Study of Effect of Nerve Growth Factor to Peripheral Nerve Regeneration
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To study the effect of nerve growth factor on the regeneration of peripheral nerve, 12 New Zealand rabbits of 1500-2000g were selected. They were equally divided into control and experimental groups. Under intravenous anesthesia ulnar nerves were dissected and cut at the middle 1/3 of the foreleg. Its proximal and distal cut ends were separately sutured to the neighboring proximal and distal ends of a muscle bundle bridge. A longitudinally cut medical silicon tube was wrapped around the nerve muscle bridge. The tube was 1.5-1.8cm long, diameter was 1.2mm. The longitudinal cut was sutured and 502 glue was added, to form a fixed tubular cavity containing nerve muscle bridge. No additional drug was added to the control group, but in the experimental group NGF saline solution 10μl (containing NGF 20-30μg) was slowly infused into the silicon tubular cavity. At respectively 4, 8, 10, 12 weeks after operation, physiological functions of ulnar nerves were tested. The distal end of ulnar nerve was soaked in CB-HRP 10μl, after 48 hours sample was taken. After routine manipulation, OD method or TMB staining method, corresponding segment of anterior horn of spinal cord and spinal nerve ganglia were observed for their morphology and number of the enzyme labeled cells. Proximal and distal segments of ulnar nerve bridging areas were taken and stained with Osmium acid, quantitative image analysis were performed to characterize the axon diameter and myelin sheath thickness, and light and electron microscopy observations were done. The results showed that at the same stage, the experimental group has an increase in nerve transmission rate when compared with that in the control group. The anterior horn of the cord in the experimental group showed a more obvious recovery from degeneration when compared with the control group; in nerve muscle bridging area, muscle fibers became loosened and elongated axons were found between the muscle fibers. In the experimental group, the appearance of CB-HRP enzyme labeled cells was earlier in C7-C8 anterior horn and spinal nerve ganglia. The above results showed that local application of exogenous NGF was beneficial to the regeneration of peripheral nerve. At the same time it proved that outside of the muscle bridge the addition of silicon tube cavity is a beneficial method for providing a favourable microenvironment for nerve regeneration.