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Histopathological Analysis of Skeletal Muscle Biopsy of Patient with Peripheral Arterial Disease before and after Peripheral Blood Stem Cells Intramuscular Injection

Mavlikeev M., Plotnikov M., Maximov A., Murtazin A., Gafiatullina G., Titova A., Gazizov I., Deev R., Gumerova A., Kiyasov A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016, Springer Science+Business Media New York.Peripheral arterial diseases are characterized by a progressing tissue ischemia which results in the invalidization of patients. The aim of our research was to study the morphological effects of autologous peripheral blood stem cells intramuscular injection into patients with peripheral arterial disease. Peripheral blood stem cells were transplanted intramuscularly into a 48-year-old male patient with peripheral arterial disease stage IIb by Fontaine. The biopsies of his gastrocnemius muscle were taken before the stem cells were transplanted and 3 months after transplantation. These biopsies were stained with H&E and also with antibodies against CD34, myogenin, caspase 3, and bcl-2. Immunohistochemical study results showed an increase of capillary density of 32.7 % (P = 0.005). In muscular biopsies obtained before therapy, we identified single myogenin+ myosatellite cells, while 3 months after transplantation we detected the presence of cells with myogenin-positive nuclei and multinucleated myotubes. We also observed the formation of young myogenin+ muscle fibers with central nuclei. There was no significant difference in the expression of caspase-3 before transplantation and 3 months after transplantation. An increased number of bcl-2+ myosatellite cells, myotubes, and muscle fibers were detected after transplantation. The patient's ankle-brachial index increased by 13.56 % (0.59 before and 0.67 3 months post transplantation). The patient's pain-free walking distance by 89.97 % (from 59.56 to 113.77 m). Control arteriograms showed the formation of new collaterals. Transplanted autologous peripheral blood stem cells stimulated the formation of new capillaries, the activation of myosatellite cells and bcl-2 expression in muscle fibers.

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Keywords

Apoptosis, Autologous transplantation, Biopsy, G-CSF, Peripheral arterial disease, Stem cells

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