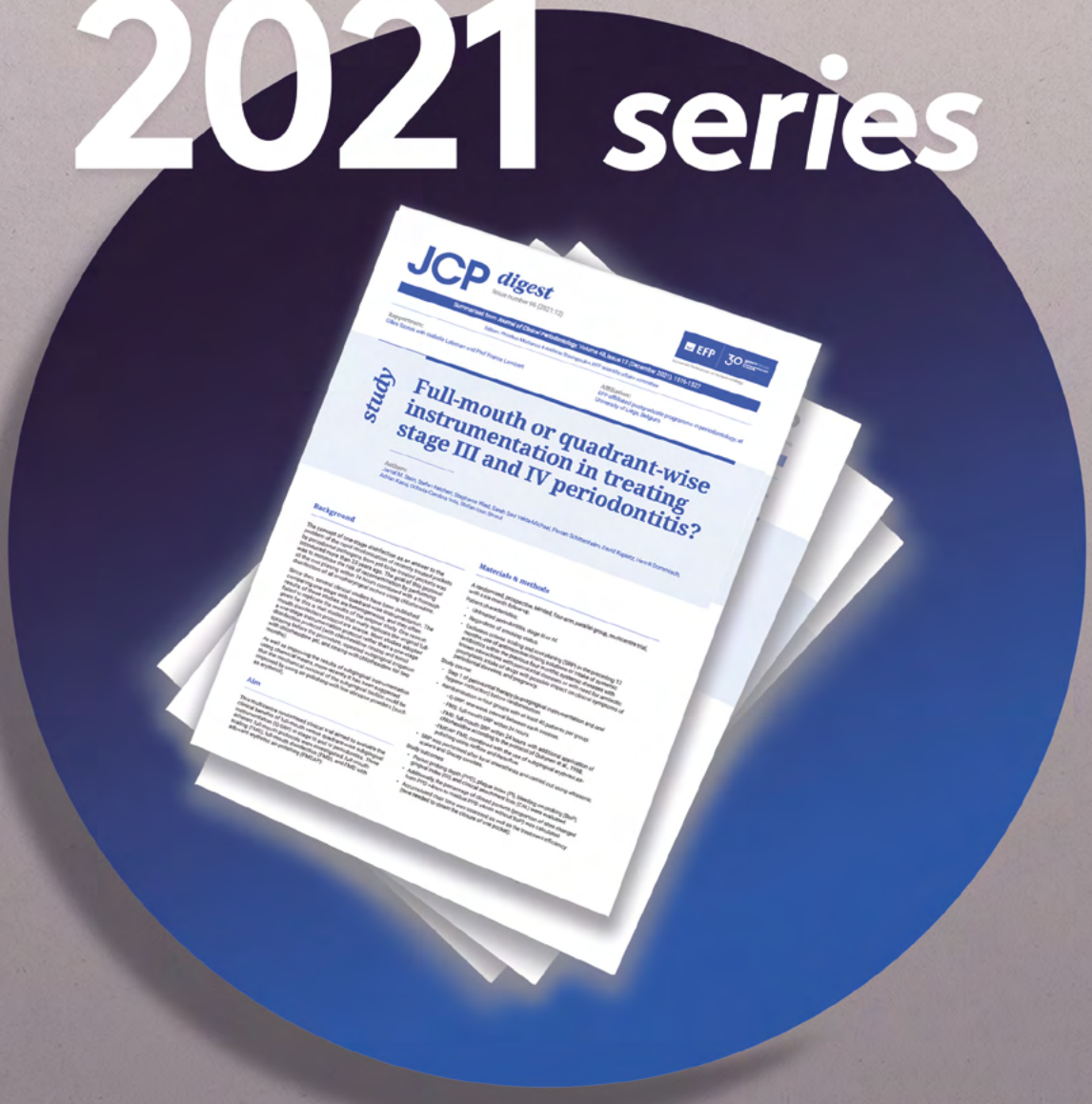
English

JCP digest collection

2021 series



Extracted from the *Journal of Clinical Periodontology*

Journal of Clinical Periodontology
An EFP initiative

EFP
European Federation of Periodontology

Explore the JCP Digest collection - 2021 series

JCP Digest, edited by the European Federation of Periodontology (EFP), is a summary of a scientific article published in the *Journal of Clinical Periodontology* (*JCP*), one of the world's most authoritative publications in dentistry, with a high impact factor.

This free publication is prepared primarily for clinicians and offers a concise two-page summary of articles published in the *JCP*, with one article each month chosen to be summarised in this way. All articles are selected for their relevance to practitioners working in periodontology and implant dentistry. *JCP Digest* is published on the EFP website (www.efp.org/publications/jcp-digest/) in seven languages: Croatian, English, French, German, Italian, Portuguese, and Spanish.

After the success of the first JCP Digest collection - 2020 series launched last year, the EFP has now published the **JCP Digest collection - 2021 series**, a compendium that brings together all the 12 issues of the English-language version of *JCP Digest* referring to articles published in the *JCP* during 2021. You can read the collection online, download it, or print it for later reading.

Please feel free to share this **JCP Digest collection - 2021 series** with your co-workers and students, and to encourage them to stay tuned with the latest research by accessing each month the new issue of *JCP Digest* published on the EFP website.

Andreas Stavropoulos
Editor of ***JCP Digest***, chair of the EFP's scientific affairs committee, and EFP president

Bettina Dannewitz
Chair of the EFP's communications committee

Contents

JCP digest
Issue number 85 (2021:1)

EFP
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, volume 48, issue 1 (January 2021), 101-114

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

Rapporteurs:
Ho-Yan Duong, with Prof Giovanni Salvi and Prof Anton Sculean

Affiliation:
Postgraduate programme in periodontology, University of Bern, Switzerland

study

Healing of periodontal infrabony defects following regenerative surgery

Authors:
Luigi Nibali, Duaa Sultan, Claudia Arena, George Pelekos, Guo-Hao Lin, Maurizio Tonetti

Background

Periodontal infrabony defects are defined as defects extending below the bone crest. Within this category are intrabony defects that extend within or inside the bone and which are classified according to location and number of osseous walls.

Regenerative treatment of intrabony defects has shown higher periodontal probing depth (PPD) reduction and clinical attachment level (CAL) gain compared to open-flap debridement surgery. However, the effect of defect morphology on treatment outcomes following periodontal surgery has not been investigated systematically. In addition, there are recent developments in techniques and materials that need to be considered.

Aims

To analyse the healing pattern of infrabony defects following regenerative surgery in relation to clinical and radiographic outcomes, and furthermore to examine how defect morphology is described.

Materials & methods

- This systematic review provided meta-analyses for the predictive value of defect morphology in regenerative procedures. Moreover, the description of defect morphology was analysed in the selected studies.
- The included studies were published between 1992 and 2019.
- The sources of evidence were MEDLINE, Cochrane, and Scopus databases.
- Risk of bias was ranged from low to high after analyses of all included studies.
- Meta-analyses of the following parameters on healing at 12 months after surgery were performed:
  - Effect of ***defect depth:***
    - Categorical analysis for the effect of defect depth >4mm on radiographic hard-tissue gain (Figure 1).
    - Regression estimates for the effect of initial defect depth on radiographic hard-tissue gain.
    - Regression estimates for the effect of initial depth on CAL gain.
  - Effect of ***defect angle:***
    - Categorical analysis for the effect of initial defect angle <37° on radiographic hard-tissue gain (Figure 2).
    - Regression estimates for the effect of initial defect angle on radiographic hard-tissue gain.
    - Regression estimates for the effect of defect angle on CAL gain.
  - Effect of ***number of walls:***
    - Categorical analysis for the effect of one-wall versus two-wall defects on radiographic hard-tissue gain (Figure 3a).
    - Categorical analysis for the effect of two-wall versus three-wall defects on radiographic hard-tissue gain (Figure 3b).
    - Regression estimates for the effect of the number of walls on radiographic hard-tissue gain.
    - Regression estimates for the effect of the number of walls on CAL gain.

Figure 1

Categorical analysis for the effect of defect depth >4 mm on radiographic hard-tissue gain.

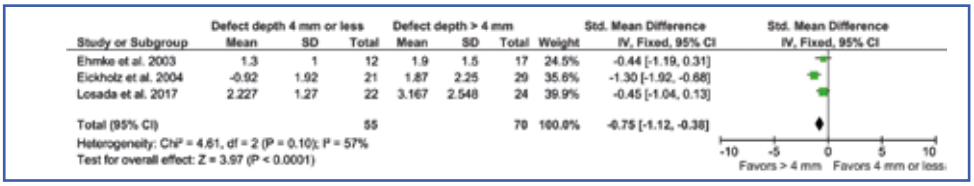
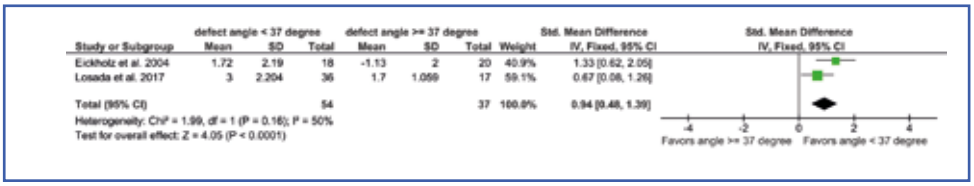


Figure 2

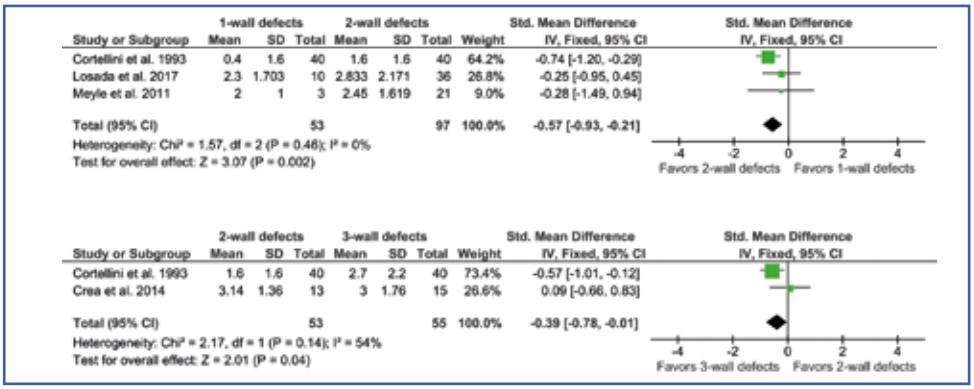
Categorical analysis for the effect of the initial defect angle <37° on radiographic hard-tissue gain.



Figures 3a y 3b

3a: Categorical analysis for the effect of 1-wall versus 2-wall defects on radiographic hard-tissue gain.

3b: Categorical analysis for the effect of 2-wall versus 3-wall defects on radiographic hard-tissue gain.



Results

- The 4,487 titles encountered included 117 randomised controlled trials (RCTs), 20 cohort studies, and six case series. However, it was possible to quantitatively analyse only 14 publications.
- At 12 months following regenerative treatment, the following associations in relation to defect depth, defect angle, and the number of walls were found.
  - Defect depth:
    - A statistically significant association was found between a defect depth >4mm and increased radiographic hard-tissue gain (−0.7mm, 95% CI = −1.12, −0.38).
    - A statistically significant association was found between deeper defect depth and increased radiographic hard-tissue gain (OR = 1.32, 95% CI = 1.19, 1.47).
  - Defect angle
    - A statistically significant association was found between a defect angle <37° and increased radiographic hard-tissue gain (0.94mm, 95% CI 0.48, 1.39).
    - A statistically significant association was found between narrow angles and increased CAL gain (OR = 0.97, 95% CI = 0.95, 0.98).
  - Number of walls
    - Comparison between one-wall and two-wall defects indicated significantly more radiographic hard-tissue gain in treatments of two-wall defects (−0.57mm, 95% CI = −0.93, −0.21).
    - Comparison between two-wall and three-wall defects indicated significantly more radiographic hard-tissue gain in treatments of three-wall defects (−0.39mm, 95% CI = −0.78, −0.01).
    - Comparison between one-wall and three-wall defects indicated significantly more radiographic hard-tissue gain in treatments of three-wall defects (−1.18mm, 95% CI = −1.66, −0.71).

Limitations

- Only a few publications reported outcomes based on defect morphology, although descriptions of defect morphology exist in most of the studies.
- No detailed classification system was widely used to describe infrabony defects. Therefore, only studies with heterogeneously described defects were found.
- No data is available concerning the description of defect morphology with extension to buccal and lingual surfaces.
- Only 12 months of follow-up was reported.

Conclusions & impact

- The 12-month outcome following regenerative surgery of infrabony defects indicated increases in radiographic hard-tissue gain and CAL gain.
- Deep defects positively influenced radiographic hard-tissue gain, while narrow angles and a larger number of walls positively influenced both radiographic hard-tissue gain and CAL gain.
- The initial defect morphology can be used to assess the likely prognosis following regenerative surgery.

JCP Digest issue number 85, published in May 2021, is a summary of the article 'Periodontal infrabony defects: Systematic review of healing by defect morphology following regenerative surgery.' *J Clin Periodontol.* 2020; 48 (1), 101–114. DOI: 10.1111/jcpe.13381.

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13381

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 86 (2021:2)

European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, volume 48, issue 2 (February 2021), 302-314

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

Rapporteurs:
David Naughton and Cianna O'Brien with Lewis Winning and Ioannis Polyzois

Affiliation:
Postgraduate programme in periodontology, Dublin Dental University College, Trinity College, Dublin, Ireland

study

Dimensional changes of newly established keratinised tissue following free gingival grafts

Authors:
Pilar Golmayo, Lucía Barallat, Meritxell Losada, Cristina Valles, José Nart, Andrés Pascual-La Rocca

Background

The role of the attached gingiva in maintaining both periodontal and peri-implant health has been extensively investigated but until now the evidence has been equivocal. There is a general consensus that gingival augmentation around teeth should be performed only in cases where a patient cannot perform proper plaque control because of sensitivity of the non-keratinized gingiva, when there is progressive soft-tissue recession, and for pre-prosthetic purposes. Sometimes bone dehiscence developed because of orthodontic movement may also warrant gingival augmentation.

Despite similarities in the clinical appearance of the gingiva around teeth and implants, the connective tissue differs significantly. Around implants, there is a reduced blood supply because of the lack of periodontal ligament and the collagen fibres do not attach to the implant's surface but run parallel to and in a circular fashion around it. It is because of these characteristics that existing literature advocates ≥2mm of keratinised tissue width (KTW) around implants as its presence is associated with a reduction in mucosal inflammation, brushing discomfort, and plaque levels.

Gingival augmentation by means of a free gingival graft (FGG) is the established "gold standard" procedure for increasing the amount of keratinised tissue. Graft shrinkage occurs during the healing phase, but it is unknown whether FGGs behave differently around teeth and implants.

Aims

The aim of the study was to compare dimensional changes in keratinised tissue around teeth and implants, following a FGG procedure with one year of follow-up. Graft shrinkage and the gingival-margin position were also evaluated.

Materials & methods

- This prospective observational study was conducted on patients attending the Department of Periodontology at the Universitat Internacional de Catalunya (UIC), Barcelona, Spain.
- Adult patients with a mucogingival defect at the buccal site of a tooth or implant were identified. Inclusion criteria included <2mm of keratinized tissue width (KTW) present and discomfort while brushing.
- The primary outcome variable was change in KTW around teeth and implants, following an FGG procedure, with one year of follow-up. The secondary variables were changes in keratinised tissue length (KTL), gingival shrinkage (GS) and gingival margin position (GMP).
- Initial therapy involved oral-hygiene instructions (OHI) and scaling and root planing (SRP) to achieve low plaque and bleeding scores. In the implant group, resolution of peri-implant mucositis was required.
- The same surgical technique was used for both the teeth and implant group. A partial-thickness flap was dissected at the recipient site. An FGG of 1.5mm thickness was taken from the anterior palate and sutured over the recipient site. Post-operative care instructions included OHI, pain relief (1g of paracetamol QDS, prednisone 10-40mg/day), and soft-diet advice.
- Recall appointments (including supportive periodontal therapy) occurred initially at one, two, and six weeks, and then at three, six, and 12 months.
- All clinical examinations were performed by the same experienced clinician. A customised acrylic stent was made on study models to standardise the clinical measurements.
- The clinical measurements recorded in both groups were:
  - Keratinised tissue width of the graft – apico-coronal dimension (mm).
  - Keratinised tissue length of the graft – mesial-distal dimension (mm).
  - Graft shrinkage (%).
  - Gingival margin position (mm).

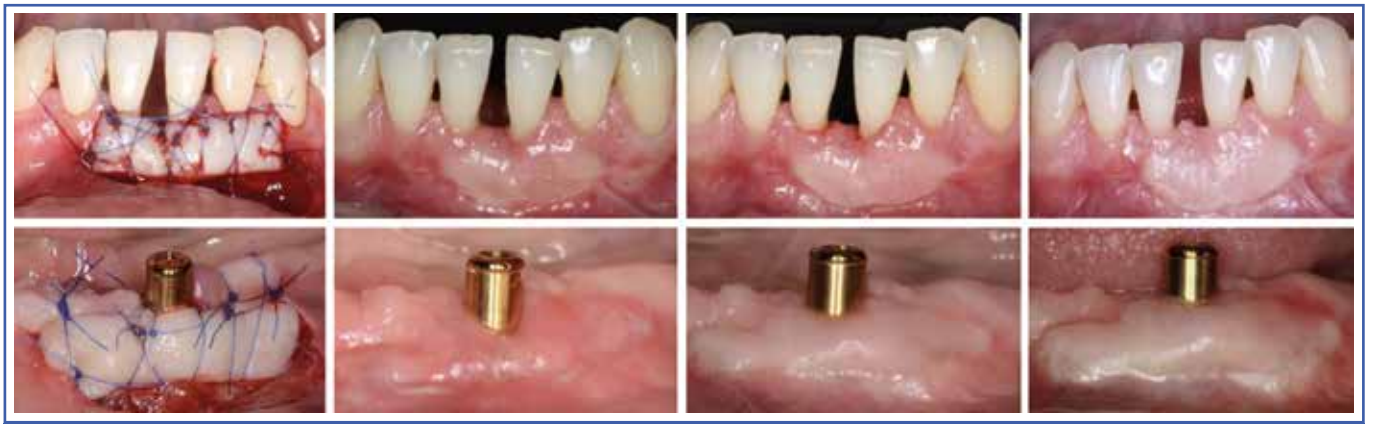


Figure: Images depicting free gingival graft at teeth and implant sites: immediately post-op, and at three, six, and 12 months of follow-up.

Results

- Twenty-nine patients contributed 35 sites. The teeth group had two males and 14 females, two of whom were current smokers and 14 non-smokers/former smokers. The implant group had three males and 10 females, three of whom were current smokers and 10 non-smokers/former smokers. The overall mean age was 56 ± 11.86 years.
- Nineteen FGGs were placed in the teeth group and 16 in the implant group.
- The mean KTW and KTL of grafts at baseline were 6.4 ± 1.4mm and 16.8 ± 6.8mm in the teeth group, while in the implant group they were 5.7 ± 1.4mm and 18.6 ± 4.9mm, respectively (no significant difference in KTW/KTL between groups).
- Mean decrease in KTW of the grafts between baseline and 12-months were:
  - Teeth group: 2.0 ± 2.1mm.
  - Implant group: 2.9 ± 2.0mm.
  - Differences between groups were not statistically significant (p=0.22). However, a multilevel analysis showed a 1.31mm (SE=0.66) higher KTW reduction in the implant group (p=0.02).
- Mean decrease in KTL of the grafts between baseline and 12-months were:
- Teeth group: 3.1 ± 5.5mm.
- Implant group: 6.9 ± 5.4mm.
- Differences between groups were statistically significant (p=0.046).
- Mean graft shrinkage at 12 months was 36.7 ± 38.2% in the teeth group and 61.8 ± 36.3% in the implant group (p=0.056).
- The greatest reduction in KTW and GS was observed following six weeks of healing.

Limitations

- While 94% of the augmentation procedures around teeth were performed in the anterior regions of the mouth, 90% of the augmentation procedures around implants were performed in the posterior region. This discrepancy may have affected the outcome.
- Similarly, anatomic difference between teeth and implant groups relate to the lack of adjacent teeth at implant sites. The lack of adjacent teeth, and thus vascular supply from a periodontal ligament, may have affected the outcome.
- The sample size of the study was determined by a power calculation (80% power with an α = 5%). However, given the marginal p values at 12 months, a larger study might have provided more certainty in findings.
- The method of calculating the graft area is an estimate because of the irregular shape of grafts. Standardised digital scanning might have been helpful.

Conclusions & impact

- Where and when it is indicated, a FGG is a valuable and predictable treatment for increasing KTW around both teeth and implants.
- Within the limitations of this study, there may be more KTW and KTL reduction and GS following FGG augmentation procedures performed around implants than in those around teeth.
- Further research comparing augmentation procedures in teeth and implants is needed with standardised parameters such as recipient anatomic site location.

JCP Digest issue number 86, published in June 2021, is a summary of the article 'Keratinized tissue gain after free gingival graft augmentation procedures around teeth and dental implants: A prospective observational study' *J Clin Periodontol.* 2021; 48: 302–314. DOI: 10.1111/jcpe.13394.

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13394

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 87 (2021:3)

European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology,* Volume 48, issue 3 (March 2021), 464-477

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

Rapporteurs:
Marta Ciccarelli, Federica Romano, Filippo Citterio, Giacomo Baima and Giulia Mariani with Prof Mario Aimetti

Affiliation:
Postgraduate programme in periodontology, C.I.R. Dental School, University of Turin, Italy

study

Healing of compromised alveoli over six months: is ridge preservation worth it?

Authors:
Ben Amara Heithem, Kim Jung-Ju, Kim Hae-Young, Lee Jungwon, Song Hyun-Young, Koo Ki-Tae.

Background

Following tooth extraction, the residual alveolar bone undergoes marked qualitative and quantitative changes: the amount of ridge resorption that occurs during the healing process appears to be inversely proportional to the baseline level of alveolar bone loss. After the extraction of periodontitis-diseased teeth, each phase of wound healing takes longer (Kim et al, 2017), and cortication of the socket entrance and bone deposition are particularly delayed compared to intact sites (Ahn & Shin, 2008).

Ridge preservation is a safe technique indicated to minimise the loss of ridge volume that typically follows tooth extraction. Regarding severely absorbed extraction, the literature remains controversial: some authors reported that the grafting of compromised alveoli reduced ridge resorption compared to spontaneous healing (Aimed, 2018), while others reported that this postoperative resorption reduction was less evident and mainly concerned the cervical width of the ridge (Zhao et al, 2018) or the socket height (Rasperini et al, 2010).

Plausible reasons that may explain the discrepancies in the reports include heterogeneity in the biomaterials and surgical techniques used and the morphology of the sockets at baseline.

Aims

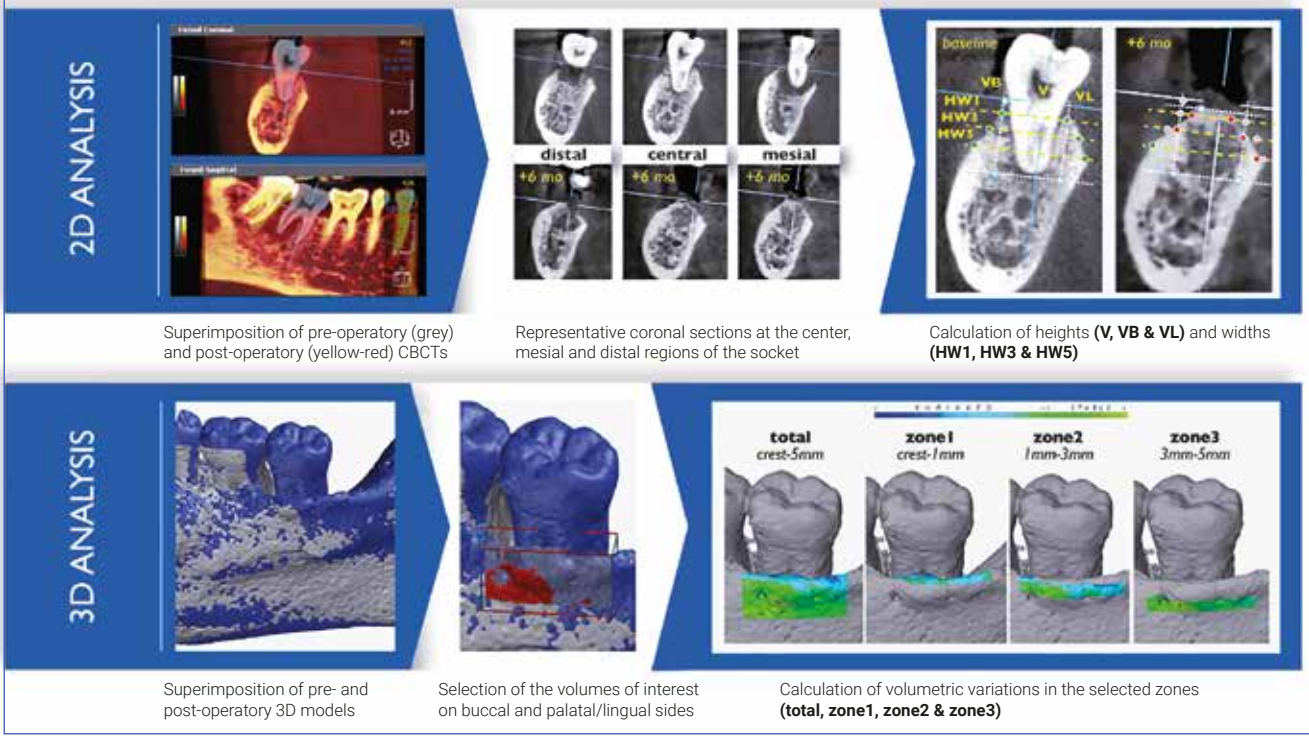
The aim of this randomised controlled trial was to analyse modifications of extraction sockets of periodontally compromised teeth treated with ridge-preservation techniques, compared with spontaneous healing, using volumetric analysis of standardised CBCT images and histomorphometric data.

Materials & methods

This randomised clinical trial enrolled 26 subjects, diagnosed with stage III/IV periodontitis, requiring single or multiple extractions of periodontally compromised teeth with subsequent implant-supported restoration.

- All subjects received a periodontal evaluation, using probing and periapical radiographs complemented by cone-beam computed tomography (CBCT) scans. Included participants underwent supportive periodontal therapy at least one week before treatment (full-mouth plaque and bleeding scores ≤25%).
- The patients were randomly assigned to one of two groups:
  - Test group – ridge preservation (RP): alveoli were filled with deproteinised bovine bone mineral with 10% collagen (DBBM-C; Geistlich Bio-Oss Collagen, Geistlich Pharma AG) and covered with a double layer of a native collagen membrane (NBCM; Geistlich Bio-Gide, Geistlich Pharma AG).
  - Control group – spontaneous healing (SH): no grafts or sutures were placed.
- Week 23: postoperative CBCT was performed.
- Week 24: all sites were re-entered for implant placement. The central portion of the alveolar crest was excised and processed for histomorphometric analysis.
- The efficacy of RP was determined by confronting baseline and postoperative linear and volumetric modifications on CBCT.
- The histomorphometric assessment of the samples was performed using a digital software program (Photoshop, Adobe, USA) that measures the percentage of bone, residual graft, and connective tissue in each specimen.
- The primary outcome measurement of the study was horizontal width. Secondary outcomes were height measurements, volumetric measurements, and histomorphometric outcomes. For statistical analysis, nonparametric tests were used.

Figure: Calculation of socket dimensional alterations



Superimposition of pre-operatory (grey) and post-operatory (yellow-red) CBCTs

Representative coronal sections at the center, mesial and distal regions of the socket

Calculation of heights **(V, VB & VL)** and widths **(HW1, HW3 & HW5)**

Superimposition of pre- and post-operatory 3D models

Selection of the volumes of interest on buccal and palatal/lingual sides

Calculation of volumetric variations in the selected zones **(total, zone1, zone2 & zone3)**

Results

- A total of 26 subjects scheduled for extraction and subsequent implant-supported restoration in the maxilla or mandible were included in this study: 13 individuals (18 sockets) in the RP group and 13 individuals (16 sockets) in the SH group. There were three smokers per group.
- Preoperative socket width was not significantly different between groups.
- Width changes: at week 23, both treatments resulted in a significant reduction in socket width: RP resulted in a reduced bone attenuation compared with SH and the resorption was mainly at cervical level.
- Height changes: buccal and lingual bone walls presented a significant resorption from baseline to week 23, which was more severe in SH compared with RP. In both groups, the reduction in buccal bone height was more severe compared to the palatal/lingual aspect of the socket; at the palatal/lingual bone plates, socket grafting significantly preserved bone.
- Volume changes: the mean volume difference from baseline to week 23 was −26.88% in RP pockets and −50.34% in SH sites, and it was most pronounced in the coronal zones.
- In SH sockets, baseline bone damage was associated with greater subsequent ridge resorption.
- Histological data: reduced bone quantities were found in biopsies: 30.1% in RP, 53.9% in SH. In RP specimens, newly formed bone surrounding the residual bone-substitute particles, free of inflammation was found. In SH specimens, living bone was found, consisting mainly of woven bone organised in trabeculae.

Limitations

- The timing of the baseline CBCT: the first CBCT scan was made before extraction, even though the surgical procedure itself alters the immediate postoperative ridge dimensions.
- No reference was made to the need for additional augmentation techniques for subsequent implant placement.
- There is no reference to the image-acquisition protocol, whose setting may have had an impact on the quality of the images and subsequently on the superimposition of the CBCT images.

Conclusions & impact

- The placement of Bio-Oss collagen secured with a collagen membrane in fresh extraction sockets seemed to minimise the bone-remodelling process, resulting in a less pronounced change in the buccal profile of the alveolar crest and a better maintenance of the volume when compared to unassisted socket control.
- Baseline bone resorption seemed to influence the dimensional shrinkage of the ridge.
- Volumetric dimensional alterations of the hard tissues in severely resorbed alveolar sockets can be quite extensive. The application of a slow-resorbing xenograft with a secured covering collagen membrane may limit post-extraction bone loss and plausibly simplify later implant insertion.

JCP Digest issue number 87, published in June 2021, is a summary of the article 'Is ridge preservation effective in the extraction sockets of periodontally compromised teeth? A randomized controlled trial.' *J Clin Periodontol.* 2021; 48 (3): 464–477. DOI: 10.1111/jcpe.13412.

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13412

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 88 (2021:4)

European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 4 (April 2021), 581-589

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

Rapporteurs:
Eirini Chatzopoulou and Alexandre Courtet with Philippe Bouchard, Francis Mora, Hélène Rangé, and Maria Clotilde Carra

Affiliation:
Postgraduate programme in periodontology and implant dentistry, Periodontology Department, Rothschild Hospital, Paris University, Paris, France.

study

Probing dental implants: with or without prostheses?

Authors:
Marta García-García, Javier Mir-Mari, Rui Figueiredo, Eduard Valmaseda-Castellón

Background

The probing of dental implants is considered an essential clinical examination tool for monitoring peri-implant tissue health and diagnosing peri-implant diseases (Berglundh et al., 2018).

Nevertheless, numerous factors such as peri-implant probing force, probe thickness and angulation, and the apical-coronal position of the implant may interfere with the measurement of periodontal probing depth (PPD). Consequently, it is still difficult to establish a consensus regarding the threshold for "healthy" and "pathological" PPD around implants. Some authors have considered bleeding on probing (BOP) as a more reliable parameter than PPD to evaluate peri-implant inflammation (Renvert et al., 2018).

Prosthesis design can also lead to an incorrect PPD measurement. Over-contoured crowns or crowns wider than the implant may limit accessibility for probing. Removing the prosthesis has therefore been proposed to improve the reliability of probing (Serino et al., 2013).

No studies have evaluated the impact of not removing the prosthesis before PPD measurement in single-tooth implant restorations without interproximal bone loss.

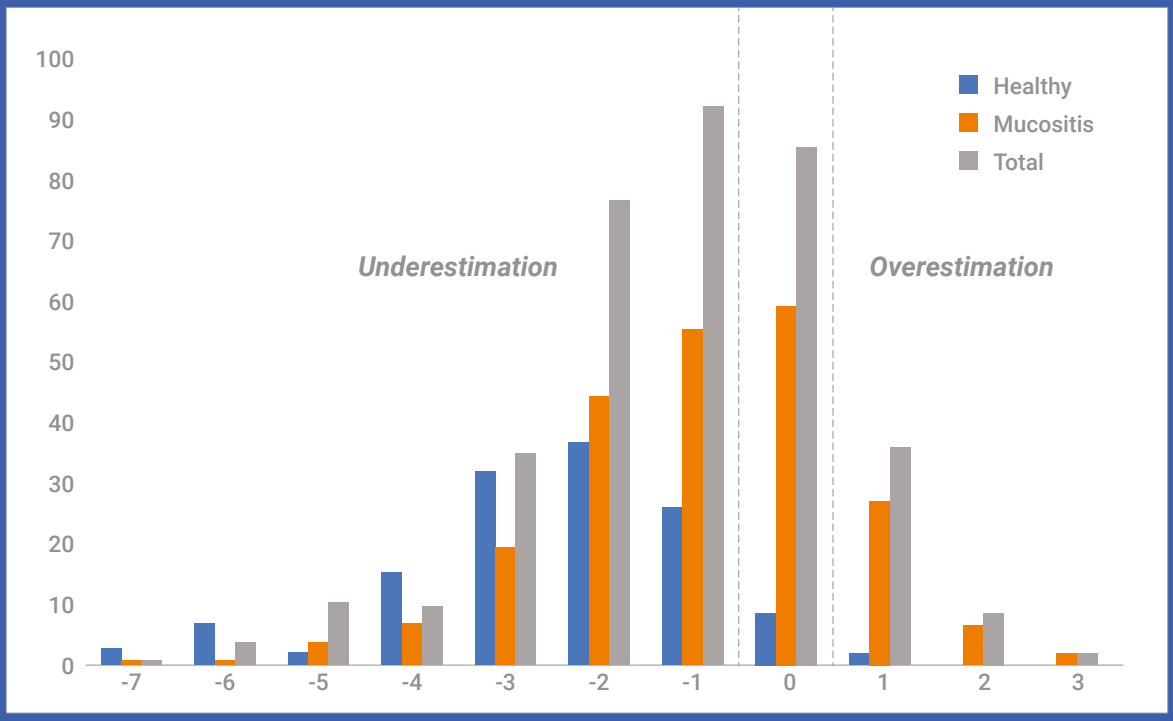
Aims

The primary aim of this study was to evaluate PPD differences with and without prosthesis in single posterior implants without interproximal bone loss (IBL). A secondary aim was to evaluate the effect of diagnosis (healthy vs. mucositis) and implant location (premolar vs. molar) on differences in PPD.

Materials & methods

- This cross-sectional study recruited 62 patients attending the Implant Maintenance Unit at the University of Barcelona, Spain.
- Patients with a posterior single-tooth implant placed at bone level, without radiographically detected IBL or a polished collar, were included. The prosthesis should be screw-retained without an intermediate abutment. Clinical follow-up of at least one year from prosthetic loading was required.
- Only implants in a healthy condition or with mucositis were included (Berglundh et al., 2018).
- A single examiner evaluated the following variables from six sites per implant:
  Before removal of the prosthesis:
  Periodontal probing depth (PPD1), bleeding on probing (BOP), Mombelli modified plaque index (mPI), and keratinised mucosa width (KM).
  After removal of the prosthesis:
  Periodontal probing depth (PPD2) and the distance between implant shoulder and the mucosal margin (DIM), which was further defined as recession or transmucosal height and attachment level (AL). The difference PPD1-PPD2 was calculated for each site and the mean for each implant.
- Plastic curettes and irrigation with chlorhexidine gluconate / Cetylpyridinium chloride were used to clean the implants. Protheses were recontoured in areas that interfered with oral hygiene. Patients received oral-hygiene instructions and were included in a maintenance programme.
- The primary outcome was PPD1-PPD2 difference with and without prosthesis. Secondary outcomes were PPD1-PPD2 difference according to implant location (premolar vs. molar) and diagnosis (healthy vs. mucositis).

Figure: Differences in mm between PPD1 and PPD2 in healthy group, mucositis group, and total sample



Results

- Sixty-two patients contributed 372 sites with and without prosthesis. The mean age was 54 years, and the mean follow-up was 71 months. Ten patients were smokers. Twenty implants were placed in the premolar area and 42 in the molar region. The mean mPI was 0.3 (±0.9), the mean KM was 2.2mm (±1.0mm), the mean DIM was 2.80mm (±1.43mm), and the mean AL was 1.59mm (±0.51mm).
- PPD2 was significantly higher than PPD1 for all six implant sites, with a mean difference of 1.15mm (±1.24mm) ($p<0.001$).
- Values of PPD1 and PPD2 were identical in 23.6% of sites. Overestimation was up to 1mm in 12.9% of sites. Underestimation was observed in 63.5% of sites and exceeded 2mm in 38% of the sites.
- Subgroup analysis of both healthy and mucositis implants showed higher PPD2 than PPD1 values ($p<0.001$). The mean PPD difference was more pronounced in healthy (1.48mm) than in mucositis implants (0.95mm), without reaching statistical significance ($p=0.115$).
- The DIM did not differ between healthy and mucositis implants.
- The difference between PPD1 and PPD2 was similar for premolars and molars except at the buccal sites, the difference was significantly greater in premolars (1.5mm) compared to molars (0.7mm) ($p = .048$).

Limitations

- It was not possible to use a standardised reference point for reproducible probing depth measurements because of the different implant systems and prosthetic designs.
- A single examiner performed all clinical measurements.
- Implants and prostheses were placed by several dentists in different settings and no further information related to treatment could be obtained.
- Only single posterior implant restorations were included and the results cannot be extrapolated for anterior implants or implant-supported dentures.
- The effect of smoking or plaque control on PPD was not assessed.

Conclusions & impact

- Within the limitations of this study, the presence of prosthesis may alter the PPD recording leading to a mean underestimation of -1.15mm (±1.24mm).
- PPD underestimation may be more pronounced in healthy implants compared to implants with mucositis.
- Implant location (molar/premolar) does not affect PPD measurements whether with or without prosthesis.
- Future studies are warranted to evaluate the possible impact of the prosthesis on PPD measurements over time as well as on implants where bone loss is already present.

JCP Digest issue number 88, published in August 2021, is a summary of the article 'Probing single-tooth dental implants with and without prostheses: a cross-sectional study comparing healthy and peri-implant mucositis sites' *J Clin Periodontol.* 2021; 48 (4): 581-589. DOI: 10.1111/jcpe.13436.

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13436

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 89 (2021:5)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 5 (May 2021), 695-704

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

Rapporteurs:
Elisabeth Åhrén and Abdulrahman Alotaibi
with Ingemar Abrahamsson

Affiliation:
Postgraduate programme in periodontology, Sahlgrenska Academy at the University of Gothenburg, Sweden

study

Short vs long implants combined with osteotome sinus-floor elevation: three-year results

Authors:
Jun-Yu Shi, Yi-Rao Lai, Shu-Jiao Qian, Shi-Chong Qiao, Maurizio S. Tonetti, Hong-Chang Lai

Background

Short implants can be an alternative to vertical bone-augmentation procedures when the vertical dimension in the maxilla is reduced. Today, a 6mm implant is commonly considered a short implant. It has been suggested that short implants are associated with less treatment time and lower initial costs.

Previous studies have shown comparable clinical and radiological results between short implants and longer implants in combination with OSFE (osteotome sinus-floor elevation). No significant difference has been found in terms of survival rate, marginal bone loss, and post-surgical complications.

Treatment and post-treatment costs are important factors for both patients and clinicians and could influence treatment decisions. It is therefore of interest to assess clinical efficacy and cost-effectiveness.

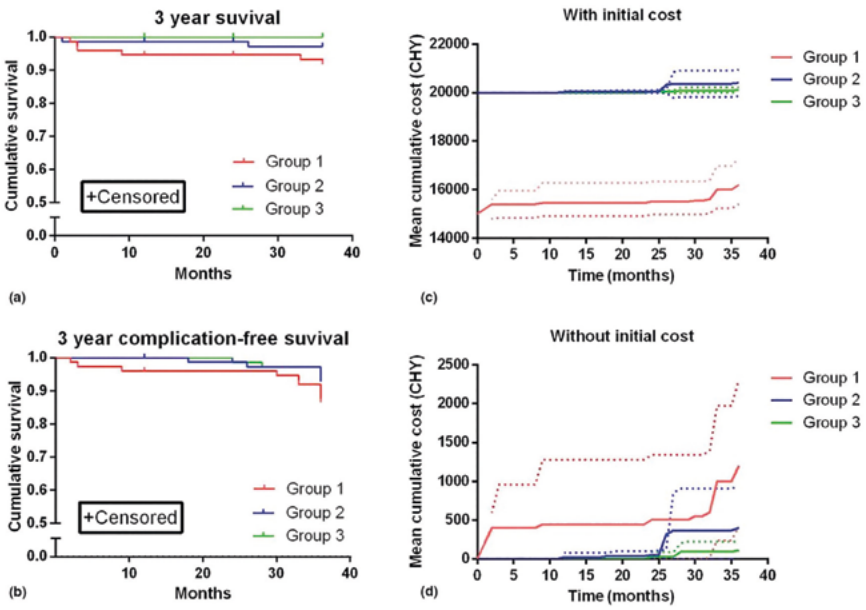
Aims

To compare the three-year clinical, radiographic, and economic outcomes of short and longer implants combined with OSFE in the moderately atrophic posterior maxilla.

Materials & methods

- A study reporting a three-year follow-up of a previously published randomised controlled trial (Shi et al, 2015).
- A total of 225 patients with 225 implants, placed in posterior maxillary areas with a residual bone height (RBH) of 6-8mm and a ridge width of ≥6mm.
- Periodontal treatment was performed before the start of the trial and inclusion criteria were bleeding on probing (BOP) <10% and periodontal probing depth (PPD) ≤4mm.
- Medically compromised patients, heavy smoking, uncontrolled diabetes. and complete edentulism were reasons for exclusion.
- The patients were randomly assigned into three groups: (1) 6mm implants with standard surgical procedure; (2) 8mm implants combined with OSFE; (3) 10mm implants combined with OSFE.
- The baseline assessment was performed at crown delivery. Patients were then recalled at least once a year.
- Implant system: Straumann Standard Plus.
- Implant survival rate was the primary outcome and peri-implant condition, radiographic assessment, complications, and treatment costs were secondary outcomes.
- PPD, BOP, and modified plaque index (mPI) were measured at follow-up visits using a Williams PQW probe and the marginal bone-level change between baseline and recall visits at one and three years was measured on periapical radiographs using the parallel technique.
- Complications such as peri-implant mucositis, peri-implantitis, and technical complications – e.g., abutment/screw loosening, fractures, ceramic veneer chipping – were recorded.
- The included costs were initial treatment and additional treatment resulting from complications.

Figure: Implant survival and cost



Kaplan–Meier survival (a) and complication free-analysis (b) in group 1 (6mm implant), group 2 (8mm implant with OSFE), and group 3 (10mm implant with OSFE). The mean cumulative cost (CNY) of treatment cost (c, with initial cost; d, without initial cost) during the three-year observation period. Dashed lines represent the 95% confidence intervals. Amounts do not include the regular maintenance cost.

Results

- The drop-out rate was 11.6%. The main reasons were the pandemic situation, or that the patient could not be contacted or had moved from the area.
- In terms of marginal bone loss, no significant difference was found between the three groups.
- The implant-survival rate was: group 1; 91.8%, group 2; 97.08%, and group 3; 100%.
- Short implants had a significantly lower survival rate compared to longer implants in combination with OSFE.
- Short implants with a larger diameter (4.8mm) had a better survival rate compared to implants with a diameter of 4.1mm.
- No difference was detected between the three groups in terms of clinical outcomes and complication-free survival.
- Complication-free survival was respectively 83.3%, 86.9%, and 90,2% in groups 1, 2, and 3.
- The total costs for the shorter implants were significantly lower.
- Retreatment costs were higher in the shorter-implants group.

Limitations

- The short follow-up time of three years is a limitation and long-term studies are needed to confirm the results.
- The study was performed by a single surgeon in a well-controlled specialist university clinic, using a single brand of implants. Multicenter studies and studies of other implant systems are needed to confirm the results and to evaluate the long-term costs for the different treatment alternatives.
- For 8mm and 10mm implants, the available bone height was between 6-8mm, while the 6mm implants could benefit from a maximum 6mm of bone height.

Conclusions & impact

- Longer implants in combination with OSFE are more predictable in terms of three-year survival rates.
- The total cost after three years for short implants was lower than for longer implants.
- No differences in complication rates were found between the three groups.

JCP Digest issue number 89, published in September 2021, is a summary of the article 'Clinical, radiographic and economic evaluation of short 6mm implants and longer implants combined with osteotome sinus floor elevation in moderately atrophic maxillae: A 3-year randomized clinical trial' *J Clin Periodontol.* 2021; 48 (5): 695-704. DOI: 10.1111/jcpe13444

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13444

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 90 (2021:6)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 6 (June 2021), 834-842

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

Rapporteurs:
Moaad Alami, Pieter-Jan Germonpré, Nikolaos Ntovas, Jits Robben, Fabio Rodríguez Sánchez, Sayed Ahmad Manoetjer Siawasch, and Nina Sidiropoulou, with Wim Teughels and Ana Castro

Affiliation:
Postgraduate programme in periodontology, KU Leuven, Belgium

study

Correlation between dental-plaque accumulation and gingival health in periodontal-maintenance patients

Authors:
Anna P.P. Reiniger, Juliana Maier, Ulf M.E. Wikesjö, Carlos H.C. Moreira, Karla Z. Kantorski

Background

The relationship between dental plaque and periodontal diseases was demonstrated more than half a century ago. Subsequent research proved that the development and progression of periodontitis could be prevented by treating gingivitis. Effective personal oral-hygiene (pOH) measures play a fundamental role in achieving and maintaining periodontal health, so it is essential to establish these measures as a lifelong daily activity.

Despite the recommendation of the American Dental Association to perform pOH twice daily, data have suggested that pOH once per day could be sufficient to maintain gingival health in patients, whether or not they have a history of periodontitis.

While effective daily pOH showed a decrease in the correlation between the accumulation of dental plaque and gingival inflammation, prolonged intervals of pOH may promote changes in dental-plaque composition that favour bacterial pathogenicity. In non-periodontitis patients, the correlation between dental-plaque accumulation and gingival inflammation was shown to be weak for short pOH intervals compared to long ones. Therefore, it could be hypothesised that comparable correlations between dental plaque and gingival inflammation relative to pOH are present in patients with a history of periodontitis.

Aims

The aim of this study was to assess the correlation between dental-plaque accumulation and gingival health in patients under periodontal maintenance who perform pOH at short and extended intervals.

Materials & methods

- This randomised clinical trial enrolled 42 periodontally treated patients presenting proximal attachment loss of ≥3mm at ≥2 non-adjacent teeth, attending a maintenance programme (recalls at 4-6 months).
- All subjects were randomly assigned to one of the three groups based on the pOH interval, performed at intervals of 12, 24, or 48 hours.
- At baseline, 30 days, and 90 days, the following parameters were recorded: Plaque index (PI), gingival index (GI), probing depth (PD), clinical attachment level (CAL), and bleeding on probing (BoP) at six sites per tooth, excluding third molars.
- All patients received a soft multi-bristle toothbrush, dental floss and/or interdental brushes, fluoride dentifrice, and a fluoride mouthwash to perform oral hygiene.
- Clinical examinations were performed immediately prior to scheduled pOH events. Examinations were performed by two blinded and calibrated examiners.
- Subjects showing 30% or more sites with gingival bleeding during the study were excluded.
- Subjects performing their oral hygiene at 12- or 24-hour intervals (G12/G24) were allocated to the same group and compared to the patients performing pOH every 48 hours (G48).
- The primary outcome of this study was to evaluate the correlation between dental-plaque accumulation (mean PI) and gingival health (mean GI and BoP).
- The secondary outcome of this study was to investigate the correlation between gingival bleeding (GI score 2) and BoP.
- For statistical analysis, both descriptive and analytic tests were performed.

Table 1: Mean (SD) of Plaque Index (PI) and Gingival Index (GI) according to experimental groups at baseline, 30 and 90 days

	PI			GI		
	Baseline	30 days	90 days	Baseline	30 days	90 days
G12/24	0.22 (0.14)$^{A.a}$	0.42 (0.24)$^{A.b}$	0.49 (0.30)$^{A.b}$	0.64 (0.26)$^{A.a}$	0.76 (0.22)$^{A.b}$	0.81 (0.25)$^{A.b}$
G48	0.28 (0.23)$^{A.a}$	0.70 (0.42)$^{B.b}$	1.10 (0.46)$^{B.c}$	0.60 (0.21)$^{A.a}$	0.99 (0.18)$^{B.b}$	1.12 (0.13)$^{B.c}$

Note: Linear Mixed Models. Different uppercase letters demonstrate intergroup differences (p<0.05). Different lowercase letters show intra-group differences ($p < 0.05$). G12/24: $n = 28$ at baseline and 30 days, $n = 26$ at 90 days. G48: $n = 14$ at baseline and 30 days, $n = 12$ at 90 days.

Table 2: Correlation between Gingival Index (GI) score of 2 and bleeding on probing (BoP) according to individual group at baseline, 30 and 90 days

	All sites			PD≤ 3mm			PO> 3 mm		
	Baseline	30 days	90 days	Baseline	30 days	90 days	Baseline	30 days	90 days
G12/24	0.17[a]	0.23[a]	0.28[a]	0.17[a]	0.25[a]	0.28[a]	0.13[a]	0.16[a]	0.27[a]
G48	0.19[a]	0.30[a]	0.35[a]	0.17"	0.32[a]	0.35[a]	0.28[a]	0.17[a]	0.33[a]

Note: All sites: G12/24 $n = 3,642$ at baseline, 30 and 90 days $n = 3,390$; G48 $n = 1,638$ at baseline, 30 and 90 days $n = 1,380$. PD≤3 mm: G12/24 $n = 3,313$ at baseline, 30 and 90 days $n = 3,066$; G48 $n = 1,480$ at baseline, 30 and 90 days $n = 1,228$. PD>3 mm: G12/24 $n = 329$ at baseline, 30 and 90 days $n = 324$; G48 $n = 158$ at baseline, 30 and 90 days $n = 152$.
[a]Spearman correlation coefficient ($p < 0.001$).

Results

- No statistically significant differences (p>0.05) could be observed between the two study groups regarding the baseline subjects' demographics and clinical characteristics.
- In the G12/24 group, there was a significant increase (p<0.05) for both GI and PI from baseline to 30 days, but with no further significant change up to 90 days.
- In the G48 group, there was a significant increase (p<0.05) for both GI and PI from baseline to 30 days, with a further significant increase up to 90 days.
- For both study groups, a reduction in healthy sites was reported. In the G12/24 group, there was a reduction of approximately 20% of plaque-free sites over 90 days, while in the G48 group the reduction was 50% compared to baseline.
- G12/24 presented fewer than 10% sites with gingival bleeding after 90 days while G48 presented 19%. This difference was statistically significant (p<0.05).
- BoP increased from 13% to 22% over 30 days and to 25% over 90 days in the G48 group. For the G12/24 group, this increase was from 13% to 16% over 30 days and to 19% over 90 days. This difference was statistically significant (p<0.05).
- There were statistically significant correlations between PI and GI and between PI and BoP for both groups. The correlation coefficient between PI and BoP remained unchanged for G12/24 but increased for G48. The correlation between PI and GI increased for both groups until day 30 and remained unchanged from day 30 to day 90.

Limitations

- Selection bias may have occurred as subjects showing 30% or more sites with gingival bleeding during the experimental period were excluded from the study.
- Included subjects presented an adequate pOH (FMBS ≤7.5%) and an absence of risk factors, which may decrease the external validity of the results and overestimate the correlations between dental-plaque accumulation and gingival inflammation.
- A subjectively scored index (GI) was used to assess periodontal health, which may introduce variability in the results.
- The correlation-coefficient values were weak.

Conclusions & impact

- The frequency of pOH measures has an influence on the correlation between dental-plaque accumulation and gingival inflammation in patients in periodontal maintenance programmes.
- Extended pOH intervals compromise gingival health when compared to short pOH intervals.
- There is a positive correlation between dental-plaque accumulation with GI and BoP and this correlation was reinforced in the G48 group throughout the study.
- The pOH interval should be considered because it influences the correlation between dental-plaque accumulation and gingival inflammation – especially when assessed with BoP – in subjects with a history of periodontitis attending a maintenance programme.
- Extended pOH intervals were not sufficient to maintain plaque levels and gingival status compatible with gingival health.

JCP Digest issue number 90, published in September 2021, is a summary of the article 'Correlation between dental plaque accumulation and gingival health in periodontal maintenance patients using short or extended personal oral hygiene intervals.' *J Clin Periodontol.* 2021; 48 (6): 834-842. DOI: 10.1111/jcpe13448

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13448

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 91 (2021:7)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 7 (July 2021), 996-1006

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

Rapporteurs:
Lory Abrahamian, María Bonnín Liñares, Camilo Torres, Amr Khorshed, Ada Lapedra Bosch, Cristina Vallés and Andrés Pascual, with José Nart

Affiliation:
Postgraduate programme in periodontology, International University of Catalonia (UIC), Barcelona, Spain

study

How does systemic antibiotic therapy affect the outcome of non-surgical peri-implantitis treatment?

Authors:
Yvonne C. M. De Waal, Tine E. Vangsted, Arie Jan Van Winkelhoff

Background

Peri-implantitis is an inflammatory condition affecting the peri-implant tissues, which is caused mainly by bacteria. While different treatment approaches (non-surgical and surgical) have been proposed, the success of the final treatment remains an issue.

As a general treatment guide, non-surgical therapy should always precede surgery. Several authors suggest that the use of adjunctive systemic antimicrobials provides an additional benefit, even though he evidence in support of this treatment strategy remains unclear.

Aims

To evaluate the effect of adjunctive systemic amoxicillin (AMX) plus metronidazole (MTZ) on full-mouth non-surgical peri-implantitis treatment.

Materials & methods

This randomised clinical trial enrolled 62 subjects, diagnosed with peri-implantitis and assigned to be treated with non-surgical therapy.

- All patients received full-mouth mechanical cleansing of implants and teeth by experienced dental hygienists in one to five sessions. Implants were supra- and submucosally cleaned using an air polisher with a subgingival tip and ultrasonic instruments. Teeth were supra- and subgingivally cleaned using ultrasonic instruments and hand instruments. Individualised oral-hygiene instructions were provided.
- The patients were randomly assigned to one of two groups:
  - Test group – peri-implant non-surgical therapy with 0.12% chlorhexidine (CHX) + 0.05% cetylpyridinium chloride (CPC) mouth rinse, twice daily during 30 seconds for two weeks + use of systemic AMX and MTZ (both in doses of 500 mg, three times daily for seven days).
  - Control group – peri-implant non-surgical therapy with 0.12% CHX + 0.05% CPC mouth rinse, twice daily during 30 seconds for two weeks.
- The primary outcome measurement of the study was change in peri-implant full-mouth bleeding score.
- Secondary outcomes were changes in peri-implant and periodontal full-mouth plaque scores, suppuration scores, mean probing pocket depths, mean (relative) clinical attachment levels, and mean peri-implant bone levels.
- Follow-up was at three months, assessing changes in primary and secondary outcomes from baseline.

Table: Mean change in probing pocket depth between baseline and three-month follow-up for initially shallow, moderate, and deep peri-implant and periodontal pockets.

		MEAN POCKET DEPTH REDUCTION		
N = 57	Basetine pocket depth	Control group (*n* = 29)	Test group (*n* = 28)	*p* = value
Peri-implant pockets	≤3mm	-0.10 (0.86)	0.37 (0.80)	.099
		[3 (2)]; *n* = 17	[4 (3)]: *n* = 19	
	4-6mm	1.07 (1.00)	1.29 (0.86)	.407
		[7 (4)]; *n* = 26	[8 (8)]; *n* = 26	
	≥7mm	2.42 (1.23)	3.19 (1.53)	.054
		[5 (4)]; *n* = 25	[4 (3)]: *n* = 26	
Periodontal pockets	≤3mm	0.36 (0.32)	0.47 (0.23)	.135
		[94 (32)]; *n* = 29	[92 (30)]: *n* = 28	
	4-6mm	1.24 (0.52)	1.33 (0.45)	.513
		[40 (20)]; *n* = 29	[37 (15)]; *n* = 28	
	≥7mm	2.78 (1.37)	3.75 (1.23)	.025[a]
		[6 (8)]; *n* = 19	[5 (7)]; *n* = 20	

[a]Significant difference between test and control groups (Independent-Samples *T* test); [..] = mean number of pockets (SD); *n* = number of patients.

Results

- A total of 62 patients with 143 implants with peri-implantitis were allocated in this study: 32 patients in the control group (68 implants) and 30 patients in the test group (75 implants). A total of 57 patients with 122 implants completed the three-month follow-up.
- For clinical peri-implant and periodontal parameters at the baseline examination, no differences were observed between the two groups.
- At the three-month follow-up, no significant differences between the groups were found regarding the clinical data. Nevertheless, a tendency for some benefit from systemic antimicrobials could be seen when deep peri-implant pockets had been initially present.
- Regarding the microbiological analysis, even though a reduction of the mean counts of bacteria was observed from baseline to three-month follow-up, no significant differences were found, either for implants or teeth.
- No differences were found between the groups in terms of patient-related outcomes/adverse effects.
- Related to the need for peri-implant surgery after the last examination, 20 patients (11 in the control group and nine in the test group) were scheduled for surgical intervention, including the explantation of an implant in the cases of two patients. Eight patients were scheduled for retreatment using the non-surgical approach to improve oral hygiene and compliance.

Limitations

- The short follow-up period – a longer follow-up period might give different results between the groups.
- No other limitations affecting the validity of the conclusions could be identified.

Conclusions & impact

- The adjunctive use of systemic antibiotics does not present an additional effect to non-surgical peri-implantitis treatment at three months of follow-up in terms of clinical and microbiological parameters.
- The routine prescription of antibiotic therapy for the treatment of peri-implantitis is not recommended.
- A meticulous non-surgical therapy with patient motivation should always precede any surgical intervention to treat peri-implantitis.

JCP Digest issue number 91, published in September 2021, is a summary of the article 'Systemic antibiotic therapy as an adjunct to non-surgical peri-implantitis treatment: A single-blind RCT.' *J Clin Periodontol.* 2021; 48 (7): 996-1006. DOI: 10.1111/jcpe13464

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13464

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 92 (2021:8)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology,* Volume 48, issue 8 (August 2021), 1111-1125

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

Rapporteurs:
María Vilar Doceda, Pierre-Yves Gegout, Marianna Gavriiloglou, Elizabeth Ibrahim, and Alexia Larderet with Dr Catherine Petit and Prof Olivier Huck

Affiliation:
Postgraduate programme in Periodontology and Implant Dentistry, Dental Faculty, University of Strasbourg, France

study

Using a tissue-engineered biocomplex for periodontal reconstruction

Authors:
Danae A. Apatzidou, Athina A. Bakopoulou, Kokkona Kouzi-Koliakou, Vassilis Karagiannis, Antonis Konstantinidis

Background

Various innovative biomaterials, bioactive agents, and flap designs have been proposed to enhance periodontal healing. However, their clinical outcomes remain unclear. To obtain convincing results, established protocols for their application, appropriate dosage, and therapeutic indications are required.

At present, therapies based on mesenchymal stem cells (MSCs) therapies are being developed as a safe and predictable way to reconstruct intrabony defects. MSCs can be increased *ex vivo* from a small tissue biopsy or they can be minimally manipulated in the form of micrografts. In addition, autologous alveolar bone-marrow MSCs (a-BMMSCs) have been commonly used and have proved to be the most suitable cell source for the intended clinical application.

To guide tissue regeneration, collagen scaffolds play a central role allowing the adhesion, proliferation, and differentiation of stem cells. In addition, platelet concentrates provide a source of growth factors that can boost tissue regeneration.

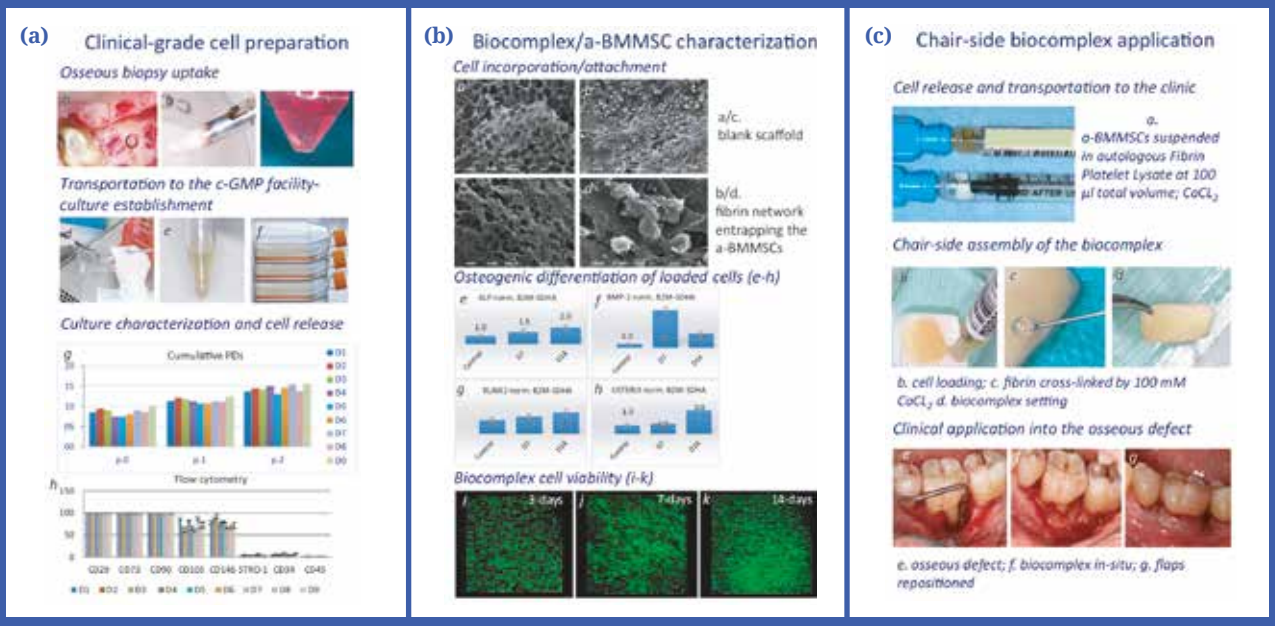
Aim

This study proposed an alternative therapeutic strategy for the regeneration of intrabony defects, using autologous bone marrow mesenchymatous stem cells (a-BMMSC) and autologous fibrin/platelet lysate (aFPL), incorporated in a collagen fleece/scaffold. The aim of this study was to evaluate the clinical efficacy and potential side effects of this therapeutic strategy.

Materials & methods

- This prospective, controlled clinical trial enrolled 27 patients diagnosed with advanced periodontitis, having at least one intrabony defect with probing pocket depth (PPD) and clinical attachment level (CAL) ≥6mm and an intrabony component ≥3mm with no radiographic evidence of endodontic/furcation involvement that required surgical intervention.
- Patients with concurrent illness or treatment compromising wound healing, alcohol intake, pregnancy/lactation, poor compliance, and full-mouth plaque index (PI) >30% were excluded from this study.
- Patients were randomly assigned to one of three groups:
  - Group A: minimal access flap with a-BMMSC (collected from the patient in an osseus biopsy and grown in culture) and an aFLP transplantation incorporated into a collagen scaffold.
  - Group B: minimal access flap with a collagen fleece enriched with aFPL but without a-BMMSC.
  - Group C: minimal access flap only.
- All subjects received oral-hygiene instructions and non-surgical periodontal treatment.
- Periodontal recordings were assessed after the non-surgical periodontal therapy and before the surgical approach (baseline), and at six, nine, and 12 months. Radiographic outcomes were evaluated at six weeks and at three, six, nine, and 12 months.
- Strict post-operative plaque control and oral-hygiene instructions were performed from one week to 12 months.
- The primary outcome of this study was the CAL gain, with recession measurements as the secondary outcome. Univariate analysis of variance with a split-plot design technique was used for clinical and radiographic variables. Pair-wise comparisons with Bonferroni adjustment compared the mean differences across groups. Subgroup analysis for smoking was conducted by two-way ANOVA before/after treatment.

Figure: Step-by-step process of the pre-clinical study methodology of the tissue-engineered biocomplex



(a) Clinical-grade cell preparation. (b) Biocomplex preparation and further ex vivo characterisation. (c) Chair-side assembly and application of the biocomplex into the osseous defect.

Results

- A total of 9/10 biopsies in group A passed the quality controls assessing possible culture infection and immunophenotypic analysis for specific surface antigen expression, as well as the growth rate and viability of the seeded a-BMMSCs.
- No adverse healing events were reported during the 12-month study period and during the three additional years following study completion.
- Clinical outcomes:
  - A significant amelioration was measured from baseline to 12 months. For all groups, the estimated marginal mean for CAL gain was 3.0mm (95% CI: 1.9-4.1mm); PPD reduction was 3.7mm (2.7-4.8mm), and the recession increment was 0.7mm (0.2-1.3mm).
  - There were no significant differences between the groups. Throughout the study, clinical parameters were continuously improved. No significant interaction effect was found between groups and time.
  - PPD closure (≤4mm) and CAL gain (≥3mm) were obtained in 55.6% of defects in group A and 50% of defects in groups B and C. During the study period, PI was maintained at a low level and bleeding on probing (BOP) was reduced.
- Radiographic outcomes: at 12 months, group B showed less reduction of the distance between the cementoenamel junction and the bottom of the defect (CEJ-BD) than groups A and C. The estimated marginal mean (95% CI) reduction was 1.8mm (95% CI: 1.4-2.2mm), 0.3mm (0-0.7mm), and 1.4mm (1.0-1.8mm) for groups A, B, and C respectively.
- Smokers were 66.6% (6/9), 50.0% (5/10), and 62.5% (5/8) in groups A, B, and C, respectively. There were no significant differences between smokers and non-smokers in either clinical or radiographic outcomes for all the treatments.

Limitations

- The sample size was small (27 sites). The sample-size calculation was estimated at 22 in each group to detect a true difference in CAL of at least 1mm.
- The inclusion of smoker patients and the wide range of tobacco consumption (4-30 packs/year) between the groups may lead to arbitrary results.
- The heterogeneity of the distribution of the intrabony defects among the groups could influence the bone-fill outcomes.
- The bone-fill calculation using 2D measurements may produce inaccurate results because of the overlapping of bone walls.
- There are no data regarding the position of the intrabony defects (molar/incisor).

Conclusions & impact

- This tissue-engineered biocomplex required three weeks of laboratory preparation after 20 minutes of surgery to obtain the biopsy from the patient. It was well-tolerated and had the advantage of fitting into any type of bone defect.
- This promising new bioengineered tool may be able to promote healing, probably because of the modulation of local inflammation and the stimulation of the local-host cells. Other therapies, based on the use of isolated cellular components (growth factors, proteins, exosomes, extra-cellular vesicles…) are expected to be an alternative to stem cells.
- Nevertheless, this study presents some disadvantages directly linked to the technique, such as cost, logistics, and preparation time.
- Future studies should consider an increase of the sample size and study period, as well as the use of more complex anatomical bone defects (two-wall intrabony defects) to obtain more accurate results.

JCP Digest issue 92, published in September 2021, is a summary of 'A tissue-engineered biocomplex for periodontal reconstruction. A proof-of-principle randomized clinical study.' *J Clin Periodontol.* 2021; 48 (8): 1111-1125. DOI: 10.1111/jcpe13464

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13474

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 93 (2021:9)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 9 (September 2021), 1216-1227

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

Rapporteurs:
Chin Hoi Man Bonnie, Kwok Chee Yin, Lam Pok Man, and Tsang Nichol Chun Wai, with George Pelekos

Affiliation:
Postgraduate programme in periodontology, University of Hong Kong

study

Are periodontal pathogens no longer susceptible to antibiotic therapy?

Authors:
Karin Jepsen, Wolfgang Falk, Friederike Brune, Rolf Fimmers, Søren Jepsen, Isabelle Bekeredjian-Ding

Background

There is an increased worldwide concern about the use of antibiotics.

Dentistry accounts for 13.2% of all medical prescriptions of antibiotics in the USA and for 8.8% in Germany.

The adjunctive use of systemically administered antibiotics alongside non-surgical periodontal therapy has been shown to improve clinical outcomes, although its routine use has not been recommended because of known side-effects and the development of antimicrobial resistance.

Among the vast choices of antibiotics, the combination of amoxicillin and metronidazole has been recommended for periodontal patients and is generally used without any prior antibiotic susceptibility test. With emerging knowledge of periodontal medicine and the association between periodontal pathogens and several common systemic conditions – such as diabetes mellitus and cardiovascular diseases – the impact of antibiotic susceptibility for periodontal pathogens reaches beyond the scope of periodontics.

Aim

The aim of this study was to understand the change in microbiological composition and its susceptibility to different antibiotics over eight years.

Materials & methods

- An eight-year retrospective surveillance study on microbiological data of 7,804 patients diagnosed with advanced periodontitis from 163 German dental clinics from 2008 to 2015.
- Bacterial specimens were collected from up to five deep periodontal pockets of each patient diagnosed with moderate to advanced periodontitis, prior to treatment with a standardised protocol.
- Samples were then transported via Amies transport medium to the Centre for Oral & Dental Microbiology for microbiological culture and analyses.
- Bacterial culture was conducted for both aerobic and anaerobic bacteria by anaerobic recovery, and nucleic-acid amplification was performed to identify the presence, but not the quantity, of selected bacteria (*A. actinomycetemcomitans, P. gingivalis, P. intermedia, T. forsythia, F. nucleatum, C. rectus, Capnocytophaga, E. corrodens*).
- The prevalence of bacteria was calculated as the number of positive samples of each species within the population.
- The proportional representation for each species was expressed as the percentage of patients within the population from which the species was identified.
- Antimicrobial susceptibility was investigated using disc diffusion and occurrence of growth inhibition with antibiotics commonly used for periodontal infections, including amoxicillin, amoxicillin/clavulanic acid, metronidazole, doxycycline, clindamycin, azithromycin, ciprofloxacin, and ampicillin.
- Susceptibility was determined by the zone diameter breakpoints for resistance, defined according to different species.
- Linear logistic regression was used to analyse the temporal evolution of antimicrobial susceptibility.

Table: Prevalence of periodontitis patients (n = 7804) harbouring the targeted bacteria in Germany

Année	2008		2009		2010		2011		2012		2013		2014		2015		2008 – 2015	
Taux d'échantillons positifs	%	1266	%	1065	%	1004	%	1038	%	905	%	747	%	933	%	846	%	7804
Aggregatibacter actinomycetemcomitans (Aa)	26,1	331	18,7	199	22,4	225	20,8	216	19,6	177	18,9	141	20,9	195	22,7	192	21,5	1676
Treponema denticola (Td)	70,1	887	73,9	787	71,8	721	81,1	842	78,3	709	79,9	597	80,5	751	79,1	669	76,4	5963
Porphyromonas gingivalis (Pg)	69,3	877	66,6	709	67,9	682	67,1	697	67,8	614	67,1	501	71,5	667	68,1	576	68,2	5323
Tannerella forsythia (Tf)	84,5	1070	86,8	925	86,1	864	89,6	930	89,7	812	89,9	672	89,0	830	90,5	766	88,0	6869
Prevotella intermedia (Pi)	53,5	677	50,9	542	44,3	445	42,7	443	40,5	367	38,4	287	34,7	324	33,1	280	43,1	3365
Campylobacter rectus (Cr)	69,2	876	71,0	756	75,6	759	81,4	845	84,6	766	79,6	595	78,5	732	75,4	638	76,5	5967
Fusobacterium nucleatum (Fn)	99,3	1257	98,8	1052	78,2	785	97,9	1016	98,9	895	98,5	736	98,4	918	97,9	828	95,9	7487
Peptostreptococcus micros (Pm)	42,3	535	46,5	495	21,9	220	77,5	805	81,7	739	74,3	555	72,8	679	56,6	479	57,7	4507
Eubacterium nodatum (En)	12,6	159	10,8	115	37,0	372	37,6	390	47,8	433	38,7	289	36,2	338	32,5	275	30,4	2371
Eikenella corrodens (Ec)	82,4	1043	73,5	783	76,5	768	83,8	870	87,5	792	73,2	547	66,1	617	60,5	512	76,0	5932
Capnocytophaga spp (Cap)	66,3	839	54,5	580	75,2	755	82,8	859	84,0	760	84,3	630	81,8	763	78,8	667	75,0	5853

Results

- All periodontitis-associated species were present in the samples over the eight years, although varying prevalence and proportion was found throughout the population.
- Apart from *A. actinomycetemcomitans, P. intermedia,* and *E. nodatum*, all other tested species were identified in samples from more than half of the population.
- The most common bacteria was *F. nucleatum*, which was present in 95.9% of patients, followed by *T. forsythia* in 88.0% of patients, and *T. denticola* in 76.4% of patients.
- In terms of antibiotic susceptibility, isolates from 63.5% of patients were not susceptible to at least one of the antibiotics tested.
- *A. actinomycetemcomitans* showed resistance to metronidazole but not to the other antibiotics.
- *P. gingivalis* and *T. forsythia* showed a low resistance (mean 0.38% and 1.38% respectively) to amoxicillin.
- With the exception of *F. nucleatum*, all other periodontal pathogens tested were susceptible to amoxicillin/clavulanic acid throughout the surveillance period.
- An increasing proportion of patients with isolates resistant to at least one of the antibiotics tested was observed, rising from 37% in 2008 to 70% in 2015.
- A trend of decreasing susceptibility of *P. gingivalis, P. intermedia,* and *F. nucleatum* to ciprofloxacin, clindamycin, and azithromycin was shown ($p<0.05$).
- On the other hand, a trend of increasing susceptibility of *F. nucleatum* to amoxicillin, ampicillin/sulbactam, and amoxicillin/clavulanic acid was observed ($p<0.0001$).

Limitations

- Retrospective design with no history of other antibiotic usage or systemic conditions of the patients or other clinical information, which limits the interpretation of the prevalence of certain species in the subgingival microflora and their antibiotic susceptibility profile.
- The use of microbiological cultures instead of microbiome-sequencing technology limits findings to cultivable organisms.

Conclusions & impact

- Within the limitations of this study, a high prevalence of periodontitis-associated species was shown in German periodontitis patients, with individual variations in proportion.
- A trend of decreasing susceptibility of periodontal pathogens to antibiotics was observed over the years. However, susceptibility to amoxicillin and metronidazole remained unaffected.
- The trend of decreasing susceptibility of periodontal pathogens to antibiotics revealed in this study calls for an evaluation of the efficacy of adjunctive antibiotics regimens in periodontal therapy and the need for further prospective research on antibiotic resistance of periodontal pathogens in relation to clinical outcomes.

JCP Digest issue 93, published in October 2021, is a summary of 'Prevalence and antibiotic susceptibility trends of periodontal pathogens in the subgingival microbiota of German periodontitis patients: A retrospective surveillance study.' *J Clin Periodontol.* 2021; 48 (9): 1216-1227. DOI: 10.1111/jcpe13468

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13468

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 94 (2021:10)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 10 (October 2021), 1282-1292

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

Rapporteurs:
Nili Cohen Sedek, Yael Horev, and Mary Elias with Prof Moshe Goldstein

Affiliation:
EFP-affilliated postgraduate programme in periodontology at Hadassah-Hebrew University Medical Center, Jerusalem, Israel

study

How timing of orthodontic therapy affects outcomes of regenerative periodontal surgery

Authors:
Karin Jepsen, Christina Tietmann, Eric Kutschera, Peter Wüllenweber, Andreas Jäger, Daniele Cardaropoli, Lorena Gaveglio, Ignacio Sanz Sanchez, Conchita Martin, Rolf Fimmers, Søren Jepsen

Background

Pathological tooth migration, a side-effect of loss of periodontal attachment, is a common complication of advanced periodontal disease and a reason why patients seek orthodontic treatment. Before any orthodontic movement, control of the periodontal infection needs to be achieved followed by a corrective phase aiming to reconstruct the damage caused by the periodontal disease, including regeneration of vertical bone defects.

Reports have suggested different time intervals between regenerative procedures and orthodontic movement. For favourable periodontal outcomes, some reports advocate late orthodontic movement (six to 12 months after the regenerative procedure), while others show successful outcomes for early orthodontic movement (almost immediately or up to three months after the regenerative surgery was performed).

However, no randomised clinical controlled trials comparing these two treatment modalities are available at present.

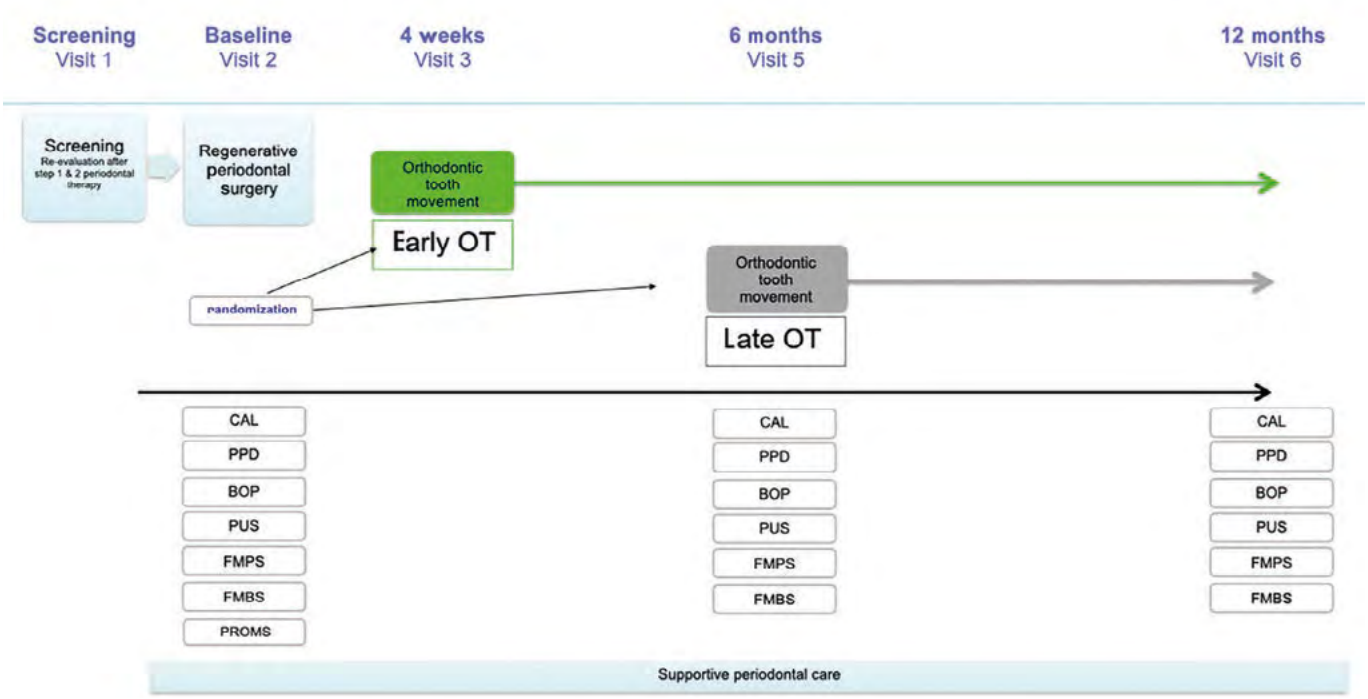
Aim

The aim of this study is to compare the early initiation of orthodontic therapy (four weeks) and late orthodontic therapy (six months) following regenerative surgery to treat infrabony defects in patients with severe periodontitis (stage IV) and to establish the clinical superiority of one treatment protocol.

Materials & methods

- A prospective, multicentre, multinational, randomised, parallel-group clinical trial.
- 12-month follow-up.
- All patients were diagnosed with stage IV periodontitis.
- The patients had to complete the anti-infective phase of therapy, with a full-mouth plaque score and a full-mouth bleeding score <25%. In addition, one infrabony defect was left untreated after the corrective phase. The included teeth were incisors, canines, or premolars with infrabony defects indicated for periodontal regeneration and presenting pathologic tooth migration that required orthodontic treatment.
- Exclusion criteria: furcation involvements of the teeth to be treated, smoking >5 cigarettes per day, uncontrolled metabolic disorders, medical contraindication for oral surgical procedures, and sensitisation to collagen-based material products.
- Regenerative therapy: All regenerative procedures were carried out by a single periodontist at each centre. Different graft materials were used depending on defect configuration.
- Before orthodontic therapy, patients were randomly allocated to two groups:
  1) Early treatment group (four weeks post-regeneration): 23 patients, mean age of 45.
  2) Late treatment group (six months post-regeneration): 20 patients, mean age of 52.
- Orthodontic movement was personalised for each individual using fixed appliances, with an emphasis on low forces and movement. Appliances were removed after achieving the goals of therapy (the planned teeth positioning).
- Supportive periodontal therapy was held on a constant basis of every two months during the whole treatment.
- The primary outcome of this RCT was clinical attachment level (CAL) gain. Secondary outcomes were probing pocket depth (PPD) reduction, bleeding on probing, pocket closure, patient-reported pain using the visual analogue score (VAS), and wound healing.

Figure: Chronological sequence of examinations, periodontal and orthodontic therapy (OT), early OT initiated 4 weeks after, and late OT initiated 6 months after regenerative periodontal surgery.



Results

- Improved CAL gain and PPD reduction were observed in both groups in target sites after 12 months. Those clinical parameters were statistically significant.
- CAL gain (12 months): ΔCAL was 0.89mm in favour of early orthodontic treatment (four weeks) in comparison to later treatment (six months). The difference was not statistically significant.
- PPD reduction (12 months :(ΔPPD was 0.31 mm in favour of early orthodontic treatment (four weeks). The difference was not statistically significant.
- Percentage of pocket closure in target sites was similar in both groups: 91% (four weeks) and 85% (six months).
- Percentage of pocket closure without bleeding on probing in the target sites was 69% (four weeks) and 75% (six months).
- Patient VAS and wound healing were good in both groups and without differences between the groups.
- To overcome the effect of differences between centres, a further analysis was done. The results showed a significant ΔCAL in favour of the early treatment (four weeks) at three out of four centres.

Limitations

- Blinded examination was not possible in the first six months, because of the early application of orthodontic appliance in the early group.
- Pocket measurement in teeth with orthodontic appliances was technically challenging and might be inaccurate.
- Comparison of the defect by X-ray before and after the orthodontic treatment was not possible because of the different tooth positions at the end of the orthodontic movement.
- Follow-up was limited to 12 months after regeneration.
- Molars were not included in this study.

Conclusions & impact

- For patients with stage IV periodontitis, who present good oral hygiene and cooperation by adhering to supportive periodontal therapy every two months, good outcomes were achieved in the early group (four weeks), where teeth with intrabony defects were treated by regenerative therapy followed by orthodontic therapy for treating pathologic tooth migration.
- These results were at least as good as the results achieved after later initiation of orthodontic treatment (six months).
- The outcomes suggest that initiation of orthodontic therapy is possible as early as four weeks after regenerative treatment of an infrabony defect, and that favourable CAL gain and periodontal parameters can be achieved. This finding allows a reduction of the overall treatment time.

JCP Digest 94, published in November 2021, is a summary of 'The effect of timing of orthodontic therapy on the outcomes of regenerative periodontal surgery in patients with stage IV periodontitis: A multicenter randomized trial.' *J Clin Periodontol.* 48 (9): 1282-1292. DOI: 10.1111/jcpe13528

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13528

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 95 (2021:11)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 11 (November 2021), 1480-1490

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

Rapporteurs:
Naz Kurt, Ahmet Duranay, and Canberk Kemik with Hare Gürsoy and Prof Bahar Eren Kuru

Affiliation:
EFP-affilliated postgraduate programme in periodontology at Yeditepe University, Istanbul, Turkey

study

Short implants: two adjacent or a single implant with a cantilever?

Authors:
Daniel S. Thoma, Karin Wolleb, Roman Schellenberg, Franz-Josef Strauss, Christoph H.F. Hämmerle, and Ronald E. Jung

Background

The length of the implants is an important factor during implant treatment planning. In the posterior areas, vertical bone height is usually limited either by the maxillary sinus or by the inferior alveolar nerve. This often leads to a preference for shorter implants. Reviews have suggested that survival rates of rough-surfaced short implants are similar to those of longer implants.

In clinical situations where there are two-unit gaps in the posterior maxilla and mandible, two options are indicated for restoring function and aesthetics: two adjacent implants or a single implant with a cantilever.

One-to-one, single-tooth short implants are the most well-documented treatment modality and present high survival rates after five years in terms of implant and restorative aspects. The placement of a single implant with a cantilever may have advantages such as less patient morbidity, a shorter treatment time, and lower cost. This approach offers an alternative in unfavourable anatomical conditions.

However, it has been hypothesised that cantilevers may increase occlusal and functional forces on the implant, jeopardising the success together with unfavourable peri-implant parameters. There is a lack of information in the literature on the clinical outcomes comparing two single implants versus a single implant with a cantilever.

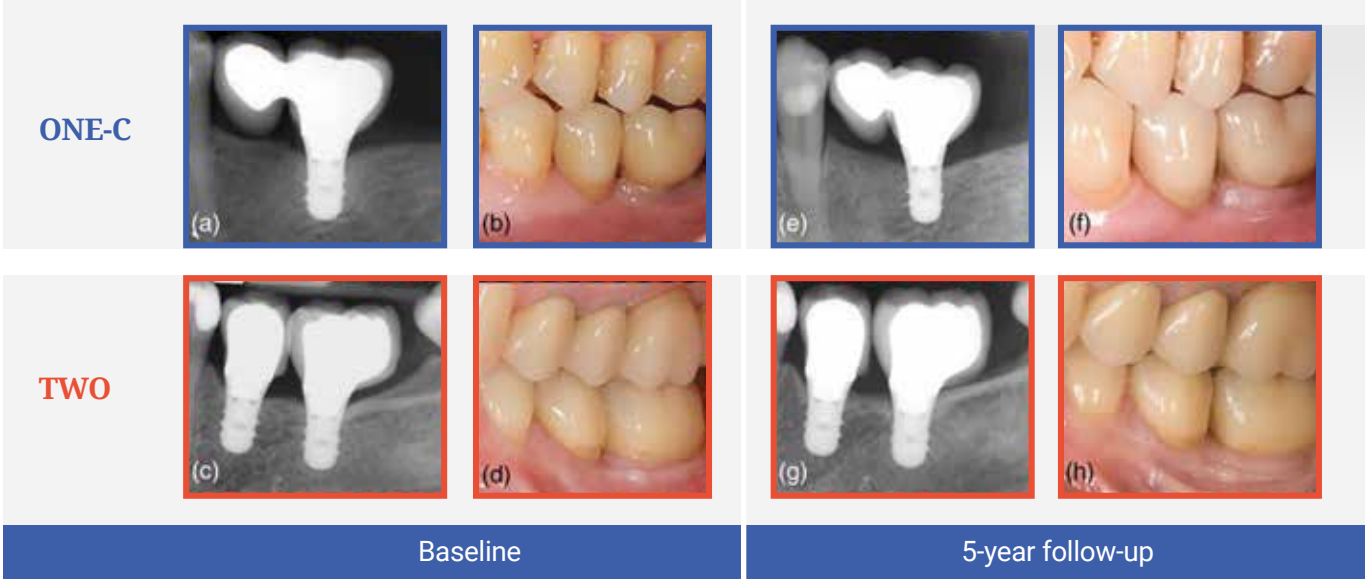
Aim

The aim of this study was the clinical, radiographic, and technical evaluation of the use of one short implant with a cantilever versus two adjacent short implants with single-tooth reconstructions after five years of functioning.

Materials & methods

- This prospective, parallel-design randomised clinical trial included patients requiring fixed implant-supported dental prosthesis for two-unit gaps.
- Smokers (more than 15 cigarettes per day), people with active periodontal disease, and pregnant or breastfeeding women were excluded.
- Participants were randomly assigned into two groups to receive either one short implant (group ONE-C) or two short implants (group TWO). All implants were 6mm in length and had a diameter of 4.1mm. A total of 54 "Straumann Standard Plus" implants were placed in 36 patients (18 in group ONE-C and 36 in group TWO). Surgical procedures were performed according to standard protocols and the manufacturer's recommendations. In cases of bone deficiency, guided bone regeneration was performed. Fixed prostheses were inserted three to six months after implant surgery.
- Baseline examinations were performed one to three weeks after final prosthesis placement. All patients were placed in a supportive periodontal care programme and re-examinations were performed at six months and at one, three, and five years after prosthesis placement.
- The primary outcome was radiographic marginal bone loss (MBL) calculated as the mean of mesial and distal MBL. Changes in MBL from baseline to six months and one, three, and five years were estimated. Implant survival (implant being in place and stable) and reconstruction survival (reconstruction being in situ) rates were estimated after five years.
- Biological complications (peri-implant mucositis and peri-implantitis) and technical complications (implant/abutment fracture, chipping, and loosening of the abutment screw) were also evaluated.
- Clinical parameters (probing depth, bleeding on probing, and plaque scores) were evaluated at the follow-up examinations.

Figure: Representative cases of each treatment modality



Periapical radiographs (a,c) and clinical situation (b,d) at baseline (crown delivery). Periapical radiographs (e,g) and clinical situation (f,g) at five-year follow-up.

Results

- The study was completed with 26 patients (15 in group ONE-C and 11 in group TWO).
- Implant survival rates were 84.2% in ONE-C versus 80.4% in TWO after five years. Two patients had early failure before loading (one in each group). Four late failures occurred, two in each group. In ONE-C, one implant failed after prosthesis delivery and the other six months after loading; in TWO, two implants failed after three years.
- Twenty-five technical complications were seen in 16 implants (18 in ONE-C and seven in TWO). Rates of these technical complications were 64.2% in ONE-C versus 54.4% in TWO. No statistically significant differences were detected between the groups.
- From baseline to five years of loading, the median MBL changes were 0.13mm in ONE-C and 0.05mm in TWO, without a statistically significant difference. Likewise, no statistically significant differences were observed between the groups in terms of MBL changes at any time point.
- Prevalence of peri-implant mucositis was 56.2% in ONE-C versus 63.6% in TWO, without statistically significant difference. Peri-implantitis was not observed.
- There was no statistically significant difference between the two groups in probing-depth, plaque, and bleeding-on-probing scores.

Limitations

- After five years, only 26 of 36 participants were available for review, which limited the power of the study.
- Two different jaws, maxilla and mandible, with different posterior bone quality were included.
- Clinical variables such as implant location, mesial/distal cantilevers, unstandardised surgical procedures (such as application of guided bone regeneration), and type of placement (submerged or transmucosal) may have affected the results.
- One of the figures used - on representative cases of each treatment modality - is controversial because the representative case for group TWO has faulty superstructure in terms of an inappropriate distally extended single-crown unit without a distal contact.
- No information was given as to whether the clinical measurements were standardised by a single investigator.

Conclusions & impact

- Both treatment options revealed similarly modest survival rates after five years of functioning. However, short implants with a cantilever were more prone to earlier failure, suggesting that the implant was overloaded.
- Similar clinical, radiographical, and technical outcome parameters were seen in both treatment modalities during the five-year follow-up period.
- Similar rates of biological complications were seen between both treatment modalities over the five years.
- In daily practice, when reconstructing two-unit gaps in the posterior area of the jaws, the clinical indication of both treatment options should be carefully evaluated.

JCP Digest 95, published in February 2021, is a summary of 'Two short implants versus one short implant with a cantilever: 5-Year results of a randomized clinical trial' *J Clin Periodontol.* 48 (11): 1480-1490. DOI: 10.1111/jcpe13541

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13541

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest
Issue number 96 (2021:12)

EFP 30 years (1991-2021) promoting periodontal health for a better life
European Federation of Periodontology

Summarised from *Journal of Clinical Periodontology*, Volume 48, issue 12 (December 2021), 1516-1527

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

Rapporteurs:
Gilles Szotek with Isabelle Laleman and Prof France Lambert

Affiliation:
EFP-affilliated postgraduate programme in periodontology, at University of Liège, Belgium

study

Full-mouth or quadrant-wise instrumentation in treating stage III and IV periodontitis?

Authors:
Jamal M. Stein, Stefan Reichert, Stephanie Wied, Sareh Said Yekta-Michael, Florian Schittenhelm, David Kupietz, Henrik Dommisch, Adrian Kasaj, Octavia-Carolina Vela, Stefan-Ioan Stratul

Background

The concept of one-stage disinfection as an answer to the problem of the rapid recolonisation of recently treated pockets by periodontal pathogens from yet-to-be-treated pockets was introduced more than 25 years ago. The goal of this protocol was to minimise the risk of recontamination by performing all the root planing within 24 hours combined with a thorough disinfection of all oropharyngeal niches using chlorhexidine.

Since then, several clinical studies have been published comparing one-stage with quadrant-wise instrumentation. The results of these studies are heterogeneous, and they often failed to replicate the results of the original study. One reason given for this is that studies that really replicate the original full-mouth disinfection protocol are scarce. Most studies adopted a one-stage instrumentation protocol rather than a one-stage disinfection protocol (with chlorhexidine rinsing and tonsil spraying before the procedure, repeated subgingival irrigation with chlorhexidine gel, and rinsing with chlorhexidine for two months).

As well as improving the results of subgingival instrumentation using chemical means, more recently it has been suggested that the mechanical removal of the subgingival biofilm could be improved by using air-polishing with low-abrasive powders (such as erythritol).

Aim

This multicentre randomised clinical trial aimed to evaluate the clinical benefits of full-mouth versus quadrant-wise subgingival instrumentation (Q-SRP) in stage III and IV periodontitis. Three different full-mouth protocols were investigated: full-mouth scaling (FMS), full-mouth disinfection (FMD), and FMD with adjuvant erythritol air-polishing (FMDAP).

Materials & methods

A randomised, prospective, blinded, four-arm, parallel-group, multicentre trial, with a six-month follow-up.

Patient characteristics:

- Untreated periodontitis, stage III or IV.
- Regardless of smoking status.
- Exclusion criteria: scaling and root planing (SRP) in the preceding 12 months, use of antimicrobial rinsing solutions or intake of systemic antibiotics within the previous four months; systemic diseases with known interactions with periodontal diseases or with need for antibiotic prophylaxis; intake of drugs with possible impact on clinical symptoms of periodontal diseases; and pregnancy.

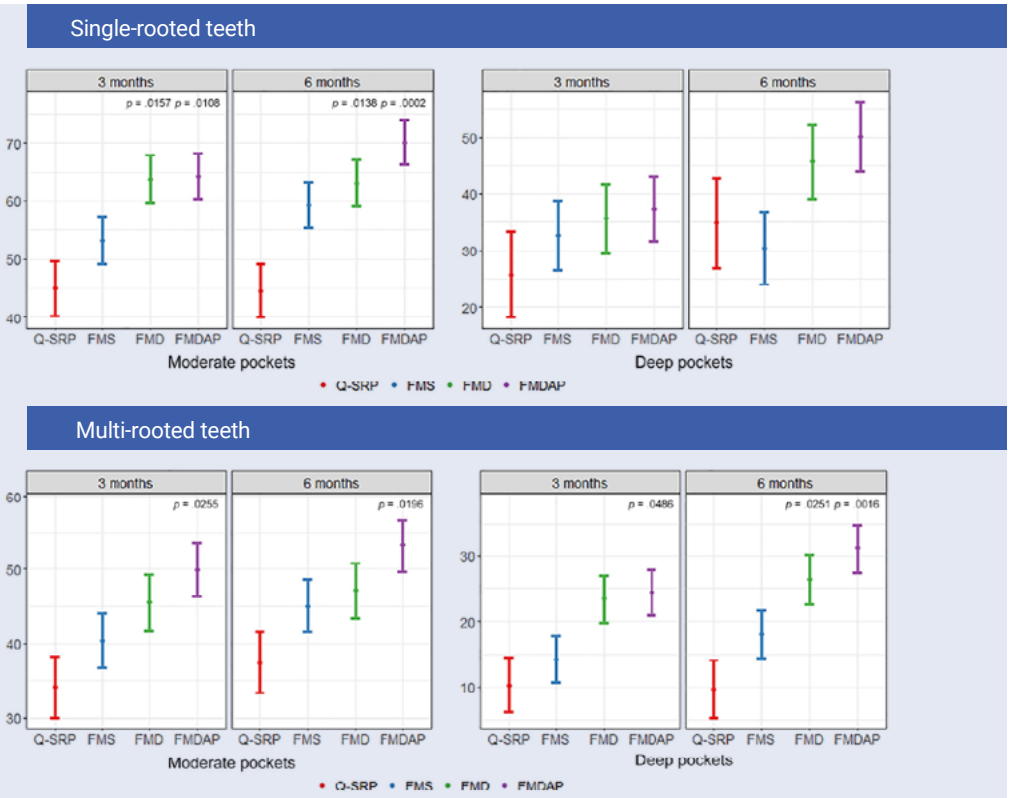
Study course:

- Step 1 of periodontal therapy (supragingival instrumentation and oral hygiene instruction) before randomisation.
- Randomisation in four groups with at least 45 patients per group:
  - Q-SRP: one-week interval between each session.
  - FMS: full-mouth SRP within 24 hours.
  - FMD: full-mouth SRP within 24 hours, with additional application of chlorhexidine according to the protocol of Quirynen et al., 1998.
  - FMDAP: FMD, combined with the use of subgingival erythritol air-polishing using Airflow and Perioflow.
- SRP was performed after local anaesthesia and carried out using ultrasonic scalers and Gracey curettes.

Study outcomes:

- Pocket probing depth (PPD), plaque index (PI), bleeding on probing (BoP), gingival index (GI), and clinical attachment loss (CAL) were evaluated.
- Additionally, the percentage of closed pockets (proportion of sites changed from PPD >4mm to residual PPD ≤4mm without BoP) was calculated.
- Accumulated chair time was assessed as well as the treatment efficiency (time needed to obtain the closure of one pocket).

Figure:
Proportion of closed pockets (%) after 3 and 6 months for moderate pockets with initial PPD 5-6mm and deep pockets with initial PPD >6mm at single-rooted and multi-rooted teeth; p values indicate significant differences compared to Q-SRP.



Results

- A total of 190 patients were randomised, and the data of 172 patients could be analysed.
- Significant mean PPD reduction was observed in all groups.
- FMDAP led to the highest mean PPD reduction and was the only full-mouth protocol that led to significantly better PPD reduction compared to Q-SRP, both for moderate (PPD 4-6mm) and deep pockets (PPD >6mm) pockets.
- FMD showed significantly better PPD reduction compared to Q-SRP only for deep pockets (PPD >6mm).
- Significant CAL gain was observed in all groups, without statistically significant differences between them.
- PI, GI, and BoP were reduced in all groups, but without statistically significant intergroup differences.
- The following percentages of pocket closure were observed: 38% for Q-SRP, 46% for FMS, 49% for FMD, and 55% for FMDAP.
- FMDAP was the only full-mouth protocol that led to significantly better pocket closure compared to Q-SRP (both for single- and multi-rooted teeth).
- FMD showed significantly better pocket closure compared to Q-SRP only for single-rooted teeth.
- Chair time was longer for Q-SRP compared to all full-mouth protocols, but only in relation to FMS was this statistically significant.
- The time to achieve one closed pocket was significantly less for all full-mouth protocols compared to Q-SRP (6.3 minutes for FMDAP, 8.5 minutes for FMD, and 9.5 minutes for FMS versus 17.8 minutes for Q-SRP).

Limitations

- There was a significant number of dropouts in the Q-SRP group.
- Follow-up was limited to six months.
- Chlorhexidine staining in the FMD and FMDAP groups impaired the blinding of the assessors.
- Evaluation time after treatment was not the same for Q-SRP and for the other groups, because of the time needed to perform the whole procedure.

Conclusions & impact

- Of the examined protocols, FMDAP led to the highest PPD reduction and pocket closure, and it was the most efficacious treatment.
- FMD also showed statistical benefits in terms of PPD reduction and pocket closure compared to Q-SRP.
- All the full-mouth protocols were more efficacious than Q-SRP based on the time needed to achieve one closed pocket.
- An important problem with Q-SRP is the multiple appointments leading to extended treatment time and a greater risk of postponing and/or cancelling one of the appointments.
- Full-mouth disinfection protocols thus seem easier to apply in a daily practice in terms of organisation and treatment completion and lead to better treatment outcomes. The use of air-polishers during initial non-surgical treatment should thus be further studied.

JCP Digest 96, published in February 2022, is a summary of 'Comparison of three full-mouth concepts for the non-surgical treatment of stage III and IV periodontitis: A randomized controlled trial' *J Clin Periodontol.* 48 (12): 1516-1527. DOI: 10.1111/jcpe13548

https://www.onlinelibrary.wiley.com/doi/10.1111/jcpe.13548

Access through EFP members' page log-in: http://efp.org/members/jcp.php

JCP digest

EFP

30 years (1991-2021)
promoting periodontal health
for a better life