

Taichiro Morimoto
 Yoshihiro Tsukiyama
 Keizo Morimoto
 Kiyoshi Koyano

Facial bone alterations on maxillary anterior single implants for immediate placement and provisionalization following tooth extraction: a superimposed cone beam computed tomography study

Authors' affiliations:

Taichiro Morimoto, Yoshihiro Tsukiyama, Keizo Morimoto, Kiyoshi Koyano, Section of Implant and Rehabilitative Dentistry, Division of Oral Rehabilitation, Faculty of Dental Science, Kyushu University, Fukuoka, Japan

Corresponding author:

Taichiro Morimoto, DDS, MSD
 Section of Implant and Rehabilitative Dentistry
 Division of Oral Rehabilitation
 Faculty of Dental Science, Kyushu University
 3-1-1 Maidashi, Higashi-ku,
 Fukuoka 812-8582, Japan
 Tel.: +81 92 642 6441
 Fax: +81 92 642 6380
 e-mail: taichiro_morimoto@yahoo.co.jp

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Abstract

Objectives: The purpose of this cone beam computed tomography (CBCT) study was to describe the facial bone changes around single implants for immediate placement and provisionalization following tooth extraction in the maxillary anterior.

Material and methods: The data between 2008 and 2013 were collected retrospectively. Superimposed facio-palatal cross-sectional CBCT images for the implants were derived from preoperative and postoperative radiographs via standardized CBCT processes. Horizontal and vertical facial measurements on the implants were identified at preoperative and approximately 1-year postoperative follow-ups. Correlation coefficient for those parameters was evaluated.

Results: A total of 12 single implants in 12 patients were included in this study. The mean loading period was 13.3 months (range 12–15 months). The median data of preoperative bone thickness 0.54 mm (A), preoperative vertical bone level 1.46 mm (B), postoperative bone thickness 1.77 mm (C), postoperative vertical bone level 1.08 mm (D), horizontal distance from outer surface of preoperative facial bone to implant surface 2.08 mm (E), horizontal gap distance 1.41 mm (E–A), horizontal bone resorption –0.26 mm (E–C), and vertical bone resorption –0.25 mm (B–D) were obtained. The data at the implant platform level (IPL) were selected for the horizontal measurements. Spearman's analysis demonstrated statistically significant correlations between B and D, C and E, E and E–A, and B and E–C ($P < 0.01$). Significant correlations between C and B, D, and E–A were also found, respectively ($P < 0.05$).

Conclusions: Immediate placement and provisionalization of single implants procedure in the maxillary anterior showed excellent outcomes with the small facial bone alterations around the implants. Neither preoperative facial bone thickness nor horizontal gap distance influenced the amount of facial bone resorptions.

A number of researches involving immediate placement and provisionalization of single implants (IPPSI) procedure in the maxillary anterior for patients demonstrated successful outcomes (Wöhrle 1998; Kan et al. 2003). Due to the lack of longitudinal clinical IPPSI studies, the mode of peri-implant hard and soft tissue long-term alterations has not been thoroughly clarified (Crespi et al. 2008; Kan et al. 2011; Malchiodi et al. 2013; Cooper et al. 2014; Ross et al. 2014). It has been reported that <1.0 mm mean interproximal vertical bone resorption on single implants after immediate placement and provisionalization has

been observed in the maxillary esthetic zone after approximately 1 year of implant loading (Norton 2004; De Rouck et al. 2008; Tsuda et al. 2011; Slagter et al. 2014). In addition, bone alterations on also facial and palatal surface of the implants should be obviously extrapolated from the aspect of logical and physiological reasons. Facial and palatal bony tissue could not be reflected by periapical radiograph. Under such circumstances, the prevalence of dental cone beam computed tomography (CBCT) enable clinicians to make facio-palatal bone measurements precisely and accurately. It could also be performed less

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