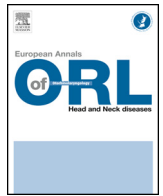




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Original article

Diagnostic and prognostic contribution of laryngeal electromyography in unilateral vocal-fold immobility in adults

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ABSTRACT

Objectives: To study the diagnostic and prognostic contribution of laryngeal electromyography in unilateral vocal-fold immobility in adults.

Material and methods: A retrospective study included patients with unilateral vocal-fold immobility undergoing laryngeal electromyography between 2007 and 2015. Neurogenic, normal or myogenic findings were compared to the clinical aspect. Prognosis for recovery was assessed from motor unit potentials on laryngeal electromyography, and compared to subsequent progress on laryngoscopy.

Results: Sixty-three patients (mean age, 59 years) were initially included; 2 were subsequently excluded from analysis. Mean time from onset of immobility to laryngeal electromyography was 7 months. 85% of the 61 patients showed neurogenic findings, indicating neural lesion; 13% showed normal electromyography, indicating cricothyroid joint ankylosis; and 1 patient showed a myogenic pattern. Neurogenic cases were usually secondary to cervical surgery. Thirty-eight patients were followed up. In total, 75% of patients showing reinnervation potentials recovered. The positive predictive value of laryngeal electromyography was 69.2%.

Conclusion: Laryngeal electromyography is effective in specifying the origin of unilateral vocal-fold immobility in adults. It also has a prognostic role, lack of reinnervation potentials being a possible indication for early medialization surgery.

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1. Introduction

Vocal-fold immobility may be of neurogenic, mechanical or neuromuscular origin [1]. Visual assessment of laryngeal dynamics is insufficient for etiological diagnosis of unilateral vocal-fold immobility, giving false results in almost 30% of cases [2]. Indirect laryngoscopy alone does not well differentiate between neurogenic cases and cricothyroid ankylosis or neuromuscular involvement.

In 1944, Weddel et al. introduced laryngeal electromyography for these differential diagnoses; it was improved in the 1950s by Faaborg-Andersen and Buchthal, but was mainly developed as a diagnostic tool in the 1980s and 1990s [3]. Its prognostic value in vocal-fold palsy was established in several studies [4–8]. Its interest is 3-fold: diagnostic, prognostic in vocal-fold palsy, and indispensable for the treatment of spasmodic dysphonia by botulinum toxin injection [9]. It is relatively easy to perform, with few side effects

[10]. It does, however, require an ENT physician and neurophysiologist to perform the examination and interpret the results, making it little used in routine practice [11].

The main objective of the present study was to assess the diagnostic contribution of laryngeal electromyography in differentiating between neurogenic causes, cricothyroid ankylosis and neuromuscular involvement in unilateral vocal-fold immobility in adults. The secondary objective was to assess its prognostic value in case of vocal-fold palsy.

2. Patients and methods

Sixty-three patients undergoing laryngeal electromyography for unilateral vocal-fold immobility between January 2007 and January 2015 were studied retrospectively. The examination was performed in ENT consultation, with the help of a neurophysiologist. The ENT physician placed the needle electrode in the thyroarytenoid muscle, and the neurophysiologist interpreted the data. The nerve tested was the inferior laryngeal nerve, by thyroarytenoid muscle recording. The equipment comprised a 50 × 0.45 mm

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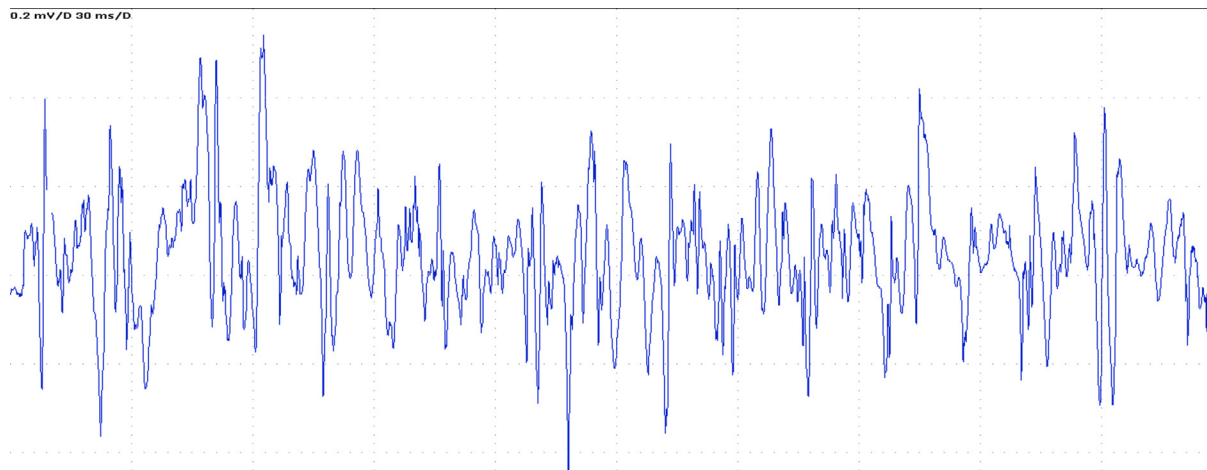


Fig. 1. Normal electromyogram in phonation.

concentric needle and Dantec Keypoint Focus electromyograph (Natus Medical Inc., Pleasanton, CA, USA).

All patients had undergone prior clinical examination by indirect laryngoscopy, for dysphonia. The etiological context requiring the examination was noted. Symptoms (dysphonia, leakage-induced dyspnea, laryngeal aspiration), any associated neurologic deficit, and laryngoscopic data (immobility side, vocal-fold position, atrophy) were collected.

Laryngeal electromyography was performed at rest and then under phonation. Findings were classified as neurogenic, myogenic or normal. In case of normal findings, cricoarytenoid ankylosis was diagnosed [12], and neural lesion in case of neurogenic findings [13]. Normal findings were defined as silent electromyogram

at rest, with interference pattern with rich spatial and temporal recruitment on phonation (Fig. 1). Neurogenic findings were defined as poor electromyogram on phonation (Fig. 2), with or without fibrillation at rest. Myogenic findings were defined by abnormally rich recruitment, confirmed by further exploration.

Electromyogram characteristics defined prognostic criteria in neurogenic involvement. Good prognosis was indicated by absence of fibrillation potential at rest and presence of large and/or multi-phasic motor unit potentials with rich or intermediate recruitment (reinnervation potentials) (Fig. 3). Poor prognosis was indicated by absence of reinnervation potentials and presence of fibrillation potential at rest and/or poor or no recruitment [4,8].

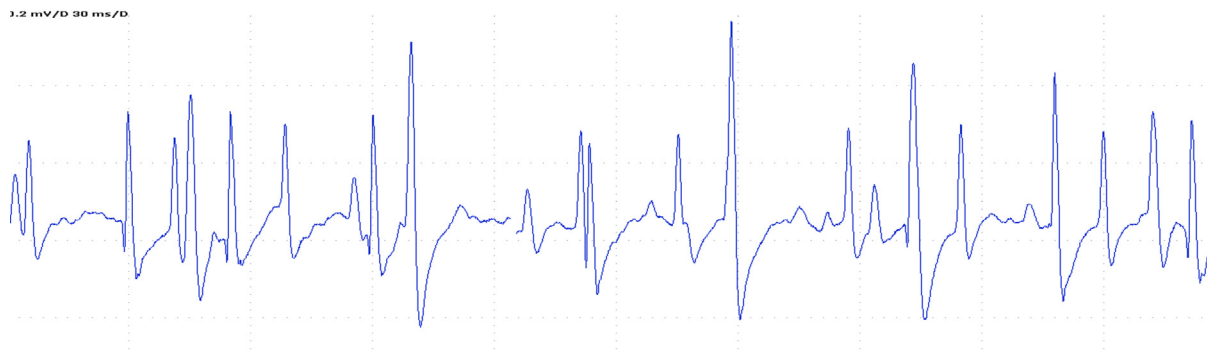


Fig. 2. Neurogenic electromyogram in phonation with signs of chronic denervation and poor electromyogram.

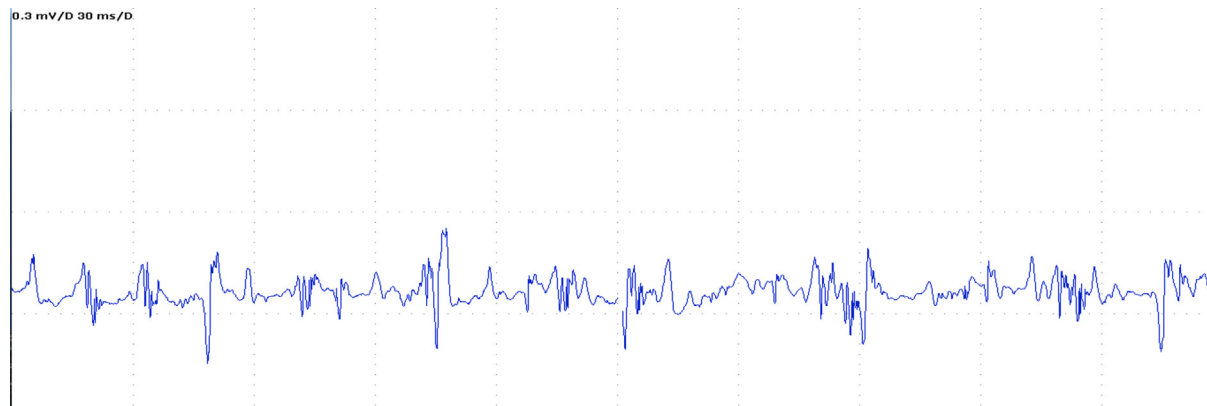


Fig. 3. Neurogenic electromyogram with reinnervation potentials.

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