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Editors: Phoebus Madianos & Andreas Stavropoulos, EFP scientific affairs committee

**Rapporteurs:**
Eli Regev with Jacob Horwitz

**Affiliation:**
Postgraduate programme in periodontology, Department of Periodontology, School of Graduate Dentistry, Rambam Health Care Campus, Haifa, Israel

*study*

# Supportive therapy after peri-implantitis surgery - titanium curettes or chitosan brushes?

**Authors:**
Odd Carsten Koldsland and Anne Merete Aass

## Background

In recent decades, studies have shown that peri-implant diseases have become more prevalent. Although no treatment has been proven to be superior for peri-implantitis, surgical therapy has been shown to have a beneficial short-term effect on the progression of the disease.

Maintenance after completion of dental-implant therapy and following surgical therapy has three components: measures taken by the patient, preventive procedures carried out by a dental healthcare professional, and supportive peri-implant therapy (SPiT). As of today, even though several methods of biofilm removal are available, there is no universal consensus for maintenance therapy. Most studies regarding SPiT evaluate the treatment of peri-implant mucositis.

However, following surgical therapy, a rough surface with implant threads will be exposed, and in these situations, proper biofilm removal may be difficult. The use of chitosan brushes and curettes for non-surgical treatment of mild peri-implantitis has been previously evaluated but neither treatment has shown superiority in the eradication of peri-implant disease.

At present, there are no studies comparing different SPiT treatment modalities following surgical therapy for peri-implantitis.

## Aims

To assess chitosan brushes (test) and titanium curettes (control) as treatment methods in supportive peri-implant therapy from six months up to 18 months following surgical treatment for peri-implantitis.

## Materials & methods

- This study was designed as a two-arm randomised clinical trial with one year of follow-up.
- The outcome of the two treatment methods was assessed while performing SPiT in subjects having received surgical treatment for peri-implantitis.
- A total of 45 patients (143 implants) with a diagnosis of peri-implantitis were surgically treated without using any regenerative material. At the six-month evaluation following surgical therapy, 44 subjects (142 implants) with pocket probing depth (PPD) >3mm and bleeding on probing (BoP) or suppuration randomly assigned to control or test groups:
  - Control group: maintenance treatment with **titanium curettes** (Langer and Langer, Rønvig, Denmark).
  - Test group: maintenance treatment using **chitosan brushes** (LBC, BioClean®, Labrida AS, Oslo, Norway).
- A clinical examination evaluating the PPD values, plaque score, gingival-bleeding score, and the presence or absence of BoP/suppuration was performed every three months, beginning with the six-month evaluation until 18 months after surgery.
- Four different clinical outcomes were reported at each time point following peri-implant maintenance/SPiT: (1) health stability, (2) improvement, (3) persisting disease, and (4) impairment (success at previous control and peri-implant disease at the following control).
- Radiographic examination was performed twice at both six and 18 months (>2 weeks between each measurement).

**Table** Clinical parameters for the test and control groups in the follow-up period

| Time after surgery | 6 months (SD) | 9 months (SD) | 12 months (SD) | 15 months (SD) | 18 months (SD) |
|---|---|---|---|---|---|
| **Clinical registrations - Plaque %** | | | | | |
| Test | 14.3 (0.4) | 31.3(0.5) | 34.6 (0.5) | 48.2 (0.5) | 42.9[a] (0.5) |
| Control | 26.6 (0.4) | 26.5 (0.4) | 32.9 (0.5) | 44.3 (0.5) | 34.2 (0.5) |
| Control | 13.9 (0.3) | 23.5 (0.4) | 32.9 (0.5) | 31.6 (0.5) | 21.5 (0.4) |
| **Gingival bleeding %** | | | | | |
| Test | 12.5 (0.3) | 29.2 (0.5) | 26.9 (0.4) | 37.5 (0.5) | 25.0 (0.4) |
| Control | 13.9 (0.3) | 23.5 (0.4) | 32.9 (0.5) | 31.6 (0.5) | 21.5 (0.4) |
| **PPD mean (mm)** | | | | | |
| Test | 4.9 (1.2) | 5.2 (1.6) | 5.2[b] (1.6) | 5.7 (1.7) | 5.6[a] (1.6) |
| Control | 5.0 (1.6) | 5.3 (1.7) | 5.9[b] (2.0) | 5.7 (1.9) | 5.7[a] (1.8) |
| **PPD>3mm%** | | | | | |
| Test | 91.1 (0.3) | 85.1 (0.4) | 90.4 (0.3) | 92.9 (0.3) | 96.4 (0.3) |
| Control | 83.3 (0.4) | 92.5 (0.3) | 93.6 (0.3) | 94.9 (0.3) | 97.4 (0.2) |
| **BoP%** | | | | | |
| Test | 80.4 (0.4) | 91.5 (0.3) | 92.3 (0.3) | 91.1 (0.3) | 85.7 (0.4) |
| Control | 83.5 (0.4) | 80.9 (0.4) | 84.8 (0.4) | 91.1 (0.3) | 84.8 (0.4) |
| **Suppuration %** | | | | | |
| Test | 16.1 (0.4) | 16.7 (0.4) | 32.7 (0.5) | 33.9 (0.5) | 30.4[a] (0.5) |
| Control | 17.7 (0.4) | 27.9 (0.5) | 29.5 (0.5) | 34.2(0.5) | 24.1 (0.4) |

*Note*: Implant level registrations; the most severe clinical registration at any site representing the implant.
[a]Statistically significant difference compared to 6-month results (Wilcoxon signed rank test).
[b]Statistically significant difference between test and control groups (Independent sample *t* test).

## Results

- In the test group, 61% of implants underwent SPiT at the six-month post-operative control. At the controls at nine, 12, 15, and 18 months, a higher percentage of implants needed supportive treatment: 75%, 81%, 82%, and 79%, respectively.
- In the control group, SPiT was performed at 69% of the implants at the six-month postoperative control. At the following controls at nine, 12, 15, and 18 months, a higher percentage of implants required supportive treatment: 74%, 80%, 82%, and 78%, respectively.
- Pooled data showed that more than 60% of the implants were registered as persisting disease.
- Regarding clinical parameters for test and control groups, the percentage of implants with peri-implant disease (PPD >3mm and BoP/suppuration) during the observation period was higher than 80% with no significant difference between groups. Moreover, there was a significant increase in mean PPD values throughout the observation period, compared to six-month baseline results for both groups. The clinical parameters of implants rarely improved.
- 38.9% of the implants in the test group and 38.6% of the implants in the control group were registered with >0.5mm bone gain.
- 9.3% of the implants in the test group and 22.9% of the implants in the control group were registered with >0.5mm bone loss.
- No statistically significant difference was found between the test and control groups.

## Limitations

- In the present study, no regimes other than the use of titanium curette or chitosan brush were used in addition to basic maintenance therapy.
- The control arm of the treatments may have been limited because of the inability of the curette to reach difficult areas where the implant thread was exposed.

## Conclusions

- Results from the present study indicate that the two treatment protocols are ineffective in the maintenance of dental implants following surgical peri-implantitis therapy.

## Impact

- This study highlights the need for more effective maintenance protocols in obtaining stable peri-implant health following surgical therapy.

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