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ORIGINAL ARTICLE

Our Experience With Facial Nerve Monitoring in Vestibular Schwannoma Surgery Under Partial Neuromuscular Blockade☆

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KEYWORDS
Vestibular schwannoma;
Facial nerve;
Intraoperative monitoring;
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Abstract
Introduction and objectives: Facial nerve monitoring is fundamental in the preservation of the facial nerve in vestibular schwannoma surgery. Our objective was to analyse the usefulness of facial nerve monitoring under partial neuromuscular blockade.
Methods: This was a retrospective analysis of 69 patients operated in a tertiary hospital.
Results: We monitored 100% of the cases. In 75% of the cases, we could measure an electromyographic response after tumour resection. In 17 cases, there was an absence of electromyographic response. Fifteen of them had an anatomic lesion with loss of continuity of the facial nerve and, in 2 cases, there was a lesion with preservation of the nerve. Preoperative facial palsy (29% 7%; *P*=.0349), large tumour size (88 vs 38%; *P*=.0276), and a non-functional audition (88 vs 51%; *P*=.0276) were significantly related with an absence of electromyographic response.
Conclusions: Facial nerve monitoring under neuromuscular blockade is possible and safe in patients without previous facial palsy. If the patient had an electromyographic response after tumour excision, they developed better facial function in the postoperative period and after a year of follow up.

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PALABRAS CLAVE
Schwannoma vestibular;
Nervio facial;
Monitorización intraoperatoria;
Bloqueo neuromuscular

Nuestra experiencia con la monitorización del nervio facial en cirugía del schwannoma del vestibular bajo bloqueo neuromuscular parcial

Resumen
Introducción y objetivos: La monitorización del nervio facial es fundamental en la preservación del nervio facial en la cirugía del schwannoma del nervio vestibular. Nuestro objetivo es analizar la utilidad de la monitorización facial bajo bloqueo neuromuscular parcial.
Métodos: Análisis retrospectivo de 69 pacientes operados en un hospital de nivel terciario.
Resultados: En el 100% de los casos se pudo realizar monitorización electromiográfica. Se obtuvo respuesta electromiográfica tras la escisión tumoral en el 75% de los casos. En 17 casos no hubo respuesta electromiográfica. En 15 hubo lesión de continuidad del nervio facial y en 2 hubo lesión pero se logró mantener la continuidad anatómica del nervio. La presencia de parálisis facial preoperatoria (29 vs. 7%; p = 0,0349), el mayor tamaño tumoral (88 vs. 38%; p = 0,0276) y una audición no funcional (88 vs. 51%; p = 0,0276) son factores significativamente más prevalentes en el grupo en que no se pudo obtener una respuesta electromiográfica.
Conclusiones: La monitorización del nervio facial bajo bloqueo neuromuscular moderado es factible y segura en pacientes sin lesión facial preoperatoria. Los pacientes que obtienen respuesta electromiográfica tras la extirpación del tumour tienen mejor función facial en el postoperatorio y al año de seguimiento.

Introduction

From the introduction of electromyographic (EMG) monitoring of the facial nerve by Delgado[1] in 1979, the percentage of severe postoperative facial dysfunction has fallen from some 15%–59% in the era before monitoring to approximately 10%–33% with the use of facial nerve monitoring. Facial nerve monitoring has been established as an essential part of cranial base surgery. However, it has been impossible to standardise clinical application of EMG recording.[2] There is a general acceptance of EMG criteria that permit predicting facial function; however, the lack standards for electrode mounting and stimulation parameters has prevented establishing which method is the best.[3] To perform EMG monitoring of the facial nerve, avoiding the use of neuromuscular blockade (NMB) has been recommended. However, it is considered admissible to use intraoperative blockade drugs if their dosage is controlled by adequately monitoring the degree of peripheral NMB.[4] Among the advantages involved with the use of partial NMB are: (1) facilitating surgical exposure, (2) eliminating the need for the surgeon to interrupt the procedure to monitor the muscle potentials evoked, (3) reducing the risk of unexpected movements (especially in patients with tolerance to opioid anaesthetics) and (4) reducing the excessive noise in the EMG register, improving the signal/noise ratio by reducing the time required to acquire the signals.[5]

The present study investigated the results of EMG facial nerve monitoring in patients operated on for vestibular schwannoma (VS) under partial NMB.

Methods

This was a retrospective analysis of the database of patients with VS in follow-up by the Ear, Nose and Throat Service at our hospital. Patients who had surgery under partial NMB and with a register of intraoperative facial EMG monitoring were studied. Tumour size was evaluated using the classification of Tos and Thomsen,[6] facial function was recorded using the House-Brackmann (HB) scale[7] and hearing was classified according to the criteria of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS).[8]

The preoperative clinical factors and the intraoperative variables of interest were analysed: type of approach, tumour resection, cranial nerve VII lesion, intraoperative complications and operating time. These variables were compared based on type of EMG response and evolution of facial function in the immediate postoperative period and at 1 year's follow-up.

The intraoperative facial nerve lesion with loss of continuity is defined as the transection of the nerve; it is accompanied by the loss of the EMG register upon stimulating the area of the pontomedullary junction after tumour removal. Facial nerve lesion without loss of nerve continuity is defined as lesion of the nerve without its transection and accompanied by A-train in the EMG register. (Sinusoidal-type EMG waveform that produces a high frequency sound; it has a sudden initiation and presents ranges of maximum amplitude of 100–200 μv, never exceeding 500 μv.)

General Anaesthesia Protocol

In induction, the following was used: propofol: 2–3 mg/kg bolus, rocuronium: 0.6 mg/kg bolus and remifentanil: 0.5 mcg/kg to pass in 3 min. During maintenance, the following was used: rocuronium, in continuous perfusion of 0.15 mg/kg/h (half the dosage required for complete NMB); remifentanil, 0.1–0.3 mcg/kg/min and desflurane 4%–5% (<1 of minimum alveolar concentration). If there was intracranial hypertension, propofol was substituted for