Effects of low-level laser therapy on autogenous bone graft stabilized with a new heterologous fibrin sealant.

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Abstract:

Autogenous bone grafts are used to repair bone defects, and the stabilization is needed for bone regeneration. Laser photobiomodulation is a modality of treatment in clinical practice for tissue regeneration, and it has therapeutic effects as an anti-inflammatory, analgesic and modulating cellular activity. The aim of the present study was to evaluate the effects of low-level laser therapy (LLLT) on an autogenous bone graft integration process stabilized with a new heterologous fibrin sealant. Forty rats were divided into two groups: Autogenous Fibrin Graft (AFG, n = 20), in which a 5 mm dome osteotomy was conducted in the right parietal bone and the graft was adhered to the left side using fibrin sealant; and Autogenous Fibrin Graft Laser (AFGL, n = 20), which was subjected to the same procedures as AFG with the addition of LLLT. The treatment was performed immediately following surgery and then three times a week until euthanasia, using an 830 nm laser (30 mW, 6 J/cm², 0.116 cm², 258.6 mW/cm², 2.9 J). Five animals from each group were euthanized at 10, 20, 30 and 40 days postoperative, and the samples were submitted to histomorphological and histomorphometric analysis. Partial bone regeneration occurred, with new bone tissue integrating the graft to the recipient bed and small areas of connective tissue. Comparative analysis of the groups at the same intervals revealed minor interfaces in group AFGL, with statistically significant differences ($p < 0.05$) at all of the analyzed intervals (10 days $p = 0.0087$, 20 days $p = 0.0012$, 30 days $p < 0.0001$, 40 days $p = 0.0142$). In conclusion, low-level laser therapy stimulated bone regeneration and accelerated the process of

integration of autogenous bone grafts.