Influence of Autologus Adipose Derived Stem Cells and PRP on Regeneration of Dehiscence-Type Defects in Alveolar Bone: A Comparative Histochemical and Histomorphometric Study in Dogs

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Abstract

Background: Autogenous bone grafts is considered to be the best choice for reconstructive surgery. Adipose Derived Stromal Cells (ASCs) represents a promising tool for new clinical concepts in supporting cellular therapy. The goal of our study was to investigate bone regeneration following application of autologous ASCs with or without Platelet-Rich Plasma (PRP) at dehiscence-type defects in alveolar bone in dogs.

Material and Methods: Standardized buccal dehiscence defects (4 × 3 × 3 mm) were surgically created in eighteen dogs, the defects were grafted with either ASCs -PRP, ASCs alone, or without grafting material. Three months later; a bone core was harvested from grafted and non grafted sites for histological, histochemical and histomorphometric assessment.

Results: There was no evidence of inflammation or adverse tissue reaction with either treatment. Defects grafted with ASCs-PRP showed a significantly higher result (P ≤ 0.05), with a mean area % of spongy bone and compact bone of (64.96±5.37 and 837.62±24.95), compared to ASCs alone (47.65±1.43 and 661.92±12.65) and without grafting (33.55±1.74 and 290.85±7.27) respectively. The area % of lamellated bone increased significantly reaching its highest level in group A followed by group B. Also a significant increase in area % of neutral mucopolysaccharides and calcified reactivity of Masson’s Trichrome stain in groups A and B compared to group C was obtained.

Conclusions: Our results suggest that, the addition of PRP to ASCs enhances bone formation after 3 months and may be clinically effective in accelerating postsurgical healing in both periodontal and maxillofacial surgical applications.