OsteoBiol® by Tecnoss

Ultrastructural study by backscattered electron imaging and elemental microanalysis of bone-to-biomaterial interface and mineral degradation of porcine xenografts used in maxillary sinus floor elevation

LATERAL ACCESS SINUS LIFT

051

Maria P. Ramirez Fernandez[1]
Jose L. Calvo Guirado[1]
Jose E. Maté Sánchez del Val[1]
Rafael A. Delgado Ruiz[1]
Bruno Negri[1]
Cristina Barona Dorado[2]

1 | Department of Implant Dentistry, Faculty of Medicine and Dentistry, University of Murcia, Spain
2 | Department of Oral Surgery, Complutense University of Madrid, Madrid, Spain

ABSTRACT

Adequate alveolar ridges are fundamental to successful rehabilitation with dental implants and different techniques for reconstructing atrophied ridges are available. Bone substitute grafts represent a relevant possibility, provided that the biomaterial for bone substitution is biologically safe and safety depends on the quality of its reproducibility, its biocompatibility, and an absence of toxicity. The aim of this study was to carry out a retrospective investigation of a bone substitute material (BSM) in retrieved bone biopsies from maxillary sinus augmentation in 15 human subjects. The Authors investigated OsteoBiol® *mp3*® (Tecnoss®, Giaveno, Italy), an antigen-free bone consisting 90% porcine granules of dimensions between 600-1000 μm mixed with 10% pure Type-I porcine collagen, used as a bone substitute for sinus augmentation. The investigation was performed by means of an ultrastructural study of the bone-to-biomaterial interface using scanning electron microscopy backscattered electron imaging (SEM-BSE), as well as analysis of the mineral degradation of residual bone substitute graft material using microanalytical system based on energy-dispersive X-ray spectrometry (EDX). In the 15 partially edentulous patients (6 women and 9 men), of ages ranging from 37 to 60 years, the sinus membrane was elevated with curettes of different shapes and after membrane elevation, all sinus cavities were grafted with a BSM. After BSM grafting, an absorbable collagen porcine membrane (OsteoBiol® *Evolution*, Tecnoss®) was placed over the window to minimize soft tissue invasion.
9 months after sinus lifting, bone cores were harvested from the maxillary sinus. The specimens were processed for observation under a SEM-BSE analysis, then chemical analysis and elemental mapping of the mineral composition were generated using a EDX. Scanning electron microscopy revealed that newly formed bone had become closely attached to the xenograft. Elemental analysis (above all, a high Ca/P ratio) showed that there was a gradual diffusion of Ca^{+} ions from the biomaterial to the newly forming bone at the interface.

CONCLUSIONS

From a clinical point of view, after a 9-month follow-up period of these 15 patients the success rate was 100%. No perforation of the sinus membrane or other clinical complications such as sinusitis or pain resulted from surgery. The increased volumes produced by the xenograft procedures were stable by the end of the healing period and all planned implants could be placed in the augmented sites. The analysis demonstrated that the biomaterial proved to be biocompatible, bioreabsorbable and osteoconductive when used as a bone substitute for maxillary sinus elevation.

ORIGINAL ARTICLE
Clinical Oral Implants Research
2013 May;24(5):523-30. Epub 2012 Jan 26

Grafted with

BONE SUBSTITUTE
OsteoBiol® *mp3*®

MEMBRANE
OsteoBiol® *Evolution*

LASL