μ -CT evaluation of bone repair in critical calvaria defects of rats using bone substitutes associated or not to MTA.

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Abstract

The use of biomaterials that aim to restore the lost bone volume after tooth loss has expanded. The bone is a highly specialized connective tissue, possessing appositional dynamics where the balance between neoformation and reabsorption involves the interaction of endocrine, paracrine and autocrine factors. Several associations of mixed materials and bone substitutes have been studied, but the MTA (Mineral Trioxide Aggregate) still lacks information about its use as a bone substitute or in association with this type of material. For analysis of the parametric data, one-way ANOVA (One-Way ANOVA) analysis of the values of micro-CT of bone volume (BV), percentage of bone volume (BV / TV), bone trabeculate thickness (Tb. Th), separation and number of trabeculae (TB.Sp and Tb.N) and then the Tukey post-test. The parameters BV, BV / TV, Tb.Th and Tb.N showed no statistical differences. As the group Osteosynt® + 15% MTA was the group with the highest values for BV, BV / TV, Tb.Th and Tb.N.

Results

Rendered images of groups in the two evaluated times

Comparative graphs of evaluated parameters

Background and Aim

The use of biomaterials that aim to return bone volume lost after tooth loss has expanded. Bone is a highly specialized connective tissue, possessing appositional dynamics where the balance between neoformation and reabsorption involves the interaction of endocrine, paracrine and autocrine factors. Several associations of materials and bone substitutes have been studied, but the Mineral Trioxide Aggregate (MTA) still lacks information about its use as a bone substitute. The aim of this study was to evaluate the influence of the MTA on 5%, 10% and 15% proportions in association with bone substitute composed of Hydroxyapatite and B-tricalcium phosphate (Osteosynt®) in tissue response, mineralization and repair capacity in a critical defect in calvaria of rats.

Conclusion

Based on the results obtained and considering the limitations of this study it is possible to conclude that, statistically, the addition of MTA in the 3 proportions tested did not demonstrate effectiveness when compared to the isolated use of Bio-Oss® and Osteosynt® bone substitutes and clot. However, numerical superiority was evidenced for the newly formed bone volume of the association Osteosynt® + 15% MTA at 7 days and Osteosynt® + 10% MTA and Osteosynt® + 15% MTA at the 28 day analysis.

Methods and Materials

42 male Wistar rats were randomly divided into 7 groups (n = 6) according to their respective groups. The animals received in the 5mm diameter critical defect created in their calvaria: Clot group (CG), Osteosynt® (OS), BioOss® (BO), MTA Angelus Branco® (MTA), OS + 5% MTA (OS5), OS + 10% MTA (OS10), OS + 15% MTA (OS15) evaluated in 2 times (7 and 28 days) (n = 3). All procedures followed the standards of the institution's animal research ethics committee (process 0175-2019). The pieces were submitted to a Skyscan® μ -CT, the images obtained were reconstructed in the NRecon® software and analyzed in the Data Viewer®, CT Analyser® and CTvox®. The obtained values of bone volume (BV), percentage of bone volume (BV / TV), bone trabecular thickness (Tb.Th), separation and number of trabeculae (TB.Sp and Tb.N) were analyzed by One- Way ANOVA followed by the Tukey post-test (p < 0.05).

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