

Esthetic Outcome of Immediately Placed and Non-Functionally Loaded Implants in the Anterior Maxilla: Peri-Implant Gap Management



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Abstract

Methods and Materials

Results

Purpose: the objective of this prospective clinical trial was to evaluate the esthetic outcome of immediate implantation and immediate non-functional loading utilizing definitive abutments, with and without bony substitutes filling the peri-implant gap.

Methods: eleven implants were placed in 10 patients, utilizing a flapless immediate post extraction approach in the maxilla (15 to 25). Atraumatic extraction was performed and implants immediately placed. The gap was either left without grafting or filled with particulate bone material. Immediate non-functional loading was performed utilizing a definitive abutment. Pink Esthetic Score (PES) was assessed preoperatively, at one and two years follow up. Dental casts were obtained, scanned, registered, and signed closest point distances were measured.

Results: the means of PES score were as following: PES0=9.5±1.68, PES1=9.5±1.98, PES2=9.83±2.89, PES (graft group)=10.3±2.8, PES (non-grafting group)=10.2±2.59. There were no statistically significant differences in PES scores at different points of time and when compared for the grafting group versus non-grafting group (P=0.24 for PES2 graft vs. PES2 non-grafting). Distances between the 2 time points for all cases were less than 1 mm in all reference planes.

Conclusions: Immediate placement and non-functional loading utilizing a definitive abutment appears to result in a stable result as far as esthetic outcome and alveolar process sufficiency are concerned.

In this prospective clinical trial, 11 implants were placed in 10 subjects (5 males, 5 females) utilizing a flapless immediate post extraction approach in the esthetic area of the maxilla (15 to 25). All participants were above 21 years old and medically fit. Atraumatic extraction was performed for teeth that were indicated for extraction keeping an intact facial bone plate. Implants were placed free hand with a gap of at least 2 mm from the inner surface of the facial plate bucco-lingually, and in the range of 3–4 mm from the future gingival margin in a coronal direction (Buser et al. 2004) (5). The gap between the implant and the inner surface of the facial plate was either left without grafting or filled with natural bovine bone mineral granules based on a coin toss method regardless of the size of the gap. Upon achieving a torque of ≥ 30 Ncm, immediate non-functional loading was performed utilizing a definitive abutment as in a one-abutment-at-one-time protocol (Canullo et al 2010) (6). Definitive crowns fabrication was performed 12 weeks post implant placement. Pink Esthetic Score (PES) (Furhauser et al. 2005) (7) was assessed preoperatively (PES0), 1 year after delivery of definitive crowns (PES1), and at 2 years follow up (PES2). Dental casts were made at those points of time as well. Those casts were scanned using an imes-core table-top scanner, and the scans were registered using surface to surface registration and then signed closest point distances were measured. Surface models were cropped to include one tooth mesial and distal to the region of interest (implant site) in an attempt to remove the outliers that may result from differences else were on that cast. All image analysis steps were done using Slicer CMF. Appropriate statistical analyses were performed.

The range of the gap left between the implant and the inner surface of the facial plate varied from 2mm to 4mm. All implants remained integrated and restorations were functional at the end of a two year follow up period. The means of PES score were as following: PES0= 9.5±1.68, PES1=9.5±1.98, PES2=9.83±2.89, PES (graft group)=10.3±2.8, PES (non-grafting group)=10.2±2.59. There were no statistically significant differences in PES scores at different points of time both collectively (P=0.08 for PES0 vs PES1, P=0.14 for PES0 vs PES2, and P=0.61 for PES1 vs PES2), and when compared for the grafting group versus non-grafting group (P=0.24 for PES2 graft vs. PES2 non-grafting). As for casts scans, the surface distances between the 2 time points for all cases were less than 1 mm in all reference planes and there were no statistically significant differences between the graft group and non-grafting group (P value = 0.15 for the mean changes in (X) plane, P=0.12 for (Y) plane, and P=0.19 for (Z) plane). This reflects a stable surgical outcome of this approach.

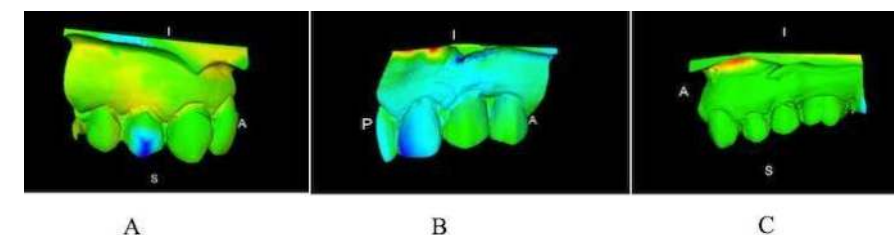


Figure 3. Overlap of a scanned impression model taken 2 years after installation of definitive crown. Blue areas indicate a decrease in volume, and yellow/red areas indicate an increase in volume after the treatment while green color indicates volume stability. **A.** a non-grafting case. A slight increase can be noticed in the alveolar process prominence related to the implant site #14 as indicated by the yellow color. **B.** a grafting case. A slight decrease can be noticed in the alveolar process prominence as well as papillary fill related to the implant site #23 as indicated by the blue color. **C.** a non-grafting case for implant site 25 where there was neither loss or gain in tissues indicated by the stable green color overtime.

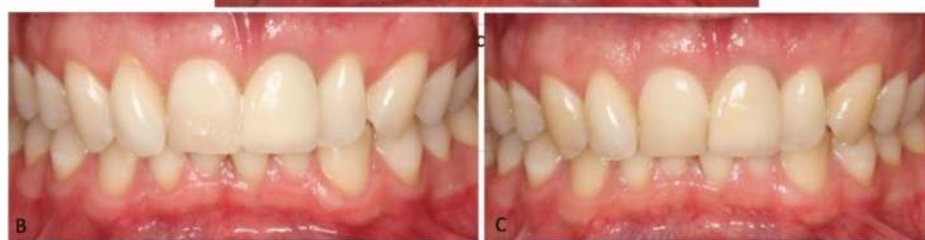


Figure 1. A. Upper left central incisor prior to extraction, B. at 1 year post definitive crown installation, C. at 2 years post definitive crown installation, demonstrating an acceptable esthetic result and soft tissue levels.

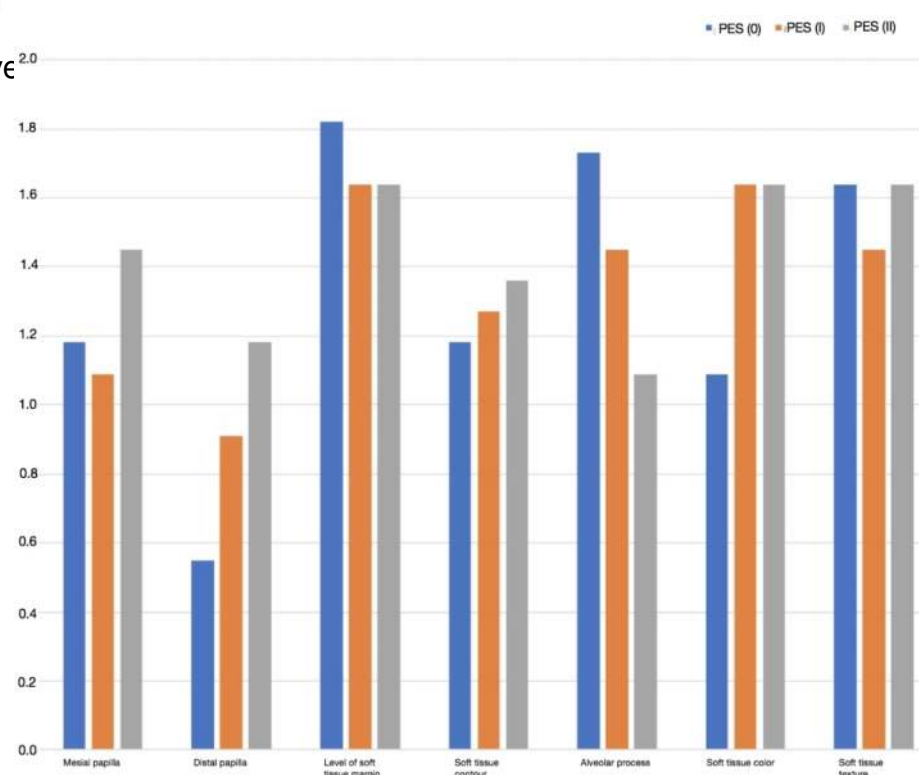


Figure 2. the change in individual PES items from baseline to the two years follow up point. PES(0): baseline, PES(I): at one year post definitive crown installation, PES(II): at two years post definitive crown installation.

Background and Aim

It has been shown that creating a facial gap of at least 2 mm upon immediate implant placement results in new bone formation, coronal to the receding facial bone wall (1). The positive impact of applying a grafting material between the socket wall and the implant on facial bone preservation and esthetics has been documented (2). It was shown that repeated disconnection causes disruption of the epithelial seal, bleeding and ulceration of the site leading to inflammatory responses and epithelial apical migration (3). A recent meta-analysis of randomized controlled trials (4), confirmed that minimizing abutment disconnection and reconnection seems to decrease peri-implant bone level changes.

The aim of this pilot prospective clinical trial was to evaluate the esthetic outcome of immediate implant placement and non-functional loading utilizing definitive abutments in the esthetic area of the maxilla (incisors, canines and premolars), with and without bone substitutes filling the peri-implant gap

Conclusion

Immediate placement and immediate non-functional loading utilizing a definitive abutment in a one-abutment-at-one-time protocol in the esthetic area of the maxilla appears to result in a favorable and stable result as far as esthetic outcome, and alveolar process sufficiency are concerned. It seems grafting the horizontal gap has no additional benefit in promoting better clinical outcomes given that the provisional restoration is meticulously fabricated and strict selection criteria are applied for such cases. Of notice is the limitation present in this study as the sample number is small as this is a pilot clinical trial.

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