Clinical characteristics of lateral pterygoid myospasm: a retrospective study of 18 patients

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The available scientific literature on masticatory myospasm–induced oromandibular dystonia is limited. The objective of this study was to determine the clinical characteristics of lateral pterygoid myosapsm in a series of 18 patients. Clinical and electromyographic (EMG) data of 36 patients diagnosed with masticatory muscle myospasm were reviewed, and data from 18 patients with needle EMG-confirmed lateral pterygoid myospasm were extracted for retrospective study. The study population included 6 men and 12 women with a mean age of 53.2 ± 15.3 years. Patients' chief complaints, severity and frequency of myospasm, clinical observations, video recordings, and surface/needle EMG recordings were analyzed. Despite the variety of manifestations, 3 characteristic signs and symptoms of lateral pterygoid myospasm were observed. These were: 1) jaw function disabilities; 2) difficulty in jaw closing after wide opening; and 3) involuntary jaw movements. A differential diagnosis of lateral pterygoid myospasm should be included when oromandibular dystonia is accompanied by the fore mentioned. (Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:762-765)

Oromandibular dystonia (OMD) is characterized by repetitive involuntary jaw movements, facial grimacing, or tongue dystonia. When masticatory muscles are involved, patients always show abnormal jaw closing/opening movements, jaw deviation, or a combination of these behaviors. The available scientific literature on masticatory myospasm–induced OMD is limited. Most are case reports concerning jaw-closing dystonia that involve the masseter and/or temporalis muscles. The affected muscles often are acutely shortened, spasmodic, and associated with pain or limitations in mandibular opening.[1] Case reports involving jaw-opening and jaw-deviation dystonia affecting the lateral pterygoid and submentalis complex are equally uncommon.[2-4] The clinical characteristics of jaw-opening dystonia are expected to be different from that of jaw-closing dystonia. Clinical features may again differ if both jaw-opening and closing muscles are simultaneously involved.

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Myospasm has been defined by the American Academy of Orofacial Pain (AAOP) as the "spasmodic continuous involuntary contraction of a muscle."[5] Because it is characterized by fasciculations, myospasm can be differentiated from other muscle-related temporomandibular disorders (TMDs) by needle, fine-wire, or surface electromyography (EMG). Sustained involuntary muscle contractions are observed even when a muscle is at rest.[6] The diagnostic criteria for myospasm according to AAOP guidelines are: 1) acute onset of pain at rest and with function; 2) markedly reduced range of motion; 3) pain that is aggravated by function of the affected muscles; 4) increased EMG activity that is grossly higher at rest; and 5) sensation of muscle tightness or cramping. Acute malocclusion or bite derangement involving a sudden change in occlusal contacts between teeth may accompany myospasm. However, these criteria are based on jaw-closing myospasm involving superficial masseter and temporalis muscles, which are easier to observe clinically. The clinical manifestations of lateral pterygoid myospasm may be quite different and are not included in the diagnostic criteria for myospasm. The latter is due in part to the "deep" anatomic location of the lateral ptergyoid and the current lack of knowledge of their clinical expressions.

Statement of Clinical Relevance

The observed characteristic signs and symptoms help clinicians to identify and differentiate lateral pterygoid myospasm–induced oromandibular dystonia from other temporomandibular disorders.

Table I. Rating scale for oromandibular dystonia

Grade	*Severity*
0	None
1	Mild movements of mouth, jaw, or tongue; does not interfere with function, barely perceptible
2	Moderate movements or spasms of mouth, jaw, or tongue; definitely noticeable but not disabling
3	Moderate movements or spasms of mouth, jaw, or tongue; interfering with speech, voice, chewing, or swallowing, causing moderate drooling; moderately disabling
4	Severe and forceful spasm of mouth, jaw, or tongue; definitely disabling, patient requires a change in diet or unable to communicate.
Grade	*Frequency*
0	None
1	Mouth or jaw spasms present only rarely
2	Mouth or jaw spasms present about one-third of waking time
3	Mouth or jaw spasms present about one-half of waking time
4	Mouth or jaw spasms present almost all of the time

The purpose of the present study was to characterize the clinical presentations of lateral pterygoid myospasm induced OMD by investigating: 1) signs and symptoms; 2) severity and frequency of dystonia; and 3) EMG findings.

MATERIALS AND METHODS

Clinical and EMG data of 36 patients diagnosed with masticatory muscle myospasm from 2002 to 2010 were reviewed, and detailed data from 18 patients with needle EMG–confirmed lateral pterygoid myospasm were extracted for appraisal. The study population included 6 men and 12 women with a mean age of 53.2 ± 15.3 years. Patients' chief complaints, clinical observations, severity and frequency of myospasm, video recordings, and surface/needle EMG recordings were analyzed. Severity and frequency of lateral pterygoid myospasm were assessed using the OMD scale (Table I) of Jankovic and Orman.[7] Neurologic examinations as well as computerized tomography (CT) or magnetic resonance imaging (MRI) of the brain were also performed to determine presence of neurologic infarct, tumor, and/or brain compression.

Surface electrodes were placed bilaterally at the center of the superficial masseter, anterior temporalis, and anterior digastric muscles along the direction of the muscle fibers for evaluating surface EMG of the temporalis, masseter, and digastric muscles using the Neuropack MEB5508K evolved potential/EMG measuring system (Nihon-Kohden, Tokyo, Japan). For needle EMG, a concentric needle electrode of 0.6 mm diameter was inserted at a point 10 mm below the zygomatic arch and above the middle of the sigmoid notch of the mandible when patients were at rest. The extraoral approach was confirmed to be reliable and the superior head of the lateral pterygoid was consistently recorded.[8] EMG activity of myospasm was typically reflected as significant high-frequency (interlapping motor unit potentials) and high-voltage activity of motor unit potentials with either sustained or short duration bursts discharge patterns (Figures 1 and 2) at rest when normally electrically inactive.

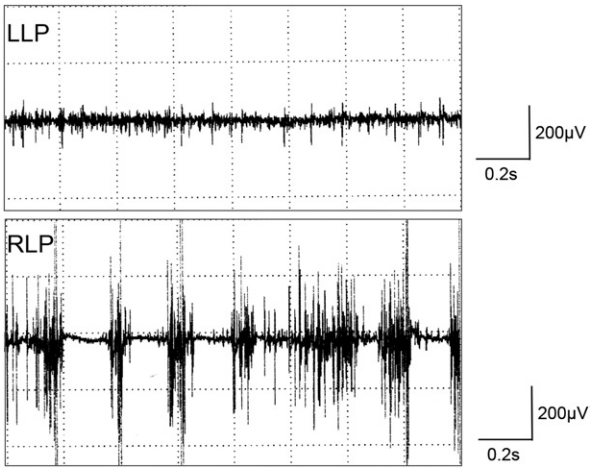

Fig. 1. Needle electromyography, showing series of short duration bursts of high-frequency and high-voltage discharges (peak-peak voltage of 600 μV) in the right lateral pterygoid (RLP) muscle and slightly increased discharges in the left side (LLP). This 59-year-old man complained of right-side closing difficulty after mouth opening for half a year.

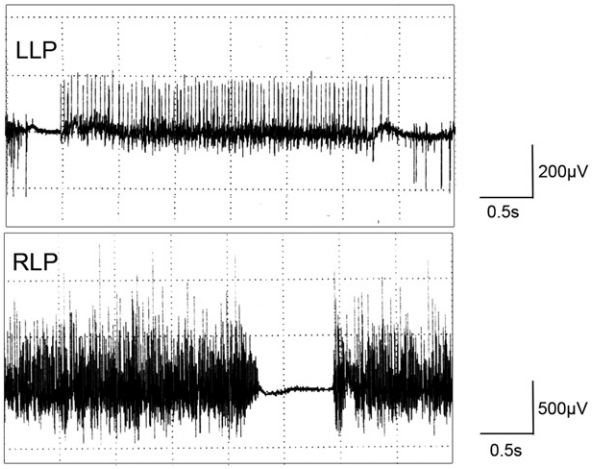

Fig. 2. Needle electromyography, demonstrating bilateral sustained high-frequency and high-voltage discharges, but with a much higher peak-peak voltage (1,750 μV) on the right side than on the left side (260 μV). This 71-year-old female patient complained of involuntarily jaw movement for 1 year. *LLP*, Left lateral pterygoid muscle; *RLP*, right lateral pterygoid muscle.

RESULTS

Frequency of the different signs/symptoms and OMD scale scores are reported in Table II. Although the

Table II. Demographics, signs and symptoms, and severity and frequency of dystonia of the study population

Age (y), mean ± SD (range)	53.2 ± 15.3 (15–71)
Sex, male/female	6/12
Disease duration (mo), mean ± SD (range)	6.35 ± 4.38 (0.3–12)
Chief complaints, n (%)	
Difficulty in mastication and/or speech	9 (50%)
Difficulty in jaw closing after wide opening	6 (33.3%)
Jaw tremble	3 (16.7%)
Clinical signs of abnormal jaw movement, n (%)	
Involuntary mouth opening	14 (77.8%)
Difficulty in clenching	9 (50%)
Involuntary jaw lateral movement	7 (38.9%)
Difficulty in jaw closing after wide opening	6 (33.3%)
Jaw deviation	5 (27.8%)
Involuntary jaw protrusive movement	3 (16.7%)
Involuntary tongue movement	2 (11.1%)
Severity of the dystonia, n (%)	
Score 1	1 (5.6%)
Score 2	3 (16.7%)
Score 3	12 (66.7%)
Score 4	2 (11.1%)
Frequency of the dystonia, n (%)	
Score 1	0
Score 2	4 (22.2%)
Score 3	5 (27.8%)
Score 4	9 (50%)

majority of patients (12/18) with lateral pterygoid myospasm had idiopathic dystonia, 6 subjects suffered from neurologic diseases, including cerebral infarction, encephalanalosis, cerebralcysticerosis, and brain surgery/injury. One-half of the patient population complained of jaw function disabilities (mastication, speech, etc.). These may be associated with involuntary mouth opening/lateral movements as well as difficulty in clenching, which were the most 3 common clinical signs. One-third (6/18) complained of difficulty in jaw closing after wide opening, and 3 patients reported jaw tremble that was induced by their involuntary jaw movements. Patients' symptoms were consistent with clinical signs. Trismus was not found in any of the patients, and mouth opening ranged from 35 to 54 mm. Few patients had TMD signs, and pain was not common. The majority of patients (14/18) were disabled by their dystonia. Moderate (score 3) to severe (score 4) interference with chewing, swallowing, speech, and/or voice was experienced. Dystonia was present almost all the time in one-half of patients (9/18), and 5 experienced it during about one-half of their waking time.

Surface EMG of temporalis, masseter, and/or digastric muscles did not show spasmodic activity in all patients, although 10 demonstrated 1 or 2 muscles with slightly increased EMG activity. Needle EMG demonstrated unilateral or bilateral typical spasmodic electric potentials of the lateral pterygoid muscles in 12 patients. This typically featured as very-high-frequency and high-voltage activity (Figures 1 and 2). The remaining 6 patients did not have the typical spasmodic features with high activity, but demonstrated asymmetric EMG activities with relatively high electric potential voltage at rest. Lateral pterygoid myospasm occurred bilateral in the majority of patients (13/18) and unilaterally in 5 patients.

With the present patient cohort, 6 patients were treated by injecting botulinum toxin (BTX-A; Lanzhou Institute of Biologic Products, Gansu, China) through an extraoral route between the zygomatic arch and sigmoid notch of the mandible.[9] A total of 50 U was administered per muscle. Patients were interviewed 1 month after injection to determine the effectiveness. Subjective patient assessment was evaluated (0 = no effect; 1 = mild effect, no improvement in function; 2 = moderate improvement but no change in function; 3 = moderate improvement in severity and function; and 4 = marked improvement in severity and function).[7] On posttreatment assessment, a score of 3 was given by 5/6 patients and a score of 4 by 1 patient.

DISCUSSION

Lateral pterygoid myospasm is a subtype of OMD. OMD has been defined as a focal dystonia manifested by involuntary masticatory and/or lingual muscle contractions.[1] No definitive diagnostic criteria for OMD are currently available. Characteristic clinical features, such as task-specific or stereotype involuntary masticatory muscle contractions, are the most commonly used diagnostic decisive factors.[10] In addition to masticatory and/or lingual muscles, other muscles of the head and neck, including the tongue and larynx, may also be involved in OMD, leading to variable signs and symptoms. Yoshida et al. summarized the clinical features of 44 patients diagnosed with OMD.[1] The majority of their patients (65.9%) suffered from jaw-closing dystonia, and only 20.4% had jaw opening dystonia. From our clinical data, one-half of the patients with masticatory myospasm had jaw-opening dystonia involving the lateral pterygoid muscle, leading to involuntary mouth opening or lateral or protrusive jaw movements. Three characteristic signs and symptoms were summarized: 1) jaw function disabilities, such as difficulty in mastication and/or speech; 2) difficulty in jaw closing after wide opening; and 3) involuntary jaw movements. All of these can be explained by the physiology of the lateral pterygoid muscle which functions to open the jaw and move it from side to side during mastication. The mylohyoid, digastric, geniohyoid, and platysma being jaw opening muscles may also contribute in part to symptom development if they are involved. The

clinical presentations of lateral pterygoid myospasm are quite different from that of jaw-closing dystonia involving the masseter and/or temporalis muscles, where patients complain of pain and trismus.

Because the lateral pterygoid muscle is located much deeper than the temporalis and masseter muscles, spasms may not be as easily recognized. Complaints of functional disability were very common, and the majority of patients experienced moderate to severe interference with chewing and swallowing. The manifestation of involuntarily jaw movements and functional/occluding disability should be distinguished from the orofacial dyskinesia and drug-induced extrapyramidal reactions. These conditions have been extensively reviewed by Clark and Ram.[11] Lateral pterygoid myospasm–induced difficulty in jaw closing after wide opening may at times be confused with temporomandibular joint (TMJ) subluxation. In TMJ subluxation or dislocation, the condyle is positioned anterior to the articular eminence and cannot return to a closed position. The "open-lock," which is usually sporadic in nature, can typically be reduced by physical manipulation. However, difficulty closing after wide opening is usually persistent and uncontrolled in patients with lateral pterygoid myospasm. It is often accompanied by other clinical presentations of jaw-opening or jaw-deviation dystonia, such as involuntary jaw movements, functional and occluding disability.

As dystonia was present half to all the time in the majority of patients, management of lateral pterygoid was necessary. BTX injections have been accepted as a safe and effective treatment for OMD.[3,12,13] Research showed that jaw-closing dystonia responded well to BTX. BTX, however, had lower effectiveness for jaw-opening and jaw-deviation dystonia.[14,15] In the present study, 6 patients were treated by injecting BTX. Functional improvements were attained in the short term (1-month assessment period), but symptoms and signs did not disappear completely. A plausible explanation for these findings is the difficulty of BTX injection. Multiple BTX injections into the temporalis and masseter muscles are easy to perform in view of the superficial nature of these muscles. The drug is able to diffuse into the whole muscle to obtain a complete response. BTX injection into the lateral pterygoid muscle can be administered either directly or guided by EMG.[14,15] It is, however, more difficult to locate and inject BTX exactly into both the superior and the inferior lateral pterygoid muscles, owing to their deep position.

Based on the present case series, we concluded that lateral pterygoid myospasm usually occurs bilaterally. The 3 characteristic signs and symptoms of lateral pterygoid myospasm observed were: 1) jaw function disabilities; 2) difficulty in jaw closing after wide opening; and 3) involuntary jaw movements. Botox injections into the lateral pterygoid improved function but did not resolve symptoms completely.

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