ARTICLE ANALYSIS & EVALUATION // DIAGNOSIS/TREATMENT/PROGNOSIS

CASE SELECTION IS CRITICAL FOR SUCCESSFUL OUTCOMES FOLLOWING IMMEDIATE IMPLANT PLACEMENT IN THE ESTHETIC ZONE

REVIEWERS
SATHEESH ELANGOVAN, GUSTAVO AVILA-ORTIZ

To compare immediate and delayed implant placement (>12 weeks after extraction) in terms of the need for bone augmentation at the time of implant placement (primary outcome). Radiographic marginal bone loss was evaluated up to 36 months after functional loading. Other peri-implant parameters (ie, probing depth, bleeding on probing, and buccal keratinized mucosa width), postsurgical complications, surgeon- and patient-reported outcomes, and esthetic outcomes were assessed up to 12 months after functional loading.

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION

Immediate versus delayed implant placement after anterior single tooth extraction: the timing randomized controlled clinical trial. ***Tonetti MS, Cortellini P, Graziani F, Cairo F, Lang NP, Abundo R, Conforti GP, Marquardt S, Rasperini G, Silvestri M, Wallkamm B, Wetzel A.*** *Journal of Clinical Periodontology 2017;44(2):215-24.*

SORT SCORE

A	B	C	NA

SORT, Strength of Recommendation Taxonomy

LEVEL OF EVIDENCE

1	2	3

See page 11A for complete details regarding SORT and LEVEL OF EVIDENCE grading system

SOURCE OF FUNDING

Nonprofit, Foundations: European Research Group on Periodontology, Genova, Italy Industry: Thommen Medical AG, Switzerland and Geistlich AG, Switzerland (biomaterials).

TYPE OF STUDY/DESIGN

Randomized controlled trial.

SUMMARY

Subjects

Medically healthy, periodontally stable patients in need of anterior single tooth extraction (ie, incisors, canines, and premolars) for periodontal, restorative, and/or endodontic reasons, with the exception of symptomatic periapical lesions, acute abscesses, or sinus tracts, were considered for enrollment in this randomized controlled trial (RCT). Upon tooth extraction, adequate bone availability to attain immediate implant placement with primary stability was required for inclusion. In addition, adequate restorative interdental space (defined as ≥6.5 mm) and a sufficient band of keratinized mucosa were required. Smokers were included, but they could not smoke more than 20 cigarettes daily, nor use more than 14 mg of nicotine replacement per day. The final study sample consisted of 124 patients (40 males and 84 females) who were randomly allocated into 2 interventional groups of 62 subjects each: immediate implant placement group (IMI; mean age: 50 ± 14 years), and delayed (≥12 weeks after extraction) implant placement group (DI; mean age: 55 ± 13 years).

Key Exposure/Study Factor

The primary intervention was minimally traumatic tooth extraction involving flap elevation, followed by either immediate or delayed implant placement. After tooth extraction and confirmation of the feasibility of immediate implant placement on clinical inspection, randomization took place. In the IMI group, after implant placement in a restoratively favorable position was achieved, bone

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grafting was indicated when the sum of the crestal bone thickness and horizontal gap between the bone and the implant was <2 mm on the buccal aspect. In the DI group, bone augmentation was indicated when the endosteal portion of the implant was exposed coronal to the bone crest. In both groups, the bone augmentation technique consisted of the combination of bovine xenograft particles covered with an absorbable collagen membrane. Primary closure was attempted in all surgical interventions by approximating the flaps around a transmucosal healing abutment.

Main Outcome Measure

The primary outcome in this RCT was the need for bone augmentation at the time of implant placement. Secondary outcomes included intergroup comparisons of implant survival, incidence of surgical complications, patient-reported outcomes at different time points, as well as changes in plaque scores, probing depth (PD), bleeding on probing, attachment levels, and width of keratinized mucosa from the time of crown delivery to 1 year after loading. Esthetic outcomes using pink esthetic score (PES) and white esthetic score (WES) at 12 months after crown delivery were assessed.[1] In addition, pooled mesial and distal radiographic marginal bone level changes from the time of crown insertion to 1, 2, and 3 years after loading were analyzed in both groups using standardized radiographs.

Main Results

The need for bone augmentation at the time of implant placement was higher in the IMI group than that in the DI group (72% vs 43.9%; $P = .01$). Primary closure was achieved in 61.7% and 82.1% of the IMI and ID sites, respectively. Wound healing complications were more frequent in the IMI group than those in the DI group (26.1% vs 5.3%; $P = .02$). Only one implant failure occurred; it was in IMI group. Deeper PDs were noted around immediately placed implants compared with delayed implants at 1 year postloading (4.1 ± 1.2 vs 3.3 ± 1.1 mm, $P < .01$). PES at 1 year was superior in the DI group, whereas no differences were observed in WES between the 2 groups. A trend for greater radiographic bone loss at 3 years after loading was observed in the IMI group as compared with implants placed following a DI approach. Patients in both groups tolerated the interventions well, with no significant differences noted regarding perioperative and 1-week postoperative pain and discomfort.

Conclusions

Authors did not recommend immediate implant placement at sites where achieving an esthetic result is a priority. Since a trend for greater marginal bone loss over the 3-year observational period was noticed, the authors underscored the need for longer follow-ups to ascertain the true differences in long-term complication rates between the 2 treatment modalities.

COMMENTARY AND ANALYSIS

In light of the available evidence, it is generally acknowledged that the main therapeutic advantages associated with IMI are shortening of the total treatment time and reduced number of surgical interventions, which may contribute to increased patient satisfaction. On the other hand, numerous preclinical and clinical investigations have shown that IMI by itself, without supporting bone augmentation, does not contribute to the preservation of the alveolar ridge architecture after tooth extraction.[2-4] However, there is a paucity of long-term studies that explore the differences between immediate and delayed implant placement protocols considering relevant clinical, radiographic, and patient-reported outcomes that may be used for the development of contemporary clinical practice guidelines. Hence, this RCT is very timely.

This trial identified the need for bone grafting to allow for adequate implant placement to be significantly higher in the IMI group, compared with the DI group. The inability to achieve primary closure and wound healing complications occurred more frequently in the IMI group. In addition, deeper PDs and greater radiographic bone loss were observed in the IMI group after 1 and 3 years after loading, respectively. No differences in patient-reported outcomes were noted between the groups.

Although this RCT does not completely adhere to the Consolidated Standards of Reporting Trials (CONSORT) Statement guidelines,[5] the study design and execution are generally sound. The authors minimized the selection bias by recruiting subjects using eligibility criteria and by effectively randomizing and concealing subject allocation to the trial arms. A proper power analysis was conducted to determine the minimum number of subjects to be recruited ($n = 54$ per group). Investigators aimed at recruiting a minimum of 120 subjects to compensate for attrition bias and possible missing data on completion of the study. The interventions allowed for single blinding, which was performed by not disclosing the intervention to the clinical and radiographic outcome examiners, who were reported to be calibrated. It is important to mention that feasibility for immediate implantation on tooth extraction was determined before randomization. The subjects allocated to the DI group did not receive any intervention to preserve the alveolar ridge dimensions, making this trial "ethically challenging," as the authors recognize in the manuscript.

The fact that this multicenter trial was done by experienced clinicians in different countries and in private practice settings contributes to the external applicability of the study