ARCHIVES OF HEAD AND NECK SURGERY
ISSN 2595-2544

LETTER TO THE EDITOR

SBCCP course - Qualification for mapping of cranial nerves in head and neck surgery - intraoperative facial nerve monitoring

Fátima C. Mendes de Matos[1]*, Vinicius Matos Vasconcellos[2]

How to cite: Matos FCM, Vasconcellos VM. SBCCP course - Qualification for mapping of cranial nerves in head and neck surgery - intraoperative facial nerve monitoring. Arch Head Neck Surg. 2022;51:e20220001. https://doi.org/10.4322/ahns.2022.0001

Facial nerve injury is the most feared complication of parotidectomy. Temporary facial nerve paralysis (FNP) occurs in 20-40% of patients undergoing parotidectomy, whereas permanent dysfunction affects 0-4% of patients[1].

Intraoperative facial nerve monitoring (IOFNM) is a technology that assists the surgeon in identifying and preserving the facial nerve and its branches that has been used for a long time in otoneurosurgeries.

The benefits of using IOFNM during parotidectomy listed in the literature include early facial nerve identification, sound warning to the surgeon of unexpected facial nerve stimulation, reduction of mechanical trauma to the nerve, mapping of the course of the nerve, and evaluation and prognosis of nerve function at the conclusion of the procedure[1,2]. Recent studies have shown that most otolaryngologists and head and neck surgeons in the United States and United Kingdom use IFNM, and that this group of physicians is less likely to be involved in surgery-related litigation[2-4]. Lowry and collaborators applied 3,139 questionnaires to specialists aiming to assess the monitoring pattern employed in parotidectomy and found that 60% of surgeons use this technology. They also found that surgeons were five to six times more likely to use this monitoring in daily practice if they used it in training during residency[5].

The method consists in placing needle electrodes in the subcutaneous layer in the projection of the referred muscles in the areas innervated by the facial nerve: frontal, zygomatic, buccal, and marginal mandibular. There is also need to place a ground anode electrode (usually in the shoulder or anterior thoracic region) and use a stimulation probe on the sterile operative field. The distal portions of these electrodes and of the electrostimulation probe are connected to a channel receptor box that will transmit the motor

[1]Universidade Estadual de Pernambuco (UPE), Centro de Oncologia (CEON), Recife, PE, Brasil
[2]Escola Americana do Recife (EAR), Recife, PE, Brasil

Financial support: None.
Conflicts of interest: No conflicts of interest declared concerning the publication of this article.
Submitted: March 04, 2022.
Accepted: March 06, 2022.
The study was carried out at Brazilian Society of Head and Neck Surgery (SBCCP), São Paulo, SP, Brasil.

action potential generated by the nervous stimulus that will be decoded in an audiovisual system with emission of sound and visual signals. The best way to set the stimulation intensity level is to use the lowest amount that produces an electromyography (EMG) event. A current of 0.3 mA may be sufficient for an adequate and direct monopolar stimulation of the facial nerve and its branches, but may trigger a small or non-existent response during monitoring[1,5]. An intensity range of 0.5-1.0 mA is the stimulation parameter commonly used in practice[1]. It is also important to conduct the electrostimulation following a clinical criterion, performing an initial stimulus when the nerve trunk and its branches are found, repeat these stimuli at the end of the surgery, and issue a report containing the stimulation times to serve as a legal basis. There is no scientific evidence for random stimulation of tissues in search of the nerve. Knowledge of anatomy is vitally important to perform a successful surgery, especially in parotid gland surgery.

As for the type of anesthesia used, neuromuscular blockade should be avoided. Currently, it is known that fast acting muscle relaxants can be used in low doses[1].

A commonly used nerve monitoring system, the NIM-Response, is popular in the US, particularly among surgeons who conduct the monitoring themselves, because it requires minimal manipulation during the procedure[1,5].

The principle of monitoring facial nerves is similar to that of laryngeal nerves, where after a stimulus motor action potentials arise and are translated into auditory and visual signals from the reading of EMG records. There is also emission of sound signals when the nerves are manipulated or pulled. In addition, during electrostimulation with the probe, it is also possible to observe contraction of the muscles related to the facial branch[5].

Even experienced surgeons should consider and discuss the occurrence of temporary or permanent paralysis with the patient preoperatively. Early paralysis is significantly more associated with electrical potentials induced by manipulation of the frontal and orbital branches than of the buccal or marginal mandibular branches of the facial nerve during parotid gland surgery[6].

Studies addressing the assessment of IOFNM are still limited and generally have small sample sizes. The diversity of information to be evaluated should also be considered, such as types of tumors, surgical extension, type of monitoring, stimulation intensity, surgery duration, degree of local inflammation, among others. López et al.[7] evaluated facial nerve mapping in 52 parotidectomies where there was reduced severity of facial paralysis regardless of surgical extension and found that the number of cases of temporary and permanent facial nerve paralysis was significantly lower in the monitored group (36 and 4%, respectively) than in the unmonitored group (70 and 30%, respectively). A multivariate analysis conducted in another study showed that the following factors influenced facial nerve dysfunction: unmonitored cases, advanced age, and long operative time[6]. Other factors associated with facial nerve paralysis include malignancy, parotidectomy extention, and dissection beyond the parotid gland[8]. An abnormal EMG event without clinical repercussions can also occur, as evidenced by Meier and collaborators (16% of patients had an abnormal EMG event not associated with paralysis)[8].

It is undeniable that technology does not replace the surgeon's knowledge; however, IOFNM has proved to be a very useful tool in patients with voluminous and/or malignant tumors, inflammatory processes, recurrent tumors, and in surgeries in children[1,4,9], in addition to allowing better documentation of surgeries[9].

Some failures, complications, or disadvantages have been reported in the literature[9,10]:

1. False positive (which can be caused by a high-intensity stimulus);
2. False negative (which can be caused by stimulation of the fibrous layer that covers the nerve);
3. Injuries related to electrodes (such as bruises and burns);
4. High cost.

And what is considered loss of signal? After checking the integrity of the device and if there was inadvertent use of muscle relaxant, loss of activity on EMG after neural dissection is defined as an EMG ≤100 mV, after adequate stimulation of the dissected nerve, in a dry field, with 1 to 2 mA, associated with lack of muscle spasm without observation of target muscle movement[1,11]. It is also mandatory to assess the amplitude and characteristic of the curve on the EMG.

IOFNM has brought to our daily practice – obviously after adequate training – greater ergonomics for the surgeon and team, as well as greater safety. Once again, it is worth emphasizing that knowledge of anatomy and the surgical technique are important, which will never be replaced by technology. Here is a final message with a few tips:

- *BE CAREFUL WHEN PLACING THE ELECTRODES*;
- *USE WARM SALINE SOLUTION AND ALWAYS DRY THE FIELD GENTLY*;
- *DO NOT STIMULATE TISSUES RANDOMLY IN SEARCH OF THE NERVE*;
- *STIMULATE THE TRUNK (AS SOON AS FOUND) AND THE BRANCHES (ONLY TO NECESSITY) OF THE NERVE AT THE BEGINNING AND AFTER REMOVING THE PIECE, MARKING THE TIMES*;
- *USE A STIMULUS RANGE OF 0.5-1.0 mA*;
- *LOSS OF SIGNAL DOES NOT ALWAYS MEAN NEURAL INJURY – KEEP FOCUSED AND CALM*;
- *KEEP PRE- AND POST-OPERATIVE DOCUMENTATION OF THE PATIENT (THROUGH PHOTOS OR VIDEOS)*.

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***Correspondence**
Fátima C. Mendes de Matos
Universidade Estadual de Pernambuco (UPE), Serviço de Cirurgia de Cabeça e Pescoço
R. Arnóbio Marques, Santo Amaro
CEP 50100-130, Recife (PE), Brasil
Tel.: +55 (81) 3184-1304
E-mail: fcmmatos@hotmail.com

Authors information
FCMM - Coordinator of the Head and Neck Surgery Service, State University of Pernambuco (UPE). VMV - High-school student, American School of Recife (EAR) (Revisor).

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