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Histomorphometric analysis of intraoral bone grafts harvested by different methods

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Autogenous bone is considered the "gold standard" among graft materials for alveolar ridge augmentation, because of its osteogenic, osteoconductive and osteoinductive features. In clinical practice, autogenous bone chips can be obtained by using different methods, and several studies demonstrated the influence of devices used for tissue harvesting on bone chip morphology and vitality.

Aim of the present study was to compare histologically and histomorphometrically the morphological features and the vitality of bone chips harvested intraorally with five different methods.

Material and Methods Five young adult men were recruited for this study. Five bone samples were harvested from the alveolar process of each patient by means of different methods: 1) bone scraper, 2) stainless steel round bur, 3) stainless steel implant spiral bur, 4) piezoelectric device, 5) trephine bur+manual mill. Samples were processed for undecalcified histology and stained with toluidine blue/ pyronine G (Sigma-Aldrich, St Louis, MO). The sections were photographed in a Nikon light microscope (Eclipse E600) equipped with a calibrated digital camera (DXM1200, Nikon, Tokyo, Japan). Histomorphometric analyses were performed to evaluate bone fragment dimensions: fragments with dimensions comprised between 100 μ m and 1000 μ m (medium size fragments = MF), fragments smaller than 100 μ m (small size fragments = SF) and those greater than 1000 μ m (large size fragments = LF) were differentiated. Total area and percentage area were also evaluated. A stereologic method was used to calculate the percentage of vital bone.

Results Five samples for each harvesting procedure were analyzed. Bone fragments harvested using Trephine bur mostly resulted vital and of large dimensions. Spiral and implant bur produced only small and medium fragments but the percentage of non-vital bone was higher than in the other groups. Bone scraper and piezoelectric device produced vital bone fragments with medium-large dimensions.

Conclusions Within the limited number of samples evaluated, results of the present study claim that bone scraper and piezoelectric device are the most efficacious procedure on harvesting vital bone fragments.

Key words

Alveolar bone, autograft, bone vitality, histology