Science

Scientific Highlights

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

March – April 2019

Edited by Dr Marcin Maj

in this issue

Crestal bone level change around narrow and standard diameter implants with hydrophilic surface.
(Ghazal SS. et al. 2019).

Surface hydrophilicity facilitates attachment, proliferation and osteoblastic differentiation of human bone mesenchymal stem cells in vitro.
(Yin L. et al. 2019)

Prevalence of peri-Implantitis in implants with turned and rough surfaces.
(Saulacic N. et al 2019).

Editor's choice

Int J Oral Maxillofac Implants. 2019 Apr 1

A Randomized, Controlled, Multicenter Clinical Study Evaluating The Crestal Bone Level Change Of SLActive Bone Level Ø 3.3mm Implants Compared To SLActive Bone Level Ø 4.1mm Implants For Single -Tooth Replacement.

Ghazal SS, Huynh-Ba G, Aghaloo T, Dibart S, Froum S, O'Neal R, Cochran D

Study objectives

The purpose of this prospective randomized clinical trial was to test the hypothesis that narrow-diameter titanium-zirconium (Ti-Zr) alloy implants with a chemically modified hydrophilic surface are not inferior in regard to crestal bone level change compared with standard-diameter implants with the same implant surface and material (control).

Results and conclusions

- Fifty patients were enrolled; 47 completed the study. Twenty-three patients were in the narrow-diameter implant group (test), and 24 patients were in the standard-diameter implant group (control).
- The success and survival rates at 12 months postloading were 100% for both groups.
- The change in the mean crestal bone level from implant loading to 12 months postloading around narrow-diameter implants was -0.27 ± 0.34 mm. For the standard-diameter implants, the change was significantly higher at -0.48 ± 0.67 mm (P = .02). No significant difference was found in gingival recession and patient satisfaction.
- The results of this prospective randomized clinical trial suggest noninferiority of the narrow- vs standard-diameter Ti-Zr implant. In addition, bone remodeling was less pronounced for the narrow-diameter implants.

*Adapted from Ghazal SS et al., JOMI. 2019 Apr 1. for more info about this publication click **HERE***

Highlights

Dent Clin North Am. 2019 Apr;63(2):309-329

Consideration for Contemporary Implant Surgery.

Morton D, Phasuk K, Polido WD, Lin WS

Study objectives

The advancement of technology often provides clinicians and patients better clinical alternatives to achieve optimal treatment outcomes. Computer-guided options allow clinicians to realize the virtual prosthodontically driven surgical plan, facilitating more predictable implant placement. Although the use of technology does not mean the clinicians can forgo the fundamental treatment principles when treating a patient, proper assessment and diagnostic approach from prosthodontic, surgical, and radiographic perspectives are still essential for a successful clinical outcome. The purpose of this article is to review the fundamental concepts for the use of computer-guided surgery to facilitate prosthodontic treatment.

Adapted from Morton D et al., Dent Clin North Am. 2019 Apr;63(2):309-329, for more info about this publication click HERE

Clin Oral Implants Res. 2019 Apr 29.

European Association for Osseointegration Delphi study on the trends in Implant Dentistry in Europe for the year 2030.

Sanz M, Noguerol B, Sanz-Sanchez I, Hammerle CHF, Schliephake H, Renouard F, Sicilia A; Steering Committee, Cordaro L, Jung R, Klinge B, Valentini P, Alcoforado G(, Ornekol T, Pjetursson B, Sailer I, Rochietta I, Manuel Navarro J, Heitz-Mayfield L, Francisco H

Study objectives

The aim of this study was to assess the potential trends for the year 2030 in dental implant dentistry in Europe using the Delphi methodology. A steering committee and a management team of experts in implant dentistry were created and validated a questionnaire including 60 questions, divided in eight topics. The survey was conducted in two rounds using an anonymous questionnaire, which provided the participants in the second round with the results of the first.

Results and conclusions

- From all the invited experts, 52 answered in both the first and second rounds.
- Three different consensus categories were established based on the percentage of agreement: no consensus (<65%); moderate consensus (65%-85%); and high consensus (≥86%).
- Within the topic categories, a consensus was reached (mainly moderate consensus) for the majority of questions discussed among experts during a face to face consensus meeting.
- About 82% of the questions reached consensus. The consensus points towards a lower number of implants to replace chewing units, with implants surfaces made of bioactive materials with reduced micro-roughness using mainly customized abutments with polished surfaces and an internal implant-abutment connection (85%).
- CBCT-3D technologies will be the main tool for pre-surgical implant placement diagnosis together with direct digital restorative workflows.
- There will be an increase in the incidence of peri-implantitis, although there will be more efficient interventions its treatment and prevention.

Adapted from Sanz M et al., Clin Oral Implants Res. 2019 Apr 29., for more info about this publication click HERE

Clin Implant Dent Relat Res. 2019 Apr 22

Biological responses of human bone mesenchymal stem cells to Ti and TiZr implant materials.

Yin L, Chang Y, You Y, Liu C, Li J, Lai HC

Study objectives

The purpose of this study was to investigate the biological responses of hBMSCs to implant holes affected by the physicochemical properties of oral implants (TiSLA , TiSLActive , TiZrSLA , and TiZrSLActive). Physicochemical properties were detected and the biological responses of hBMSCs were observed.

Results and conclusions

- Surface morphology characterization by scanning electron microscopy and atomic force microscopy revealed differences between the four groups. SLActive had higher surface energy/wettability than SLA, indicating that increased surface energy/wettability can promote the absorption of osteogenic proteins and enhance osseointegration.
- hBMSCs seeded on SLActive substrates exhibited better performance in terms of cell attachment, proliferation and osteoblastic differentiation than cells seeded on SLA.
- Because of their more suitable physicochemical properties, TiSLActive and TiZrSLActive materials demonstrated more pronounced effects on the biological responses of hBMSCs compared with TiSLA and TiZrSLA

*Adapted from Yin L et al., Clin Implant Dent Relat Res. 2019 Apr 22, for more info about this publication click **HERE***

J Oral Maxillofac Res. 2019 Mar 31;10(1):e1

Prevalence of Peri-Implantitis in Implants with Turned and Rough Surfaces: a Systematic Review

Saulacic N, Schaller B

FREE FULL TEXT

Study objectives

The aim of this study was to compare the prevalence of peri-implantitis in implants with rough and turned (machined) implant surfaces

Results and conclusions

- Eight articles with 2992 implants were included in the systematic review. The incidence of peri-implantitis for two implant surfaces varied between studies. A meta-analysis was not feasible due to the heterogeneity among studies. Implant with rough surfaces were more favourable for plaque accumulation during short-term follow-up.
- On a long-term, turned implants surfaces were associated with more plaque and higher peri-implant bone loss. Peri-implant clinical parameters and survival rate for two implant surfaces was similar.
- Within the limitations of the present study, rough implant surface does not seem to increase the incidence of peri-implantitis in comparison to turned implants surface.

*Adapted from Saulacic N al., J Oral Maxillofac Res. 2019 Mar 31;10(1):e1, for more info about this publication click **HERE***

Clin Oral Implants Res. 2019 Apr 25

The effect of five mechanical instrumentation protocols on implant surface topography and roughness: A scanning electron microscope and confocal laser scanning microscope analysis.

Cha JK, Paeng K, Jung UW, Choi SH, Sanz M, Sanz-Martín I

Study objectives

The aim of this studyTo evaluate in vitro the changes in implant surface topography and roughness of commercial implants after instrumentation with five decontamination protocols. Seventy-two titanium implants with a sandblasted and acid-etched (SLA) surface were placed 5 mm supra-crestally. Five groups of twelve implants were instrumented with the following protocols: a metal scaler tip (SCAL), a thermoplastic scaler tip (PEEK), a round titanium brush (RBRU), a tufted brush with titanium bristles (TNBRU), and a glycine-based air-powder abrasive (GLYC). A sixth group with untreated implants was used as control. Scanning electron microscope and confocal laser scanning microscope were utilized to evaluate the changes in the implant surfaces.

Results and conclusions

- The SCAL caused pronounced macroscopic alterations and damage of the implant surface, the PEEK left remnants of the plastic tip in the implant surface, and both titanium brush groups flattened the thread profile, while minimal alterations were observed in the GLYC.
- When compared to the control group, the roughness parameters (Sa) in the buccal aspect increased in the thread area of SCAL, and a minor reduction was observed in the PEEK while in the other groups, these values remained unchanged.
- In the valley areas, however the RBRU, TNBRU, and GLYC experienced a significant reduction (smoothening) indicating different accessibility of the decontamination protocols to the thread and valley. Similarly, the buccal aspects had more pronounced changes than those in the palatal aspect.
- Within the limitations of this in vitro investigation, the tested protocols induced different macroscopic alterations and surface roughness changes that varied in the thread and valley area.
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*Adapted from Cha JK et al., Clin Oral Implants Res. 2019 Apr 25, for more info about this publication click **HERE***

Clin Oral Implants Res. 2019 Mar 27

Zirconia compared to titanium dental implants in preclinical studies-A systematic review and meta-analysis.

Roehling S, Schlegel KA, Woelfler H, Gahlert M

Study objectives

The purpose of this study was to evaluate whether zirconia implants demonstrate differences in hard and soft tissue integration compared to titanium implants in preclinical studies.

Results and conclusions

- A total of 37 studies were included for data extraction after screening of 91 from 1,231 selected titles. Thirty-seven experimental studies using six different species were identified.
- The follow-up periods ranged between 0.4 and 56 weeks. For titanium, mean values of 59.1% (95% CI: 53.3 - 64.8), 102.6 Ncm (95% CI: 81.5 - 123.6), and 25.1 N (95% CI: 20.2 - 30.0) for BIC, RTQ, and PI were estimated, respectively.
- The mean values for zirconia were 55.9% (95% CI: 51.6 - 60.1), 71.5 Ncm (95% CI: 51.1 - 91.9), and 22.0 N (95% CI: 13.2 - 30.7) for corresponding parameters.
- Confounding factors such as animal species, implant material, loading protocol, and study or loading duration significantly influenced the outcomes.
- Similar qualitative soft tissue integration was reported for zirconia and titanium implants. However, faster maturation processes of epithelial and connective tissues around zirconia implants were assumed. Quantitatively, similar BW dimensions were evaluated for titanium (3.5 mm; 95% CI: 2.9 - 4.2) and zirconia (3.2 mm; 95% CI: 2.7 - 3.7), whereas the loading protocol significantly influenced the outcomes.
- Zirconia and titanium implants demonstrate a similar soft and hard tissue integration capacity. However, titanium tended to show a faster initial osseointegration process compared to zirconia. Importantly, not only material characteristics but predominantly animal species and study protocols can significantly influence the outcomes.

*Adapted from Roehling S et al., Clin Oral Implants Res. 2019 Mar 27, for more info about this publication click **HERE***

Int J Oral Maxillofac Implants. 2019 Apr 1

Narrow-diameter implants in the anterior region: A meta-analysis.

Parize HN, Bohner LOL, Gama LT, Porporatti AL, Mezzomo LAM, Martin WC, Vega Gonçalves TMS

Study objectives

The aim of this systematic review and meta-analysis was to summarize evidence of functional and esthetic performance of anterior single crowns supported by NDIs.

Results and conclusions

- Twenty-one studies meeting the screening criteria were included for qualitative analysis, and three for meta-analysis. A total of 892 NDIs, placed in 736 patients, were analyzed.
- Follow-up duration varied from 12 months to 14 years (mean: 40 months), and 16 failures (implant loss) were recorded.
- Fixed-effect meta-analysis (I2 = 0%) of survival rate revealed a risk difference of 0.02 (95% CI: -0.03 to 0.08), between NDIs and controls (regular-diameter implants), without differences between groups (P = .39). Success rates ranged from 84.2% to 100% (mean: 95.2%).
- Random-effects meta-analysis (I2 = 56%) of MBL indicated a mean difference of 0.02 mm (95% CI: -0.21 to 0.25), without differences between groups (P = .87).
- Single crowns supported by NDIs are a predictable treatment, since their survival rate and MBL are comparable to those supported by regular-diameter implants.

*Adapted from Parize HN et al., Int J Oral Maxillofac Implants. 2019 Apr 1, for more info about this publication click **HERE***

J Clin Periodontol. 2019 Mar 1

Effectiveness and clinical performance of early implant placement for the replacement of single teeth in anterior areas: A systematic review.

Graziani F, Chappuis V, Molina A, Lazarin R, Schmid E, Chen S, Salvi GE

Study objectives

The aim of this study was to assess the effectiveness and clinical performance of early implant placement, 4-8 (Type 2) or 12-16 weeks (Type 3) after extraction, in single anterior sites. Studies reporting on Type 2 and 3 implant placement were identified. Main outcome was implant survival. Peri-implant soft and hard tissues changes, periodontal parameters, aesthetics and patient-reported outcomes were also evaluated

Results and conclusions

- 19 eligible articles (7 from 1 RCT, 3 from 2 CCTs, and 9 from 3 case series) reporting on 140 patients and 140 implants were included.
- Type 3 implants showed comparable results to Type 4: 95% vs. 100% survival rates. Studies reported high values of implant survival, minimal technical and biological complications and high aesthetic scores in both short and long-term follow-ups for both Type 2 and Type 3 implant placement.
- Quality evaluation highlighted important weaknesses in the included trials.
- Limited data on Type 2 and Type 3 implant placement appear to indicate that they can perform well both short and long term. However, the limited number of cases, the significant heterogeneity of the included studies and the high risk of biases importantly reduce the generalizability of the findings

*Adapted from Graziani F et al., J Clin Periodontol. 2019 Mar 1, for more info about this publication click **HERE***

Gerodontology. 2019 Mar 15.

Oral health-related quality of life and satisfaction of edentulous patients using conventional complete dentures and implant-retained overdentures: An umbrella systematic review.

Sharka R, Abed H, Hector M

Study objectives

The aim of this study was to appraise the systematic reviews (with/without meta-analysis) that investigate the impacts of complete conventional dentures (CCDs) and/or implant-retained overdentures (IRODs) on the oral health-related quality of life (OHRQoL) and satisfaction among edentulous patients.

Results and conclusions

- A total of eight reviews were included in data synthesis (six were systematic reviews without meta-analysis, one was systematic review with meta-analysis, and one was meta-analysis).
- The level of evidence of all included reviews based on the Scottish Intercollegiate Guidelines Network ranged between 1+ and 1-.
- The results of this umbrella systematic review demonstrate the superiority of using IRODs compared with CCDs on the OHRQoL and patients' satisfaction outcomes. However, this positive impact is more accentuated when patients demand implant treatment or cannot adapt to CCDs treatment. Financial factors and adaptive capability indeed affect patient tolerance to both treatment modalities.

*Adapted from Sharka R al., Gerodontology. 2019 Mar 15., for more info about this publication click **HERE***

J Prosthet Dent. 2019 Mar;121(3):398-403.e3

Influence of different implant-abutment connection designs on the mechanical and biological behavior of single-tooth implants in the maxillary esthetic zone: A systematic review.

Vetromilla BM, Brondani LP, Pereira-Cenci T, Bergoli CD

Study objectives

The purpose of this systematic review was to determine the best implant-abutment connection type for anterior single-tooth implants considering esthetics, success, and survival rates.

Results and conclusions

- Of the 891 articles identified, 29 were selected and analyzed.
- The most common technical complications were abutment screw loosening and crown-cement loosening, while dehiscence and recession were the most common biological complications.
- The most frequent complications were dehiscence for external hexagon, crown-cement loosening for the internal hexagon, and ceramic fracture for the Morse taper.
- Esthetics were favorable for all connections, but the internal hexagon performed better. However, better results for marginal bone loss, success, and survival were found for the Morse taper.
- The global annual failure rate was 0.90% and 0.2% for Morse taper, 0.3% for external hexagon, and 2.2% for internal hexagon.
- This review suggests that Morse taper performs better for survival, success, and marginal bone loss. Internal hexagon performed better for esthetic parameters.

*Adapted from Vetromilla BM et al., J Prosthet Dent. 2019 Mar;121(3):398-403.e3, for more info about this publication click **HERE***

References

Ghazal SS et al., JOMI. 2019 Apr 1 | **Morton D et al.**, Dent Clin North Am. 2019 Apr;63(2):309-329 | **Sanz M et al.**, Clin Oral Implants Res. 2019 Apr 29 | **Yin L et al.**, Clin Implant Dent Relat Res. 2019 Apr 22 | **Saulacic N al.**, J Oral Maxillofac Res. 2019 Mar 31;10(1):e1 | **Cha JK et al.**, Clin Oral Implants Res. 2019 Apr 25 | **Roehling S et al.**, Clin Oral Implants Res. 2019 Mar 27 | **Parize HN et al.**, Int J Oral Maxillofac Implants. 2019 Apr 1 | **Graziani F et al.**, J Clin Periodontol. 2019 Mar 1 | **Sharka R et al.**, Gerodontology. 2019 Mar 15 | **Vetromilla BM et al.**, J Prosthet Dent. 2019 Mar;121(3):398-403.e3 | source: www.pubmed.com