

Is Laryngeal Electromyography Useful in the Diagnosis and Management of Vocal Fold Paresis/Paralysis?

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BACKGROUND

Laryngeal electromyography (LEMG) has been used for decades in the evaluation of vocal fold motion impairment. The literature still lacks adequate scientific data to support its use as a diagnostic and/or prognostic modality primarily because the studies to date have been retrospective or unblinded case series categorized as level IV evidence.¹ Among otolaryngologists that have interest in laryngological disorders, up to three quarters use LEMG clinically.² Despite commonly accepted practice, in 2004, an evidence-based review was not able to support the use of LEMG by available published research.¹ The topic was re-evaluated in 2006 by the Neurolaryngology Study Group of the American Academy of Otolaryngology Head and Neck Surgery with the conclusion that there is a role for LEMG in the diagnosis of vocal fold movement disorders.²

LITERATURE REVIEW

Vocal fold motion impairment is a clinically heterogeneous disorder that provides challenges in diagnosis and management at every level. Symptoms vary from none to debilitating vocal dysfunction. The laryngeal examination may clearly demonstrate a static hemilarynx, or there may be compensatory supraglottic function that obscures evaluation of vocal fold motion and glottic closure pattern. Finally, the differential diagnosis of the motion impairment in patients with a similar symptom complex and clinical examination includes neural disruption, joint dislocation/ankylosis, glottic scarring, or tumor fixation. As a further confounding observation, even a normal larynx can have mild structural and dynamic asymmetry with no functional deficit. So the clinician must rely on integrating the patient history, laryngeal examination, radiologic studies,

and results of electrodiagnostic testing, specifically LEMG, for the most complete clinical picture.

The diagnosis of vocal fold immobility is enhanced with the use of LEMG. The electromyographic signs of spontaneous activity, polyphasic motor action potentials, and a neuropathic interference pattern are pathognomonic for neurological injury and clearly point to a diagnosis of paralysis or paresis. Completely normal waveforms and interference pattern in the face of an immobile cord suggest a structural cause of immobility in an acute time frame. Unfortunately, the studies reporting the use of LEMG for diagnosis of vocal fold paralysis to date are unblinded and/or retrospective (Table 2 in Sataloff et al.).¹

LEMG performed in the proper time frame can provide prognostic information regarding recovery after vocal fold paralysis. Although the literature offers only level IV evidence, the data clearly indicate that LEMG can accurately predict (75%–100%) which patients will not recover vocal fold motion (Table 3 in Sataloff et al.¹ and reference 57 in Blitzler et al.²). A recent study from Pittsburgh³ added evaluation for synkinesis to the traditional signs indicating a poor prognosis for recovery, which increased their LEMG predictive value for “no return of movement” from 80% to 100% at their institution. This critical information allows the clinician to identify the set of patients who will require further intervention and offer an early definitive rehabilitation procedure rather than temporizing the patient with an absorbable injection medialization. This alleviates patient suffering promptly, decreases cost to the medical system, and prevents unnecessary procedures.

LEMG plays a critical role in the evaluation of dysphonia and suspected vocal fold paresis. In a retrospective series of patients from Philadelphia⁴ with vocal fold paresis, LEMG correctly identified evidence of neuropathy in 19/22 (86.4%) patients. This study specifically sampled the thyroarytenoid muscle representing the recurrent laryngeal nerve and the cricothyroid muscle representing the superior laryngeal nerve with the electromyographer blinded to the clinical diagnosis. Interestingly, of a total of 88 nerves sampled in these 22 patients, laryngoscopy correctly predicted the paretic nerve in only 27/42 (64.3%) nerves found to have

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electromyographic abnormalities. Although the laryngoscopic examination can accurately identify a vocal system with neurologic imbalance, alone it poorly identifies which component of the system is malfunctioning.

In addition to accurately localizing neurologic dysfunction, LEMG guides choice of vocal rehabilitation. Although technical issues surrounding LEMG can give variable reports according to the skill of the performing clinician, clearly electromyography gives subtle real-time information that assists in clinical decision making. Another series of 14 patients from San Antonio⁵ with suspected paresis showed 13/14 with electromyographic evidence of denervation. In 50% of these patients, the information from the LEMG changed the management of the patient: guiding voice therapy, influencing laterally of surgical rehabilitation, or influencing timing of surgery.

BEST PRACTICE

LEMG is useful in the evaluation of laryngeal paralysis/paresis. In many cases, LEMG can differentiate neural disruption from structural immobility and can accurately predict which patient will not recover vocal fold motion after a nerve injury. It is the only method to determine if a subtle vocal fold motion asymmetry is due

to a neurologic insult and provides critical information regarding the sidedness of the abnormality, which may not be obvious from laryngoscopic examination. This information allows clinicians to confirm the etiology and location of dysphonia with a suspected neurologic basis to provide timely and targeted vocal rehabilitation.

LEVEL OF EVIDENCE

For reference ¹ and ², the level of evidence is uncategorized. References 3 through 5 are retrospective case series and are level IV.

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