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IMPLANT THERAPY OUTCOMES; SURGICAL ASPECTS

New bone formation comparison in sinuses grafted with anorganic bovine bone and β -TCP.

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Abstract

This study presents histological comparative information of biopsies taken from grafted sinuses using exclusively anorganic bovine bone (ABB) or β -TCP. Maxillary sinuses were grafted with the lateral window (LW) technique using bone substitutes and a collagen membrane to cover the window. Thirty-five patients were included in the study. Group 1 (20 patients) and 2 (15 patients) were grafted exclusively with ABB and β -TCP, respectively. 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 6 months after sinus graft. The biopsies were stored in paraformaldehyde 4%. The evaluation included new bone formation, connective tissue and residual particles of the bone substitutes. The primary stability of the dental implants was measured by the resonance frequency analysis (RFA). The 35 patients provided one biopsy core each. 124 implants were placed in the grafted areas (84 in the areas grafted with ABB and 60 in the areas grafted with β -TCP). The new bone formation, residual bone substitutes particles and connective tissue was 27.97 ± 0.90 %, 20.61 ± 0.71 % and 51.42 ± 0.94 %, for group 1 and 49.32 ± 4.04 %, 3.22 ± 2.55 % and 47.45 ± 3.80 % for group 2. The implants placed in the ABB presented RFA of 73.32 ± 0.61 while the implants placed in the areas grafted with β -TCP presented RFA of 33.03 ± 2.80 . The biopsies of the sinus grafted with β -TCP presented statistically more bone formation and less bone substitutes remnants than the areas grafted with ABB. On the other hand, the implants placed in the areas grafted with ABB presented higher primary stability than the implants placed in the areas solely grafted with β -TCP.

Results

Fig.2. Representative images of the histological sections. Black Arrows represent the bone substitutes remnants and the yellow arrows represent the new bone.

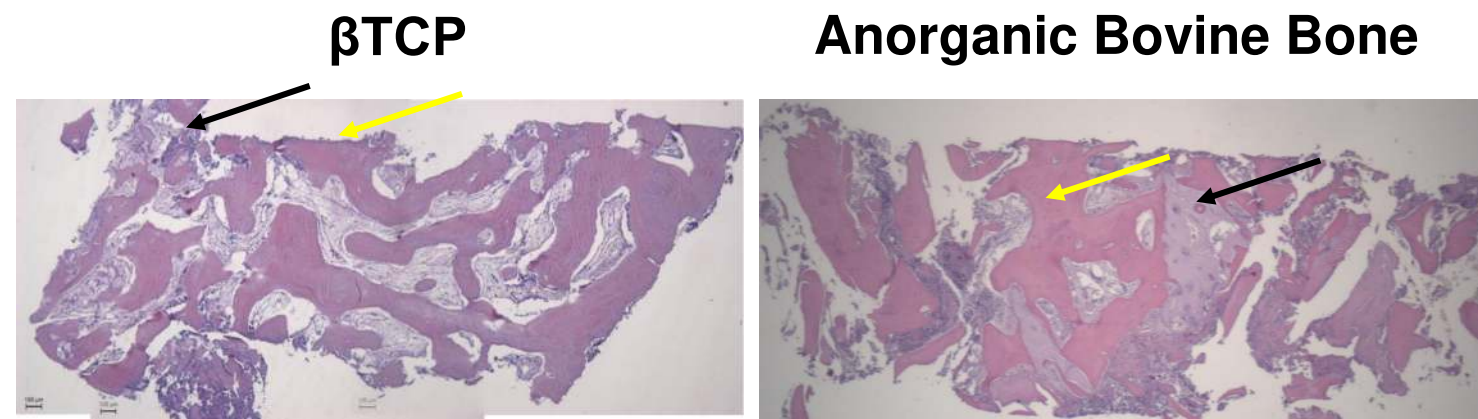


Table 1. Mean and standard deviation of the analysis performed in this study. * $p < 0.05$ - Statistically higher values the comparative group – Unpaired t-test.

Parameter	β TCP	ABB
% Bone	$49.32 \pm 4.04^*$	27.97 ± 0.90
% Biomaterial	3.22 ± 2.55	$20.61 \pm 0.71^*$
%Connective Tissue	47.45 ± 3.80	51.42 ± 0.94
RFA	$33.03 \pm 2.80.$	$73.32 \pm 0.61^*$

Background and Aim

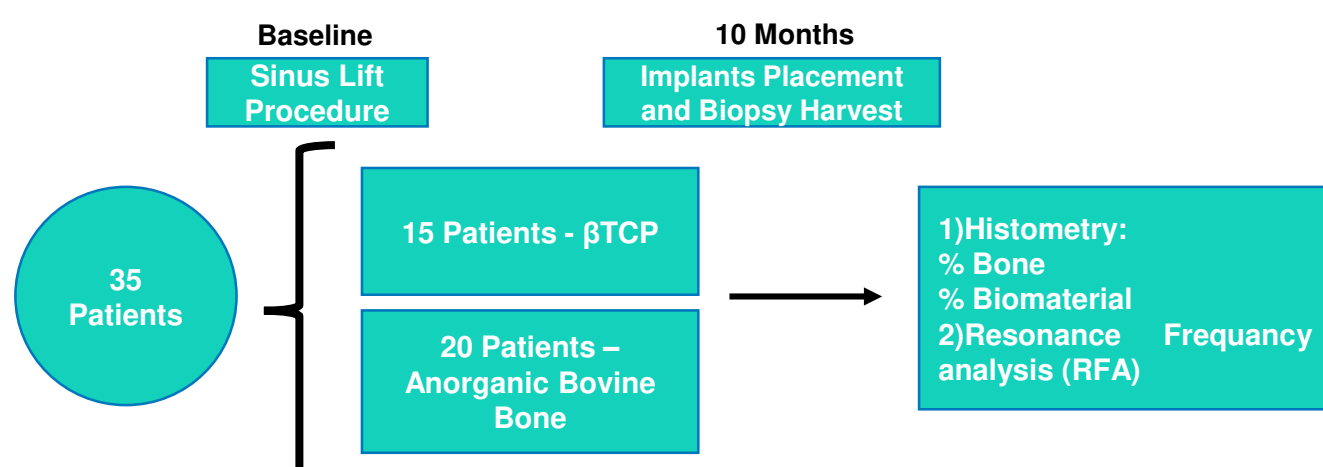
Maxillary sinus lift (MSL) procedures using the lateral window technique are considered a safe and predictable option for bone gain in the posterior maxillae(1). The use of bone substitutes for MSL gained space in the past decades due to reduced morbidity (2). Also the results in terms of implant survival rates are comparable to MSL performed with autogenous bone grafts (2,3). Anorganic bovine bone (ABB) and β -Tricalcium Phosphate (β -TCP) are widely applied for MSL (1,3). This study presents histological comparative information of biopsies taken from grafted sinuses using exclusively anorganic bovine bone or β -TCP.

Conclusion

The areas grafted with β -TCP presented more bone formation that was associated with the less amount of bone substitutes remnants than the areas grafted with ABB. However, the implants placed in the areas grafted with ABB presented higher primary stability than the implants placed in the areas grafted with β -TCP.

Methods and Materials

Fig.1. Study design and analysis



References

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- 3) Pereira RS, Gorla LF, Boos FBJD, Okamoto R, Garcia Júnior IR, Hochuli-Vieira E. Use of autogenous bone and beta-tricalcium phosphate in maxillary sinus lifting: histomorphometric study and immunohistochemical assessment of RUNX2 and VEGF. Int J Oral Maxillofac Surg. 2017 Apr;46(4):503-510.

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