Products, Tulsa, OK, USA). Plaque present along the gingival margin that could be easily removed with the tip of a periodontal probe was recorded.

*Bleeding on probing*. Areas of bleeding on probing were recorded during the course of measurements of probing depth and probing attachment level (see below).

*Probing depth and probing attachment level*. Measurements of probing depth and probing attachment level were made using an electronic, pressure-sensitive probe (Electronic Periodontal Probe, Model 200A, Vine Valley Research, Middlesex, NY, USA) with a probing force of 0.50 N. A probe tip having 1 mm increments and a 0.4 mm diameter was used. Measurements were made to the nearest 0.5 mm. A vacuum adapted soft acrylic onlay (Scheu-Dental, Iserlohn, West Germany) was used to provide reference points for the probing attachment measurements. For proximal surfaces, the placement of the probe was guided by the interdental indentations of the thin onlay and the probe was directed apically toward the midproximal aspect of the root surface. Midbuccal and midlingual sites were measured by placing the probe at these locations and directing it longitudinally along the root surface. For furcation sites, the probe was angled into the midfurcal areas and after 2 or 3 repeated probings, the deepest point was located and recorded.

#### Identification of sites with probing attachment loss

The recordings at 3-month intervals during the 24-month study provided a series of 9 probing attachment level measurements for each site. These measurements were subjected to linear analysis of regression (Goodson et al. 1982, Haffajee et al. 1983, Badersten et al. 1985b). The slope of the regression line for each of these sites was calculated together with the projected probing attachment loss during the 24-month interval ($\Delta y$). The probability for each slope being different from a horizontal line was determined using 7 degrees of freedom. A minimum $\Delta y$ of 1.5 mm and a probability of $p < 0.05$ were required to classify a site as showing probing attachment loss (deteriorating site).

#### Analysis of data

Sites from non-molar teeth, flat surface areas of molar teeth, and molar furcations were pooled into 3 separate groups. Each of these anatomical groups was divided into subgroups of initial probing depth $\leq 3.5$ mm; 4.0–6.5 mm, and $\geq 7.0$ mm. Mean results for these subgroups were calculated. Furthermore, the % of sites showing probing attachment loss was calculated for these subgroups and compared using 2-way analysis of variance, controlling for patient variability.

## Results

#### Dental plaque

Initially, 60–93% of the sites showed plaque. At 3 and 6 months plaque scores were reduced substantially. Subsequently, there was a collapse of plaque scores for all subgroups of sites (Fig. 1).

#### Bleeding on probing

At the initial examination 65–98% of the sites demonstrated bleeding on probing. At the 3- and 6-month examination the bleeding scores were markedly reduced. Subsequently, they showed some collapse. Furcation sites generally showed a higher bleeding frequency than either sites from non-molar teeth or from molar flat surface areas. Molar furcation sites initially $\geq 7.0$ mm demonstrated high bleeding scores (60–70%) throughout the study (Fig. 2).

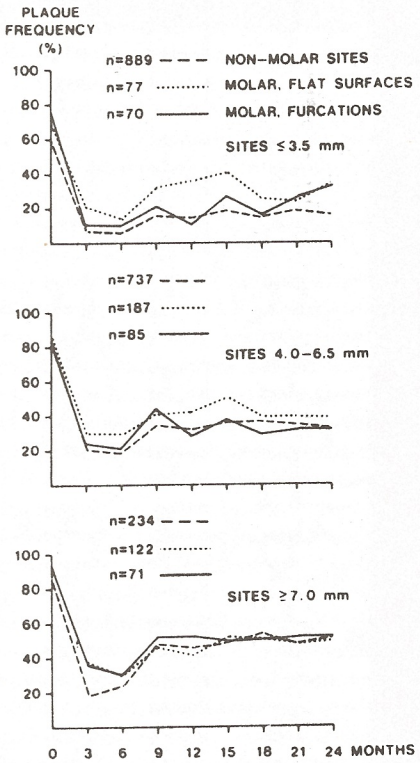


*Fig. 1.* % of sites with dental plaque at various intervals during the 24 months of observation for non-molar sites, molar flat surface sites, and molar furcation sites in subgroups of sites with initial probing depths of $\leq 3.5$ mm, 4.0–6.5 mm, and $\geq 7.0$ mm.

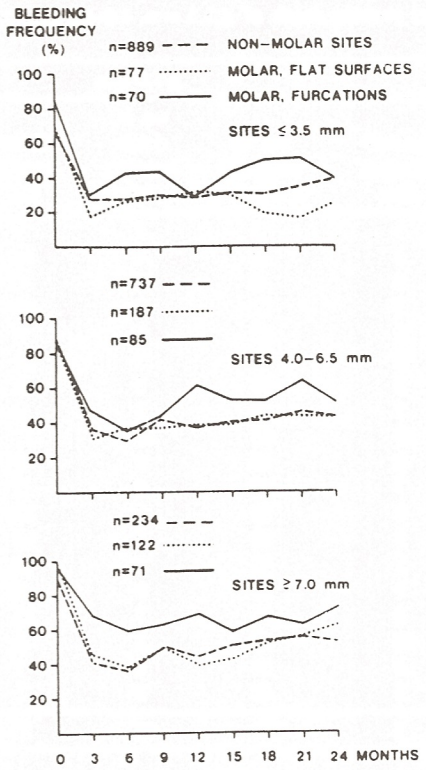


*Fig. 2.* % of sites with bleeding on probing at various intervals during the 24 months of observation for non-molar sites, molar flat surface sites, and molar furcation sites in subgroups of sites with initial probing depths of ≤3.5 mm, 4.0–6.5 mm and ≥7.0 mm.

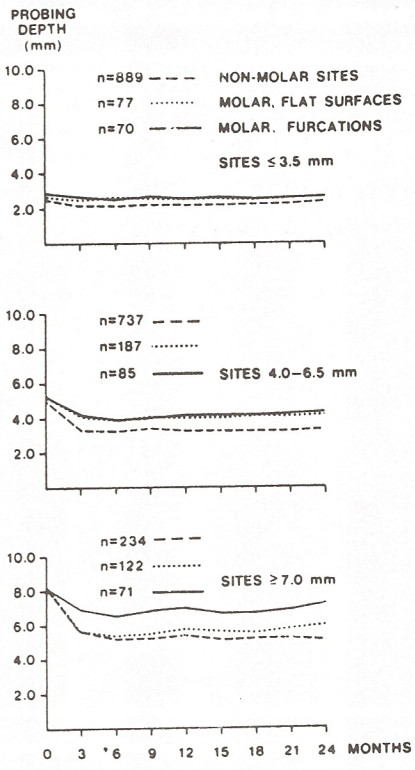


*Fig. 3.* Mean probing depth (mm) at various intervals during the 24 months of observation for non-molar sites, molar flat surface sites, and molar furcation sites in subgroups of sites with initial probing depths of ≤3.5 mm, 4.0–6.5 mm, and ≥7.0 mm.

### Probing depth

Sites initially ≤3.5 mm showed little change in probing depth throughout the study (Fig. 3).

In sites initially 4.0–6.5 mm, non-molar teeth showed 1.6 mm mean reduction and molar flat surface and molar furcation sites showed a 1.1–1.0 mm reduction of probing depth after 3 months. These reductions were maintained throughout the 24-month period.

In sites initially ≥7.0 mm, non-molar sites demonstrated an initial 2.8 mm mean reduction at 3 months which gradually improved to 3.3 mm at 24 months. Molar flat surfaces demonstrated 2.7 mm reduction at 3 months with a slight relapse to 2.3 mm by 24 months. Molar furcations demonstrated an initial reduction of 1.3 mm at 3 months with a slight relapse to 1.0 mm at 24 months.

*Table 1.* Frequency of sites with probing attachment loss for non-molar sites, molar flat surfaces sites, and molar furcation sites in subgroups of sites with initial probing depth ≤3.5 mm, 4.0–6.5 mm, and ≥7.0 mm

| | Non-molar sites | | Molar flat surface sites | | Molar furcation sites | |
|---|---|---|---|---|---|---|
| Initial probing depth (mm) | no. of available sites | % deteriorating sites | No. of available sites | % deteriorating sites | no. of available sites | % deteriorating sites |
| ≤3.5 | 889 | 9.7* | 77 | 9.1 | 70 | 5.7** |
| 4.0–6.5 | 737 | 4.3 | 187 | 5.3 | 85 | 11.8 |
| ≥7.0 | 234 | 10.7*** | 122 | 6.6*** | 71 | 21.1 |
| all sites | 1860 | 7.7 | 386 | 6.5 | 226 | 12.8 |

*Significantly different ($p < 0.05$) from sites initially 4.0–6.5 mm in non-molar teeth.
**Significantly different ($p = 0.05$) from sites initially ≥7.0 mm in molar furcations.
***Significantly different ($p < 0.05$) from molar furcation sites initially ≥7.0 mm.

### Probing attachment level

Sites initially ≤3.5 mm showed a gradual loss of probing attachment for all 3 anatomical groups, resulting in a 0.6–0.7 mm loss at 24 months (Fig. 4).

In sites initially 4.0–6.5 mm, the non-molar and molar flat surface areas demonstrated approximately 0.4 mm mean probing attachment gain by 6 months followed by a gradual return to baseline values at 24 months. Molar furcation sites in this group showed no change initially and eventually showed 0.5 mm mean loss at 24 months.

Non-molar and molar flat surface sites initially ≥7.0 mm demonstrated approximately 1.4 mm mean probing attachment gain at 6 months followed by a gradual relapse to 0.7 mm at 24 months. In this group, molar furcation sites also showed no change initially and a 0.5 mm mean loss by 24 months.

### Sites with probing attachment loss

Table 1 demonstrates the frequencies of sites identified as deteriorating over 24 months using linear regression analysis. While the %s generally ranged between 5% and 10%, furcation sites with initial probing depth 4.0–6.5 mm and ≥7.0

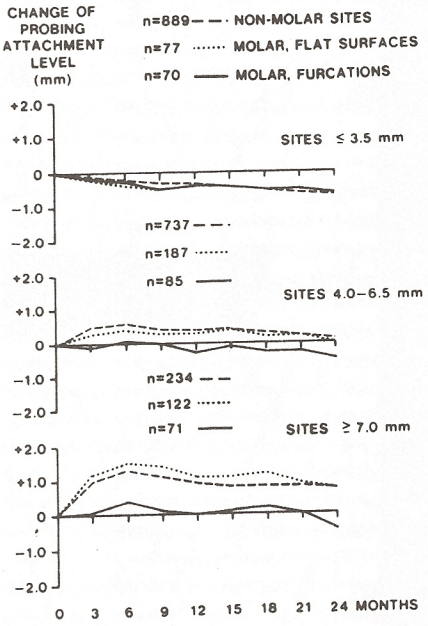


*Fig. 4.* Mean change of probing attachment level (mm) at various intervals during the 24 months of observation for non-molar sites, molar flat surface sites, and molar furcation sites in subgroups of sites with initial probing depths of ≤3.5 mm, 4.0–6.5 mm, and ≥7.0 mm.

*Table 2.* Frequency of sites with probing attachment loss in each subject for sites with initial probing depth of ≤3.5 mm, 4.0–6.5 and ≥7.0 mm

| | ≤3.5 mm | | | 4.0–6.5 mm | | | ≥7.0 mm | | |
|---|---|---|---|---|---|---|---|---|---|
| Subject | no. of available sites | no. of deteriorating sites | % deteriorating sites | no. of available sites | no. of deteriorating sites | % deteriorating sites | no. of available sites | no. of deteriorating sites | % deteriorating sites |
| 1 | 47 | 0 | 0 | 80 | 1 | 1 | 15 | 1 | 7 |
| 2 | 64 | 0 | 0 | 39 | 1 | 3 | 35 | 4 | 11 |
| 3 | 30 | 2 | 7 | 17 | 0 | 0 | 6 | 0 | 0 |
| 4 | 39 | 0 | 0 | 62 | 2 | 3 | 30 | 3 | 10 |
| 5 | 80 | 2 | 3 | 51 | 0 | 0 | 19 | 0 | 0 |
| 6 | 62 | 5 | 3 | 67 | 12 | 18 | 20 | 7 | 35 |
| 7 | 46 | 2 | 2 | 32 | 0 | 0 | 11 | 2 | 18 |
| 8 | 28 | 2 | 7 | 84 | 6 | 7 | 16 | 1 | 6 |
| 9 | 23 | 5 | 22 | 38 | 4 | 10 | 65 | 11 | 17 |
| 10 | 71 | 5 | 7 | 73 | 0 | 0 | 12 | 0 | 0 |
| 11 | 89 | 5 | 6 | 61 | 4 | 7 | 12 | 0 | 0 |
| 12 | 43 | 18 | 42 | 25 | 2 | 8 | 10 | 2 | 20 |
| 13 | 49 | 0 | 0 | 87 | 3 | 3 | 20 | 2 | 10 |
| 14 | 100 | 2 | 2 | 43 | 1 | 2 | 24 | 3 | 13 |
| 15 | 36 | 8 | 22 | 56 | 5 | 9 | 16 | 0 | 0 |
| 16 | 78 | 8 | 10 | 54 | 2 | 4 | 24 | 7 | 30 |
| 17 | 60 | 22 | 37 | 48 | 5 | 10 | 35 | 2 | 6 |
| 18 | 39 | 7 | 18 | 43 | 2 | 4 | 14 | 1 | 7 |
| 19 | 52 | 6 | 23 | 43 | 2 | 5 | 43 | 2 | 5 |
| totals | 1036 | 99 | 10 | 1009 | 52 | 5 | 427 | 48 | 11 |

mm both showed a higher % of deterioration as compared to non-molar or molar flat surface sites with similar initial probing depths. In sites initially ≥7.0 mm, this difference was statistically significant. 21% of these molar furcation sites were identified as demonstrating probing attachment loss.

Table 2 shows the frequency of deteriorating sites per subject. The % of deteriorating sites ranged from 0% to 42% in sites initially ≤3.5 mm: from 0% to 18% in sites initially 4.0–6.5 mm, and from 0% to 35% in sites initially ≥7.0 mm.

## Discussion

Molar teeth with furcation involvement seem to be the most difficult teeth to maintain with periodontal treatment. Long-term follow-up of treatment over 15–50 years suggests that in otherwise well-maintained patients, eventual loss of 20–50% of teeth with initial furcation involvements can be expected (Hirschfeld & Wasserman 1978, McFall 1982).

This study was designed to investigate the effects of plaque control and root debridement over 24 months in molar furcation sites, molar flat surface sites, and non-molar sites. The findings demonstrate that the therapy resulted in mean improvement of gingival conditions in most subgroups of sites studied. However, molar furcation sites with initial probing depth of 4.0 mm or greater showed a poor response. This was particularly recognizable in the deepest sites.

These differences in healing results do not seem related to supragingival plaque scores, as the presence of plaque in molar furcation sites varied little from that of molar flat surface and non-molar sites. The degree of effectiveness of the root debridement may be an explanation for the differences. The inaccessability of furcation sites to root debridement (Matia et al. 1985), especially in sites with deeper probing depths, may preclude as effective a debridement as can be accomplished in more accessible flat surface areas. It is also possible that the poor response at the deepest furcation sites is related to a greater grade of furcation involvement in these sites as compared to shallower furcation sites. Data for comparing furcation grades were not available in this study.

The differences in bleeding frequencies between flat surface sites (either non-molar or molar) and furcation sites may be related to different probing methods. In furcation sites probing was repeated 2 or 3 times to ensure location of the deepest point. These repeated probings may have induced more frequent bleeding. However, the minimal improvement in bleeding frequencies in the deeper furcation sites following therapy seems to indicate a poor response to therapy in these areas irrespective of probing method.

The lack of improvement of mean probing attachment levels in furcation sites may in part be due to the mode of probe penetration in these sites. In flat surface areas, probing attachment gains following treatment seems to be related to improvement in the tissue health with increased adaptation of the gingival tissue to the tooth and an associated decrease in probe penetration (Magnusson & Listgarten 1980, Fowler et al. 1982). This same relationship between tissue health and probe penetration may not exist in furcations probed to the deepest intrafurcal point. In this location, we may probe into the epithelial/connective tissue mass in the furcation, rather than between the epithelium and the root surface. Improvements of the connective tissue health may not translate as readily into reduced probe penetration of these sites. However, the lack of mean probing attachment gain in deeper furcation sites was associated with limited improvement of bleeding scores. In addition, the collapse of plaque and bleeding scores after 6 months was accompanied by a decrease in probing attachment gains in sites ini-

tially 4 mm or greater. This seems to indicate that the relationship between inflammation and probing that has been established in flat surface areas also applies, at least in general terms, to deepest point measurements in furcations.

Different methods have been suggested for identification of periodontal sites with probing attachment loss (Haffajee et al. 1983). The interpretation of probing attachment level measurements is complicated not only by the inability of probing to accurately disclose the connective tissue attachment level, but also by the limited reproducibility of probing measurements. A number of repeated measurements for each site, both before and after therapy, would allow calculation of individual site reproducibility. However, practically, it is difficult to expose investigated subjects to sufficient numbers of repeated probings to obtain reliable reproducibility data. Measurements every 3rd month for 24 months, as was done in this study, probably represent an acceptable compromise. A discussion of the positive and negative aspects of analyzing this type of data with linear regression analysis is provided by Badersten et al. (1985b). This method provides a mathematical model to analyze the magnitude of attachment level changes over time and at the same time take into account measurement variability for individual sites.

The findings from calculations of deteriorating sites in this study paralleled the observations from the mean data. Molar furcation sites initially 4.0 mm or deeper showed a higher % of sites with probing attachment loss than corresponding flat surface sites from either molar or non-molar teeth. Again, this difference was more obvious in molar furcation sites initially $\geq 7.0$ mm. In this group, 1 of 5 molar furcations were identified as showing probing attachment loss.

The distribution of deteriorating sites per subject in this study seems consistent with the findings of Badersten et al. (1985c), who also investigated the effect of plaque control and root debridement. Both studies reveal that a large proportion of sites with probing attachment loss is found in a small number of the studied subjects. In this study, for example, 50% of the deteriorating sites that were initially 4.0–6.5 mm were found in only 2 of the 19 subjects. Similarly, 50% of the deteriorating sites that were initially $\geq 7.0$ mm were found in 3 of the 19 subjects.

In conclusion, the results of this study indicate that flat surface sites of molar teeth respond in a manner similar to non-molar sites when treated by plaque control and root debridement. This is consistent with the results of Lindhe et al. (1982, 1984) and Pihlstrom et al. (1984), who found little or no differences in therapeutic results between molar and non-molar teeth. However, in the present study when molar furcation sites initially 4.0 mm or deeper were compared to molar and non-molar flat surface sites of the same initial depth, a poorer response to plaque control and root debridement was observed. Further studies are necessary to determine whether alternative forms of therapy would be more effective in stabilizing the periodontal status of molar furcation areas.

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**Zusammenfassung**

*Der Effekt der Plaquekontrolle und der Wurzelglättung bei Molaren.*
Nach durchgeführter Parodontaltherapie (Plaquekontrolle und Wurzelglättung) wurden bei 19 erwachsenen Parodontitispatienten die Heilungsvorgänge an »Seiten« (Zahn/Wurzeloberflächen mit dazugehörendem Parodont) die nicht zu Molaren gehörten, an Molaren-»Seiten« mit platter Oberfläche und an »Seiten« mit den Wurzelteilungsstellen der Molaren untersucht. Alles in allem wurde die klinische Situation an 2472 »Seiten« durch 24 Monate langes, an jedem 3. Monat vorgenommenes, Registrieren der dentalen Plaque, der Blutung nach dem Sondieren, der Sondierungstiefe und der Sondierung des Attachmentniveaus, festgehalten. An Seiten mit initialen Sondierungstiefen von 4.0 mm oder mehr waren, im Vergleich zu den Seiten mit platten Molarenoberflächen oder an den nicht zu Molaren gehörenden »Seiten«, die Resultate an den »Seiten« mit Teilungsstellen der Molarenwurzeln ungünstiger. Das konnte durch die höheren mittleren Beurteilungseinheiten des Blutens nach dem Sondieren, durch geringere Reduktion der Sondierungstiefen und durch den mittleren Verlust des sondierten Attachmentniveaus von 0.5 mm, im Zeitabschnitt von 24 Monaten gezeigt werden. Bei der Analyse der »Seiten« mit linearer Regression, wurde ein prozentual höheres Vorkommen von »Seiten« mit tiefer sondiertem Attachmentverlust an den Wurzelteilungsstellen der Molaren beobachtet, als an sowohl den platten Oberflächen als auch an den nicht zu Molaren gehörenden »Seiten«. Bei initial 7.0 mm oder tieferen »Seiten« wurde Verlust von sondiertem Attachment bei 21% der Molarenwurzelteilungsstellen beobachtet, gegenüber 7% an den »Seiten«

**References**

Badersten, A., Nilveus, R. & Egelberg, J. (1981) Effect of non-surgical periodontal therapy. I. Moderately advanced periodontitis. *Journal of Clinical Periodontology* **8**, 57–72.

Badersten, A., Nilveus, R. & Egelberg, J. (1984a) Effect of non-surgical periodontal therapy. II. Severely advanced periodontitis. *Journal of Clinical Periodontology* **11**, 63–76.

Badersten, A., Nilveus, R. & Egelberg, J. (1984b) Effect of non-surgical periodontal therapy. III. Single versus repeated instrumentation. *Journal of Clinical Periodontology* **11**, 114–124.

Badersten, A., Nilveus, R. & Egelberg, J. (1985a) Effect of non-surgical periodontal therapy. IV. Operator variability. *Journal of Clinical Periodontology* **12**, 190–200.

Badersten, A., Nilveus, R. & Egelberg, J. (1985b) Effect of nonsurgical periodontal therapy. V. Patterns of probing attachment loss in non-responding sites. *Journal of Clinical Periodontology* **12**, 270–282.

Badersten, A., Nilveus, R. & Egelberg, J. (1985c) Effect of non-surgical periodontal therapy. VI. Localization of sites with probing attachment loss. *Journal of Clinical Periodontology* **12**, 351–354.

Caton, J., Proye, M. & Polson, A. (1982) Maintenance of healed periodontal pockets after a single episode of root planing. *Journal of Periodontology* **53**, 420–424.

Cercek, J. F., Kiger, R. D., Garrett, S. & Egelberg, J. (1983) Relative effects of plaque control and instrumentation on the clinical parameters of human periodontal disease. *Journal of Clinical Periodontology* **10**, 46–56.

Echeverria, J. J. & Caffesse, R. G. (1983) Effects of gingival curettage when performed 1 month after root instrumentation. A biometric evaluation. *Journal of Clinical Periodontology* **10**, 277–286.

Fowler, C., Garrett, S., Crigger, M. & Egelberg, J. (1982) Histologic probe position in treated and untreated human periodontal tissues. *Journal of Clinical Periodontology* **9**, 373–385.

Goodson, J. M., Tanner, A. C. R., Haffajee, A. D., Sornberger, G. C. & Socransky, S. S. (1982) Patterns of progression and regression of advanced destructive periodontal disease. *Journal of Clinical Periodontology* **9**, 472–481.

mit platten Oberflächen und 11% an den nicht zu Molaren gehörenden »Seiten«.


## Résumé

*Effets du contrôle de la plaque bactérienne et du débridement radiculaire au niveau des molaires*

Chez 19 patients adultes atteints de parodontite, les auteurs ont étudié la guérison se produisant en réponse à un traitement parodontal par contrôle de la plaque et par débridement radiculaire au niveau de localisations des types suivants: non molaires (non-molar), surfaces lisses des molaires (molar flat surface sites) et furcation des molaires (molar furcation sites). Au total, 2472 localisations ont été suivies pendant 24 mois: on a enregistré la plaque, le saignement lors du sondage, la profondeur de sondage et les niveaux de l'attache mesurés par sondage. Les résultats ont montré que, pour les localisations ayant à l'origine une profondeur de sondage de 4.0 mm ou plus, la réaction au traitement au niveau des furcations de molaires était moins favorable qu'au niveau des surfaces lisses de molaires et au niveau des non molaires. On constatait ainsi que les scores moyens du saignement lors du sondage étaient plus élevés, la réduction de la profondeur de sondage était plus faible et la perte moyenne de l'attache mesurée par sondage sur les 24 mois était de 0.5 mm. Une analyse des localisations par régression linéaire montrait que la proportion des localisations profondes avec perte de l'attache était plus forte pour les furcations des molaires que pour les surfaces lisses des molaires ou pour les localisations non molaires. Parmi les localisations ayant à l'origine une profondeur de 7.0 mm ou plus, 21% des furcations des molaires présentaient une perte de l'attache, alors que cette proportion était de 7% pour les surfaces lisses des molaires et de 11% pour les localisations non molaires.



Haffajee, A. D., Socransky, S. S. & Goodson, J. M. (1983) Comparison of different data analyses for detecting changes in attachment level. *Journal of Clinical Periodontology* **10**, 298–310.

Helldén, L. B., Listgarten, M. A. & Lindhe, J. (1979) The effect of tetracycline and/or scaling on human periodontal disease. *Journal of Clinical Periodontology* **6**, 222–230.

Hill, R. W., Ramfjord, S. P., Morrison, E. C., Appleberry, E. A., Caffesse, R. G., Kerry, G. J. & Nissle, R. R. (1981) Four types of periodontal treatment compared over two years. *Journal of Periodontology* **52**, 655–662.

Hirschfeld, L. & Wasserman, B. A. (1978) A long-term survey of tooth loss in 600 treated periodontal patients. *Journal of Periodontology* **49**, 225–237.

Hughes, T. P. & Caffesse, R. G. (1978) Gingival changes following scaling, root planing and oral hygiene. *Journal of Periodontology* **49**, 245–252.

Isidor, F., Karring, T. & Attstrom, R. (1984) The effect of root planing as compared to that of surgical treatment. *Journal of Clinical Periodontology* **11**, 669–681.

Lindhe, J., Westfelt, E., Nyman, S., Socransky, S. S., Heijl, L. & Bratthall, G. (1982) Healing following surgical/non-surgical treatment of periodontal disease. A clinical study. *Journal of Clinical Periodontology* **9**, 115–128.

Lindhe, J., Westfelt, E., Nyman, S., Socransky, S. S. & Haffajee, A. D. (1984) Long-term effect of surgical/non-surgical treatment of periodontal disease. *Journal of Clinical Periodontology* **11**, 448–458.

Lindhe, J. & Nyman, S. (1985) Scaling and granulation tissue removal in periodontal therapy. *Journal of Clinical Periodontology* **12**, 369–373.

Listgarten, M. A., Lindhe, J. & Helldén, L. (1978) Effect of tetracycline and/or scaling on human periodontal disease. Clinical, microbiological, and histological observations. *Journal of Clinical Periodontology* **5**, 246–271.

MacAlpine, R., Magnusson, I., Kiger, R., Crigger, M., Garrett, S. & Egelberg, J. (1985) Antimicrobial irrigation of deep pockets to supplement oral hygiene instruction and root debridement. I. Biweekly irrigation. *Journal of Clinical Periodontology* **12**, 568–577.

Magnusson, I. & Listgarten, M. A. (1980) Histological evaluation of probing depth following periodontal treatment. *Journal of Clinical Periodontology* **7**, 26–31.

Magnusson, I., Lindhe, J., Yoneyama, T. & Liljenberg, B. (1984) Recolonization of a subgingival microbiota following scaling in deep pockets. *Journal of Clinical Periodontology* **11**, 193–207.

Matia, J., Bissada, N., Maybury, J. & Richetti, P. (1985) Scaling and root planing of the bifurcation area with and without surgical access. *Journal of Dental Research* **64**, 335.

McFall, W. T. (1982) Tooth loss in 100 treated patients with periodontal disease. A long term study. *Journal of Periodontology* **53**, 539–549.

Morrison, E. C., Ramfjord, S. P. & Hill, R. W. (1980) Short-term effect of initial, nonsurgical periodontal treatment (hygienic phase). *Journal of Clinical Periodontology* **7**, 199–211.

Pihlstrom, B. L., McHugh, R. B., Oliphant, T. H. & Ortiz-Campos, C. (1983) Comparison of surgical and nonsurgical treatment of periodontal disease. A review of current studies and additional results after 6½ years. *Journal of Clinical Periodontology* **10**, 524–541.

Pihlstrom, B. L., Oliphant, T. H. & McHugh, R. B. (1984) Molar and non-molar teeth compared over 6½ years following two methods of periodontal therapy. *Journal of Periodontology* **55**, 499–504.

Proye, M., Caton, J. & Polson, A. (1982) Initial healing of periodontal pockets after a single episode of root planing monitored by controlled probing forces. *Journal of Periodontology* **53**, 296–301.

Rosling, B. G., Slots, J., Christersson, L. A. & Genco, R. J. (1984) Clinical and microbiological effects of surgical and non-surgical treatment of multi-rooted teeth in adult periodontitis. *Journal of Dental Research* **63**, 205.

Tagge, D. L., O'Leary, T. J. & El-Kafrawy, A. H. (1975) The clinical and histological response of periodontal pockets to root planing and oral hygiene. *Journal of Periodontology* **46**, 527–534.

Torfason, T., Kiger, R., Selvig, K. A. & Egelberg, J. (1979) Clinical improvement of gingival conditions following ultrasonic versus hand instrumentation of periodontal pockets. *Journal of Clinical Periodontology* **6**, 165–176.

Waite, I. M. (1976) A comparison between conventional gingivectomy and a nonsurgical regime in the treatment of periodontitis. *Journal of Clinical Periodontology* **3**, 173–185.

Westfelt, E., Bragd, L., Socransky, S. S., Haffajee, A. D., Nyman, S. & Lindhe, J. (1985) Improved periodontal conditions following therapy. *Journal of Clinical Periodontology* **12**, 283–293.



Address:

*Steven Garrett*
*School of Dentistry*
*Loma Linda University*
*Loma Linda, CA 92350*
*USA*