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Research Article

Limited Evidence for Clinical and Radiographic Outcomes of Immediate Versus Delayed Implant Placement Supporting Full-Arch Fixed Prostheses

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Abstract

Background: With the increased demands for esthetics in implant dentistry, immediate implant placement has become popular.

Methods: A Randomized Clinical Trial (RCT), comparing immediate and delayed implants in both maxillary and mandibular full arch fixed prostheses, was critically appraised. Reported outcomes were crevicular fluid volume (CFV), ginigival retraction, plaque index, keratinized mucosa and probing depth, modified gingival index, mucositis and marginal bone loss. They agreed on the risk of applying immediate implants despite of the article findings which was read and then assessed for bias by the aid of Cochrane risk assessment tool for RCT. Any disagreement between authors was resolved by discussion.

Results: CFV was 87.4 ± 60.5 for immediate and 34.7 ± 22.6 for delayed implants in maxilla, 62.4 ± 57.3 (immediate) and 44.2 ± 31.8 (delayed) in mandible, with an overall CFV 75.6 ± 58.6 (immediate) and 38.5 ± 26.0 (delayed). Of all reported outcomes, only the CFV of maxilla showed a significant difference at the 12 months follow up period. No implant failures occurred in both groups. Outcomes were judged at high risk of cointervention, attrition and contamination bias.

Conclusion: Immediate implants should be considered with cautions. Clinical implications: Considering biases in this trial, evidence about results might be limited. Case selection is highly recommended, where factors like site of implant placement, surgical experience, opposing occlusion, and para-functional habits should be considered.

Keywords: Implants; Prostheses; Randomized clinical trial

Introduction

Single-blind randomized clinical trial to evaluate clinical and radiological outcomes after one year of immediate versus delayed implant placement supporting full-arch prostheses.

Purpose/Question: To compare peri-implant health, marginal bone loss and success of immediate and delayed implants supporting full-arch fixed prostheses.

Study Design

RCT

This randomized single-blinded clinical preliminary trial was conducted in the Oral Surgery Unit, University of Valencia between December 2009 and February 2011 to evaluate clinical and radiographic outcomes after one year of immediate versus delayed implant placement supporting full-arch fixed prostheses. Moreover, authors and University of Valencia funded the study and no conflict of interest was reported.

16 patients were randomized using the balanced random permuted block approach into two treatment groups (A and B), 8 each. Stratification was performed according to the arch to be treated, maxilla versus mandible. In group A,48 maxillary and 30 mandibular implants were placed immediately after extractions, while in group B, 40 maxillary and 36 mandibular implants were placed in healing sites. Study population was sampled using consecutive sampling of patients that fulfilled the selection criteria. The latter included age older than 18 years, a full mouth plaque and bleeding scores less than 25%, enough bone height and width to place 6-8 implants of minimum length of 10mm and diameter of 3.8 mm without bone grafting procedures, and finally an insertion torque more than 35 Ncm. Authors excluded pregnant and lactating females, smokers, patients with a history of biphosphanate therapy, chemo and/or radiotherapy, severe bruxism, poor oral hygiene, and those with incomplete data gathering. Periodontal treatment was done for group A patients only to control inflammation preceding extractions. Maxillary implant beds were prepared using drills and osteotomes, while in the mandible, implants were placed in the interradicular septum if possible. Some patients of group A received delayed implants that were later on excluded from the analysis. Patients of both groups were prescribed antibiotic treatment, as well as chlorhexidine mouthwash. Prostheses were delivered 10 weeks after implant placement in the mandible and after 12 weeks in the maxilla. The recorded outcomes included peri-implant CFV, plaque index, gingival retraction, keratinized mucosa

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and probing depth using a periodontal probe, modified gingival index, presence of mucositis and marginal bone loss. Measurements were obtained at 1 week, 6 months, and 12 months after prosthetic loading for all outcomes except for the radiographic measurements which were taken only at the time of prosthetic loading and one year later. Despite of the absence of radiographic stents, the authors claimed that intraoral digital radiographic images were standardized using Rinn XCP.

Results and Conclusion

At the 12 months follow up period, gingival retraction was 17.6% for group A and 8.7% for group B with no significant difference between them. Regarding the CFV of maxilla it was 87.4 ± 60.5 for group A and 34.7 ± 22.6 for group B. Regarding the CFV of mandible it was 62.4 ± 57.3 for group A and 44.2 ± 31.8 for group B. However, the overall CFV was 75.6 ± 58.6 for group A and 38.5 ± 26.0 for group B. Of all reported outcomes, only the CFV of maxilla showed a significant difference at the 12 months follow up period. No implant failures occurred in both groups. Hence, it was concluded that both treatment modalities offer comparably equal implant success and peri-implant marginal bone loss. Also, the measured variables showed no significant difference in peri-implant health, at the twelve-month follow upper iod.

Commentary

Several approaches have been used regarding timing of implant placement following tooth extraction [1-4]. These approaches include immediate, immediate-delayed and delayed implant placement. Conventionally, a healing period of 2 to 6 months post-extraction is allowed before placing the implants (delayed implant placement protocol). This long treatment time leads to high degree of bone resorption and soft tissue loss during socket healing. Besides, it requires extra-surgical procedures [5]. In an attempt to overcome these disadvantages implants were placed immediately after tooth extraction (immediate implant placement) [6]. This was reported to shorten the treatment time, reduce the number of surgical procedures, maintain hard and soft tissues, give better aesthetics and higher patient satisfaction and guide the implant placement [6-8]. However, immediate implants are associated with higher risks of infection and implant failures. Maurizio et al. [9] reported that immediate implants are not recommended whenever aesthetics is required. They should be limited to selected cases. They further recommended longer follow-up periods to assess differences in complication rates between immediate and delayed implants. Hence, evidence about the best approach is still lacking [9,10]

Strength and Weakness of the RCT

In this randomized clinical trial great effort was done to eliminate confounders by setting adequate inclusion and exclusion criteria. This together with the consecutive sampling technique and the proper method of randomization might reduce selection bias. Presence of sufficient bone without bone grafting procedures was one of the selection criteria. However, autologous bone grafts, guided bone regeneration and sinus lifting procedures did not hinder participants' inclusion in the study. These procedures together with the periodontal treatment that was performed for the immediate implant group, might account for cointervention bias. In addition, contamination bias is highly suspected since in some patients both treatment modalities, immediate and delayed implants, were introduced. Drop out of a patient from group A, excluding non-immediate implants from the immediate implant group, excluding patients with incomplete data or those who failed to attend the follow up appointments might reflect a failure for using intention to treat analysis. These factors increase of the risk of attrition bias.

Although, sample size calculation was not done, post-study power analysis revealed a probability of 95% at a sample size of 15. However, inconsistency between abstract and results section can be spotted easily as it was stated in the abstract section that the sample was composed of 15 patients with 9 women and 6 men. Nevertheless, in the results section, the authors mentioned that the sample had 6 women and 9 men instead. Despite of using XCP Rinn during digital intra-oral radiographic imaging and of being assessed by a trained blinded clinician, failure of using radiographic template during measuring the marginal bone loss might affect the standardization of the radiographs and hence, produce assessment bias. The authors reported an insignificant difference between the treatments when considering peri-implant health and implant success, which could be attributed to β error and uncalculated sample size.

Practical Implications

With the increased demands for esthetics in implant dentistry, immediate implant placement has become a must. The lack of significant difference between delayed and immediate implant placement, which was reported in this article, might encourage clinicians to use immediate implant approach more frequently. However, considering the biases that might be introduced in this trial, evidence about the results could be limited (level 2 according to the SORT Grading). Therefore, the use of immediate implant placement should be approached cautiously and is recommended limitedly (Grade B according to the SORT grading).Case selection is highly recommended, where factors like site of implant placement, surgical experience, bone quality and quantity, opposing occlusion, and para-functional habits might affect peri-implant health and its success. Randomized clinical trials with calculated sample sizes, standardized treatment and measurement procedures and appropriately set inclusion criteria are still highly required to enhance the internal validity.

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