Effects of saliva contamination on osseointegration during dental implant surgery in augmented areas

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Background: It is suggested that multiple risk factors are involved in implant failure. According to the original osseointegration concept, implant surgery under sterile conditions was advocated. However, all surfaces in the oral cavity are moisturised by saliva, which itself contains approximately 110 bacteria per millilitre. Consequently, there is a risk that implant and bone are contaminated during incision, osteotomy, implant insertion and bone augmentation procedures.

Aim/Hypothesis: The aim of this in vivo study is to investigate whether osseointegration is affected by saliva contamination during dental implant placement in an augmented site. It was hypothesized that saliva contamination during implant insertion in augmented areas has a negative effect on osseointegration.

Material and Methods: Six sheep were used in the present study. In the calvaria bone of each sheep, six bone defects, 8 mm in diameter of hemispheric shape were created and filled with three different bone graft materials. Autogenous bone, bovine bone mixed with autogenous bone (50–50), and biphasic ceramic bone substitute were used respectively. After 5 weeks of healing, 36 dental implants (Nobel Biocare Mark III, machined surface, 3.75 × 7 mm), including 18 contaminated implants with fresh human saliva (Group SC) and 18 implants with no contamination (Group NC) were randomized installed in the centre of the augmented areas. After a healing period of 5 weeks, bone blocks containing implants were retrieved, and undecalcified ground sections were fabricated. For histomorphometric analysis, bone to implant contact (BIC), bone area fraction occupancy (BAFO), bone and material area (BMA) and bone area (BA) were measured. The statistical analyses were performed at a statistical difference of 0.05.

Results: All groups showed no inflammation signs around the implants and osseointegration in residual bone area. The overall test revealed a significantly lower amount of BIC in Group SC compared to Group NC (P = 0.036) in the augmented area, however no significant difference in the area of the pre-existing bone (P = 0.429). For BAFO, BMA and BA, there were no significant differences between Group SC and Group NC.

Conclusions and Clinical Implications: Within the limitations of the present in vivo model, it was shown that saliva contamination during dental implant placement in augmented areas significantly affected the bone formation on the implant surface (BIC), however presented less effect on bone formation in areas more distant from the implant surface. The results indicate that it might be crucial to pay attention to saliva contamination during implant placement in an augmented area.