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ORIGINAL ARTICLE

Laryngeal Electromyography in Diagnosis and Treatment of Voice Disorders☆

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KEYWORDS
Electromyography;
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Abstract
Introduction and objectives: Laryngeal electromyography, together with clinical evaluation, is a valuable tool for voice disorder management. It assesses the integrity of laryngeal nerves and muscles, contributing to the diagnosis of many diseases, especially laryngeal movement disorders. Our purpose was to describe the experience of the first Spanish series with laryngeal electromyography in evaluating voice disorders.
Methods: A prospective study was designed to evaluate laryngeal movement disorders with laryngeal electromyography. Both the cricothyroid and thyroarytenoid muscles were tested routinely and, in some cases, the posterior cricoarytenoid muscle. The laryngeal electromyography technique and result interpretation were performed by a laryngologist and a neurophysiologist.
Results: We included 110 patients, with the most common symptom being dysphonia. Laryngeal electromyography was performed in 85% of cases. Primary diagnosis before electromyography was laryngeal immobility. Positive predictive value for diagnosis in cases of paralysis was 88%.
Conclusions: Laryngeal electromyography is a useful adjunct, together with clinical evaluation, for diagnosis and management of motion abnormalities in the larynx in patients who present with dysphonia.

PALABRAS CLAVE
Electromiografía;
Laringe;
Disfonía

Electromiografía laríngea en el diagnóstico y tratamiento de los trastornos de la voz

Resumen
Introducción y objetivos: La electromiografía laríngea es una herramienta útil en el diagnóstico y tratamiento de los trastornos de la voz. Proporciona información acerca del estado de los nervios y músculos laríngeos completando la evaluación diagnóstica de un gran número de afecciones, fundamentalmente los trastornos del movimiento laríngeo. Presentamos la primera

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serie española, hasta donde tenemos referencias, que describe la utilidad de dicha prueba en la valoración de los trastornos de la voz.
Métodos: Se diseñó un estudio prospectivo descriptivo mediante la creación de un protocolo de valoración para trastornos del movimiento laríngeo, que incluyera la realización de electromiografía laríngea. Los músculos estudiados fueron ambos cricoaritenoideos y tiroaritenoideos en todos los casos y el cricotiroideo posterior en algunos pacientes. La realización de la prueba y la interpretación de los resultados se realizó de forma conjunta por un especialista en Otorrinolaringología y un especialista en Neurofisiología Clínica.
Resultados: Ciento diez pacientes fueron incluidos en el estudio. El síntoma de presentación más frecuente fue la disfonía. Se realizó electromiografía laríngea en un 85% de los casos. La entidad diagnóstica más frecuente fue la inmovilidad laríngea. En el caso de la parálisis laríngea, la electromiografía tuvo un valour predictivo positivo del 88% para el diagnóstico.
Conclusiones: La electromiografía laríngea es una herramienta útil utilizada de forma conjunta con la exploración clínica en el diagnóstico y el tratamiento de las alteraciones del movimiento laríngeo que cursan habitualmente con disfonía.

Introduction

Electromyography (EMG) is a useful diagnostic tool in the evaluation and diagnosis of neurological diseases. This technique can be used in Neurolaryngology, which comprises the study of diseases caused by sensory and motor alterations of the larynx.[1] The earliest works in the field of laryngeal EMG were published by Faaborg-Andersen[2,3] and Buchtal[4] in the 1950s, with the technique being introduced by Weddel in 1944.[5] However, the technique is not used routinely by most of the Spanish otolaryngologists. This is not the case in other fields of Otolaryngology, such as facial nerve examination, in which EMG is commonly employed.[6,7]

Most otolaryngologists who use laryngeal EMG habitually for the evaluation of voice conditions consider it a very useful tool,[6] especially in cases of vocal cord immobility.

The Neurolaryngology study group of the American Academy of Otolaryngology gathered a panel of experts to define the usefulness of EMG in laryngeal diseases.[8] The conclusions of this panel were the following: EMG is important for the diagnosis of laryngeal mobility disorders, serves to guide the injection of botulinum toxin into the laryngeal muscles and is a useful tool in laryngology research.

Perhaps the most established indication, apart from its therapeutic use to guide injection of botulinum toxin, is the diagnosis of laryngeal immobility, and in particular its role in the differential diagnosis of mechanical fixation and neurogenic lesion or true vocal cord paralysis.[9,10]

Although there are no prospective and double blind studies in the literature on the usefulness of EMG in neurolaryngological disorders, there are currently numerous publications which discuss its usefulness as a complementary tool in the diagnosis thereof.

To our knowledge, there is no Spanish series describing the usefulness of laryngeal EMG through a descriptive study.

The aim of this work is to describe our experience with EMG in the diagnosis and treatment of laryngeal movement disorders, with the objective of developing a protocol that includes the use of laryngeal EMG and to assess its usefulness as a diagnostic tool.

Methods

We designed a prospective study by creating a study protocol for all patients referred to the Voice Pathology Unit of our hospital with a diagnosis of laryngeal mobility disorder. We present the results obtained after 2 years of work with this protocol (2010 and 2011).

We consider a laryngeal mobility disorder to be present in those cases where movement asymmetry or stillness of one or both vocal cords is observed, both in abduction–adduction and in elongation when emitting high tones, as well as the presence of spontaneous or unintentional movements.

All patients underwent the usual explorations carried out at our Unit: medical history, subjective assessment by the patient through the Vocal Disability Index,[11] psychoacoustic evaluation through the GRABS (grading, roughness, asthenia, breathiness, strain) index, aerodynamic assessment by maximum phonation time and s/a ratio, acoustic analysis and both rigid and flexible endoscopic evaluation with both fixed and stroboscopic light.

Of these, the most important examination to decide the indication for EMG is flexible fibroscopy, which enables an assessment of the larynx under physiological conditions. Firstly, we conducted an observation of the larynx at rest while the patient breathed, designed to measure the tone and position of the cords, as well as the eventual presence of their paradoxical movement, with adduction in inspiration and abduction in expiration. We also assessed the presence of abnormal movements, such as tremor or myoclonus.

Secondly, we conducted an evaluation during phonation, both with a sustained vowel and with a conversational voice and singing voice. In the case of laryngeal dystonia we observed abnormal spastic movements during phonation activity, which typically diminished or disappeared in the singing voice. By contrast, in muscle tension dysphonia, sometimes very difficult to distinguish from spasmodic dysphonia, there were no variations between conversational and singing voice. In order to assess fatigability and asymmetries in adduction–abduction we requested patients to repeatedly emit the phoneme /i/ with a deep inspiration between repetitions.