



Longevity of dental implants: are surveys conclusive?

38

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Dental implants are performed with the aim of improving oral function and aesthetics. That may have sounded unrealistic when implants were first introduced for the first time at the end of the 70's and beginning of the 80's. Nowadays, restoring function and aesthetics by using dental implants has become a widely applied treatment modality. A very common question asked by patients at our offices is about implants longevity. Looking at the current situation, systematic reviews and long-term studies started to emerge.

Regarding longevity and aesthetics of peri-implant tissues, in 2007 Francischone et al.¹ published a longitudinal study of 12 to 15 years demonstrating that it is possible to reach good functional and aesthetic results in the medium and long-term, as long as scientifically established protocols are followed. Eight years later, in 2015, Francischone et al.² evaluated osseointegration longevity in aesthetic regions, showing other cases with 24-year monitoring. Following the current successful concepts, they analyzed the set of different factors that act on the biological process of osseointegration and on the maintenance of these osseointegrated implants. In aesthetic zones, the final goal was reaching results that seemed as natural as possible. Besides the specific limitations of each case, the formation of the biological distance around the implant

is directly related to the aesthetic result. Therefore, the correct three-dimensional position of the implant was fundamental to the success of the rehabilitation procedures. That is the register in the literature showing greatest longevity when it comes to aesthetic regions.

Esposito et al.³ evaluated, in 2013, the success rate of dental implants using different protocols. The authors concluded that there was no solid clinical evidence to find out if the failure had to do with the implant or the prosthesis; they also suggested that the quality of the scientific evidence was 'too low', due to the presence of strong bias and only a few studies. These authors, as well others,^{4,5,6} recommend that clinicians should consider such results with caution. The ORONet⁷ (Oral Rehabilitation Outcomes Network) approach was introduced in 2013 to shed light on the lack of adequate and standardized reporting. This approach represents the beginning in a continuous direction towards the improvement and development of consensus for clinical practice, with regard to osseointegrated implants.

In recent research addressing long-term success of dental implants, evaluating clarity of results is a challenge. In a systematic revision of the literature done by Engelhardt et al.⁸ comparing immediate and conventional loading of dental implants, it was concluded that there were no physically relevant differences regarding the annual failure or osseous level alteration rates between the two

protocols for up to 5 years. In another 5-year evaluation study carried out by Cooper et al.⁹, it was concluded that immediate loading in alveoli grafted in the esthetic zone can be successful.

In a 7-year study, Orentlicher et al.¹⁰ evaluated the difference in the cumulative survival rates of implants placed with the guided surgical technique and the conventional one, and concluded that there was no difference, except for the fact that the implant placement right after tooth extraction by using guided surgery may reduce the survival rate. As for the immediate loading, Maló et al.¹¹ evaluated, for 5 years, the immediate loading of dental implants in spots with untreated periodontal disease and concluded that this protocol is feasible in the medium term, depending on the periodontal therapy continued after rehabilitation.

There have also been studies related to the type of flap. Xu et al.⁵ evaluated immediate placement without flap and with immediate loading, concluding that there is the need for more evidences of high quality to reach better conclusions, corroborating the study by Chambrone et al.⁶ Obviously, the application of immediate loading emerged as a common approach to help our patients. Yet, we need results of refined clinical measurements. The end point in the literature, regarding longevity of dental implants, would be reaching a consensus upon the clinical results of the treatments that can be applied to those patients who receive osseointegrated implants.

Measurement of clinical results for the evaluation of dental implants longevity in the literature: ORONet⁷ approach

The Oral Rehabilitation Outcomes Network (ORONet)⁷ is a working group that carried out a literature research between 1995 and 2009 in randomized clinical trials related to longevity of osseointegrated implants. The results of the measurements done in these studies were identified and submitted to the feasibility, truth and validity criteria of the OMERACT component. Through this process, it was difficult identifying clinical results capable of fully meeting these criteria. Thus, an attenuated version of the criteria was applied, and it was possible to identify clinical measurements for the prosthetic results, the implants and other rates. Besides, a recommendation related to standardized deadlines for reports presentation was presented for further consideration. The end point of this evaluation process will be reaching a consensus upon the measuring of clinical results that can be applied to great populations of patients who receive osseointegrated implants. ORONet initiative represents a start for the continuous improvement and development of a consensus for measuring the clinical results of osseointegrated implants.

Interventions in order to replace missing teeth: different loading moments of dental implants³

In order to minimize the risk of failure on implants after their placement, dental implants are kept free from loading for 3 to 8 months, to establish osseointegration (conventional loading). It would be advantageous if the repairing period could be reduced, without jeopardizing the implant success. Nowadays, implants are subject to precocious or immediate loadings, and it would be useful to know if there is a difference in the success rates of these implants and those conventionally loaded. The aims of this study³ were to evaluate the effects of: (1) immediate implants (up to 1 week), precocious implants (1 to 2 weeks), and of conventional loading (after two months); (2) loading with immediate occlusal contact versus loading without occlusal contact, and loading with precocious occlusal contact versus loading without occlusal contact; (3) direct loading versus progressive loading at immediate, precocious and conventional time. The following electronic databases were looked into: Cochrane Oral Health Group's Trials Register (until June 8th, 2012), Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, 2012, n. 4), MEDLINE via OVID (from 1946 to June 8th, 2012), and EMBASE via OVID (from 1980 to June 8th, 2012). The authors of the identified studies were contacted in order to find unprecedented randomized clinical trials (RCTs). There were no restric-

tions regarding language or date of publication. All the RCTs on osseointegrated dental implants with 4-month to 1-year monitoring were included, comparing the same type of implant when used with: immediate, precocious or conventional loading; loading with occlusal contact or without contact; progressive loading or not. The results were analyzed through the following variables: prosthesis or implants failures, and radiographic alterations at the marginal osseous level. The data extraction was independent, duplicate and done by at least two authors of this review. The authors of the analyzed studies were contacted whenever information was missing. Bias risk was evaluated for each paper by at least two authors of this review, and the data extraction was independent and duplicate. The results were combined by using fixed effect models with mean differences (MD), for continuous outcomes; risk rates (RR) for dichotomized outcomes with confidence intervals of 95% (CI). A table summarizing the main results was drawn. Forty-five clinical trials were identified and, among them, 26 studies were included, with a total of 1,217 participants and 2,120 implants. Three trials showed low bias risk, 12 had high risk and, as for the other 11 trials, bias risk was not clear. In 9 of the studies included, there was no prosthetic failure in the first year, and in 7 studies there were no implant failures; the failure rate of the implants in all the 26 trials was only 2.5%. In 15 RCTs comparing immediate and conventional loadings, there was no evidence of dif-

ferences in prosthesis failure (RR = 1.87; CI 95% = 0.70 to 5.01; 8 trails), nor implants failure (RR = 1.65; CI 95% = 0.6 to 3.98; 10 trials) in the first year; but there was some evidence of a slight reduction in bone loss in favor of immediate loading (MD = -0.10mm; CI 95% = 0.20 to -0.01; $p = 0.03$; 9 trials), with some homogeneity (Tau² = 0.01; Chi² = 14.37, df = 8 ($p = 0.07$); I² = 44%). Nevertheless, this slight difference may not be clinically important. From the three RCTs that compare precocious loading with conventional loading, there were no sufficient proofs to determine if there is any clinically significant difference in the prostheses failure, implants failure or bone loss or not. Six RCTs compared immediate and precocious loadings, finding insufficient evidences to determine if there is any clinically significant difference in prostheses failure, implants failure or bone loss. Based on the three trials that compared the loading with occlusal contact and the loading without occlusal contact, there were no sufficient evidences to determine if there is any clinically important difference in the results of prostheses failure, implants failure and bone loss. The authors did not identify any trials evaluating progressive loading in implants. All in all, there were no convincing evidences of clinically significant differences in prostheses failure, implants failure or bone loss associated to the different moments of implants loading. Better designed RCTs are necessary and must be reported in accordance with CONSORT guideline (www.consort-statement.org/).

Annual rates of failure and changes of marginal bone level in dental implants with immediate loading compared to conventional loading. A systematic review of the literature and meta-analysis⁸

Immediate loading of dental implants seems to be a successful option. However, there is still doubt if the annual failure rates (AFR), as well as of changes in marginal bone level, are comparable to those of implants conventionally loaded. The hypothesis analyzed in this study⁸ is that implants with immediate loading (≤ 24 hours after placement) do not show different annual rates of survival or changes in peri-implant bone level, in comparison with conventional loading (≥ 3 months after placement). An electronic search was done, on the National Library of Medicine and on the Cochrane Central Register of Controlled Trials, for papers published by November 2013. Only publications in English were taken into consideration. In addition, the references of papers available in full text were analyzed. The main variable analyzed was the AFR percentage; the secondary variable was the change in bone level radiographically evaluated. The electronic search resulted in 154 full text papers; 10 controlled randomized clinical trials were analyzed by meta-analysis. The annual failure rates were 2.3% and 3.4% for conventional implants and implants with immediate loading, respectively. There was no difference in failure rates of the implants (RR = 0.82). As for changes in margin-

al bone level, the weighted mean difference (WMD) between immediate and conventional loadings counted for 0.02mm in a year ($p > 0.05$), 0.08mm in two years ($p > 0.05$), - 0.10mm in 3 years ($p > 0.05$) and - 0.3mm in 5 years ($p < 0.05$). The total weighted mean difference for the combined monitoring was 0.01mm ($p > 0.05$). Hence, no clinically relevant difference regarding rates of failure or changes in radiographically evaluated bone level between the implants with conventional loading and those with immediate loading was found in the monitoring up to 5 years.

Immediate temporization of dental implants in grafted alveolar ridges in the aesthetic zone: a 5-year evaluation⁹

This clinical study⁹ evaluated, during a period of 5 years, both implants survival and the architecture of the peri-implant tissues, in immediately temporized implants placed 4 to 6 months after bone augmentation with allogenic graft of demineralized bovine bone and collagen membrane. Only 1 out of 23 implants in 19 patients failed before receiving loading (survival rate of 95.6%). The peri-implant tissues remained stable after the implant placement. The changes in marginal bone level were registered since the implant placement until 5 years later (average = - 0.18 ± 0.79mm, ranging from - 1.6 to 1.4mm, $p = 0.51$), changes in length of the mesial and distal papilla (mesial = 1.14 ± 0.92mm, $p < 0.001$; dis-

tal = 0.74 ± 1.46 mm, $p = 0.04$), and the unchanged localization of the gingival zenith (0.24 ± 0.93 mm, $p = 0.15$). There was no surgical complication during the period of 5 years. Whenever ridge augmentation is necessary, the implant placement in the esthetic zone of the maxilla may be done by means of immediate implantation and temporization protocol, in order to achieve success of the osseointegration process and stable responses from the peri-implant tissues.

Immediate loading versus precocious loading of dental implants placed with surgeries without flap: a systematic review⁵

The implant without flap technique is a predictable procedure, with several advantages and a high implant survival rate. Immediate and precocious loadings have been widely applied in treatments with dental implants and provide aesthetic improvement, with enhanced function and comfort. Nonetheless, the scientific base for immediate or precocious loading approaches is not clear. This being said, the aim of this systematic review⁵ was to evaluate the effectiveness and safety of immediate loading versus precocious loading of dental implants placed in surgeries without flap. The following databases: Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CNKI, VIP, WANGFANG and World Health Organization International Clinical Trials Registry Platform were investigated (until October 2012). This systematic review encompassed

controlled randomized clinical trials, which compared immediate and precocious loadings in implants placed in surgeries without flap, in order to replace missing teeth in adult patients who were partially or totally edentulous. The compilation of studies included the data extraction and the quality evaluation of the studies and their evidences were done independently by reviewers. Six papers reported in four randomized clinical trials, which involved 180 selected participants were included. The implants failure rate was 0,0 to 3,3% in both groups (immediate loading and precocious loading)

with placement without flap. There was not, between the groups, any statistically significant difference in implants failure rates, peri-implant alterations at marginal level bone, or complications. However, the participants preferred immediate loading, instead of waiting for almost two months. Considering that high quality additional evidences are necessary, both the immediate and precocious loadings of dental implants after surgery without flap showed an acceptable survival rate in the medium and long-terms. Yet, immediate loading seems to be more acceptable, due to its time saving.

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