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Autologous adipose-derived stem cells (ADSCs) transplantation in the management of chronic wounds

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Our aim is to characterize the chronic wound response to autologous Adipose-Derived Stem Cells (ADSCs) sheet transplantation. A pilot descriptive longitudinal study at the Wound Healing Center of the Vietnam National Burn Hospital, from July 1, 2019 to August 30, 2020. Thirty patients with 38 chronic wounds enrolled in the study and were grafted with autologous ADSCs sheets on the wound bed. Wound edges, wound bed, wound size and structure using H&E staining, ultrastructure changes by Transmission Electron Microscope at the time of transplantation and at the first, second and third week of follow-up were followed. Results indicated that after ADSCs sheet transplantation, the structure and ultrastructure of chronic wounds had improved. The Extracelluler Matrix (ECM), neo-vascular, fibroblast and collagen fibers proliferated and arranged side by side at the dermis layer. Fibroblast proliferated and increased secretion of collagen. Keratinocytes proliferated and immigrated in epidermis layer. After three weeks of autologous ADSCs sheet transplantation, the epithelial cells covered 90% of the wound surface. Neo-vascular, fibroblast and collagen proliferation increased weekly. The image of lymphocytes infiltration in connective tissues decreased. Wound size reduced significantly compared to before experiment, wound beds were cleaner and filled with granulation tissue. Re-epithelialization appeared at the wound edge and throughout the wound. Wound measurements were statistically significant at the second and third weeks after starting treatment (week 2: 12.8±11.56 cm^2 (range: 1-47.42 cm^2), $p<0.05$; week 3: 7.44 ± 5.68 cm^2 (range: 0.45-20.10 cm^2), $p<0.001$), indicating the autologous ADSCs treatment enhanced the healing of chronic wounds. In conclusion, ADSCs has a beneficial effect on cutaneous regeneration and chronic wound healing.

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