The edentulous ridge expansion (ERE) technique an experimental study in the dog

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Abstract
Objective: To compare the healing and bony crest resorption at implants installed conventionally or applying an edentulous ridge expansion (ERE) technique in the maxilla.

Material and methods: In six Labrador dogs, the first and second maxillary incisors were extracted bilaterally. In the left side of the maxilla (Test), the flaps were elevated and the buccal plate of the alveoli and septa was removed. After 3 months of healing, partial-thickness (split) flaps were dissected and the residual alveolar bone was exposed. In the right side of the maxilla, an implant was installed conventionally (Type IV; Control) while, in the left side, the ERE technique was adopted. Hence, an expansion of the buccal bony crest was obtained, and the implant was subsequently installed (Test). After 3 months of healing, biopsies were obtained and ground sections were prepared for histological analyses.

Results: A buccal vertical resorption of the bony crest of 2.2 ± 1.2 mm and 1.6 ± 0.7 mm was found at the test and control sites, respectively. The difference, however, did not reach statistical significance. The coronal level of osseointegration at the buccal aspect was located at 3.1 ± 1.0 mm and 2.2 ± 0.7 mm from the implant shoulder at the test and control sites, respectively, the difference being statistically significant. The mean values of the mineralized bone-to-implant contact (MBIC%) ranged from 43% to 48% at the buccal and lingual sites. No differences reached statistical significance.

Conclusions: Implants installed by applying an ERE technique may osseointegrate similarly to conventional implant installation. However, vertical and horizontal resorption of the displaced buccal bony wall occurred as well.

An adequate width of the alveolar bony crest is a pre-requisite to perform a correct implant installation and to reach a favorable long-term prognosis (Adell et al. 1981). However, if the bony crest is insufficient in width, the installation of an implant may result in dehiscences that may jeopardize the long-term prognosis. Moreover, due to the centripetal resorption of the alveolar bony ridge after tooth extraction (Pietrokovski & Massler 1967; Araújo & Lindhe 2005; Tan et al. 2012), the implant position may be located quite lingually in respect of the original position of the tooth [Scipioni et al. 1994]. This may result in functional, esthetic and hygienic problems.

To overcome such problems, different procedures have been suggested for alveolar ridge augmentation, such as bone grafting (e.g., Misch 1997) or guided bone regeneration procedures [Nyman et al. 1990; Buser et al. 1996]. A surgical procedure, the so-called edentulous ridge expansion (ERE), was proposed as well and described in a clinical study [Scipioni et al. 1994]. The technique was subsequently tested in the mandible of dogs [Scipioni et al. 1997], and similar results were obtained at the test sites, where the implants were installed in a thin bony ridge, compared with the control sites, where a conventional installation was performed in healed bony crests of normal width (Type IV installation).

The ERE technique in combination with immediate implant installation is mostly applied in the maxilla [Scipioni et al. 1994]. However, no data are available regarding the magnitude of vertical and horizontal resorption of the buccal bony wall encountered with this procedure.