Nanoanesthesia - Intravenous Ankle Block in the Rat By Magnet-Directed Concentration of Nanoparticle-Conjugated Ropivacaine: Demonstration of a Novel Approach

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Technology description

Background

Nerve and plexus blocks in humans are performed at the ankle and other locations in the body. The purpose is to produce anesthesia in the part of the body supplied by those nerves. These blocks involve injecting local anesthetic drugs to deposit them close to the nerve bundles. The vast majority of these nerves/nerve bundles are in close proximity to major arteries and veins. Accidental injection into the blood vessels might cause immediate convulsions and cardiorespiratory arrest. Current practice is to perform these blocks either blindly using a nerve stimulator, or under ultrasound guidance. Thus, these techniques require considerable training and skill. Faulty technique might result in failure or complications.

Technology

Investigators combined a local anesthetic drug ropivacaine with magnetic nanoparticles, so that the complex would get attracted towards a magnet. Under general anesthesia, this complex was injected into a tail vein and applied a ring magnet around the ankle for 30 minutes. The magnet arrested the complex from the circulation and concentrated it at the ankle area. The drug was released and acted on the nerves around the ankle, similar to the way direct injections work. The animals were awakened and tested for anesthesia of the paw. The results were comparable to those obtained with direct injections of ropivacaine.

Application area

Nerve block

Advantages

Simplifies the ankle block procedure

Safety of ropivacaine was increased by 1300% when combined with the nanoparticles

Institution

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