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Radiographic analysis of graft dimensional changes after lateral maxillary sinus augmentation with heterologous materials and simultaneous implant placement: a retrospective study in 18 patients

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ABSTRACT

In this retrospective clinical study, the Authors radiologically investigated the behavior of different heterologous bone substitutes, alone or in combination, in terms of mechanical stability and bone regeneration in maxillary sinus floor augmentation procedure via lateral approach. Eighteen patients, with a mean age at surgery of 66.5±9.8 (range 52-82) years, were unilaterally treated. Thirty-five dental implants were positioned in the posterior maxilla simultaneously to grafting with different biomaterials. The heterologous biomaterials used were: OsteoBiol® *mp3*® (Tecnoss®, Giaveno, Italy), OsteoBiol® *Putty* (Tecnoss®), OsteoBiol® *GTO*® (Tecnoss®), OsteoBiol® *Apatos*® *Mix* (Tecnoss®), OsteoBiol® *Gel 40* (Tecnoss®). In addition, a synthetic granular bone substitute (Bioresorb Macro Pore, Implant Direct, USA) was also used. A gradually resorbable membrane, composed by heterologous mesenchymal tissue with dense collagen fibers (OsteoBiol® *Evolution,* Tecnoss®) was applied to cover the Schneiderian membrane. Intraoral radiographs taken at the time of surgery, after six months, and at the longest follow-up (up to nine years after implant placement) were analyzed. The results evidenced that the mean residual bone height at the mesial and distal aspect of the implants was 3.19±2.05 mm and 2.65±1.60 mm, respectively (p=0.38). The mean graft width at baseline was 27.95±5.23 mm, and the mean graft width reduction was 10.2±12.7% (2.98±3.62 mm) and 11.3±14.4% (3.36±4.08 mm) at six months and at the latest follow-up. The change was significant at six months (p = 0.005), but did not show significant further variation (p=0.11). On the mesial and distal aspect, the mean graft extension decreased by 1.56±2.67 mm and 0.84±2.71 mm at the latest follow-up. No significant difference between mesial and distal changes was found (p=0.24), suggesting that the biomaterial is resorbed homogeneously on both sides. The mean graft height was 11.92±2.53 mm at baseline and decreased by 9.3±9.05% (1.11±1.09 mm) at six months (p<0.001). Non-significant further changes were found at the latest follow-up (p=0.10).

CONCLUSIONS

This study presents some limitations, such as the low number of samples for each of the different biomaterials used and the fact that all measurements were based on bi-dimensional intraoral radiographs. Consequently, in order to compare the performance of different materials, specific studies with wider sample size and long-term follow-up are needed.
Anyway, based on the outcomes of this study, the Authors concluded that "*the data of this study performed under daily practice conditions suggest that in maxillary sinus augmentation with a lateral approach, xenogeneic bone substitutes of porcine origin, combined or not with alloplastic graft materials, undergo a resorption pattern consisting of an early remodeling, followed by a phase of stability. The amount of change appears to be related to the baseline dimension of the graft. The remodeling pattern of the graft was compatible with durable implant support and protection*".

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