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ORIGINAL ARTICLE

Intraoperative neurophysiological monitoring in peripheral nerve surgery: Technical description and experience in a center☆

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KEYWORDS
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Abstract
Introduction: Intraoperative neurophysiological monitoring has experienced a spectacular development in the past 20 years, particularly in the fields of neurosurgery and spine surgery. It has become a useful, almost indispensable tool in preventing nerve damage during surgery. The aim of this article is to describe the intraoperative technique and analyze its results in the field of peripheral nerve surgery.
Objective: To describe the usefulness of a technique in peripheral nerve surgery, the technique used and the experience in a center.
Patients and methods: A retrospective study was conducted on 30 cases of peripheral nerve surgery performed in this center from 2009 to 2013, using the intraoperative monitoring technique.
Results: Of the total of 13 peripheral nerve tumors recorded, there were 11 excellent results and 2 good results, one temporary hypoesthesia and one with almost complete sensory, except for motor recovery. Traumatic injury was recorded in 17 cases, of which 6 required performing a graft, and the remaining 11 cases only neurolysis was performed, with complete motor and sensory recovery.

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Conclusions: Intraoperative neurophysiological monitoring is a useful tool in the secondary surgery of peripheral nerve injury and the intraneural tumor pathology.

PALABRAS CLAVE
Monitorización neurofisiológica intraoperatoria;
Nervio periférico;
Neuromas traumáticos;
Schwannoma;
Tumores neurogénicos de nervio periférico

Monitorización neurofisiológica intraoperatoria en la cirugía del nervio periférico: descripción técnica y resultados en nuestro centro

Resumen
Introducción: La monitorización neurofisiológica intraoperatoria ha experimentado un espectacular desarrollo en los últimos 20 años, particularmente en campos como la neurocirugía y la cirugía de raquis. Se ha constituido en una herramienta muy útil en la prevención de daño neurológico durante la cirugía, si bien su utilidad en la cirugía del nervio periférico en el área de traumatología y ortopedia no ha sido constatada.
Objetivo: Describir exhaustivamente la técnica de monitorización neurofisiológica intraoperatoria y secundariamente comunicar la experiencia de nuestro centro.
Pacientes y método: Estudio descriptivo retrospectivo de 30 casos de cirugía de nervio periférico realizadas en nuestro centro en el período 2009–2013. Descripción pormenorizada de la técnica de monitorización neurofisiológica intraoperatoria utilizada.
Resultados: Registramos 13 tumores del nervio periférico, de estos, obtuvimos 11 resultados excelentes y 2 buenos, uno con hipoestesia temporal y otro con recuperación motora casi completa aunque no sensitiva. Registramos 17 casos de lesiones traumáticas, en 6 casos fue necesaria la realización de injerto, en los 11 restantes solo realizamos neurolisis, con recuperación sensitiva y motora completa.
Conclusiones: La monitorización neurofisiológica intraoperatoria supone una herramienta útil en la cirugía secundaria de las lesiones del nervio periférico y en la enfermedad tumoral intraneural de dicho nervio.

Introduction

Microsurgery of the peripheral nerve in the area of Traumatology and Orthopedics is mainly carried out in the treatment of acute neurological lesions or complications thereof (neuromas), as well as peripheral nerve tumors.[1] Traumatic lesions of the peripheral nerve are usually secondary to fractures (open or closed) or to penetrating injuries in the limbs.[1] Their diagnosis is mainly clinical, can affect all age groups, and is potentially devastating for patients, as they affect professional and daily life activities. Peripheral nerve tumors are rare lesions developed at the expense of the elements comprising the nerve, with Schwann cells being the main constituent element.[2,3] They usually appear as a soft tissue mass in the path of the nerve, which may be painful upon palpation and present positive Tinel sign.[2,4] So-called schwannoma or neurilemoma is the most frequent neurogenic tumor in peripheral nerves, accounting for approximately 5% of benign soft tissue neoplasms.[5–12]

Both traumatic lesions, particularly secondary ones once the neuroma is constituted, and tumoral lesions, particularly intraneural ones, require advanced anatomical knowledge and extensive experience in microsurgery in order to achieve the desired objectives, which include recovery of the maximum functional capacity possible and elimination of pain.[1] Direct nerve repair or through a graft in the first case or exeresis of the lesion respecting the nerve of origin in the second case are the treatments of choice.[13,14]

Therefore, we can say that an essential goal of this procedure is the preservation of a maximum of the undamaged nerve fascicles, that is, not sacrificing healthy nerves, and it is in this aspect that intraoperative neurophysiological monitoring (INM) studies are of great value, as they provide the surgical team with basic, reliable and real-time information on the functionality of the explored nerve.[4,5]

The main uses of INM of the peripheral nerves and brachial plexus are[14,15]:

1. Identifying the peripheral nerves.
2. Locating preexisting lesions throughout the pathway of the nerve.
3. Determining continuity across a nerve lesion.
4. Determining whether there is root avulsion.
5. Identifying the targets for nerve biopsy.
6. Monitoring and preventing damage to healthy nerves during the intervention.
7. Obtaining an evolutionary prognosis of the neurological lesion.