

Early implant placement following single-tooth extraction in the esthetic zone: 36-month results of a prospective study with 20 consecutive patients

Buser D, Wittneben J, Bornstein MM, Grütter L, Chappuis V, Belser UC. *Stability of Contour Augmentation and Esthetic Outcomes of Implant-Supported Single Crowns in the Esthetic Zone: 3-Year Result of a Prospective Study With Early Implant Placement Post Extraction.* J Periodontol. 2011 March; 82(3): 342-9.

Introduction

Early implant placement following the extraction of a single tooth is a procedure used by many clinicians in the maxillary anterior zone¹, but there is a lack of long-term documentation on the esthetic outcomes. When esthetic results have been reported for immediate implant placement, mucosal recessions have been observed.²

The purpose of the present prospective study was to follow up on the 12-month results of a case series study with 20 consecutive patients³ and to evaluate the stability of contour augmentation and esthetic outcomes of Straumann Bone Level implants 3 years after restoration.

Materials and methods

A total of 20 patients requiring single-tooth replacement in the anterior maxilla were entered into the study. After flapless tooth extraction the socket was allowed to heal for 4–8 weeks. Bone level implants were subsequently placed and sealed with healing caps, with simultaneous contour augmentation using locally harvested autogenous bone with anorganic bovine bone mineral and a collagen membrane. Reopening was performed 8–12 weeks later (day 0). Within 7 days, provisional crowns were placed, which were gradually enlarged if necessary to optimize soft tissue contours. Final all-ceramic restorations were placed after 6 months.

- Indication: Single-tooth replacement in the anterior maxilla
- Implant: Bone Level Ø 4.1 mm SLActive®
- Solution: Screw-retained full-ceramic crown

The patients were recalled for several follow-up visits at various points in time. During these visits, various parameters were assessed such as:

- Modified plaque index (mPLI)
- Modified sulcus bleeding index (mSBI)
- Probing depth (PD)
- Width of keratinized mucosa (KM)
- Distance from implant shoulder to first bone-to-implant contact (DIB)
- Pink esthetic score (PES)⁴
- White esthetic score (WES)⁴

Within all measurements the day of re-opening was set as baseline (day 0).

Results

All 20 implants achieved and maintained successful tissue integration at the 3-year follow-up visits fulfilling strict success criteria.⁵

Standard soft tissue parameters

Standard soft tissue parameters such as mPLI, mSBI, PD and KM were assessed after 3, 6, 12 and 36 months from baseline. These parameters were assessed with the crown in place. Mean mPLI and mSBI values at 36 months were 0.40 and 0.20 respectively (Table 1). The mean PD value increased from 3.69 mm at the 3-month visit to 4.00 mm at the 36-month visit. However, the change was not statistically significant. A wide KM band was seen at 3 months, which remained stable at the following points in time (Table 1).

	3 mos.	6 mos.	12 mos.	36 mos.
mPLI	0.08 ± 0.24 ^{ab}	0.08 ± 0.20 ^{cd}	0.36 ± 0.33 ^{ac}	0.40 ± 0.27 ^{bd}
mSBI	0.26 ± 0.29	0.16 ± 0.23	0.21 ± 0.17	0.20 ± 0.20
PD	3.69 ± 0.62 ^a	3.75 ± 0.46 ^b	4.43 ± 0.57 ^{ab}	4.00 ± 0.56
KM	4.06 ± 1.43	4.10 ± 1.41	4.50 ± 1.54	4.10 ± 1.17

Table 1: Mean and standard deviation values of the standard soft issue parameters over 3-year follow-up period. The displayed values of KM and PM are in mm. Statistically significant differences among gingival-parameter scores are marked with the same superscript letters.

Radiographic evaluation/DIB values

Periapical radiographs were taken from baseline (BL) at every visit. The distance from implant shoulder to the first bone-to-implant contact was assessed (DIB). At baseline the mean DIB was 0 mm. It increased showing remodeling patterns from 3 to 6 and to 12 months with values of 0.09 mm, 0.14 mm and 0.18 mm, respectively. The mean value remained stable at 0.18 mm thereafter until 36 months (Figure 1).



Figure 1: Crestal bone change displayed by the mean DIB value (in mm) showing a remodeling pattern the first 12 months and stable bone for the following months.

Frequency analysis of crestal bone showed that 18 patients had a bone loss of 0.5 mm or less after 3 years.

Esthetic parameters

The maximum for both pink esthetic score (PES) and white esthetic score (WES) is 10, and the threshold for clinical acceptability is 6/10 for each index.⁴ Mean PES and WES scores remained stable between 12 and 36 months with values of 8.10 and 8.65, respectively (total score of 16.75), indicating a favorable esthetic outcome (see Table 2).

	12 mos.	36 mos.
Mean PES	8.1	8.1
Mean WES	8.65	8.65
Total	16.75	16.75

Table 2: The esthetic parameters remained stable at high values between 12 and 36 months.

Conclusions

- Strict success and survival criteria were fulfilled resulting in 100% success and survival rates at 36 months
- Minimal crestal bone resorption was demonstrated
- Stable crestal bone after 12 months was shown
- Good esthetic and clinical results were seen at 12 and 36 months

References

- 1) Hammerle CH, Chen ST, Wilson TG, Jr. Consensus statements and recommended clinical procedures regarding the placement of implants in extraction sockets. *Int J Oral Maxillofac Implants* 2004; 19 Suppl:26–28.
- 2) Chen ST, Darby IB, Reynolds EC. A prospective clinical study of non-submerged immediate implants. Clinical outcomes and esthetic results. *Clin Oral Implants Res* 2007; 18: 552–562.
- 3) Buser D, Halbritter S, Hart C, Bornstein M, Grutter L, Chappuis V, Belser U. Early Implant Placement With Simultaneous Guided Bone Regeneration Following Single-Tooth Extraction in the Esthetic Zone: 12-month Results of a Prospective Study with 20 Consecutive Patients. *J Periodontol.* 2009; 80:152-162.
- 4) Belser UC, Grutter L, Vailati F, Bornstein MM, Webe HP, Buser D. Outcome evaluation of early placed maxillary anterior single-tooth implants using objective esthetic criteria. A cross-sectional retrospective study in 45 patients with a 2–4 year follow-up using pink and white esthetic scores (PES/WES). *J Periodontol.* 2009; 80: 140–151.
- 5) Buser D, Weber HP, Lang NP. Tissue integration of non-submerged implants. 1-year results of a prospective study with 100 ITI hollow-cylinder and hollow-screw implants. *Clin Oral Implants Res* 1990; 1: 33–40.

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