Influence of implant positioning in extraction sockets on osseointegration: histomorphometric analyses in dogs

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Abstract
Aim: To evaluate the influence of implant positioning into extraction sockets on osseointegration.

Material and methods: Implants were installed immediately into extraction sockets in the mandibles of six Labrador dogs. In the control sites, the implants were positioned in the center of the alveolus, while in the test sites, the implants were positioned 0.8 mm deeper and more lingually. After 4 months of healing, the resorptive patterns of the alveolar crest were evaluated histomorphometrically.

Results: All implants were integrated in mineralized bone, mainly composed of mature lamellar bone. The alveolar crest underwent resorption at the control as well as at the test sites. After 4 months of healing, at the buccal aspects of the control and test sites, the location of the implant rough/smooth limit to the alveolar crest was 2/0.9 mm and 0.6/0.9 mm, respectively (P<0.05). At the lingual aspect, the bony crest was located 0.4 mm apically and 0.2 mm coronally to the implant rough/smooth limit at the control and test sites, respectively (NS).

Conclusions: From a clinical point of view, implants installed into extraction sockets should be positioned approximately 1 mm deeper than the level of the buccal alveolar crest and in a lingual position in relation to the center of the alveolus in order to reduce or eliminate the exposure above the alveolar crest of the endosseous (rough) portion of the implant.

The direct placement of implants into extraction sockets was introduced three decades ago (Schulte et al. 1978). Subsequently, immediate implant placement into extraction sockets was propagated for submerged (Lazzara 1989) as well as non-submerged (Lang et al. 1994; Brägger et al. 1996; Hämerle & Lang 2001) titanium oral implants. Although excellent incorporation and success rates were reported, esthetic outcomes were not addressed. Also, the long-term outcome of this treatment modality remained unknown (Quirynen et al. 2007). In recent years, several prospective (e.g., Fugazzotto 2002, Prosper et al. 2003; Covani et al. 2004; Lang et al. 2007; Botticelli et al. 2008) and retrospective studies (e.g., Goldstein et al. 2002; Bianchi & Sanfilippo 2004), however, reported satisfactory long-term outcomes, and yet, esthetic outcomes have still not been addressed.

In a consensus report (Hämerle et al. 2004), various advantages were mentioned for the immediate implant placement into extraction sockets, such as the reduced overall treatment time and the reduced number of surgical procedures as well as