

Relationship between facial bone thickness and root angulation of maxillary anterior teeth using dental cone beam computed tomography

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Abstract

Nowadays, immediate implant placement (IIP) has been claimed to be the treatment of choice with high survival rates when it comes to replacing failing teeth in the esthetic zone. However, the alteration in collagen fiber orientation after IIP resulting the alveolar bone loss at the peri-implant site. One of the most challenging factors when it comes to dental implant treatment is that the remaining bone thickness of the alveolar socket, which is required to optimize esthetic and functional implant outcomes. This study aim to assess the average of the facial bone thickness at the several reference points along the facial root surface of the maxillary anterior teeth in a group of Thai population, along with its relationship to the root angulation by using cone-beam computed tomography (CBCT). Seventy CBCT scans (420 teeth) were randomly selected from the CBCT database at Department of Oral Radiology, School of Dental Medicine, Rangsit University. The inclusion criteria were applied to all of participants who are 21-66 years old, with the presence of all maxillary anterior teeth. The exclusion criteria are the patients with large dental caries, having any fixed coronal restorations, any tooth with severe root resorption, untreated periodontal disease in maxillary anterior region. Four-hundred and six teeth were used for measuring the facial bone thickness and classifying types of root angulation¹. According to the CBCT scans, the data of the facial bone thickness will be collected in sagittal dimension, the facial bone measured at 3 references (R1, R2, R3). The results of the study revealed that the facial bone thickness seemingly decreased apically in every type of tooth, possibly because of tooth position and facial bony exostoses. Mean facial bone thickness is between 0.67 (right lateral incisor) to 1.04 mm (left canine). Class I root angulation was the majority in this group of Thai population, and it is also the most favorable for immediate implant placement due to the broad palatal bone availability. Class II root angulation was found to be 5.4%, 5.22% and 2.27% in lateral incisor, central incisor and canine respectively. The surrounding bone might not be adequate to ensure implant stability, inferior to class I. Class III rootangulation classification was not found in this study. Class IV SRP is considered to be a relative contraindication for immediate implant placement and only 1.73% class IV SRP was found in the study. In addition, Simple correlation test showed no statistically significance between the facial bone thickness and root angulation. Higher number of subjects should be collected for the further investigations to determine the interrelationship between root angulation and bone thickness.