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# Equine and porcine bone substitutes in maxillary sinus sugmentation: a histological and immunohistochemical analysis of VEGF expression



## ABSTRACT

In case of correct severe bone defects, it is necessary to perform a bone regeneration procedure in order to allow the placement of implants. When the intermaxillary relationship is maintained and in order to have suitable prosthetic results, maxillary sinus augmentation procedure represents a valid treatment solution. In recent years, different materials have been proposed to achieve bone regeneration through grafting the maxillary sinus. As the host tissue response to a bone substitute may be evaluated by immunohistochemical analysis for the expression of molecules specifically involved in the bone healing process and in this process, vascular endothelial growth factor (VEGF) plays an important role, in this study the Authors aimed to investigate the morphological structure and the expression of vascular endothelial growth factor (VEGF) after maxillary sinus augmentation through equine and porcine bone biomaterials. Twenty patients who were scheduled for maxillary sinus augmentation procedures before implants placement, were included in this study. Ten patients underwent maxillary sinus augmentation through particulate equine bone substitute (BioBone Osteoconductor Mix; BioSAF IN S.r.l., Ancona, Italy) and 10 patients through a particulate bone substitute of swine origin (OsteoBiol® *Gen-Os*®, Tecnoss®, Giaveno, Italy). Postoperative healing was uneventful for all the patients and after about 6 months they all underwent a second surgery for implant placement. During implant insertion, bone samples were retrieved at the sites of implant placement to obtain significant specimens of bone regenerated with both heterologous bone substitutes. Morphological analysis was performed by light microscope after hematoxylin-eosin staining. Light microscopic analysis strongly evidenced that sites treated with the equine bone substitute showed good integration between host tissue and graft. More evident signs of particles resorption were observed in equine bone substitute group specimens compared to porcine ones. Clinical results showed both bone substitutes are capable to achieve comparable bone regenerative performances.

## CONCLUSIONS

Based on the results, the Authors concluded that *"even if long-term results are not yet available to evaluate host-tissue response after a longer healing period, the present results indicate that both equine- and porcine-derived bone substitutes could be successfully used for regenerative therapy of intraoral bone defects"*.

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