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# Attachment loss after scaling and root planing with different instruments

## A clinical study

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***Abstract***

**Objectives:** The aim of this study was to evaluate clinically the immediate effect of trauma from instrumentation after scaling and root planing with different instruments.
**Material and Methods:** Ten subjects with moderate chronic periodontitis, presenting probing depths ranging from 3.5 to 6.5 mm on anterior teeth, upper and/or lower, were selected. Teeth were randomly assigned to one of the following groups: MC group – scaled and planed with Gracey mini-curettes (*MiniFive*™); CC group – scaled and planed with Gracey conventional curettes. The selected teeth were probed with a computerized electronic probe, guided by an occlusal stent, and then subjected to scaling and root planing. Immediately following instrumentation, teeth were probed again. The difference between relative attachment level (RAL) immediately before and after instrumentation was considered as trauma from instrumentation.
**Results:** Intra-group analysis revealed statistically significant differences between RAL immediately before and after instrumentation in both groups ($0.68 \pm 0.32$ for MC group; and $0.83 \pm 0.41$ for CC group – $p < 0.05$). However, inter-group analysis did not show a statistically significant difference in trauma from instrumentation caused by the different instruments.
**Conclusions:** Within the limits of this study, it was concluded that root instrumentation causes an average trauma from instrumentation of 0.76 mm with no differences between the tested instruments.

Key words: attachment loss; periodontal curettes; scaling and root planing; trauma from instrumentation

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Periodontal therapy is based on the removal of bacterial deposits present on disease-affected roots. This therapeutic approach has been shown to provide positive results in longitudinal evaluations (Badersten et al. 1981, 1984). Therefore, the fundamental procedure to achieve this goal is scaling and root planing, which may be performed by a large variety of instruments.

Regardless of the initial probing depths, a single episode of root instrumentation by an ultrasonic device has been shown to produce a periodontal attachment loss of 0.5–0.6 mm (Claffey et al. 1988). The authors suggested the occurrence of mechanical trauma due to instrumentation as a major cause of attachment loss. However, this trauma at the bottom of the periodontal pocket appears to be less important than proper elimination of bacterial deposits from diseased root surfaces.

There is little published data concerning periodontal attachment loss immediately following scaling and root planing in humans. Moreover, it is not known whether any different instruments produce different attachment loss. Therefore, the aim of this study was to quantify and compare the immediate changes in clinical attachment level due to trauma following scaling and root planing with conventional Gracey curettes and Gracey mini-curettes (MiniFive™).

## Material and Methods

### Sample

Ten subjects, 34 to 62 years old, with moderate chronic periodontitis, were selected. These individuals presented a minimum of 5 periodontal pockets, on incisors and canines (upper and/or lower), with probing depths ranging from 3.5 to 6.5 mm. The protocol of the study has been previously approved by the

Institutional Committee of Ethics in Clinical Research of the State University of Campinas (UNICAMP). Patients taking medications, presenting any compromising medical conditions or undergoing orthodontic treatment, were not included.

#### Initial preparation

Selected individuals were subjected to supragingival debridement with an ultrasonic device. All subjects received oral hygiene instructions on this visit. Individual plastic occlusal stents were obtained to standardize the relative attachment level measurements.

#### Clinical parameters

Seven days later, the patients were probed by a previously calibrated examiner (LM). This procedure was performed with a computerized electronic probe (Florida Probe™, Florida Probe Corporation, Gainesville, FL, USA).

Probing depth (PD) was measured by the Florida pocket probe as an inclusion criterion for periodontal sites. Measurements of relative attachment level (RAL) were obtained from a groove at the occlusal stent to the bottom of the pocket by the Florida stent probe.

The attachment loss due to trauma from instrumentation (TI) was calculated by the difference between RAL measurements registered immediately before and immediately after scaling and root planing.

#### Scaling and root planing

Following the electronic probing, patients were anesthetized and subjected to scaling and root planing. The selected anterior teeth (upper and/or lower) were randomly assigned to one of the 2 groups:

- MC group – scaled and root planed with Gracey 5–6 mini-curettes (*MiniFive*™) (*HuFriedy*™, Chicago, IL, USA).
- CC group – scaled and root planed with Gracey 5–6 conventional curettes (*HuFriedy*™, Chicago, IL, USA).

Regardless of the instrument used, each selected site received 30 strokes by the same operator (RVA). Instruments were sharpened whenever necessary.

Immediately after scaling and root planing, selected teeth were probed again by the same initial examiner (LM) and new measurements of RAL were obtained.

#### Statistical analysis

RAL means were obtained from each patient for each of the 2 groups (MC and CC group). The means registered before and after scaling and root planing and the differences in RAL measurements between the groups were compared by the Student paired *t*-test and Student non-paired *t*-test, respectively ($\alpha = 0.05$).

## Results

Six men and 4 women with a mean age of $44.9 \pm 10.24$ participated in the study. Figures 1 and 2 show the distribution of RAL means immediately before and after scaling and root planing with different instruments. Each subject had a mean of $3.6 \pm 1.35$ sites assigned for the MC group, and $3.5 \pm 1.58$ sites for the CC group.

Periodontal sites in the MC group (36 sites) showed a mean RAL of 8.23 mm immediately before scaling and root planing, and 8.91 mm immediately after scaling and root planing. The observed mean difference in RAL for the MC group was $0.68 \pm 0.32$ mm, and this difference was statistically significant ($p < 0.0001$) (see Table 1).

In the CC group, a mean RAL value of 8.28 mm was observed immediately

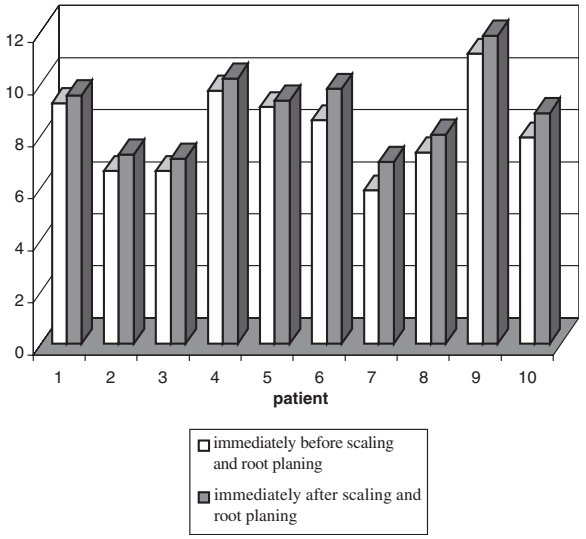


*Fig. 1.* Mean RAL variation (in mm) immediately before and after scaling and root planing using Gracey 5–6 mini-curettes (MiniFive™) (MC group) in different patients.

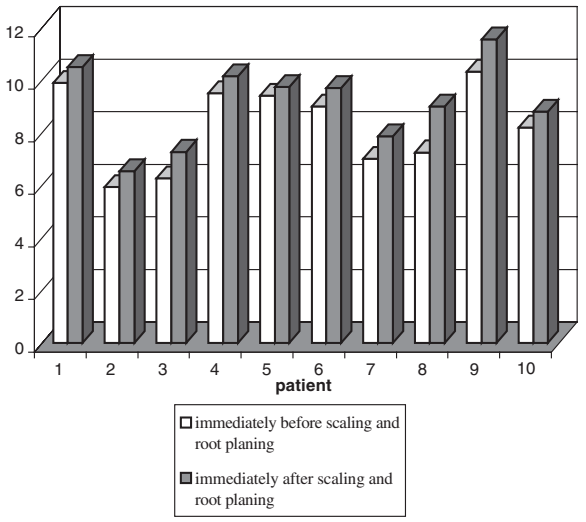


*Fig. 2.* Mean RAL variation (in mm) immediately before and after scaling and root planing using Gracey 5–6 conventional curettes (CC group) in different patients.

*Table 1.* RAL measurements in mm (mean ± SD) observed immediately before and after scaling and root planing using conventional curettes (CC) and mini-curettes (MC)

| | Immediately before scaling and root planning | Immediately after scaling and root planning |
|---|---|---|
| MC | 8.23 ± 1.63 *A* | 8.91 ± 1.56 *B* |
| CC | 8.28 ± 1.57 *A* | 9.11 ± 1.54 *B* |

Means followed by different letters indicate statistically significant differences ($p < 0.05$).

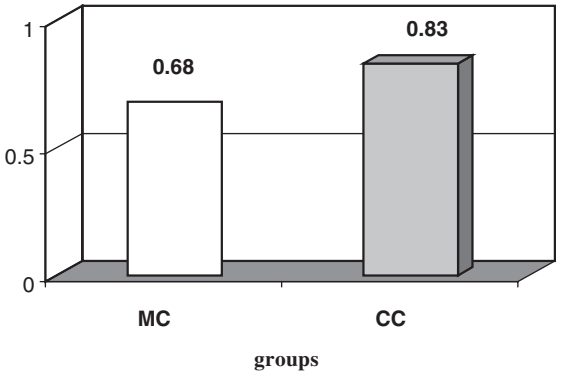


*Fig. 3.* Trauma from instrumentation (RAL loss in mm) in the different groups.

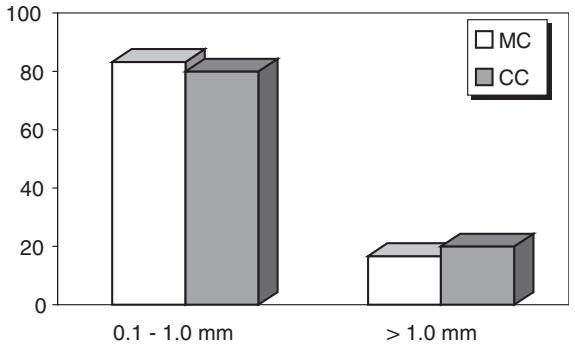


*Fig. 4.* Percentage of sites showing attachment loss between 0.1 mm and 1.0 mm and superior to 1 mm in each group.

before scaling and root planing, and 9.11 mm immediately after this procedure. In the CC group, the mean difference in RAL measurements was 0.83 ± 0.40 mm, and this difference was statistically significant ($p < 0.0001$) (see Table 1).

No statistically significant difference was observed in RAL changes between the 2 groups ($p = 0.345$) (see Fig. 3).

The mean attachment loss detected immediately after scaling and root planing considering both instruments was 0.76 ± 0.11 mm.

The percentage of sites that showed attachment loss between 0.1 mm and 1.0 mm and superior to 1.0 mm is presented in Fig. 4. In the MC group, 83.3% of the sites had an attachment loss inferior to 1.0 mm, and 16.7% had an attachment loss superior to 1.0 mm. The corresponding values in CC group were 80% and 20%, respectively.

## Discussion

This study was designed to quantify the attachment loss produced by scaling and root planing with manual instruments immediately after the procedure. The results showed a mean RAL loss of 0.76 mm, considering both instruments. Within the limits of the author's knowledge, there is only one study concerning trauma from instrumentation (Claffey et al., 1988). The authors reported a mean attachment loss of 0.5–0.6 mm after instrumentation. However, the comparison of the findings of the previous report and the present study should be made with caution due to important methodological differences. Claffey et al. (1988) reported the changes observed on single and multi-rooted teeth, immediately following a single episode of subgingival ultrasonic instrumentation. Also, mechanical instrumentation was performed until the roots were considered to be clinically free of calculus. On the other hand, the present study did not include multi-rooted teeth, and the instrumentation was limited to 30 strokes with hand instruments. Thus, it may be suggested that under- or overinstrumentation of the root surface might have occurred in the present study. In spite of these differences, the magnitude of RAL loss observed in both studies seems to be comparable.

In the present study, a preparation period with supragingival debridement and oral hygiene instructions was conducted to reduce gingival inflammation before the initial probing measurements and subgingival instrumentation session. Moreover, a blinded examiner and the use of an electronic probe (to optimize the reproducibility of periodontal probing measurements) were included to improve the quality of the data. However, the influence of subgingival inflammation on the degree of trauma from instrumentation should be considered, since inflamed tissues are less resistant to probe penetration and, consequently, may be also less resistant to scaler penetration.

With respect to the alterations produced by scaling and root planing with different instruments, neither the conventional curettes nor mini-curettes were able to show any advantage related to the injury caused in the bottom of the pocket. These findings are interesting, since the mini-curettes should be more readily able to reach the apical portion of the pocket, when compared with the conventional curettes.

Although trauma from instrumentation at the bottom of periodontal pocket appears to be less important than proper elimination of bacterial deposits from diseased root surfaces (Izumi et al., 1999), there is a lack of information concerning the influence of this trauma on the healing process. Thus, more studies are necessary to clarify how harmful periodontal instrumentation may be to the diseased tissues, since this clinical procedure is the major step

in periodontal therapy. Another interesting message from the present data is the fact that clinicians should be aware that the measurements taken immediately after scaling and root planing might be overestimating preoperative probing depths and attachment level measurements

In conclusion, the results of this study suggest that:

(1) Scaling and root planing performed with hand instruments produce a mean attachment loss of 0.76 mm, observed immediately following the procedure.
(2) There is no significant difference between the trauma from instrumentation produced by conventional curettes and mini-curettes.

## References

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

Badersten, A., Nilvéus, R. & Egelberg, J. (1984) Effect of nonsurgical periodontal therapy. II. Severely advanced periodontitis. *Journal of Clinical Periodontology* **11**, 63–76.

Claffey, N., Loos, B., Gantes, B., Martin, M., Heins, P. & Egelberg, J. (1988) The relative effects of therapy and periodontal disease on loss of probing attachment after root debridement. *Journal of Clinical Periodontology* **15**, 163–169.

Izumi, Y., Hiwatashi-Horinouchi, K., Furuichi, Y. & Sueda, T. (1999) Influence of different curette insertion depths on the outcome of non-surgical periodontal treatment. *Journal of Clinical Periodontology* **26**, 716–722.

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