Bone formation in grafted sinuses performed with anorganic bone in heavy smokers: a histological study

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Abstract

This study presents histological information of biopsies taken from grafted sinuses using exclusively anorganic bovine bone performed in heavy smokers. Maxillary sinuses were grafted with the lateral window (LW) technique using exclusively ABB and a collagen membrane to cover the window. Twelve patients classified as heavy smokers (≥ 10 cigarettes/day) were selected and asked to provide a biopsy core. All patients provided a written informed consent. Bone biopsies were retrieved using a trephine bur with an inner diameter of 2 mm and outer of 2.8 mm, following the planned long axis of the implant (i.e. crestal approach) which would be immediately installed in the site 8-10 months after sinus graft. The biopsies were stored in paraformaldehyde 4% until histological processing. The biopsies evaluation included new bone formation, connective tissue and residual ABB. Implant survival was considered to be any implant that remained in situ, non-mobile, free from peri-implant radiolucency or infection, and without associated pain, either spontaneous or under pressure. The twelve patients provided one biopsy core each. A total of twelve biopsies were analyzed and the average percentage of the new bone formation, residual ABB particles and connective tissue was $25.67 \pm 8.46 \%$, $26.28 \pm 8.61 \%$, and 47.75 ± 9.33 . A total of 26 implants were installed. After 2 years of functional loading the implant survival rate was 96.15%. One implant had an early failure 3 months after placement. It was removed and a carefully alveolus curettage was performed. After 4 months of healing a new implant was installed. The sinus lift procedure associated with the use of ABB in heavy smokers provided adequate bone healing. In addition, it was a secure procedure and enabled the implants placement and a high survival rate after 2-years of functional load.

Results

Fig.2. Representative images of the histological sections. Black Arrows represent the bone substitutes remanants and the purple arrows represents the new bone. It is possible to observe a presence of a good patern of new bone connecting the ABB particles.

Table 1. Mean and standard deviation of the analysis performed in this study.

Parameter	Smokers
% Bone	25.67 ± 8.46
% Biomaterial	26.28 ± 8.61
%Connective Tissue	47.75 ± 9.33
%Survival Rates	96.15%

Background and Aim

Sinus lift procedures using the lateral window technique and anorganic bovine bone (ABB) as a graft material is considered a safe and predictable option for bone gain in the posterior maxillae (1,2). There is consistent information in literature demonstrating that smoking habits negatively influence regenerative procedures (3). However limited information is available regarding the influence of smoking habits in new bone formation in maxillary sinuses grafted exclusively with anorganic bovine bone. The aim of this study was to evaluate the histological information of grafted sinuses using exclusively ABB performed in heavy smokers.

Conclusion

The implants placed in the posterior region of the maxilla associated with the sinus floor augmentation grafted with ABB in smokers presented high survival rates after 2 years of follow-up. Furthermore, healing of the grafted areas provided adequate bone formation.

Methods and Materials

Fig.1. Study desing and analysis

References

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