The dimensions of the facial alveolar bone at tooth sites with local pathologies: A cone-beam CT analysis

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Background

The thickness of the facial alveolar bone wall was shown to be crucial for long-term successful esthetic outcomes of implants immediately placed into extraction sockets. However, currently available investigations report on the thickness of the facial alveolar bone at healthy tooth sites and information regarding the facial bone dimensions at compromised sites is scarce.

Aim

To assess the impact of various local pathologies on facial alveolar bone dimensions at tooth sites.

Materials and Methods

Cone-beam computed tomography images of 60 patients were analyzed. Healthy teeth and teeth with local pathologies (i.e., endodontically treated, periodontally diseased teeth and teeth with periapical lesions Fig. 1 and 2) were included. The thickness of the facial alveolar bone was measured at five locations: 1) the bone crest (W0); 2) 25% (W25), 3) 50% (W50), 4) and 75% (W75) of the distance from the bone crest to the root apex (A); and 5) in the A region (W100) (Fig. 3). The results were considered statistically significant at $p < 0.0008$ (adjustment according to the statistical correction for multiple testing).

Results

A total of 1174 teeth (707 healthy and 467 with the local pathologies) were assessed. Periodontally diseased maxillary premolars and anterior teeth in the mandible in the W0 position, as well as maxillary molars in the W25 position tended to have a lower facial bone thickness when compared to the healthy teeth (0.68 mm vs. 0.84 mm, $p = 0.008$; 0.47 mm vs. 0.55 mm, $p = 0.004$; and 1.27 mm vs. 1.72 mm; $p = 0.009$, respectively). In contrast, the observed tendency pointed towards thicker facial bone wall for the periodontally diseased mandibular anterior teeth in the W50 position (0.74 vs. 0.52, $p = 0.001$). Healthy maxillary molars tended to displayed a thicker facial alveolar bone compared to the teeth with local pathologies in the W25, W50, and W75 positions ($p = 0.001$, $p = 0.005$, and $p = 0.004$, respectively).

Conclusions

Local pathologies are commonly associated with a compromised socket morphology. The facial bone thickness was particularly reduced at periodontally diseased teeth, which may challenge implant therapy.

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Figure 1. Mandibular molar with periapical lesion

Figure 2. Periodontally diseased mandibular premolar with periapical lesion

Figure 3. Locations of facial bone thickness measurements: W0: at the bone crest (BC); W25: at the position of 25% BC – root apex (A); W50: at the position of 50% of the BC-A distance; W75: at the position of 75% of the BC-A distance; W100: at the A (W100).