Nº 7081

Does the distance from native bone influences quality of bone formation at grafted sites?

IMPLANT THERAPY
OUTCOMES, SURGICAL
ASPECTS

Túlio B. Pignaton; Carlos E. A. Ferreira; Carolina B. Martinelli; Guilherme J. P. L. Oliveira; Rubens Spinato; Elcio Marcantonio Jr.

Department of Diagnosis and Surgery, School of Dentistry of Araraquara, Univ. Est. Paulista, Araraquara, Brazil.

Background and Aim

Background: Sinus lift procedures are considered a safe and predictable option for bone gain in the posterior maxilla and anorganic bovine bone a predictable graft option. The grafting site volume and the distance from native bone is considered a key factor in bone regeneration. However, there is limited evidence about the influence of the maxillary sinus anatomy and length of grafting sites in the quality of bone formation after sinus lift procedure.

Aim: The aim of this clinical study was to evaluate the influence of bone graft distance from native bone in bone repair after sinus lift procedures performed exclusively with anorganic bovine bone.

Histological image

Micro-CT images

Methods and Materials

Twenty edentulous patients with deficient bone high (< 5mm) in the posterior maxilla were select according to tomographic analysis for bilateral sinus floor elevation. All procedures were performed by the same surgeon (TBP) with the lateral window approach using 100% anorganic bovine bone and a collagen membrane over the window fixed with tacks. After 8 months a second tomographic exam was used for planning and 6-8 dental implants were performed and submerged in each patient. Biopsies were taken using a trephine bur (3mm) at the implant installation site in augmented sinuses. The biopsies were scanned for Micro Ct and processed for histological analysis. The Micro Ct was used to evaluate the volume of mineralized tissues in the biopsies in native and grafted areas while the histometry was performed to evaluated the composition of the native bone and grafted areas (bone, biomaterial and connective tissues). The grafted area was also evaluated millimeter-by-millimeter being the first the closest to native bone.

Results

A total of 53 biopsies were evaluated. The Micro Ct analysis showed that the amount of mineralized tissues was higher in the grafted area compared to native bone (graphic 1). Also from the 3rd mm of height of the grafted area there was a smaller amount of mineralized tissues compared to the first two millimeters (graphic 2). Regarding the histometric analysis, it was showed that the amount of bone tissue reduced from 3rd mm in comparison with the first two millimeters of the grafted area (graphic 3). In contrast, the amount of biomaterial was not influenced by the height of the grafted area. Finally, the amount of connective tissue increased from the 4th mm compared to the first 2 mm of the grafted area. The data about the volume of mineralized tissues, amount of bone and biomaterial presented a negative correlation with the height of the grafted area. In contrast, the amount of connective tissue and the height of the grafted area showed a positive correlation. All the correlations tested were statistically significant.

Graphic 1. Micro Ct and histological analysis

Graphic 2. Micro Ct analysis

Graphic 3. Histological analysis

Conclusions

The grafted areas composition changed with the increase of the distance from the native bone, with a reduction in the amount of mineralized tissues (bone and biomaterial) and an increase in the amount of soft connective tissue.

References

- Corbella, S., Taschieri, S., Weinstein, R., & Del Fabbro, M. (2016). Histomorphometric outcomes after lateral sinus floor elevation procedure: a systematic review of the literature and meta-analysis. *Clin Oral Implants Res*, 27(9), 1106-1122. doi: 10.1111/clr.12702
- Pjetursson, B. E., Tan, W. C., Zwahlen, M., & Lang, N. P. (2008). A systematic review of the success of sinus floor elevation and survival of implants inserted in combination with sinus floor elevation. Part I: Lateral approach. *J Clin Periodontol*, 35(8 Suppl), 216-240. doi: 10.1111/j.1600-051X.2008.01272.x
- Polimeni, G., Xirapaidis, A. V., & Wikesjo, U. M. (2006). Biology and principles of periodontal wound healing/regeneration. *Periodontol 2000*, 41, 30-47. doi: PRD157 [pii]10.1111/j.1600-0757.2006.00157.x