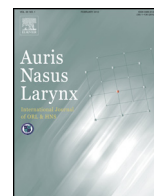




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Laryngeal myofascial pain syndrome as a new diagnostic entity of dysphonia

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ABSTRACT

Objective: To consider the feasibility of diagnosing intrinsic laryngeal muscle myofascial pain syndrome (MPS) in dysphonic patients who demonstrated immediate symptom and stroboscopic finding improvement after laryngeal electromyography (LEMG) without further treatment.

Methods: A chart review of patients who showed subtle vocal fold movement abnormalities on a stroboscopic examination and underwent ultrasonography (US)-guided LEMG was performed. Patients with vocal fold paralysis, mucosal lesions, spasmodic dysphonia, and vocal tremor on stroboscopic examination were excluded. Among them, patients with normal EMG findings were included in this study. The patients who reported voice symptom improvement after LEMG without further treatment were placed in laryngeal MPS (LMPS) group and the other patients were placed in non-laryngeal MPS (non-MPS) group. Predisposing factors, voice symptom, symptom-duration, and stroboscopic findings of these patients were reviewed.

Results: Among the 16 patients, LEMG findings were normal, five (31%) were included in the LMPS group and the other 11 patients (69%) were included in the non-MPS group. All LMPS group patients had a history of voice abuse and reported odynophonia. The Korean Voice Handicap Index-10 score decreased significantly after US-guided LEMG without additional treatment in the LMPS group. The stroboscopic findings revealed that vocal fold hypomobility was the most common finding in the LMPS group, and two patients showed a muscle tension dysphonia pattern. The LMPS groups showed improvement of vocal fold mobility on 1-week stroboscopic evaluation.

Conclusion: LMPS is a potential diagnosis for patients with vocal fold hypomobility finding on stroboscopic findings but with normal EMG results. Diagnosis of LMPS could be considered in patients who showed symptom and vocal fold movement improvement after LEMG.

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1. Introduction

Patients with dysphonia comprise the majority of patients presenting at laryngology clinics. Hoarseness, voice fatigue, diplophonia, breathy voice, difficulty with high pitch phonation, and odynophonia are the common symptoms. Patients

who complain of voice symptoms are examined with a stroboscope. Mucosal disorders, complete vocal fold paralysis, spasmodic dysphonia, and vocal tremors are distinctive on laryngoscopic and stroboscopic examination. Unfortunately, diagnosing a subtle vocal fold movement abnormality is complex [1–3]. These patients tend to be diagnosed only by clinical observation and be diagnosed as vocal fold paresis [3–5]. Few studies conducted laryngeal electromyography (LEMg) on these patients; 10–30% of patients showed normal EMG wave on LEMg. The alteration of crico-arytenoid joint and tumorous conditions resulted normal EMG wave with vocal fold hypomobility. Muscle tension dysphonia (MTD) could be considered as a differential diagnosis for these patients, since altered tension of extrinsic laryngeal muscle disturbs the structure of the larynx that affects the intrinsic laryngeal muscle positions [6].

We previously reported the LEMg results of vocal fold paresis patients [7] and application of ultrasonography on LEMg procedure to increase the accuracy of LEMg [8]. During the LEMg procedure, we experienced some patients who complained of sharp pain when the EMG needle passed through the muscle. These patients reported relief of their dysphonia symptom after the LEMg procedure without further treatment. Since these features did not coincide with the MTD or crico-arytenoid joint alteration exactly, other possible pathophysiology of this phenomenon was reviewed.

Myofascial pain syndrome (MPS) is a well-known disease that causes chronic or acute muscle pain [9–11]. Restricted range of muscle stretch and increased sensitivity to stretch cause muscle tightness. The most well-known predisposing factor in patients with MPS is muscle abuse, which can be classified into overuse, misuse, underuse, and trauma [9,10,12]. As the larynx is composed of five intrinsic muscles that are always active without rest for respiration and phonation, poor vocal hygiene and phonation habits can lead to laryngeal muscle misuse and dysfunction. Because muscle dysfunction and misuse can cause MPS, MPS in an intrinsic laryngeal muscle is a possible etiology for dysphonia. Several diagnostic criteria must be fulfilled to diagnose MPS. There should be a myofascial trigger point (MTrP) in the muscle, and exquisite tenderness at a point should be produced by palpation [10,11]. The patient's pain should be reproduced when the MTrP is stimulated at the same point. Eliminating the MTrP is a key to treat MPS [11], and needling of MTrP is the most common treatment modality to eliminate MTrP. When a needle is inserted in the MTrP, the local twitch response with or without a flash of pain is noticed. Symptoms including tightness, discomfort, pain, or tension should be relieved by needling. This feature is important, as it indicates that the MTrP exists and is well treated [11,13,14]. Odynophonia as voice symptom, especially aggravated during phonation, sharp pain during the needling of the intrinsic laryngeal muscle, and relief of patients' voice symptom after ultrasound (US)-guided LEMg are diagnostic criteria of MPS. We considered the possibility of MPS involvement of intrinsic laryngeal muscle and naming these as laryngeal myofascial pain syndrome (LMPS).

The aim of this study was to report LMPS and consider the feasibility of LMPS as a diagnostic disease entity of the larynx by reviewing the medical records.

2. Materials and methods

2.1. Materials

A retrospective chart review of patients who underwent US-guided LEMg at a tertiary training hospital (Ewha Womans University Mok-dong Hospital, Seoul) from September 2013 to February 2015 was performed. Patients who had voice symptoms (voice change, hoarseness, effortful phonation, voice fatigue, odynophonia, diplophonia, and pitch limitation) and whose symptoms did not improve after laryngeal massage and voice therapy underwent US-guided LEMg. Exclusion criteria were complete vocal fold paralysis, vocal tremor, spasmodic dysphonia, pathological lesions on the vocal folds (e.g., nodules or polyps), and acute laryngitis on stroboscopic findings. Patients who showed neuropathic waves on LEMg were diagnosed with vocal fold paresis (VFP) and were excluded. Sixteen patients whose LEMg findings were normal were included in this study. Among them, five patients who reported improved voice symptoms after LEMg within one week without further treatment were placed in the LMPS group and 11 patients whose symptoms did not improve were placed in the non-MPS group. The diagnostic algorithm is illustrated in Fig. 1. This study was approved by the Institutional Review Board of Ewha Womans University Hospital, Seoul, Korea.

2.2. Methods

2.2.1. Patient history

Patient demographic data and voice symptoms were reviewed. The voice symptoms were defined as voice change, hoarseness, effortful phonation, voice fatigue, odynophonia, diplophonia, and pitch limitation. Symptom duration and voice abuse history were reviewed.

2.2.2. Korean Voice Handicap Index-10 (KVHI-10)

KVHI-10 scores [15] before and after US-guided LEMg were reviewed to evaluate severity of the voice symptoms.

2.2.3. Acoustic analyses

Acoustic analyses were conducted using Computerized Speech Lab model 4500 (KayPANTAX, Montvale, NJ, USA) and the Multi-Dimensional Voice Program (MDVP). Acoustic analyses were performed with subjects in a sitting position with a microphone positioned 10 cm from their mouth. Patients were told to phonate a sustained /ah/ sound at a flat tone and comfortable pitch, without breaks at the same pitch for at least 4 s during recording. Fundamental frequency (F0), jitter, shimmer, and the noise to harmonic ratio (NHR) were recorded. F0 was recorded in Hertz (Hz), jitter and shimmer were recorded in percent (%), and NHR was expressed as a unique value in the MDVP.

2.2.4. Aerodynamic evaluation

Maximal phonation time (MPT), subglottic pressure (P_{sub}), and mean airflow rate (MFR) were measured using the Phonatory Aerodynamic System model 6600 (KayPANTAX) as an aerodynamic evaluation. Patients were instructed to inhale as much air as they could and to pronounce the vowel /ah/ at a

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