

# What's new for the clinician– summaries of recently published papers

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## 1. Surgical versus non-surgical debridement for the treatment of peri-implantitis

An evidence-based overview on peri-implantitis at the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions concluded the following<sup>1</sup>:

- Peri-implantitis is a pathological condition occurring in tissues around dental implants, characterized by inflammation in the peri-implant connective tissue and progressive loss of supporting bone.
- The histopathologic and clinical conditions leading to the conversion from peri-implant mucositis to peri-implantitis are not completely understood.
- The onset of peri-implantitis may occur early during follow-up and the disease progresses in a non-linear and accelerating pattern.
- Peri-implantitis sites exhibit clinical signs of inflammation and increased probing depths compared to baseline measurements.
- At the histologic level, compared to periodontitis sites, peri-implantitis sites often have larger inflammatory lesions.
- Surgical entry at peri-implantitis sites often reveals a circumferential pattern of bone loss.
- There is strong evidence that there is an increased risk of developing peri-implantitis in patients who have a history of chronic periodontitis, poor plaque control skills, and no regular maintenance care after implant therapy. Data identifying “smoking” and “diabetes” as potential risk factors/indicators for peri-implantitis are inconclusive.
- There is some limited evidence linking peri-implantitis to other factors such as: post-restorative presence of submucosal cement, lack of peri-implant keratinized mucosa and positioning of implants that make it difficult to perform oral hygiene and maintenance.

- Evidence suggests that progressive crestal bone loss around implants in the absence of clinical signs of soft tissue inflammation is a rare event

Various therapeutic modalities have been suggested to treat peri-implantitis.<sup>2</sup> However, no superiority of one treatment over another could be demonstrated, and more complex approaches have failed to demonstrate additional benefits over simple treatments.<sup>2</sup> Surgical and non-surgical debridement have their own comparative advantages and disadvantages. Flap access provide better visualization and access to instruments in deep and complex defects; however, it demands higher operative time and professional skills and also may lead to high morbidity and costs for patients. Contrarily, non-surgical treatment is simpler for both clinicians and patients, with less treatment time and morbidity. Wagner and colleagues (2021)<sup>2</sup> reported on a trial that sought to compare clinical and radiographic outcomes of surgical and non-surgical debridement for the treatment of peri-implantitis.

### MATERIALS AND METHODS

This was a two-centre, parallel-designed, double-blind, randomized controlled trial. To be included in the study, individuals presented with at least one implant with peri-implantitis defined as probing pocket depth (PPD)  $\geq$  5mm with bleeding on probing (BOP) and radiographic evidence of radiographic bone loss  $\geq$  2mm. If an individual had more than one implant with peri-implantitis, all of them were included. In addition to the diagnosis of peri-implantitis, participants were systemically healthy, not presenting systemic diseases/conditions that may have influenced the outcomes of peri-implantitis treatment, such as diabetes, any immunosuppression, HIV infection, osteoporosis, and rheumatoid arthritis. Participants also had a negative history of antibiotic therapy in the previous 6 months preceding the study and did not use anti-inflammatory drugs on a chronic basis. Only partially, edentulous patients were eligible for inclusion. Patients with past history of periodontitis received periodontal treatment at least 3 months before being included in the

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study. The following exclusion criteria were applied: use of antibiotics for other infections and development of any systemic condition that could interfere with peri-implantitis treatment

Non-surgical (NST) and surgical (ST) treatments were performed by three periodontists using a standardized approach. Before randomization, all participants received an initial phase of up to four sessions comprised by supragingival scaling of teeth, professional supragingival biofilm removal, and personalized oral hygiene instructions for teeth and implants.

Non-surgical treatment comprised the removal of submucosal biofilm and/or calculus adhered to the implant with Teflon curettes (HuFriedy). When the operator judged that calculus could remain at the implant surface due to robustness or lack of cutting ability of the Teflon curette, a stainless-steel Mini-Five curette (HuFriedy) was gently used to complement debridement. Surgical treatment consisted of biofilm and/or calculus removal but with a full-thickness flap with relaxing incisions for a complete view of all implant surfaces, without removal of soft tissue. No resective bone surgery or implantoplasty nor any chemical detoxification of the implant surface was performed. The flap was repositioned with silk sutures. In both groups, after removal of the submucosal biofilm, the implant surfaces were irrigated during 1 min with saline solution.

Before starting the interventions, all screw-retained crowns were removed to facilitate access. Cemented crowns were maintained because of the risk of ceramic damage during removal. All patients in both groups were treated under local anesthesia using mepivacaine with adrenaline. Postoperative care included 0.12% chlorhexidine mouthwashes, twice daily, during 7 days after the intervention for both groups. Also, acetaminophen 750mg, each 4 h, was prescribed in case of pain. After the interventions, individuals were followed once a week over the first month. Thereafter, maintenance sessions were made each month during the first 3 months. Over the last 9 months, patients were enrolled in a 3-month recall maintenance program.

During each recall session over 12 months, supragingival biofilm control was checked, and supramucosal professional biofilm removal at the implant sites was performed, together with oral hygiene reinforcement if necessary. At baseline, participants were interviewed using a structured questionnaire containing questions regarding demographic variables, oral hygiene habits, dental treatments, and behavioral factors. Also, all present teeth were examined to register visible plaque, PPD, clinical attachment loss (CAL), and BOP. Implants included in the study were examined at baseline, 3, 6, and 12 months after treatment. A 15-mm manual periodontal probe (HuFriedy) was used to register the following parameters in six sites per implant (distobuccal, buccal, mesiobuccal, distolingual, lingual, mesiolingual): probing pocket depth was measured from the mucosal margin to the bottom of the peri-implant sulcus; and bleeding on probing was evaluated as present if bleeding was evident within 30 s after probing. Also, visible plaque (VP) was recorded.

Radiographic evaluation was performed at baseline and after 12 months to assess the radiographic marginal bone level around the implants. All radiographs were digitized in a scanner. One calibrated examiner measured the vertical depth of the peri-implant defect having reproducible landmarks as reference. Specifically, the radiographic bone level was determined as the distance between the implant platform and the most apical portion of alveolar crestal bone, in mesial and distal sites. The reference point in the platform depended on the type of system/connection, always starting at the point where osseointegration may take place

The primary outcome of this study was peri-implant probing depth. Secondary clinical outcomes included plaque and BOP. Also, the change in radiographic marginal bone level (MBL) was calculated by subtracting bone levels at 12 months from that at baseline.

## RESULTS

A total of 88 individuals were refereed and screened for eligibility. After exclusions, 48 were randomized. Three individuals gave up participation before treatment due to reasons not related to the study, and 45 were treated (NST=21 and ST=24). The number of implants included in NST and ST was 33 and 30, respectively.

The age of participants was in average 60 years in both groups, and the majority of them were females. There was no significant difference in the distribution of smokers in the two groups. Most of the individuals had only one implant with peri-implantitis. The mean number of present teeth was 22.1 and 23.1 in NST and ST groups, respectively. The periodontal status of participants was stable. There were no significant differences between groups in regard to implant characteristics.

The percentage of sites with visible plaque reduced significantly in both groups after the first 3 months (NST 39.4±8.4 to 13.6±4.5%; ST 30.0±6.5 to 22.2±5.8%) and remained low (NST 11.1±6.0%; ST 12.8±5.1%) until 12 months. For all sites, pocket depth reduced significantly in both groups over time. In the NST group, the significant reduction was seen after the first 3 months (4.14±0.25 to 3.17±0.18mm;  $p<0.001$ ) and slightly increased to 3.39±0.21mm after 6 months, remaining equal to 3.25±0.23mm after 12 months ( $p<0.001$ ). In the ST, pocket depth reduced after 3 (3.73±0.22 to 3.63±0.29mm;  $p=0.68$ ) and 6 (3.33±0.31mm;  $p=0.14$ ) months but without significant difference compared to baseline. After 12 months, the reduction was statistically significant, and PPD equaled 3.03±0.26mm ( $p=0.001$ ). However, there were no significant differences between groups in PPD in any of the timepoints.

For stratified analyses by baseline PPD, the results remained basically the same as those for all sites, without significant differences between the two groups. In sites with initial PPD 5–6mm, PPD reduced from 5.2 to 3.6mm in both groups (within-groups  $p<0.001$ ). PPD for sites  $\geq 7$ mm reduced from 7.82±0.20 to 5.10±0.30mm in the NST group and from 7.11±0.11 to 5.22±0.91mm in the ST group (within-groups  $p<0.001$ ). The percentage of sites with BOP reduced significantly

in both groups after the first 3 months, equaling 43.4% and 48.9% in NST and ST, respectively, for all sites. At 12 months, BOP was 35% in both groups. There were no significant differences between groups for BOP in any of the timepoints. In moderate pockets, BOP reduced to 42% in the two groups. In deep pockets, BOP was observed in 68.2% of sites in the NST and 55.6% of sites in the ST group after 12 months ( $p=0.69$ ).

There was no significant difference between groups in the reductions of PPD and BOP for all analyzes. The reduction in PPD in the NST group was 0.83mm higher than in the ST group ( $p=0.51$ ); however, this difference was equivalent to the baseline difference observed between the two groups.

At the implant level, the percentage of implants that became healthy (negative BOP) after 12 months was 45.5% (95% CI 29.0–61.9) and 50% (95% CI 32.0–67.9) in the non-surgical and surgical groups ( $p=0.71$ ), respectively. The percentage of implants with PPD  $\leq 4$ mm and absent BOP after 12 months was 39.4% (95% CI 21.5–57.3) and 46.7% (95% CI 28.6–64.7) in the non-surgical and surgical groups ( $p=0.57$ ), respectively.

Baseline radiographic bone level equaled 3.39mm and 3.58mm in NST and ST ( $p=0.67$ ), respectively. After 12 months, there was a significant gain in bone levels for the two groups, but without significant difference between them. When only sites with radiographic bone level  $\geq 3$ mm at baseline were analyzed, there was a significant

difference between groups in radiographic bone levels after 12 months, reflecting a gain of 0.78mm in the surgical group compared to 0.25mm in the non-surgical group ( $p=0.03$ ).

## CONCLUSION

The research team concluded that surgical and non-surgical debridement for the treatment of peri-implantitis were not completely effective to establish peri-implant health. The two treatments provided similar clinical outcomes; however, greater bone gain was achieved after surgical treatment, but the relevance of such difference in terms of implant maintenance needed to be evaluated over a longer term.

**Implications for practice:** Similar treatment outcomes were achieved with a less invasive /more conservative approach to implant maintenance/management of peri-implantitis. The potential benefits of the non-surgical approach for the patient (less invasive, costs, time) should

## Reference

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## 2. Is there an association between diabetes mellitus and dental/odontogenic infections?

Diabetes is a disease that occurs when the pancreas is unable to produce or use insulin efficiently, resulting in a high blood sugar level. When the body fails to make insulin at all, this results in Type 1 diabetes. With Type 2 diabetes, the body does not produce or use insulin effectively. In addition to typical symptoms such as frequent urination and thirst and unspecific symptoms such as fatigue or recurrent infections, these patients show abnormal blood sugar counts with elevated fasting glucose tolerance above 126mg/dl.

Abscesses are one of the most frequent diagnoses in the maxillofacial practice, with most originating from odontogenic infections. While the vast majority of the cases can be treated sufficiently by a dentist, for example through local incision or calculated antibiotic treatment, some infections tend to progress and form a severe abscess which then requires inpatient treatment with intravenous antibiotic treatment and extended surgical intervention, depending on the abscess' extent, location, and the patients'

The treatment of abscesses is usually not a great challenge nowadays. Yet, some patients show more complicated courses of disease with longer inpatient stays and faster progression of the infection onto different head and neck regions at the time of admission. As diabetes mellitus tends to compromise immune response and therefore

makes patients prone to infections, one might expect it to have an influence on abscess formation. T Rahimi-Nedjat and colleagues from Germany (2021)<sup>1</sup> reported on a retrospective study that sought to investigate the relationship between diabetes and severe odontogenic abscesses and whether diabetics show more complicated disease progressions.

## MATERIALS AND METHODS

A retrospective case-control study was conducted to test the following hypotheses:

- Patients with a known diagnosis of diabetes mellitus or abnormal glucose tolerance have a higher risk to form a severe abscess than non-diabetics.
- Patients with diabetes-mellitus or abnormal glucose tolerance need longer inpatient treatment. All patients who underwent inpatient treatment due to a severe odontogenic abscess over a seven year period (2010 to 2016) at a Oral and Maxillofacial Surgery unit in Germany were retrospectively included in this study. A severe abscess was defined as any infection exceeding its local borders with wide involvement of soft tissue compartments.

Electronic health records were evaluated for the following details:

- Demographic data such as gender and age
- Location of the abscess

- Diabetes anamnesis (type I or type II)
- Type of diabetes therapy (medicinal or non-medicinal)
- Anamnesis of typical diabetes related illnesses
- Abnormal glucose tolerance was captured by two separate values:
- Maximum blood sugar count (MBSC) during the inpatient stay (a blood sugar count over 200mg/dl at any time was defined as abnormal [9])
- Fasting blood sugar count (FBSC) (fasting blood sugar count was measured only in the morning before breakfast and was defined as abnormal above 126mg/dl [9])
- Duration of inpatient treatment

To be able to compare the data of the abscess patients with those of a general maxillofacial patient group, all cases who underwent inpatient treatment because of any other diagnose during the year 2013 were analyzed as well for criteria mentioned above. All patients who had an incomplete electronic health record for any of the information except the Fasting blood sugar count (FBSC) were excluded from the analyses.

## RESULTS

In total, 977 patients with severe odontogenic abscesses were found in the observed period, with a mean age of 41 years ( $\pm 21.5$  years). A total of 538 patients were male (55.1%) and 439 female (44.9%). With a mean age of 39.2 years, the female patients were slightly younger than the males, who were 43.2 years old on average ( $p = 0.004$ ). Most patients who presented with a severe odontogenic abscess were between 20 and 29 years of age (17.1%).

### Diabetes anamnesis and blood sugar counts

In the abscess group, diabetes mellitus was confirmed among 7.3% of the 977 patients ( $n = 71$ ). From these, 6 patients had type I diabetes. Among all 977 patients, an abnormal MBSC was found in 5.7% ( $n = 56$ ), of whom only 32 (57.1%) were known to have diabetes. This means that 42.9% of these patients had an impaired glucose tolerance but had not been diagnosed with diabetes. Out of all abscess patients, 39 showed an increased FBSC (4.0 %) and of these, 22 (56.1%) already had a diabetes diagnosis.

The mean FBSC for all abscess patients was 114.0 mg/dl and the mean MBSC 112.9 mg/dl. The diabetes patients in this group showed higher blood sugar counts (FBSC 154.5 mg/dl, MBSC 234.1 mg/dl). Of the 71 diabetes patients, 59 received medicinal treatment while 12 managed their diabetes with diet. The most frequent and almost only diabetes-related disease in the anamnesis was nephropathy and could be found in 14 cases. Three more patients had a history of retinopathy and one of neuropathy.

### Severe odontogenic abscesses

With 34.1%, the perimandibular compartments were the most frequent localization of severe odontogenic abscesses, followed by the cheek (16.4%), and fossa canina (14.6%). The mean inpatient stay was an average of 6 days ( $\pm 3$  days) for all patients. While there was no significant difference for the hospital stay between diabetics and non-diabetics ( $p = 0.387$ , median inpatient stay of 6.4 days), we found a significantly longer hospitalization for patients with abnormal MBSC ( $p = 0.046$ , median inpatient

stay of 7.5 days) and FBSC ( $p = 0.008$ , median inpatient stay of 9.2 days).

The investigation of the general group from 2013 involved 2258 patients. These patients had a mean age of 48.0 years ( $\pm 23.7$  years). The proportion of diabetics was 5.3% ( $n = 121$ ). Abnormal MBSC was found in 10.7% ( $n = 242$ ) and impaired FBSC in 8.2% (185). Here again these numbers are higher than the number of diabetics since not every patient with an impaired glucose tolerance had been diagnosed with diabetes. For this group, the mean FBSC was 105.7 mg/dl and MBSC was 109.0 mg/dl. These numbers were slightly below those found in the abscess patients.

### Comparison of the abscess and general patients

Comparison of the mean ages shows that patients with abscesses were an average 9 years younger than the general group, and diabetics were significantly older than all other patients ( $p < 0.001$ ).

The portion of diabetics among patients under 60 years of age in the abscess group was twice as high as those under 60 in the general group (4.6%,  $n = 36$  versus 2.1%,  $n = 29$ ). This difference was highly significant ( $p < 0.001$ ). In patients older than 60, these numbers were opposite as the portion of diabetics was higher in the general group with 19.1% compared to 17.7% in the abscess group. However, this difference was not significant.

Finally, adding all patients from both groups into one group and then dividing them into diabetics and non-diabetics allows an examination of the portion of abscesses in both groups. This calculation shows a significant difference, with a higher number of abscesses in diabetics ( $p = 0.025$ ). An even higher significance was found for those with abnormal MBSC and FBSC ( $p < 0.001$ ).

This relationship could also be observed in the odds ratio. The occurrence of a severe abscess in diabetics was 1.28 times more likely than in non-diabetics. This number was even higher for diabetics with impaired FBSC (2.51) and for those with abnormal MBSC (2.7).

## CONCLUSION

The researchers found that abscesses are more likely to occur in diabetics and that diabetics who had poor medicinal or dietary treatment proved to have the highest odds of forming a severe abscess from a dental infection.

**Implications for practice:** Almost half of the patients with impaired blood sugar values did not have a diabetes diagnosis in this study which should also serve as a warning in our country that has one of the highest rates of diabetes among adults in the world. Patient history taking is crucial to identifying this group that has no knowledge of their blood sugar counts that presents for treatment. Caution and extra vigilance should also be key in managing patients with known diabetes.

### Reference

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