Verapamil, a Calcium-Channel Blocker, Improves the Wound Healing Process in Rats with Excisional Full-Thickness Skin Wounds Based on Stereological Parameters

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Abstract

OBJECTIVE: Calcium can play noticeable roles in the wound-healing process, such as its effects on organization of F-Actinin collagen bundles by fibroblasts at the injury site. In addition, calcium-channel blockers such as verapamil have antioxidant activity by increasing nitric oxide production that promotes angiogenesis, proliferation of fibroblasts, and endothelial cells in the skin-regeneration process. Therefore, in this study, the authors’ objective was to investigate the effects of verapamil on the process of wound healing in rat models according to stereological parameters.

MATERIALS AND METHODS: In this experimental study, 36 male Wistar rats were randomly divided into 3 groups (n = 12): The control group that received no treatment, gel-base-Treated group, and the 5% verapamil gel-Treated group. Treatments were done every 24 hours for 15 days. Wound closure rate, volume densities of the collagen bundles and the vessels, vessel's length density and mean diameter, and fibroblast populations were estimated using stereological methods and were analyzed by the Kruskal-Wallis and Mann-Whitney U tests; P <.05 was considered statistically significant.

RESULTS: The verapamil-Treated group showed a faster wound closure rate in comparison with control and gel-base groups (P =.007 and P =.011). The numerical density of fibroblasts, volume density of collagen bundles, mean diameter, and volume densities of the vessels in the verapamil group were significantly higher than those in the control and the base groups (P <.005). CONCLUSIONS: The authors showed that verapamil has the ability to improve wound healing by enhancing fibroblast proliferation, collagen bundle synthesis, and revascularization in skin injuries.