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BASIC RESEARCH

Nanometric implant surface associated to L-PRF. Histomorphometric study in osteoporotic rats

José Augusto Gabarra Jr.*, Fernando José de Oliveira Nóbrega, Paula Gabriela de Oliveira, Edmara Bergamo, Fábio Bezerra, Bruna Ghiraldini, Adriana Silveira e Souza, Sérgio Scombatti de Souza
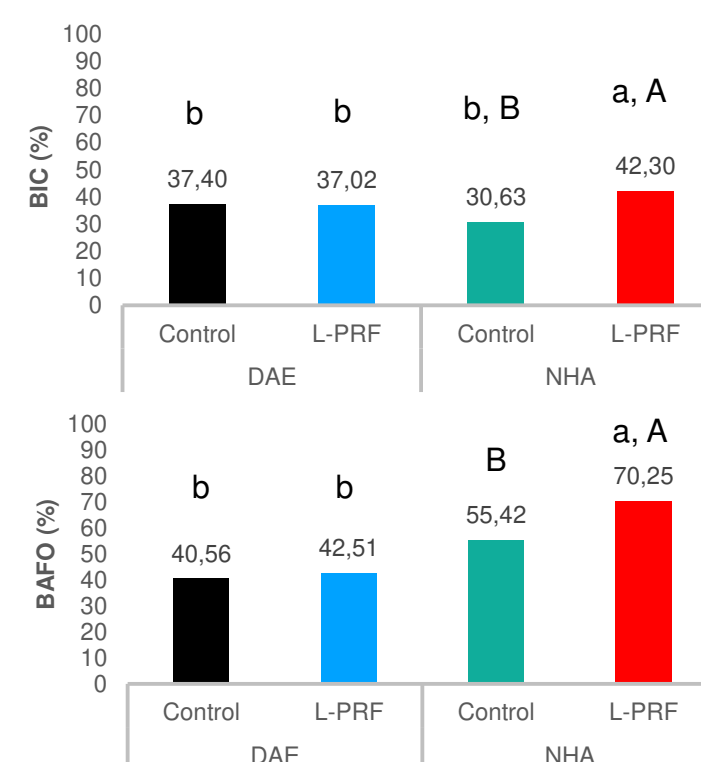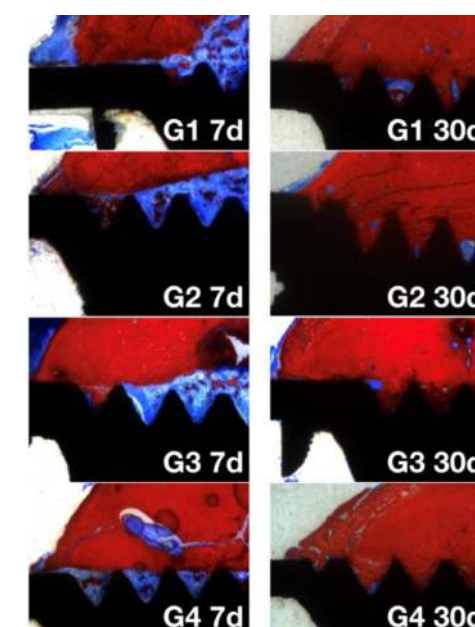
Abstract

The use of dental implants has been an extremely relevant tool in oral rehabilitation. However, there are systemic conditions, such as osteoporosis, that may negatively influence the osseointegration process by decreasing bone mineral density. Modifications in the microtopography and surface of the implants, as well as the use of the Leukocyte Fibrin Rich Plasma (L-PRF), are strategies that have been used to increase bone healing around the implant.

Background and Aim

The aim of the study was to evaluate, in osteoporotic rats, the bone repair around two implant surfaces (double acid etched=DAE or with the addition of nano-hydroxyapatite=NHA), associated or not to L-PRF, evaluating the histomorphometric parameters of Bone to Implant Contact (BIC) and Bone Area Fraction Occupancy (BAFO).

Methods and Materials

Implants with 2 types of surface (DAE or NHA; 24 implants of each) were installed in the tibias of osteoporotic rats. In 24 rats, L-PRF was obtained with blood collection by cardiac puncture and posterior centrifugation and inserted in the prepared bone site before implant insertion. The 48 rats were randomly divided into 4 experimental groups of 12 rats each: G1-DAE implants installed; G2-NHA implants installed; G3-DAE implants installed in association to L-PRF; G4-NHA implants installed in association to L-PRF. All the implants measured 2.7mm in length and 1.4mm in diameter. The animals were euthanized 7 and 30 days (7d; 30d) after implants placement (6 from each group/period) and the specimens were histologically processed. Histomorphometrical parameters (BIC, in %; and BAFO, in %) were evaluated. Data were assessed through analysis of variance + Tukey test.
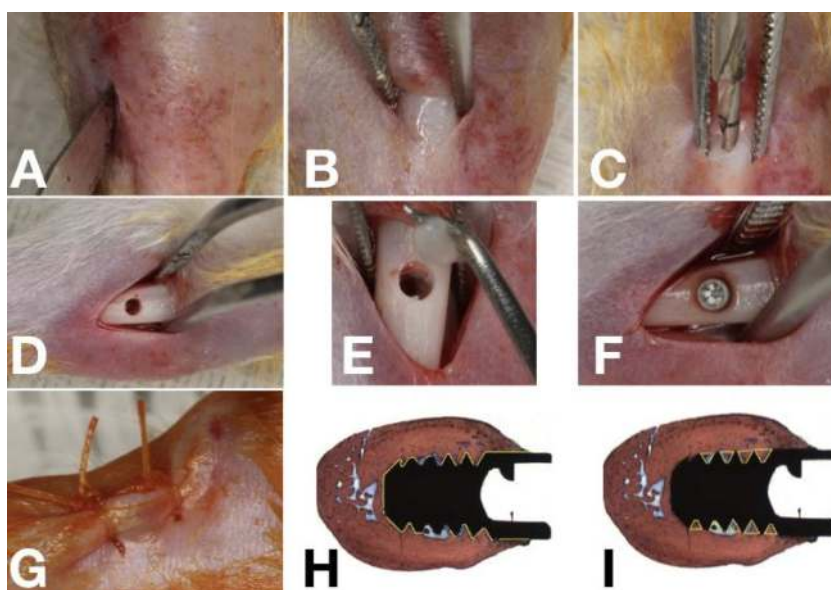

Figure 1 - Implant installation: A) Incision; B) Flap released; C) and D) Perforation under constant irrigation with saline solution for implant placement; E) Insertion of L-PRF; F) Implant installed; G) Flap sutured; H and I) Histomorphometric analysis.

Results

Different small letters indicates a significant difference between surfaces; different capital letters means a significant difference between using or not L-PRF on the same implant surface.

Conclusion

BIC and BAFO results showed that the implant surface modified by the addition of nanometric scale hydroxyapatite, mainly associated to L-PRF, presented the highest values of the evaluated parameters in an impaired bone repair model (osteoporotic rats) when compared to the double acid etched surface. These results suggest that NHA surface implants + L-PRF treatment should be tested in challenging clinical situations, in human controlled trials.

References

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