Abstracts of articles published in important Implantology, Prosthodontics and Periodontics journals from around the world

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Immediate, early, and late implant placement in first-molar sites: A retrospective case series

Annibali S, Bignozzi I, Iacovazzi L, La Monaca G, Cristalli MP. Int J Oral Maxillofac Implants. 2011 Sept-Oct;26(5):1108-22.

Purpose: To review the clinical outcomes of immediate, early, and conventional single-tooth implant placement in mandibular or maxillary first molar sites. **Materials and Methods:** The charts of patients treated consecutively for first molar replacement according to unconventional (immediate = group 1, early = group 2) or conventional (late = group 3) surgical protocols were examined. All available clinical parameters were reviewed to calculate implant survival and success rates according to well-established criteria. Periapical radiographs obtained upon delivery of the definitive crown (T_2) and 1 year later (T_3) were digitized and assessed to evaluate marginal bone loss (MBL). Clinical photographs were evaluated to determine soft tissue health. **Results:** Forty-seven patients were treated with a total of 53 immediate, early, or late single implants. The last follow-up examination was at 38.84 ± 16.14 months (mean ± SD) for group 1, 32.91 ± 18.49 months for group 2, and 42.66 ± 12.41 months for group 3. The implant survival rate was 100% for all groups. The success rates were 91.7% for early implants, 95.0% for immediate postextraction implants, and 100% for implants placed in healed sites. MBL and soft tissue parameters did not differ significantly among the three groups at definitive restoration delivery or 1 year later; a thin gingival biotype, irrespective of treatment timing, was the only covariate that was able to slightly affect the outcome variables. Conclusions: Short-term implant survival and success rates, as well as MBL values for immediate, early, and conventional implants, appear similar for maxillary and mandibular first molar sites. Early placement should be considered as a suitable alternative to immediate placement when unfavorable conditions at the time of extraction could affect the clinical outcome of immediate placement.

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Failure rates of short (≤ 10 mm) dental implants and factors influencing their failure: A systematic review

Sun HL, Huang C, Wu YR, Shi B. Int J Oral Maxillofac Implants. 2011 July-Aug;26(4):816-25.

Purpose: The aim of this study was to evaluate the long-term failure rates of short dental implants (≤ 10 mm) and to analyze the influence of various factors on implant failure. **Materials and Methods:** The PubMed and Cochrane Library databases were consulted for follow-up studies published between the years 1980 and 2009. For those studies that met the inclusion and exclusion criteria, data concerning the number of implants (≤ 10 mm) placed and lost and any related risk factors were gathered in tables and subjected to analysis. Univariate and multivariate analyses were performed. **Results:** The heterogeneity and low quality of the included studies made meta-analysis impossible. A total of 35 human studies fulfilled the criteria. The studies included 14,722 implants, of which 659 failed. The total failure rate was 4.5%. The failure rates of implants with lengths of 6, 7, 7.5, 8, 8.5, 9, and 10 mm were 4.1%, 5.9%, 0%, 2.5%, 3.2%, 0.6%, and 6.5%, respectively. A majority (57.9%) of failures occurred before prosthesis connection. There was no statistically significant difference between the failure rates of short dental implants and standard implants or between those placed in a single stage and those placed in two stages (multivariate analysis). There was a tendency toward higher failure rates for the maxilla and for dental implants with a machined surface compared with the mandible and dental implants with a rough surface, respectively. **Conclusions:** Among the risk factors examined, most failures of short implants can be attributed to poor bone quality in the maxilla and a machined surface. Although short implants in atrophied jaws can achieve similar long-term prognoses as standard dental implants with a reasonable prosthetic design according to this review, stronger evidence is essential to confirm this finding.

Influence of crown-to-implant ratio, retention system, restorative material, and occlusal loading on stress concentrations in single short implants

Sotto-Maior BS, Senna PM, da Silva WJ, Rocha EP, Del Bel Cury AA. Int J Oral Maxillofac Implants. 2012 May-Jun;27(3):e13-8.

Purpose: The aim of this study was to assess the contributions of some prosthetic parameters such as crown-to-implant (C/I) ratio, retention system, restorative material, and occlusal loading on stress concentrations within a single posterior crown supported by a short implant. **Materials and Methods:** Computer-aided design software was used to create 32 finite element models of an atrophic posterior partially edentulous mandible with a single external-hexagon implant (5 mm wide x 7 mm long) in the first molar region. Finite element analysis software with a convergence analysis of 5% to mesh refinement was used to evaluate the effects of C/I ratio (1:1; 1.5:1; 2:1, or 2.5:1), prosthetic retention system (cemented or screwed), and restorative material (metal-ceramic or all ceramic). The crowns were loaded with simulated normal or traumatic occlusal forces. The maximum principal stress (stressmax) for cortical and cancellous bone and von Mises stress (stressvM) for the implant and abutment screw were computed and analyzed. The percent contribution of each variable to the stress concentration was calculated from the sum of squares analysis. **Results:** Traumatic occlusion and a high C/I ratio increased stress concentrations. The C/I ratio was responsible for 11.45% of the total stress in the cortical bone, whereas occlusal loading contributed 70.92% to the total stress in the implant. The retention system

contributed 0.91% of the total stress in the cortical bone. The restorative material was responsible for only 0.09% of the total stress in the cancellous bone. **Conclusion:** Occlusal loading was the most important stress concentration factor in the finite element model of a single posterior crown supported by a short implant.

A prospective, randomized-controlled clinical trial to evaluate bone preservation using implants with different geometry placed into extraction sockets in the maxilla

Sanz M, Cecchinato D, Ferrus J, Pjetursson EB, Lang NP, Lindhe J. Clin Oral Implants Res. 2010 Jan;21(1):13-21. Epub 2009 Nov 18.

Aim: The primary objective of this study was to determine the association between the size of the void established by using two different implant configurations and the amount of buccal/palatal bone loss that occurred during 16 weeks of healing following their installation into extraction sockets. **Material and Methods:** The clinical trial was designed as a prospective, randomized-controlled parallel-group multicenter study. Adults in need of one or more implants replacing teeth to be removed in the maxilla within the region 15-25 were recruited. Following tooth extraction, the site was randomly allocated to receive either a cylindrical (group A) or a tapered implant (group B). After implant installation, a series of measurements were made to determine the dimension of the ridge and the void between the implant and the extraction socket. These measurements were repeated at the re-entry procedure after 16 weeks. **Results:** The study demonstrated that the removal of single teeth and the immediate placement of an implant resulted in marked alterations of the dimension of the buccal ridge (43% and 30%) and the horizontal (80-63%) as well as the vertical (69-65%) gap between the implant and the bone walls. Although the dimensional changes were not significantly different between the two-implant configurations, both the horizontal and the vertical gap changes were greater in group A than in group B. **Conclusions:** Implant placement into extraction sockets will result in significant bone reduction of the alveolar ridge.

Impact of diabetes mellitus and metabolic control on bone healing around osseointegrated implants: Removal torque and histomorphometric analysis in rats

de Molon RS, Morais-Camilo JA, Verzola MH, Faeda RS, Pepato MT, Marcantonio E Jr. Clin Oral Implants Res. 2012 Apr 18. doi: 10.1111/j.1600-0501.2012.02467.x.

Objectives: To evaluate bone healing around dental implants with established osseointegration in experimental diabetes mellitus (DM) and insulin therapy by histomorphometric and removal torque analysis in a rat model. **Materials and Methods:** A total of 80 male Wistar rats received a titanium implant in the tibiae proximal methaphysis. After a healing period of 60 days, the rats were divided into four groups of 20 animals each: a 2-month control group, sacrificed at time (group A), a diabetic group (group D), an insulin group (group I), and a 4-month control group (group C), subdivided half for removal torque and half for histomorphometric analysis. In the D and I groups the DM was induced by a single injection of 40 mg/kg body weight streptozotocin (STZ). Two days after DM induction, group I received subcutaneous doses of insulin twice a day, during 2 months. Groups C and D received only saline. Two months after induction of DM, the animals of groups D, C and I were sacrificed. The plasmatic levels of glucose (GPL) were monitored throughout the experiment. Evaluation of the percentages of bone-to-implant contact and bone area within

the limits of the implant threads was done by histomorphometric and mechanical torque analysis. Data were analyzed by anova at significant level of 5%. **Results:** The GPL were within normal range for groups A, C and I and higher for group D. The means and standard deviations (SD) for histomorphometric bone area showed significant difference between group D (69.34 ± 5.00%) and groups C (78.20 ± 4.88%) and I (79.63 ± 4.97%). Related to bone-to-implant contact there were no significant difference between the groups D (60.81 ± 6.83%), C (63.37 ± 5.88%) and I (66.97 ± 4.13%). The means and SD for removal torque showed that group D (12.91 ± 2.51 Ncm) was statistically lower than group I (17.10 ± 3.06 Ncm) and C (16.95 ± 5.39 Ncm). **Conclusions:** Diabetes mellitus impaired the bone healing around dental implants with established osseointegration because the results presented a lower percentage of bone area in group D in relation to groups C and I resulting in a lowest torque values for implant removal. Moreover, insulin therapy prevents the occurrence of bone abnormalities found in diabetic animals and osseointegration was not compromised.