

**ORIGINAL ARTICLE**

# Influence of soft tissue grafting, orofacial implant position, and angulation on facial hard and soft tissue thickness at immediately inserted and provisionalized implants in the anterior maxilla

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**Abstract**

**Background:** Resorption of hard and soft tissues following immediate implant insertion is frequently reported. Data regarding the influencing factors on facial tissue thickness are rare.

**Purpose:** This retrospective study investigated the impact of connective tissue grafting, the orofacial angulation and position of immediately inserted and provisionalized implants on the facial hard and soft tissue thickness in the anterior maxilla within a 1- to 5-year follow-up.

**Material and Methods:** Implants with the prerequisite of having preoperative and postoperative cone beam computed tomography (CBCT) and a follow-up of 1 to 5 years were included. Facial bone deficiencies were grafted flaplessly with autogenous bone in all sites. In a subgroup of implants additional connective tissue grafting was performed, whereas the remaining implants were not grafted with soft tissue. The orofacial tooth and implant angulation, the change of horizontal position and the facial bone thickness were measured by CBCT, the facial mucosa thickness by an ultrasonic device.

**Results:** In total, 76 implants were placed in 55 patients. Sixty-nine sites showed a facial bone defect. Thirty-eight received a connective tissue graft additionally. All implants were still in function after a mean follow-up of 36 months. The mean thickness of the facial mucosa was 1.72 mm at 1 mm, 1.63 mm at 4 mm, 1.52 mm at 6 mm, and 1.66 mm at 9 mm apically to mucosal margin. The bone thickness was 0.02, 0.25, and 0.36 mm initially and 1.32, 1.26, and 1.11 mm finally at 1, 3, and 6 mm apically to implant shoulder level. Mixed model analysis revealed an impact of the preoperative bone status on the facial bone increase. The facial soft tissue thickness was significantly influenced by the gingival biotype.

**Conclusions:** The results indicate that an initial severe hard tissue defect allows for significant bone regeneration. The facial soft tissue thickness is primarily influenced by the gingival biotype.

**KEYWORDS**

facial bone thickness, immediate implant, immediate provisionalization, implant angulation, implant position, soft tissue thickness, ultrasonic measurement