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study

Are there added benefits from submarginal instrumentation before surgical management of peri-implantitis?

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Background

The current treatment pathway for peri-implantitis generally mirrors that of periodontitis. This stepwise approach starts with a behavioural intervention and supragingival instrumentation, followed by non-surgical submarginal instrumentation. Patients are then re-evaluated four to eight weeks after non-surgical instrumentation to determine if the successful treatment endpoints have been achieved.

In moderate to severe forms of peri-implantitis, non-surgical instrumentation alone rarely achieves these endpoints and surgical therapy is often required. It has been suggested that non-surgical instrumentation might be considered as an intermediate preparatory phase before further surgical interventions.

However, the use of non-surgical submarginal instrumentation of implants affected by peri-implantitis may lead to an extended treatment timeline, increased costs, and discomfort for patients. As a result, various authors have questioned its value and opted to use only supragingival instrumentation before surgical treatment.

Aim

To evaluate the added effects of performing non-surgical submarginal instrumentation before the surgical treatment of peri-implantitis.

Materials & methods

- Randomised multi-centre trial with two parallel groups.
- An *a priori* power calculation required a sample of 42 patients.
- Inclusion criteria: any patient, 18 years or older, with at least one implant in function for at least a year and affected by peri-implantitis. Peri-implantitis was defined as: pocket probing depth (PPD) ≥6mm; bleeding on probing (BoP) and/or suppuration on probing (SoP); and radiographic marginal bone loss >3mm on implants in function for at least a year.
- Exclusion criteria: compromised general health; pregnancy or lactation; chronic use of anti-inflammatory, immune-suppressive, or bone/mucosa-affecting drugs; previous peri-implantitis treatment; and implant mobility.
- Control group: supra- and submarginal instrumentation, local application of 0.12% chlorhexidine + 0.05% cetylpyridinium chloride, followed by surgical therapy six weeks later.
- Test group: supramarginal instrumentation only, followed by surgical therapy two weeks later.
- Clinical measurements (six sites per implant) recorded at baseline, day of surgery, six months, and 12 months:
  - PPD
  - recession
  - BoP
  - SoP
  - keratinized mucosa height (KMH).
- Implant mobility at six and 12 months and presence of profuse BoP at 12 months were also recorded.
- Radiographic marginal bone levels were recorded at two weeks, six months, and 12 months after surgery (digital standardised long-cone intraoral radiographs).
- Primary outcomes:
  - Changes in the deepest PPD with respect to baseline.
  - Various definitions of treatment success criteria were investigated at 12 months (see table).
- Secondary outcomes: total treatment time, early wound healing, self-reported smile aesthetics, surgery difficulty, intra-operative bleeding, and adverse events.
- Patient-level analysis.

Table: Treatment success in the included implants

	Overall (*N* = 52)	Control group (*N* = 28)	Test group (*N* = 24)	MD/OR (SE) (only adjusted for clustering)	MD/OR (SE) (adjusted for clustering and surgical approach)
Criterion 1: No implant loss, no bone loss >0.5mm, BoP/SoP, PPD ≤5mm, *N* (%)					
6 months	6 (11.8)	4 (14.3)	2 (8.7)	NE	NE
1 year	14 (26.9)	6 (21.4)	8 (33.3)	OR = 1.83 (1.16) *p* = .338	OR = 2.09 (1.38) *p* = .264
Criterion 2: No implant loss, no bone loss >0.5mm, BoP/SoP, *N* (%)					
6 months	6 (11.8)	4 (14.3)	2 (8.7)	NE	NE
1 year	14 (26.9)	6 (21.4)	8 (33.3)	OR = 1.83 (1.16) *p* = .338	OR = 2.09 (1.38) *p* = .264
Criterion 3: No implant loss, no bone loss >0.5mm, no PPD ≥5 with concomitant BoP/SoP+, *N* (%)					
6 months	33 (64.7)	20 (71.4)	13 (56.5)	OR = 0.52 (0.31) *p* = .271	OR = 0.57 (0.35) *p* = .360
1 year	27 (51.9)	17 (60.7)	10 (41.7)	OR = 0.46 (0.26) *p* = .173	OR = 0.52 (0.30) *p* = .256
Criterion 4: No implant loss, no bone loss >0.5mm, BoP+ at maximum one site, no SoP, PPD ≤5mm, *N* (%)					
6 months	18 (35.3)	8 (28.6)	10 (43.5)	OR = 2.14 (2.01) *p* = .417	OR = 2.35 (2.31) *p* = .384
1 year	17 (32.7)	7 (25.0)	10 (41.7)	OR = 2.14 (1.29) *p* = .205	OR = 2.19 (1.36) p = .205
Criterion 5: No implant loss, no bone loss >0.5mm, no profuse bleeding, no SoP, PPD ≤5mm, *N* (%)					
1 year	24 (46.2)	13 (46.4)	11 (45.8)	OR = 0.98 (0.55) *p* = .966	OR = 0.99 (0.57) *p* = .989

Note: One six-months radiograph from the test group resulted unreadable, reducing in this group the sample size to 23 implants for treatment success outcomes.
Abbreviations: BoP, bleeding on probing; MD, difference in means; NE, not estimable; OR, odds ratio; PPD, probing pocket depth; SoP, suppuration on probing.

Results

- Study population group: 21 patients per treatment group (control = 29 implants, test = 24 implants, n=53), 61.9% female, mean age 61.36 years (SD±12.27 years), mean baseline bone level of 4.96mm (±1.65mm).
- One implant in one patient from the test group was removed; one patient from the control group was lost to follow-up after the two-week examination.
- The overall change in deepest PPD at 12 months was 3.03mm (±1.96mm) with 2.96mm (±1.85mm) in the control group and 3.11mm (±2.12mm) in the test group. These differences were not statistically significant.
- Treatment success (no implant loss, no bone loss >0.5mm, BoP/SoP and PPD ≤5mm) was achieved in 26.9% of all study implants, with marginally better but not statistically significant results for the test group (33.3% test vs 21.4% control).
- Radiographic examination at 12 months demonstrated that 12.0% of the implants presented with bone loss >0.5mm (OR = 1.04; SE = 1.13; p = .97), while 60.0% of the implants presented a bone gain >0.5mm (OR = 1.49; SE = 3.88; p = .88).
- No statistically significant differences were observed for early wound healing, self-reported smile aesthetics, surgery difficulty, intraoperative bleeding, and adverse events.
- The duration of non-surgical treatment was longer in the control group. However, when considering total treatment time there was no statistically significant difference between groups.

Limitations

- The observed standard deviation (SD) for PPD changes was higher than the SD used when the sample size calculation was performed, which means that the study was underpowered.
- Lack of blinding of non-surgical operators and patients regarding their treatment group.
- The type of surgical therapy was not standardised.
- Variable levels of operator experience.
- Adjunctive local antimicrobial therapy was used only in the control group.
- Only limited patient-reported outcomes were recorded. No cost-benefit analysis was carried out.

Conclusions & impact

- No added benefit was demonstrated in performing submarginal instrumentation six weeks before the surgical treatment of peri-implantitis.
- Overall findings regarding the clinical parameters included a PPD reduction of approximately 3mm and a recession reduction of approximately 2mm.
- No definitive conclusion can be reported regarding the discomfort experienced by patients undergoing additional submarginal instrumentation before the surgical management of peri-implantitis.
- Further studies with a larger population are required.
- Patient discomfort, treatment duration, and costs can potentially be reduced by avoiding submarginal instrumentation in the management of peri-implantitis before surgical therapy.

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