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Evaluation of the regenerative effect of chitosan scaffold and hyaluronic acid with and without mesenchymal stem cells on wound healing in rats

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Abstract

This study aimed to evaluate the restorative effect of chitosan hyaluronic acid scaffold (CHAS) with and without mesenchymal stem cells (MSCs) on the wound healing process in rats. The different wound treatment groups were as follows: no treatment or control (C), wound treatment with CHAS, wound covering with CHAS with MSCs. The wound healing effect was measured by measuring the wound area in each mouse on days 3, 5, 9, and 14. Then, for histopathological evaluation in the above days, each wound and 5 mm of normal skin tissue around each wound were separated and fixed. The results demonstrated that on the third and fifth days after the wound formation, the area of the remaining wound in the CHAS group was significantly smaller than the CHAS with MSCs but no significant difference was observed in the group C. Also, the area of the remaining wound on the ninth and fourteenth days in the studied groups did not show a significant difference. However, on day 14, the mean wound area in the CHAS group with MSCs was smaller than the other two groups. Histological examinations of the wound site were studied in terms of collagen arrangement, inflammation, vascular formation, granulation tissue, and epithelial regeneration. Studies in terms of collagen arrangement, granulation tissue formation, and vascular formation showed that on the third day. There was a significant difference between the groups, while no statistically significant difference was found between the groups in terms of inflammation and epithelial regeneration on the studied days. All these results demonstrate that there is no significant difference between the CHAS group and the CHAS group with MSCs as well as in group C.

Key words: Chitosan, Hyaluronic acid, Mesenchymal stem cell, Wound healing

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