Synaptic plasticity and sensory-motor improvement following fibrin sealant dorsal root reimplantation and mononuclear cell therapy.

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Abstract:

Root lesions may affect both dorsal and ventral roots. However, due to the possibility of generating further inflammation and neuropathic pain, surgical procedures do not prioritize the repair of the afferent component. The loss of such sensorial input directly disturbs the spinal circuits thus affecting the functionality of the injuried limb. The present study evaluated the motor and sensory improvement following dorsal root reimplantation with fibrin sealant (FS) plus bone marrow mononuclear cells (MC) after dorsal rhizotomy. MC were used to enhance the repair process. We also analyzed changes in the glial response and synaptic circuits within the spinal cord. Female Lewis rats (6-8 weeks old) were divided in three groups: rhizotomy (RZ group), rhizotomy repaired with FS (RZ+FS group) and rhizotomy repaired with FS and MC (RZ+FS+MC group). The behavioral tests electronic von-Frey and Walking track test were carried out. For immunohistochemistry we used markers to detect different synapse profiles as well as glial reaction. The behavioral results showed a significant decrease in sensory and motor function after lesion. The reimplantation decreased glial reaction and improved synaptic plasticity of afferent inputs. Cell therapy further enhanced the rewiring process. In addition, both reimplanted groups presented twice as much motor control compared to the non-treated group. In conclusion, the reimplantation with FS and MC is efficient and may be considered an approach to improve sensory-motor recovery following dorsal rhizotomy.