# Scientific Highlights

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

## Issue 2/2021

*Edited by Dr Pooja Nair*

IN THIS ISSUE 3
EDITOR'S CHOICE 4
1. Clinical and radiographic evaluation of implant-supported single-unit crowns with cantilever extension in posterior areas: A retrospective study with a follow-up of at least 10 years 4
HIGHLIGHTS 5
2. Short implants (≤6mm) as an alternative treatment option to maxillary sinus lift 5
3. The Implant Supracrestal Complex and Its Significance for Long-Term Successful Clinical Outcomes 6
4. Flapless application of enamel matrix derivative in periodontal retreatment: A multicentre randomized feasibility trial 7
5. Influence of implant location on titanium-zirconium alloy narrow-diameter implants: A 1-year prospective study in smoking and non-smoking populations 8
6. Association between periodontitis and severity of COVID-19 infection: A case-control study 9
7. Long-term Clinical Performance of Regeneration versus Conservative Surgery in the Treatment of Infra-bony Defects: A systematic review 10
8. Thermal exposure of Implant Osteotomies and its impact on Osseointegration - A preclinical in vivo study 11
9. A Novel Xenograft Bone Substitute Supports Stable Bone Formation in Circumferential Defects Around Dental Implants in Minipigs 12
10. Zirconia reconstructions cemented on non-original titanium bases may result in increased bleeding on probing, probing depth values and varying mean marginal bone levels 13
REFERENCES 13

# in this issue

## EDITOR'S CHOICE

Clinical and radiographic evaluation of implant-supported single-unit crowns with cantilever extension in posterior areas: A retrospective study with a follow-up of at least 10 years
*(E Schmid et al. 2021)*

**and**

Short implants (≤6mm) as an alternative treatment option to maxillary sinus lift
*(P Carosi et al. 2021)*

The Implant Supracrestal Complex and Its Significance for Long-Term Successful Clinical Outcomes
*(N Mattheos et al. 2021)*

Flapless application of enamel matrix derivative in periodontal retreatment: A multicentre randomized feasibility trial
*(H F R Jentsch et al. 2021)*

# Editor's choice

Clin Implant Dent Relat Res 2021 Jan 15. doi: 10.1111/cid.12973.

## Clinical and radiographic evaluation of implant-supported single-unit crowns with cantilever extension in posterior areas: A retrospective study with a follow-up of at least 10 years

*E Schmid, A Roccuzzo, M Morandini, C A Ramseier, A Sculean, G E Salvi*

### Study objectives and methods

Implant-supported restorations with cantilever extension may display high rates of biological and technical complications. The purpose of this study was to report the outcomes of single-unit crowns with cantilever extension (SCCs).

Patients with SCCs were reevaluated after ≥10 years of loading. Radiographic marginal bone levels (mBLs) at baseline (ie, delivery of SCCs) and follow-up were calculated and compared between implant surfaces adjacent to and distant from the cantilever extension. Implant survival and success rates were calculated.

### Results

- Twenty-one patients with 25 SCs supported by 25 implants were reevaluated after a mean of 13.6 ± 3.8 years (range: 10-19 years). No implants were lost.
- The mean overall mBLs changed from 0.99 mm ± 0.95 at baseline to 0.95 mm ± 0.99 at follow-up (p = 0.853).
- The mean pocket probing depths changed from 3.39 mm ± 0.62 at baseline to 3.34 mm ± 0.54 at follow-up (p=0.635).
- Loss of retention occurred 3× in 2 patients (14.3%).
- At follow-up, peri-implant health was diagnosed in 10 (48%) and peri-implant mucositis in 11 (52%) patients, respectively.

### Conclusions

Within the limitations of the present study, the use of implant supported SCs with cantilever extension in posterior areas represents a reliable long-term treatment option with a 100% implant survival rate and minimal marginal bone level changes.

*Adapted from* E Schmid *et al., Clin Implant Dent Relat Res 2021 Jan 15, for more info about this publication click* HERE

Int J Oral Maxillofac Surg. 2021 Feb 23; S0901-5027(21)00055-2.

# Short implants (≤6mm) as an alternative treatment option to maxillary sinus lift

*P Carosi, C Lorenzi, F Lio, M Laureti, N Ferrigno, C Arcuri*

## Study objectives and methods

The aim of this systematic review was to evaluate survival rate of short dental implants placed in the posterior area of the maxilla.

The electronic literature search of studies published between January 1, 2010 and February 29, 2020 was performed using specific word combinations. The outcome was to meta-analyse the implant survival rate (ISR). The search generated 238 potential studies. After screening procedures, only nine randomized controlled trials fulfilled the inclusion criteria and were selected for qualitative and quantitative analysis

## Results

- ISR of short implants ranged from 91.9% to 100%, while standard-length implants ISR ranged from 82.9% to 100% with a follow-up from 1 to 5 years in function.
- The risk ratio difference was 1.24 (95% confidence interval: 0.63-2.45, P=0.52) for short dental implants failure when compared with standard dental implants and was not statistically significant.

## Conclusions

Based on the evidence of the included studies, short implants (≤6mm) reported high survival rates over short to medium follow-up in posterior maxilla, but the long-term success is as yet not demonstrated.

*Adapted from P Carosi et al., Int J Oral Maxillofac Surg. 2021 Feb 23, for more info about this publication click* HERE

Int J Prosthodont. Jan-Feb 2021;34(1):88-100. doi: 10.11607/ijp.7201.

# The Implant Supracrestal Complex and Its Significance for Long-Term Successful Clinical Outcomes

*N Mattheos, I Vergoullis, M Janda, A Miseli*

## Study objectives and methods

The aim of this randomized multicenter clinical trial was to evaluate and compare the performance of anterior all-ceramic implant crowns based either on prefabricated zirconia abutments veneered with pressed ceramics or on CAD/CAM zirconia abutments veneered with the hand build-up technique.

Forty implants were inserted in sites 14-24 in two centers, the Universities of Bern and Geneva, Switzerland. Twenty patients each were randomized into either Group A and restored with one-piece single crown made of a prefabricated zirconia abutment with pressed ceramic, or Group B using an individualized CAD/CAM zirconia abutment with the hand-layered technique. After 3 years, clinical, esthetic, and radiographic parameters were assessed.

## Results

- Group A exhibited one dropout patient and one failure resulting in a survival rate of 89% after 3 years and two failures for Group B (90%).
- Clinical parameters presented healthy peri-implant soft tissues.
- There were no significant differences at baseline, 6 months, and 1 and 3 years for DIB values between the two groups.

## Conclusions

Both implant-supported prosthetic pathways represent a valuable treatment option for the restoration of implant crowns in the anterior maxilla.

*Adapted from N Mattheos., et al., Int J Prosthodont. Jan-Feb 2021;34(1):88-100, for more info about this publication click* HERE

J Clin Periodontol. 2021 Feb 2. doi: 10.1111/jcpe.13438.

# Flapless application of enamel matrix derivative in periodontal retreatment: A multicentre randomized feasibility trial

*H F R Jentsch, M Roccuzzo, A Pilloni, A Kasaj, R Fimmers, S Jepsen*

## Study objectives and methods

To investigate the potential benefit of enamel matrix derivative (EMD) as adjunct to re-instrumentation of residual pockets persisting after steps 1 and 2 of periodontal therapy.

44 adult patients participated in a multicenter feasibility randomized clinical trial with split-mouth design. They had presented at re-evaluation after initial non-surgical periodontal therapy (steps 1 and 2 of periodontal therapy) for generalized periodontitis with at least 2 teeth with residual probing pocket depths (PPD) ≥5 and ≤8 mm, with bleeding on probing (BOP). Two teeth with similar PPD were randomized to receive re-instrumentation either with (test) or without (control) adjunctive flapless administration of EMD. Differences in the changes of PPD and BOP from baseline to 6 and 12 months were analysed, and the frequencies of pocket closure (PPD ≤4 mm and no BOP) compared.

## Results

- For the primary outcome "change of mean PPD after 6 months," a significant additional benefit of 0.79 ± 1.3 mm ($p < .0001$) could be observed for the test group.
- At 12 months, this difference could be maintained (0.85 ± 1.1 mm; $p < .0001$).
- The frequency of pocket closure in the test group was 69% at 6 and 80% at 12 months and significantly higher than in the control group with 34% and 42%, respectively ($p < .01$).

## Conclusions

The results of the present feasibility study indicate a benefit of adjunctive EMD during non-surgical retreatment (step 3 of periodontal therapy) of residual deep pockets.

*Adapted from H F R Jentsch.et al., J Clin Periodontol. 2021 Feb 2., for more info about this publication click* HERE

J Prosthet Dent. 2021 Feb 4; S0022-3913(20)30719-8. doi: 10.1016/j.prosdent.2020.09.051

# Influence of implant location on titanium-zirconium alloy narrow-diameter implants: A 1-year prospective study in smoking and non-smoking populations

*W Xiao, Y Chen, C Chu, M M Dard, Y Man*

## Study objectives and methods

Titanium-zirconium (Ti-Zr) alloy (Roxolid) narrow-diameter implants (NDIs) have been widely used for implant-supported prostheses in anterior and posterior regions in the jaws. However, the relationship between implant location and clinical outcome remains unclear.

The purpose of this clinical study was to evaluate and compare the clinical and radiographic outcomes of NDIs placed in different regions of the jaws in both smokers and nonsmokers.

Eighty-four participants scheduled to receive NDIs for tooth rehabilitation were included, and the inserted NDIs were divided into 3 groups depending on their locations: implants used to restore anterior teeth, implants used to restore premolars, and implants used to restore molars. Crestal bone loss (CBL), implant survival and success rates, bleeding on probing (BOP), and pocket probing depth (PPD) were evaluated 6 and 12 months after implant loading ( $\alpha$ =.017 for implant survival and success rates after Bonferroni correction, $\alpha$ =.05 for other parameters)

## Results

- Statistical analysis of 6- and 12-month CBL of all participants presented no statistically significant difference among the 3 groups.
- For smokers, the molar group presented significantly more CBL than the premolar group (0.90 ±0.94 versus 0.16 ±0.27 mm, P=.027) at the 6-month examination.
- The implant survival rates were 95.65%, 100%, and 100% for anterior, premolar, and molar regions, respectively (P=.283). No statistically significant difference was observed regarding periodontal parameters (P>.05).

## Conclusions

Implant location has no influence on the clinical and radiographic parameters of Ti-Zr NDIs placed in a nonsmoking population. However, the combination of posterior location and smoking may induce higher risk of crestal bone loss. Caution should be taken when restoring molars for smokers with NDIs.

*Adapted from W Xiao et al., Int J Prosthodont. Jan-Feb 2021;34(1):88-100, for more info about this publication click* **HERE**

J Clin Periodontol. 2021 Feb 1. doi: 10.1111/jcpe.13435.

# Association between periodontitis and severity of COVID-19 infection: A case-control study

*N Marouf, W Cai, K N Said, H Daas, H Diab, V Rao Chinta, A A Hssain, B Nicolau, M Sanz, F Tamimi*

## Study objectives and methods

COVID-19 is associated with an exacerbated inflammatory response that can result in fatal outcomes. Systemic inflammation is also a main characteristic of periodontitis. Therefore, we investigated the association of periodontitis with COVID-19 complications.

A case-control study was performed using the national electronic health records of the State of Qatar between February and July 2020. Cases were defined as patients who suffered COVID-19 complications (death, ICU admissions or assisted ventilation), and controls were COVID-19 patients discharged without major complications. Periodontal conditions were assessed using dental radiographs from the same database. Associations between periodontitis and COVID 19 complications were analysed using logistic regression models adjusted for demographic, medical and behaviour factors.

## Results

- In total, 568 patients were included.
- After adjusting for potential confounders, periodontitis was associated with COVID-19 complication including death (OR = 8.81, 95% CI 1.00-77.7), ICU admission (OR = 3.54, 95% CI 1.39-9.05) and need for assisted ventilation (OR = 4.57, 95% CI 1.19-17.4).
- Similarly, blood levels of white blood cells, D-dimer and C Reactive Protein were significantly higher in COVID-19 patients with periodontitis.

## Conclusions

Periodontitis was associated with higher risk of ICU admission, need for assisted ventilation and death of COVID-19 patients, and with increased blood levels of biomarkers linked to worse disease outcomes.

*Adapted from N Marouf et al., J Clin Periodontol. 2021 Feb 1, for more info about this publication click* HERE

J Int Acad Periodontol. 2021 Jan 1;23(1):31-56

# Long-term Clinical Performance of Regeneration versus Conservative Surgery in the Treatment of Infra-bony Defects: A systematic review

*M S Shaikh, F Pisani, D D Vito, M A Lone, M Almasri*

## Study objectives and methods

To determine the differences in the long-term clinical outcomes between Regeneration (REG) and Conservative Surgery (CS) in infra-bony defects.

Three databases were searched [PubMed, Medline and Embase] up to April 2019. Following screening, 17 studies were included. Randomized Controlled Clinical Trials, Controlled Clinical Trials and retrospective studies with long-term clinical observations (≥ 24-months) were selected. After subgrouping the studies regarding the grafting material and the used flap, meta-analysis was performed for different outcomes [clinical attachment level gain (CALGain), probing pocket depth reduction (PPDRed), recession increase (RECInc) and bone fill (BF)] at different follow-ups (24-, 36-, 48- to 60- and 120- to 240-months).

## Results

- The time-related meta-analysis favoured REG at every interval for every outcome.
- In subgroup analysis, enamel matrix derivative (EMD) performed significantly better for both CALGain [24- (p less than 0.0001), 36- (p=0.02) and 60-months (p less than 0.00001)] and PPDRed [24- (p=0.0004), 36- (p=0.003) and 60-months (p less than 0.00001)].
- For Ceramic Grafts (CGs), CALGain at 48-months (p less than 0.00001) and PPDRed at 24- (p=0.0006), 36- (p less than 0.00001) and 48-months (p less than 0.00001) follow-up showed better results.

## Conclusions

The better outcomes from REG using EMD or CGs can be maintained for a longer duration, suggesting a potential longevity of the occurred healing.

*Adapted from M S Shaikh et al., J Int Acad Periodontol. 2021 Jan 1;23(1):31-56, for more info about this publication click* HERE

Clin Oral Implants Res. 2021 Feb 25. doi: 10.1111/clr.13729.

# Thermal exposure of Implant Osteotomies and its impact on Osseointegration - A preclinical in vivo study

*R Heuzeroth, B E Pippenger, R Sandgren, B Bellón, S Kühl*

## Study objectives and methods

Thermal and mechanical stresses during osteotomy preparation can impair implant osseointegration. This study investigated implant osseointegration following the measurement of temperature exposure during osteotomy drilling, varying drill design, sequence and drill wear.

36 tapered implants were placed in a mandibular minipig model after guided drilling of implant osteotomies using 4 different groups: (1) control drills with a conservative, sequential drilling sequence (2) control drills using a shortened drill sequence (PF) (3) Novel test drill displaying an optimized drill design and surface treatment, PF (4) aged test drill, PF. Intraosseous temperatures during drilling were measured using a temperature probe. BIC, fBIC and tissue reactions were histomorphometrically derived after 2 and 8 weeks of healing.

## Results

- Compared to control Drills (1) or (2) test drills (3) resulted in significantly lower maximum temperatures ((35.4 (CI 30.2-40.5)°C vs. (46.5 (CI 41.0-52.0)°C, p=0.0021)) and shorter drill times ((4.5 (CI 1.6-7.3)sec vs. 10.3 (7.3-13.4)sec).
- Lower osteotomy temperature values and shorter drill times corroborated with significantly higher BIC after 2- and 8-weeks healing for the test (3) compared to control groups (2) (2 weeks: (44.9 (CI 34.1-55. 7)% vs (31.3 (CI 20.5-42.2)%, p=<0.0001 and 8 weeks: (73.7 (CI 64.2-83.2)% vs (66.2 (CI 57.0-75.4)%, p=<0.0455)

## Conclusions

The improved osseointegration of implants placed after osteotomy preparation with novel test drills using a shortened drill sequence compared to standard drills and conventional drill protocols might be attributed to more favorable thermal profiles and less mechanical stress exerted on the bone surrounding the implant osteotomy.

*Adapted from R Heuzeroth et al., Clin Oral Implants Res. 2021 Feb 25, for more info about this publication click* HERE

Int J Oral Maxillofac Implants. Nov/Dec 2020;35(6):1122-1131. doi: 10.11607/jomi.8265.

# A Novel Xenograft Bone Substitute Supports Stable Bone Formation in Circumferential Defects Around Dental Implants in Minipigs

*S Catros, R Sandgren, B E Pippenger, J C Fricain, V Herber, E El Chaar*

## Study objectives and methods

The aim of this study was to evaluate and compare bone growth and implant integration in circumferential defects with two commercially available bone substitutes (demineralized bovine bone mineral [DBBM]).

Circumferential defects were created in the mandibles of minipigs (n = 10), and Bone Level Tapered implants (Straumann Roxolid with SLActive surface) were placed. The defects (4-mm-deep circumferential defect, 2 mm around each implant) were augmented with either sintered bovine bone mineral (test, cerabone) or natural bovine bone mineral (control, Bio-Oss). Bone formation and tissue composition in augmented sites were histomorphometrically assessed after 8 and 12 weeks of healing time (n = 5 each), respectively, in terms of the percentage of area of newly formed bone to total area, bone-to-implant contact (BIC), and crestal bone height relative to the implant shoulder (first bone-to-implant contact [fBIC]).

## Results

- Bone formation in all defect sites was adequate and equivalent for both groups at individual healing time points.
- The amount of residual graft material was comparable in both groups after 8 and 12 weeks, with no significant resorption in either group.
- The mean newly formed bone area in the test group amounted to 46.7% ± 5.1% and 48.7% ± 4.0% after 8- and 12-weeks vs 47.0% ± 4.8% and 47.8% ± 7.3% in the control group, respectively.
- BIC and fBIC as individually assessed for the lingual and buccal aspects were comparable at both healing time points without any statistically significant differences between the groups.
- A slightly greater variability of fBIC was observed within the test group.

## Conclusions

The results of this study indicate that test and control materials both represent viable bovine bone graft material that equivalently support the formation of new and stable bone volume specifically when used for simultaneous augmentation around implants.

*Adapted from S Catros et al., Int J Oral Max Imp. Nov/Dec 2020;35(6):1122-1131, for more info about this publication click* HERE

Int J Prosthodont. 2021 Feb 12. doi: 10.11607/ijp.6999

# Zirconia reconstructions cemented on non-original titanium bases may result in increased bleeding on probing, probing depth values and varying mean marginal bone levels

*L Stucki, A G Asgeirsson, RE Jung, I Sailer, C H Hämmerle, D S Thoma*

## Study objectives and methods

To assess the clinical, technical, and esthetic outcomes of directly veneered zirconia abutments cemented onto non-original titanium bases over 3 years.

A total of 24 healthy patients with a single missing tooth in the maxilla or mandible (incisors, canines, or premolars) received a two-piece implant with a screw-retained veneered zirconia restoration extra orally cemented on a titanium base abutment. Baseline measurements and follow-up examinations were performed at 6 months, 1 year, and 3 years following loading. Radiographic, clinical, technical, and esthetic parameters were assessed. Wilcoxon signed rank test was used to analyze the data.

## Results

- Mean marginal bone levels measured 0.54 ± 0.39 mm (median: 0.47 mm, range: 0.07 mm to 1.75 mm) at baseline and 0.52 ± 0.39 mm (median: 0.39 mm, range: 0.06 mm to 1.33 mm) at 3 years.
- Mean probing depth around the implants increased from 3.0 ± 0.6 mm at baseline to 3.8 ± 0.8 mm at 3 years (P = .001). Bleeding on probing changed from 27.1% ± 20.7% (baseline) to 51.5% ± 26.1% (3 years) (P = .001).
- The mean plaque control record amounted to 11.1% ± 21.2% (baseline) and 14.4% ± 13.89% (3 years) (P = .261).
- Two implants were lost at 3.5 and 30 months post loading due to peri-implantitis, resulting in a 91.7% implant survival rate. Patient satisfaction was high at 3 years.

## Conclusions

Zirconia restorations cemented onto the tested non-original titanium bases should not be recommended for daily clinical use, as they were associated with significant increases in BOP and PD values and varying marginal bone levels 3 years after placement.

*Adapted from L Stucki et al., Int J Prosthodont. 2021 Feb 12, for more info about this publication click* HERE

## References

**E Schmid et al.,** Clin Implant Dent Relat Res 2021 Jan 15 | **P Carosi et al**., Int J Oral Maxillofac Surg. 2021 Feb 23 | **N Mattheos., et al**., Int J Prosthodont. Jan-Feb 2021;34(1):88-100 | **H F R Jentsch.et al.,** J Clin Periodontol. 2021 Feb 2 | **W Xiao et al.,** Int J Prosthodont. Jan-Feb 2021;34(1):88-100 | **N Marouf et al**., J Clin Periodontol. 2021 Feb 1 | **M S Shaikh et al**., J Int Acad Periodontol. 2021 Jan 1;23(1):31-56 | **R Heuzeroth et al.,** Clin Oral Implants Res. 2021 Feb 25 | **S Catros et al.,** Int J Oral Max Imp. Nov/Dec 2020;35(6):1122-1131 | **L Stucki et al**., Int J Prosthodont. 2021 Feb 12 | source: www.pubmed.gov | Dr Nair holds a position of Global Scientific Communications Manager at Institute Straumann in Basel, Switzerland.

straumann

SH_02_21