Scientific Highlights

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

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Edited by Dr Pooja Nair

in this issue

EDITOR'S CHOICE

Immediate Vs. Early Loading of Bone Level Tapered Dental Implants with Hydrophilic Surface in Fully Edentulous Maxilla: Clinical and Patient-Centered Outcomes
(A Markovic et al. 2021)

and

Computer-Aided Surgery and Immediate Loading to Rehabilitate Complete Arch with Four Dental Implants and Fixed Screw-Retained Prosthesis Up to 4 Years in Function: A Retrospective Study
(P Carosi et al. 2021)

Is titanium-zirconium alloy a better alternative to pure titanium for oral implant? Composition, mechanical properties, and microstructure analysis
(A Sharma et al. 2021)

Biocompatibility and Osteogenic Potential of Calcium Silicate-Based Cement Combined with Enamel Matrix Derivative: Effects on Human Bone Marrow-Derived Stem Cells
(H M Kim et al. 2021)

Editor's choice

J Oral Implantol. 2021 Dec 22. doi: 10.1563/aaid-joi-D-21-00045.

Immediate Vs. Early Loading of Bone Level Tapered Dental Implants with Hydrophilic Surface in Fully Edentulous Maxilla: Clinical and Patient-Centered Outcomes

A Markovic, T Mišić, B Janjić, M Šćepanović, B Trifković, B Ilić, A M Todorović, J Marković, M M Dard

Study objectives and methods

The aim was to compare changes among primary and secondary implant stability between immediate and early loaded implants in edentulous maxilla, (ii) evaluate oral health related quality of life (OHRQoL) and (iii) determine patient satisfaction with 6-implant supported fixed full-arch dentures.

A prospective, randomized controlled clinical trial was conducted on 24 edentulous maxilla patients. The BLT SLActive® implants in 12 patients were immediately loaded with temporary restorations while12 patients did not receive temporary restorations. Definitive (final) dentures were delivered to all patients after 6 weeks. Stability of the implants were assessed by Insertion Torque (IT) and Resonance Frequency Analysis (RFA). Oral Health Impact Profile-19 (OHIP-19) questionnaire was used to evaluate OHRQoL and a Visual Analogue Scale (VAS) for patient satisfaction.

Results

- The IT value of implants assigned for immediate and early loading group was 27.17±9.55Ncm and 25.01±11.06Ncm, respectively.
- Changes in implant stability from baseline to week 6 were similar in both groups when measured by Penguin ® (p=0.881) and Ostell ® (p= 0.828).
- Patients in the immediate load group reported significantly lower OHIP physical pain scores (p=0.016), OHIP psychological disability score (p=0.046) and significantly higher VAS function score (p=0.009) and VAS aesthetics score (p=0.009).

Conclusions

Implant loading protocols don't have a significant effect on the change in implant stability 6 weeks after implantation, however, immediate loading significantly improves OHRQoL and satisfaction of patients with maxillary edentulism treated by fixed full-arch dentures.

Future trials will determine the role of immediate loading protocol in clinical scenarios with various amounts of available jaw bone using different numbers of implants to retain a fixed prosthetic restoration in the edentulous maxilla.

Adapted from A Markovic, et al., J Oral Implantol. 2021 Dec 22., for more info about this publication click **HERE**

Int J Oral Maxillofac Implants. Nov-Dec 2021;36(6):1180-1187.doi: 10.11607/jomi.8946

Computer-Aided Surgery and Immediate Loading to Rehabilitate Complete Arch with Four Dental Implants and Fixed Screw-Retained Prosthesis Up to 4 Years in Function: A Retrospective Study

P Carosi, N Ferrigno, C Arcuri, M Laureti

Study objectives and methods

The aim of this study was to analyze retrospectively the clinical reliability of complete-arch rehabilitations with screw-retained fixed prostheses supported by four dental implants inserted with a fully guided surgical protocol.

All the implants were placed between December 1, 2015, and April 30, 2019. Digital implant surgical planning was performed for all the complete-arch rehabilitations, and then, fully guided surgery was performed. The fixed provisional prostheses were delivered the day of the surgery and replaced by definitive prostheses after the healing period. Patients were followed up to determine survival of the implants and success of the overall treatment.

Results

- A total of 160 implants were positioned in 37 patients, with three patients receiving rehabilitations in both arches.
- A total of 40 complete-arch rehabilitations were performed, 26 in the maxilla and 14 in the mandible.
- Only five implants failed, resulting in an overall implant survival rate of 96.9%.
- No definitive prostheses failed, resulting in a 100% prosthetic success rate.
- The failed implants were successfully replaced before definitive prostheses were made, resulting in an overall treatment success of 100%.

Conclusions

Within the limitations of this study, digital planning and guided surgery to perform complete-arch rehabilitations on four dental implants seems to be a valid treatment option. However, several prospective studies with longer follow-up are needed to achieve more predictable results.

Adapted from P Carosi et al., Int J Oral Maxillofac Implants. Nov-Dec 2021;36(6), for more info about this publication click HERE

Saudi Dent J. 2021 Nov;33(7):546-553. doi: 10.1016/j.sdentj.2020.08.009

Is titanium-zirconium alloy a better alternative to pure titanium for oral implant? Composition, mechanical properties, and microstructure analysis

A Sharma, J N Waddell, K C Li, L A Sharma, D J Prior, W J Duncan

Study objectives and methods

Titanium (Ti) is widely accepted as a biomaterial for orthopaedic and dental implants, primarily due to its capacity to integrate directly into the bone and its superior corrosion resistance. It has been suggested that titanium-zirconium alloy (TiZr), with 13-17% of zirconium, has better mechanical properties than pure Ti, but there are very few published studies assessing the suitability of TiZr for high-load- bearing implants. This study aimed to compare the mechanical properties and microstructures of TiZr and commercially pure titanium (Ti).

Pure Ti and TiZr alloy discs were prepared and subjected to characterisation by nanoindentation, electron dispersive spectroscopy (EDS), X-ray diffraction (XRD), and electron backscatter diffraction (EBSD).

Results

- The TiZr alloy was found to have significantly lower elastic modulus value ($p < 0.0001$) and greater hardness than Ti ($p < 0.05$).
- The EDS results confirmed the presence of Zr (13-17%) in the TiZr alloy, with XRD and EBSD images showing microstructure with the alpha phase similar to commercially available Ti.

Conclusions

The lower elastic modulus, higher hardness, presence of alpha phase, and the finer grain size of the TiZr alloy make it more suitable for high-load-bearing implants compared to commercially available Ti and is likely to encourage a positive biological response.

Adapted from A Sharma.et al, Saudi Dent J. 2021 Nov;33(7):546-553., for more info about this publication click HERE

Materials (Basel). 2021 Dec 15;14(24):7750.doi: 10.3390/ma14247750.

Biocompatibility and Osteogenic Potential of Calcium Silicate-Based Cement Combined with Enamel Matrix Derivative: Effects on Human Bone Marrow-Derived Stem Cells

H M Kim, D Lee, S Y Kim

Study objectives and methods

The characteristics of retrograde filling material are important factors that can affect the long-term success of apical microsurgery. Various calcium silicate-based cements (CSC) were introduced to overcome drawbacks of mineral trioxide aggregate (MTA), while Emdogain is known to be effective in the regeneration of periodontal tissues. The aim of this study is to evaluate the biocompatibility and osteogenic potential of various CSCs combined with Emdogain on human bone marrow-derived mesenchymal stem cells.
Experimental groups were classified into eight groups depending on the material and the presence of Emdogain.

Results

- In the cell-counting kit test, all experimental groups combined with Emdogain showed higher cell viability compared with those without Emdogain at days 1 and 2.
- In the wound-healing assay, cell migration increased significantly over time, with or without Emdogain.
- In the alkaline phosphatase assay, all groups treated with Emdogain showed higher activity compared with those without Emdogain at day 3 ($p < 0.05$).
- Using alizarin red S staining, all groups treated with Emdogain showed greater calcium nodule formation compared with those without Emdogain at days 7 and 14 ($p < 0.05$).

Conclusions

In conclusion, using CSCs as retrograde filling materials and the application of additional Emdogain will increase bone regeneration and improve the prognosis of apical microsurgery.

Adapted from H M Kim et al., Materials (Basel). 2021 Dec 15;14(24):7750., for more info about this publication click **HERE**

Int J Comput Dent. 2021 Dec 21;24(4):457-477.doi: 10.3290/j.ijcd.b2382983

A new method of conclusively creating and transferring the emergence profile on single tooth immediate implant restorations: the E-merge protocol

K Dada, L Pariente, J Valois

Study objectives

The purpose of this article is to propose a new protocol for the accurate transfer of the peri-implant soft tissue emergence profile (EP) using a customized healing abutment or a provisional restoration whose shape is integrated into prosthetic design software.

Seven focus questions were identified, and seven electronic search queries were conducted in PubMed. Human studies reporting on bleeding on probing, probing depth or case definitions of peri-implant mucositis and peri-implantitis were included.

Report

- The EP of the future restoration is created extraorally with an ideally shaped customized healing abutment or a provisional crown. Before insertion, the latter is screwed into a repositionable analog placed on a specially designed device and scanned with an intraoral scanner (IOS).
- This repositionable analog (Straumann RB Repositionable Implant Analog, Art. no. 065.0023), whose original purpose is to keep the correct orientation of the implant platform when placed in a printed model, is already available on the market. It is an exact replica of the implant with a corresponding external index. When scanned, it allows the digital transfer of the exact implant position and index.
- After healing, a full-mouth impression is made with an IOS without removing the customized healing abutment or provisional restoration. The STL files issued from both impressions are merged to produce a digital model used to design the final restoration, which can be inserted at the next appointment..

Conclusions

The technique described is simple, predictable, and precise. It does not require a traditional implant level impression or the use of a digital accessory such as a scanbody to transfer the 3D implant position and the peri-implant gingival contour.

Adapted from K Dada et al., Int J Comput Dent. 2021 Dec 21;24(4):457-477, for more info about this publication click **HERE**

Clin Oral Implants Res. 2021 Dec 18. doi: 10.1111/clr.13886.

Patient-reported outcome measures comparing static computer-aided implant surgery and conventional implant surgery for single-tooth replacement: A randomized controlled trial

C Kunavisarut, A Santivitoonvong, S Chaikantha, S Pornprasertsuk-Damrongsri, T Joda

Study objectives and methods

To compare static computer-aided implant surgery (s-CAIS) and conventional implant surgery (CIS) for single-tooth replacement in posterior sites in terms of patient-reported outcome measures (PROMs).

Forty patients were divided into two groups for treatment with s-CAIS (Test) and CIS (Control). Patients' anxiety level was measured using the modified dental anxiety score before implant surgery. After surgery, patients completed two questionnaires for 7 days. The first questionnaire assessed pain level using a visual analog scale (VAS) and the incident rate of pain using a 5-point Likert scale; analgesic intake was also recorded. The second questionnaire investigated patients' oral health-related quality of life (OHRQoL) including postoperative symptoms, oral function, and daily activity. The difference between data was compared at significance level (α = 0.05).

Results

- There was no statistically significant difference in pretreatment dental anxiety level, postoperative pain scores, and OHRQoL between treatment groups.
- Overall, mild or moderate dental anxiety was reported by 70% and 20% of patients, respectively.
- Pain score was significantly reduced by postoperative Day 3 in the test group and Day 4 in the control group, compared with baseline.
- Both groups significant reduced analgesic intake by postoperative Day 5.
- Most OHRQoL-related complaints subsided approximately 3 days after surgery.

Conclusions

Overall, PROMs between s-CAIS and CIS were not significantly different for the single-tooth implant surgery in the posterior area. Postoperative symptoms after implant surgery still inevitably occurred, reflecting the normal process of oral wound healing.

Adapted from C Kunavisarut., Clin Oral Implants Res. 2021 Dec 18, for more info about this publication click HERE

Medicina (Kaunas). 2021 Dec 20;57(12):1388. doi: 10.3390/medicina57121388

Survival Rates of Dental Implants in Autogenous and Allogeneic Bone Blocks: A Systematic Review

P Donkiewicz, K Benz, A Kloss-Brandstätter, J Jackowski

Study objectives and methods

Preliminary studies emphasize the similar performance of autogenous bone blocks (AUBBs) and allogeneic bone blocks (ALBBs) in pre-implant surgery; however, most of these studies include limited subjects or hold a low level of evidence. The purpose of this review is to test the hypothesis of indifferent implant survival rates (ISRs) in AUBB and ALBB and determine the impact of various material-, surgery- and patient-related confounders and predictors.

The national library of medicine (MEDLINE), Excerpta Medica database (EMBASE) and Cochrane Central Register of Controlled Trials (CENTRAL) were screened for studies reporting the ISRs of implants placed in AUBB and ALBB with ≥10 participants followed for ≥12 months from January 1995 to November 2021. The review was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The risk of bias was assessed via several scoring tools, dependent on the study design. Means of sub-entities were presented as violin plots.

Results

- An electronic data search resulted in the identification of 9233 articles, of which 100 were included in the quantitative analysis.
- No significant difference ($p = 0.54$) was found between the ISR of AUBB (96.23 ± 5.27%; range: 75% to 100%; 2195 subjects, 6861 implants) and that of ALBB (97.66 ± 2.68%; range: 90.1% to 100%; 1202 subjects, 3434 implants).
- The ISR in AUBB was increased in blocks from intraoral as compared to extraoral donor sites ($p = 0.0003$), partially edentulous as compared to totally edentulous ($p = 0.0002$), as well as in patients younger than 45 as compared to those older ($p = 0.044$), cortical as compared to cortico-cancellous blocks ($p = 0.005$) and in delayed implantations within three months as compared to immediate implantations ($p = 0.018$).
- The ISR of ALBB was significantly increased in processed as compared to fresh-frozen ALBB ($p = 0.004$), but also in horizontal as compared to vertical augmentations ($p = 0.009$).

Conclusions

The present findings widely emphasize the feasibility of achieving similar ISRs with AUBB and ALBB applied for pre-implant bone grafting. ISRs were negatively affected in sub-entities linked to more extensive augmentation procedures such as bone donor site and dentition status. The inclusion and pooling of literature with a low level of evidence, the absence of randomized controlled clinical trials (RCTs) comparing AUBB and ALBB and the limited count of comparative studies with short follow-ups increases the risk of bias and complicates data interpretation. Consequently, further long-term comparative studies are needed.

Adapted from P Donkiewicz et al., Medicina (Kaunas). 2021 Dec 20;57(12):1388, for more info about this publication click **HERE**

Antibiotics (Basel). 2021 Dec 22;11(1):8. doi: 10.3390/antibiotics11010008

Adjunctive effect of systemic antibiotics in regenerative/reconstructive periodontal surgery- a systematic review with meta-analysis

L Nibali, J Buti, L Barbato, F Cairo, F Graziani, S Jepsen

Study objectives and methods

Systemic antibiotics (AB) are often used in conjunction with regenerative/reconstructive periodontal surgery of intrabony defects and furcations; however, their potential benefits have not been systematically assessed.

Data were retrieved from two recent systematic reviews (a total of 105 randomized clinical trials (RCTs) on clinical and radiographic outcomes in intrabony defects (ID) and molars with furcation involvement (FI) treated by surgical access with regenerative techniques. Pair-wise meta-analysis of RCTs with and without AB was performed. Meta-regressions from single-arm (subgroup) RCTs including study arms with or without adjunctive AB were also conducted.

Results

- No statistically significant benefits of systemic AB with regard to PPD, CAL and bone gain were detected in ID by pair-wise meta-analysis.
- Meta-regression revealed increased PPD reduction (-0.91 mm, 95% CI = -1.30; -0.51, $p < 0.001$), CAL gain (-0.92 mm, 95% CI = -1.32; -0.52, $p < 0.001$) and bone gain (-1.08 mm, 95% CI = -1.63; -0.53, $p < 0.001$) in ID but not in any of the outcomes in FI for arms treated with AB vs. study arms treated with no AB.
- No clear differences in adverse events were detected between AB and non-AB groups.

Conclusions

There is only weak indirect evidence that AB may provide additional benefits in terms of clinical improvements in the regenerative/reconstructive periodontal surgery of intrabony defects and no evidence for a benefit in furcations. Until new data are gained and in the context of antibiotic stewardship, it may be questionable to justify the adjunctive use of systemic antibiotics.

Adapted from L Nibali et al., Antibiotics (Basel). 2021 Dec 22;11(1):8., for more info about this publication click HERE

References

A Markovic, et al., J Oral Implantol. 2021 Dec 22| **P Carosi et al.,** Int J Oral Maxillofac Implants. Nov-Dec 2021;36(6) | **A Sharma.et al,** Saudi Dent J. 2021 Nov;33(7):546-553| **H M Kim et al.,** Materials (Basel). 2021 Dec 15;14(24):7750| **K Dada et al.,** Int J Comput Dent. 2021 Dec 21;24(4):457-477| **C Kunavisarut.,** Clin Oral Implants Res. 2021 Dec 18| **P Donkiewicz et al.,** Medicina (Kaunas). 2021 Dec 20;57(12):1388| **L Nibali et al.,** Antibiotics (Basel). 2021 Dec 22;11(1):8 | source: www.pubmed.gov | Dr Nair holds a position of Global Scientific Communications Manager at Institute Straumann in Basel, Switzerland.

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