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Scientific Highlights

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

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Edited by Dr. Marcin Maj

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in this issue



EDITOR'S CHOICE

Benchmark performance of anodized vs. sandblasted implant surfaces in an acute dehiscence type defect animal model

(S Shadad et al. 2022)

and

Prospective Clinical Multicenter Study Evaluating the 5-Year Performance of Zirconia Implants in Single-Tooth Gaps

(Gahlert et al. 2022)

Flapped versus flapless surgery and delayed versus immediate loading for a four mini implant mandibular overdenture: A RCT on post-surgical symptoms and short-term clinical outcomes

(C Leles et al. 2022)

Survival rates, patient satisfaction, and prosthetic complications of implant fixed complete dental prostheses: a 12-month prospective study

(T Nikellis et al. 2022)

Editor's choice

Clin Oral Implants Res. 2022 Sep 19.

Benchmark performance of anodized vs. sandblasted implant surfaces in an acute dehiscence type defect animal model

Shakeel Shahdad, Dieter Bosshardt, Mital Patel, Nahal Razaghi, Anuya Patankar, Mario Rocuzzo



Study objectives and methods

This controlled preclinical study analyzed the effect of implant surface and implant geometry on de novo crestal bone formation and osseointegration.

Histological and histomorphometrical analysis was performed to compare three implant groups, that is, (1) a novel, commercially available, gradient anodized implant, (2) a custom-made geometric replica of implant "1," displaying a superhydrophilic micro-rough large-grit sandblasted and acid-etched surface, and (3) a commercially available implant, having the same surface as "2" but a different implant geometry. The study applied a standardized buccal acute-type dehiscence model in minipigs with observation periods of 2 and 8 weeks of healing.

Results

- The amount of newly formed crestal bone (BATA) around control groups (2) and (3) was significantly increased when compared to the test group (1) at the 8 weeks of healing time point.
- Similar results were obtained for all parameters related to osseointegration and direct bone apposition, to the implant surface (dBIC, VBC, and fBIC), demonstrating superior osseointegration of the moderately rough, compared to the gradient anodized functionalization.
- After 2 weeks, the osseointegration (nBIC) was found to be influenced by implant geometry with group (3) outperforming groups (1) and (2) on this parameter. At 8 weeks, nBIC was significantly higher for groups (2) and (3) compared to (1).

Conclusions

The extent (BATA) of de novo crestal bone formation in the acute-type dehiscence defects was primarily influenced by implant surface characteristics and their ability to promote osseointegration and direct bone apposition. Osseointegration (nBIC) of the apical part was found to be influenced by a combination of surface characteristics and implant geometry. For early healing, implant geometry may have a more pronounced effect on facilitating osseointegration, relative to the specific surface characteristics.

Adapted from S Shahdad et al. Clin Oral Implants Res. 2022 Sep 19., for more info about this publication click [HERE](#)

Int J Oral Maxillofac Implants. 2022 Jul-Aug;37(4):804-811.

Prospective Clinical Multicenter Study Evaluating the 5-Year Performance of Zirconia Implants in Single-Tooth Gaps

Michael Gahlert, Heinz Kniha, Sabine Laval, Nils-Claudius Gellrich, Kai-Hendrik Bormann

Study objectives and methods

The aim of this study was to assess the clinical and radiographic data for monotype ceramic implants that have remained in place for 60 months under masticatory loading. Monotype ceramic implants (Straumann) were used according to a standard protocol. Provisional prostheses were placed after 3 months, followed by final prostheses 3 months later. Patients were invited for a 60-month follow-up. Implant survival was analyzed from lifetime data. Success rates and crestal bone levels were evaluated from implant placement to 6, 12, 36, and 60 months after surgery.

Results

- From the initial 44 patients recruited, 36 were analyzable for the 60-month follow-up.
- With one implant lost before the 6-month followup, the survival rate after 60 months was 97.7%, and the mean survival time was 58.7 months. Sixty months after implant placement, the success rate was 97.2% (95% confidence interval = 84.6% to > 99.9%).
- Mean bone loss after 60 months was 0.99 (\pm 0.59) mm.

Conclusions

Ceramic implants can be used as an alternative to titanium implants at the request of patients and if specifically indicated, for example, due to titanium intolerance.

Adapted from M Gahlert et al., *Int J Oral Maxillofac Implants*. 2022 Jul-Aug;37(4):804-811., for more info about this publication click [HERE](#)

Clin Oral Implants Res. 2022 Sep;33(9):953-964.

Flapped versus flapless surgery and delayed versus immediate loading for a four mini implant mandibular overdenture: A RCT on post-surgical symptoms and short-term clinical outcomes

Cláudio Rodrigues Leles, Marcella Silva de Paula, Thalita Fernandes Fleury Curado, Jéso Rodrigues Silva, José Luiz Rodrigues Leles, Gerald McKenna, Martin Schimmel

Study objectives and methods

This factorial randomized clinical trial (RCT) tested the effects of the surgical approach (flapped-FPS vs. flapless-FLS surgery) and loading protocol (delayed-DL vs. immediate-IL) for treatment with a four mini implant mandibular overdenture. A total of 296 one-piece titanium-zirconium mini-implants were inserted in 74 patients (IL/FLS = 17; IL/FPS = 18; DL/FLS = 20; and DL/FPS = 19). Outcomes included patient's perceived surgical burdens, clinical time, implant survival, and post-surgical symptoms and complications, assessed immediately after surgery, in the 7-day and 6-week follow-ups.

Results

- Perceived surgical burdens were relatively low, higher for females, and no difference was found between FPS and FLS surgery.
- Surgical time was lower for FLS surgery.
- Overall symptoms were mild after 24 h, and higher for females. Less symptoms were recorded for the FLS surgery compared to the FPS for the delayed loading patients, and FLS surgery was associated with a lower risk of bleeding.
- No early implant failure was observed until the 6-week follow-up.
- Delayed was associated with discontinuous use of the prosthesis and poor function.
- Lower complaint rates were observed for immediate loading regardless of the surgery protocol.

Conclusions

Mini implants for mandibular overdenture are a feasible option regardless of surgical access and loading protocol, with high safety and predictable survival rates, and low incidence of post-insertion complications. FLS surgery requires less clinical time and results in easier intraoral prosthetic incorporation of attachments compared to FPS surgeries. Immediate loading did not increase the risk of early implant failure when satisfactory primary stability was achieved.

Adapted from C Leles et al., *Clin Oral Implants Res.* 2022 Sep;33(9):953-964, for more info about this publication click [HERE](#)

J Prosthodont. 2022 Aug 14

Survival rates, patient satisfaction, and prosthetic complications of implant fixed complete dental prostheses: a 12-month prospective study

Theocharis Nikellis, Evangelia Lampraki, Davide Romeo, Alexandra Tsigarida, Abdul Basir Barmak, Charikleia Malamou, Carlo Ercoli, Panos Papaspyridakos, Elli Anna Kotsailidi, Konstantinos Chochlidakis

Study objectives and methods

This study was performed to determine the survival rate, incidence of prosthetic complications, and patient satisfaction of implant fixed complete dental prostheses (IFCDPs) after a mean observation period of 1.4 years.

Twenty-eight eligible participants were recruited according to specific inclusion and exclusion criteria. The definitive metal-acrylic resin IFCDPs consisted of titanium bars veneered with acrylic resin and acrylic denture teeth. Prosthodontic complications, divided into major and minor, were monitored. Parameters such as gender, jaw location, bruxism, and occlusal scheme were evaluated. Moreover, a questionnaire was administered throughout the study to assess patient satisfaction.

Results

- All IFCDPs survived (100% survival rate).
- The most frequent minor complication was the loss of material used to close the screw access hole (20% out of total complications).
- The most frequent major complication was chipping of the acrylic denture teeth (77.14% out of total complications).
- Gender ($p = 0.008$) and bruxism ($p = 0.030$) were significant predictors for the total major complications (major wear and major chipping) while occlusal scheme was a significant predictor for major chipping events ($p = 0.030$).

Conclusions

While IFCDPs demonstrated high prosthetic survival rates, they also exhibited a high number of chipping events of the acrylic veneering material, especially in males, bruxers, and individuals with canine guidance occlusion. However, the occurrence of these prosthetic complications did not negatively affect patient satisfaction.

Adapted from T Nikellis et al., J Prosthodont. 2022 Aug 14, for more info about this publication click [HERE](#)

Compend Contin Educ Dent. 2022 Sep;43(8):482-488

Ceramic Dental Implants: An Overview of Materials, Characteristics, and Application Concepts

Jens Tartsch, Markus B Blatz

Abstract

The clinical application of modern bioceramics is no longer limited only to prosthetic restorations. Zirconia is also successfully used as a dental implant material, enabling a metal-free restoration concept in most cases. The demand for such metal-free solutions is steadily rising mainly because of patients' increased health awareness. With the development of new materials, microrough surfaces, and improved treatment protocols, implants made of zirconium dioxide are already achieving results comparable to those of titanium. This advancement will enable clinicians to leverage the clinical advantages of ceramic implants in daily practice as an additional reliable treatment alternative to titanium implants. However, to successfully use ceramic implants, practitioners should have knowledge of the background of zirconium dioxide material and its particular features in clinical application, as presented in this overview article.

Adapted from J Tartsch et al. *Compend Contin Educ Dent.* 2022 Sep;43(8):482-488, for more info about this publication click [HERE](#)

BMC Oral Health. 2022 Aug 8;22(1):332.

Primary stability of different implant macrodesigns in a sinus floor elevation simulated model: an ex vivo study

Mikio Imai, Yoichiro Ogino, Hideaki Tanaka, Kiyoshi Koyano, Yasunori Ayukawa, Takeshi Toyoshima



Study objectives and methods

The aim of this study was to evaluate the primary stability in the implants with different macrodesigns in an SFE simulated model. Five types of Straumann® 10 mm length implants (Standard Plus; SP, Tapered Effect; TE, Bone Level; BL, Bone Level Tapered; BLT and BLX) and two types of Straumann® 6 mm length implants (SP short, BLX short) were used in this study. Each implant was inserted through 5 mm-thick porcine iliac crest blocks (an SFE simulated model). Primary stability was evaluated by using MIT and ISQ.

Results

- The mean value of MIT for BLX group showed significantly higher values than SP, BL ($p < 0.01$), and TE ($p < 0.05$) groups.
- The mean value of ISQ for BLX group was significantly higher than the other groups ($p < 0.01$).
- The mean value of MIT and ISQ for BLX and BLX short group were significantly higher than those for SP and SP short group ($p < 0.01$).

Conclusions

These results suggest that implant selection can play a crucial role in the achievement of primary stability during SFE and simultaneous implant placement.

Adapted from M Imai et al., BMC Oral Health. 2022 Aug 8;22(1):332., for more info about this publication click [HERE](#)

J Prosthodont. 2022 Aug 8.

Patient-reported outcome measures compared to professional dental assessments of monolithic ZrO₂ implant fixed dental prostheses in complete digital workflows: A double-blind crossover randomized controlled trial

Aiste Gintaute, Nicola U Zitzmann, Urs Brägger, Karin Weber, Tim Joda

Study objectives and methods

This double-blind randomized controlled trial analyzed patient-reported outcome measures in terms of subjective patient satisfaction compared to objective dental evaluation of prosthetic treatment with 3-unit monolithic zirconium dioxide implant fixed dental prostheses (iFDPs) in 3 digital workflows.

Twenty patients were restored with 3 iFDPs each on Straumann TL-implants with 2 completely digital workflows using different intraoral optical scanning systems with model-free fabrication of the restoration (Trios 3/3Shape [Test-1]; Virtuo Vivo/Straumann [Test-2]), and mixed analog-digital workflow with conventional impressions and digitized gypsum casts (Impregum/3M Espe [Control]). The order of impression-taking and the prosthetic try-in were randomly allocated.

Results

- For iFDP evaluation, patients generally provided more favorable ratings than dental experts, regardless of the workflow.
- ANOVA revealed no significant difference for overall satisfaction when comparing Test-1, Test-2, or Control, either for patients (f-ratio: 0.13; p = 0.876) or dentist (f-ratio: 1.55; p = 0.221).
- Secondary, patients clearly favored the digital impression workflows over the conventional approach (f-ratio: 14.57; p < 0.001).
- Overall, the 3Shape workflow (Test-1) received the highest scores for all analyses.

Conclusions

The different digital workflows demonstrated minor influence on the subjective and objective evaluation of the monolithic zirconium dioxide iFDPs in nonesthetic regions; however, the dentist may significantly increase patient satisfaction by choosing intraoral scanning instead of conventional impressions.

Adapted from A Gintaute et al., J Prosthodont. 2022 Aug 8., for more info about this publication click [HERE](#)

Clin Oral Implants Res. 2022 Aug;33(8):844-857

Narrow diameter implants to replace congenital missing maxillary lateral incisors: A 1-year prospective, controlled, clinical study

Andrea Rocuzzo, Jean-Claude Imber, Jakob Lempert, Mandana Hosseini, and Simon Storgård Jensen



Study objectives and methods

The purpose of this study was to report the clinical, radiographic, esthetic, and patient-reported outcomes after placement of a newly developed narrow-diameter implant (NDI) in patients with congenitally missing lateral incisors (MLIs). Patients with MLIs with a mesio-distal distance between the canine and the central incisor of 5.9–6.3 mm received a dental implant with a diameter of 2.9 mm (Test), while a diameter of 3.3 mm (Control) was used when the distance was 6.4–7.1 mm. After healing, a cement-retained bi-layered zirconia crown was fabricated. At the 1-year follow-up (T2), implant survival rate, marginal crestal bone level (CBL) changes, biological and technical complications were registered.

Results

- One Ø3.3 mm implant was lost, and seven patients dropped out of the study, yielding an implant survival rate of 99% ($p = 1.000$).
- At T2 a. CBL of -0.19 ± 0.25 mm (Test) and -0.25 ± 0.31 mm (Control) was detected, with no statistically significant difference between the groups ($p = .342$). Good to excellent esthetic scores (i.e., 1–2) were recorded in most of cases.
- Technical complications (i.e., loss of retention, abutment fracture, and chipping of veneering ceramic) occurred once in three patients with no statistically significant difference between the groups ($p > .05$).
- OHIP scores did not differ significantly at follow-ups between groups ($p = .110$).

Conclusions

The use of Ø2.9 mm diameter implants represents as reliable a treatment option as Ø3.3 mm implants, in terms of CBL changes, biological and technical complications.

Adapted from A Rocuzzo et al., *Clin Oral Implants Res.* 2022 Aug;33(8):844-857, for more info about this publication click [HERE](#)

Periodontol 2000. 2022 Aug 11

Minimal invasiveness in soft tissue augmentation at dental implants: A systematic review and meta-analysis of patient-reported outcome measures

Daniel S Thoma, Franz J Strauss, Leonardo Mancini, Thomas J W Gasser, Ronald E Jung

Study objectives and methods

The aim of this study was to compare patient-reported outcome measures (PROMs) of soft tissue substitutes versus autogenous grafts for soft tissue augmentation procedures at implant sites. Comprehensive and systematic literature searches were performed until December 2021. A focused question was formulated based on the Population, Intervention, Comparison and Outcome criteria (PICO). Randomized controlled clinical trials, prospective-, retrospective- and case-series studies were included.

Results

- There were no significant differences in satisfaction, aesthetics, and quality of life (OHIP-14) between soft tissue substitutes and autogenous grafts following soft tissue augmentation at implant sites.
- Soft tissue substitutes, compared to autogenous grafts, significantly improve PROMs following soft tissue augmentation at implant sites.

Conclusions

Soft tissue substitutes can reduce pain perception, amounts of painkillers and surgery time while achieving similar levels of patient's satisfaction as autogenous grafts without impairing the clinical outcomes. The current evidence indicates that they constitute a valid and reliable alternative to minimize the invasiveness in soft tissue augmentation procedures at implant sites.

Adapted from D Thoma et al., *Periodontol 2000. 2022 Aug 11* for more info about this publication click [HERE](#)

References

S Shahdad et al. Clin Oral Implants Res. 2022 Sep 19 | **M Gahlert** et al., Int J Oral Maxillofac Implants. 2022 Jul-Aug;37(4):804-811 | **C Leles** et al., Clin Oral Implants Res. 2022 Sep;33(9):953-964 | **T Nikellis** et al., J Prosthodont. 2022 Aug 14 | **J Tratsch** et al. Compend Contin Educ Dent. 2022 Sep;43(8):482-488 | **M Imai** et al., BMC Oral Health. 2022 Aug 8;22(1):332 | **A Gintaute** et al., J Prosthodont. 2022 Aug 8 | **A Rocuzzo** et al., Clin Oral Implants Res. 2022 Aug;33(8):844-857 | **D Thoma** et al., Periodontol 2000. 2022 Aug 11 | source: www.pubmed.gov | Dr. Marcin Maj holds a position of Global Head of Scientific Affairs at Institute Straumann in Basel, Switzerland