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Research Tip Neurotropin Incorporated Nerve Sutures?

The uncertainty of the prediction of outcome of nerve repair has made us search for an alternative or an improvisation of nerve repair. Peripheral nerve injury is often followed by incomplete recovery of function and sometimes associated with neuropathic pain. There is therefore, need for therapies that improve the speed of recovery and the final functional outcome after peripheral nerve injuries. Microsurgical nerve repair is the zenith of treatments available presently for the nerve injury. Beyond microsurgical nerve repair there is hardly any factor that is surgeon controlled.

Alternative methods of nerve repair are being explored, such as the use of a carbon dioxide laser repair and fibrin sealant.[1] Fibrin has been used as a sealant to repair transected nerve ends and even as a drug delivery system for trophic support factors.[2] Fibrin glue that contained nerve growth factor was shown to increase the number of regenerating motor neurons and improve the performance in various motor and sensory tests.[3] Treatment with hyaluronic acid or human amniotic fluid has been shown to reduce peripheral nerve scarring after surgical repair and enhance regeneration.

To obtain a high level of sustained trophic factor release, several delivery methods have been used, including microspheres, modified growth factor-secreting cells, fibrin sealants, and gels. Neurotropins, particularly neurotropin 3 and BDNF, have been shown to potentiate the spontaneous and impulse-driven activity of developing neuromuscular synapses in culture and may be involved in regulating the development of these synapses. Collagen tubes treated with aFGF, BDNF, and neurotropin 3 have shown improved axon counts in the distal stump compared with tubes without growth factors. Tubes treated with aFGF have shown comparable regeneration compared with autografts.[4]

Antibodies to myelin-associated glycoprotein, an inhibitory molecule for regeneration, have also been shown to improve preferential motor reinnervation dramatically while having a transient inhibitory effect on sensory regeneration.

Our concept or hypothesis is to incorporate stable neurotropic factors into the nerve sutures used in nerve repair. The factor should be heat stable and should have good shelf life for transport. Presently there are already few sutures available in the markets, which have incorporated antibiotics such as triclosan in Vicryl Plus (Ethicon sutures). In the similar manner a controlled released medium can be incorporated into the suture, which can elute the factors for 3 to 6 months.

Lee et al[2] have used heparin as a delivery system to immobilize nerve growth factor and slow its diffusion from a fibrin matrix. The results of their study showed that the incorporation of a heparin delivery system providing controlled release of growth factors enhances peripheral nerve regeneration and represents a significant contribution toward enhancing nerve regeneration across short nerve gaps.[2] Should neurotropin incorporated nerve sutures be considered in future.

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