

Hyperfunctional Laryngeal Conditions: Muscle Tension Dysphonia, Chronic Cough & PVFM

Karen Drake MA, CCC-SLP
Linda Bryans MA, CCC-SLP
Jana Childes MS, CCC-SLP

Learning Outcomes

- ▶ Identify disorders that can be classified as hyperfunctional laryngeal conditions
- ▶ Describe how laryngeal hyperfunction can contribute to dysphonia, chronic cough and paradoxical vocal fold motion (PVFM)
- ▶ Describe how treatment may be modified to better address these interrelationships

Muscle Tension Dysphonia

- ▶ *“MTD can be described as the pathological condition in which an excessive tension of the (para)laryngeal musculature, caused by a diverse number of etiological factors, leads to a disturbed voice.”*

- *Van Houtte, Van Lierde & Claeys (2011)*

Muscle Tension Dysphonia

- ▶ Descriptive label
- ▶ Multiple etiological factors
- ▶ Diagnosed by specific findings on videostroboscopy
- ▶ Voice therapy is the treatment of choice – supported by a joint statement of the AAO and ASHA in 2005

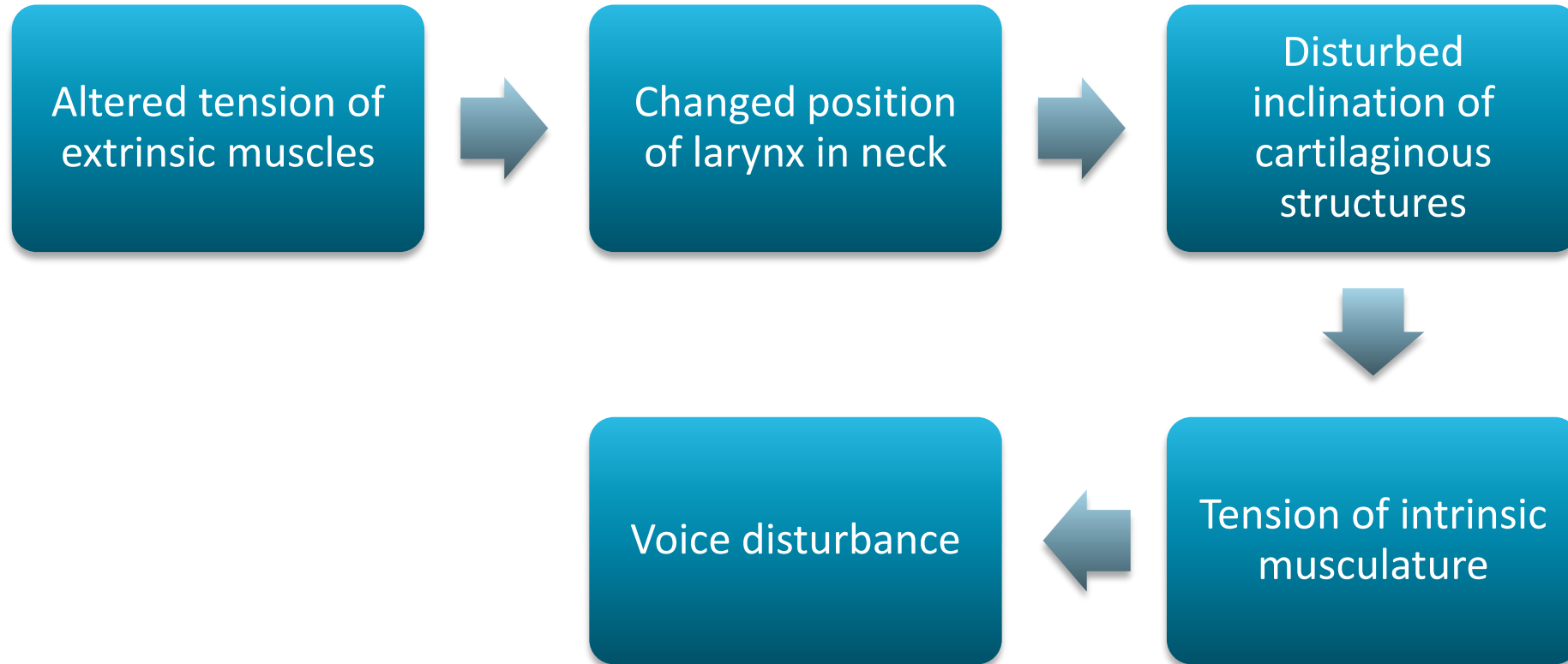
Voice-related complaints

- ▶ Hoarseness
- ▶ Poor vocal quality
- ▶ Vocal fatigue
- ▶ Increase voicing effort/strain
- ▶ Difficulty with projection
- ▶ Inability to be understood over background noise or the telephone
- ▶ Voice breaks
- ▶ Periods of voice loss

Other MTD complaints

- ▶ Sore throat
- ▶ Globus sensation
- ▶ Throat clearing
- ▶ Pressure, tightness or tension
- ▶ Tenderness
- ▶ Difficulty getting a full breath
- ▶ Running out of air with speaking
- ▶ Difficulty swallowing secretions

Pathophysiology



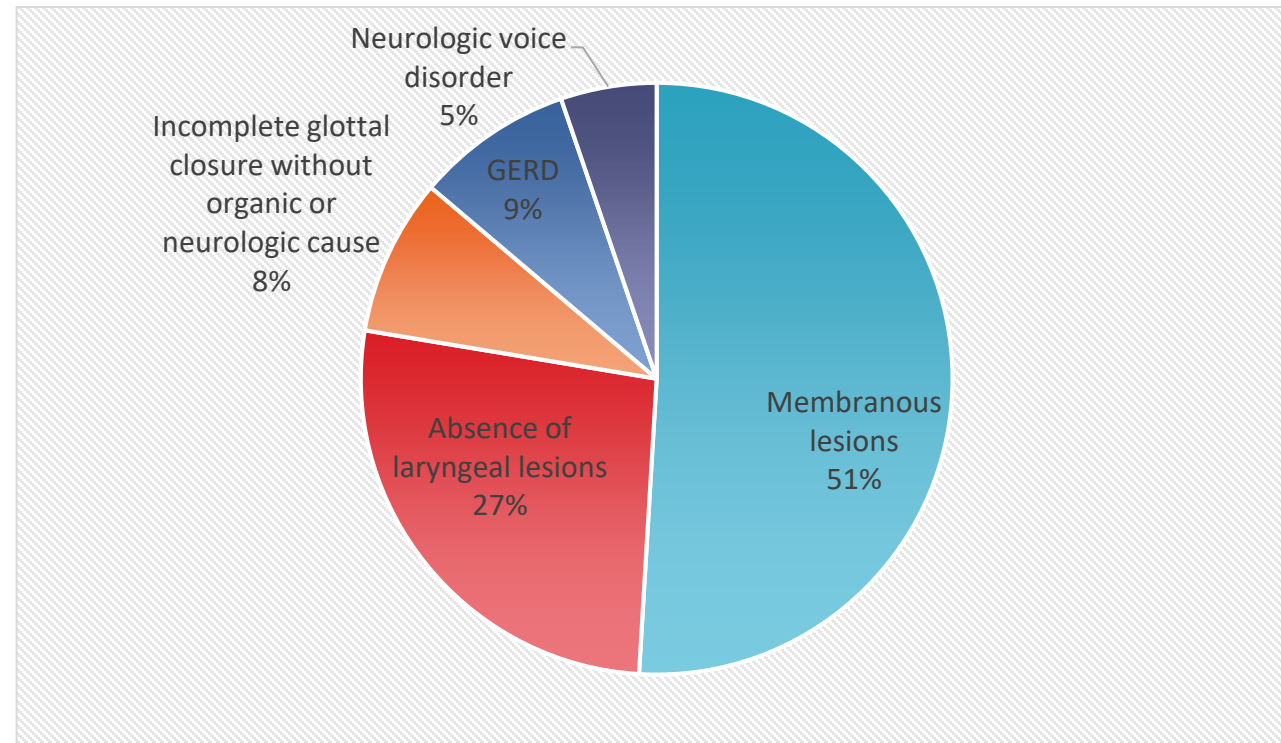
Associated signs

- ▶ Excess jaw tension
- ▶ Lingual posture and/or tension
- ▶ Altered resonance focus
- ▶ Breath holding
- ▶ Poor coordination of breath and voice
- ▶ Pharyngeal muscle contraction
- ▶ Posture
- ▶ Neck tension

Vocal tract discomfort symptoms

Lopes, Cabral, & Figueiredo de Almeida (2015)

- ▶ Vocal Tract Discomfort Scale
- ▶ 210 participants (44 males, 166 females)



Vocal tract discomfort and risk factors in university teachers

Korn, Augusto de Lima Pontes, Abranches & Augusto de Lima Pontes (2016)

- ▶ Study objective: to characterize the presence of risk factors in university teachers
- ▶ 846 participants
- ▶ Part of larger project studying occupational dysphonia among teachers
- ▶ 39.6% were experiencing hoarseness

Paradoxical vocal fold motion, laryngeal hyperfunction and cough

- ▶ What experience has taught me about PVFM, laryngeal hyperfunction and cough
- ▶ If I did not address MTD as well as PVFM, patients tended to not get to the point that they didn't even have to think of controlling their breathing.
 - If you speak with glottal fry/laryngeal tension during phonation and maintain tension in those muscles and take a deep breath, you have PVFM. If you breathe hard as if you are running while maintaining tension in those muscles, you will likely cough or throat clear.

- ▶ Laryngeal tension during breathing can come in multiple forms:
- ▶ Classic PVFM with the vocal folds approximating on inhalation and opening on exhalation.
- ▶ Movement of the vocal folds toward midline on inhalation and exhalation
- ▶ Movement of the arytenoid cartilages forward on inhalation.
- ▶ Elevation of the larynx during the breathing cycle.
- ▶ Chest variant VCD

- ▶ With “throat focused breathing” common in PVFM, the digastric muscles and base of tongue elevate the larynx and the thyrohyoid muscles squeeze inward constricting the upper airway.
- ▶ With glottal fry, common in muscle tension dysphonia or laryngeal hyperfunction, people often have base of tongue tension as well as tension in the thyrohyoid muscles.
- ▶ Shallow breathing is common to both which activates the Scalene muscles and the SCM for lifting the rib cage as well as the intercostal muscles. Often results in a feeling of tightness in the chest.

- ▶ With classic PVFM, most of the tension is in the thyroarytenoid muscle (the vocal folds themselves).
- ▶ Another common type of muscle tension dysphonia is hyper adduction (pressed voice) of the vocal folds with tension in the TA muscles.

- ▶ Vertigan, Gibson et al (2007) found that clinically significant voice problems were identified in approximately 40% of the individuals presenting with chronic cough and PVFM.
- ▶ They found that talking was a common trigger for cough.
- ▶ They found treatment addressing chronic cough also improved vocal quality

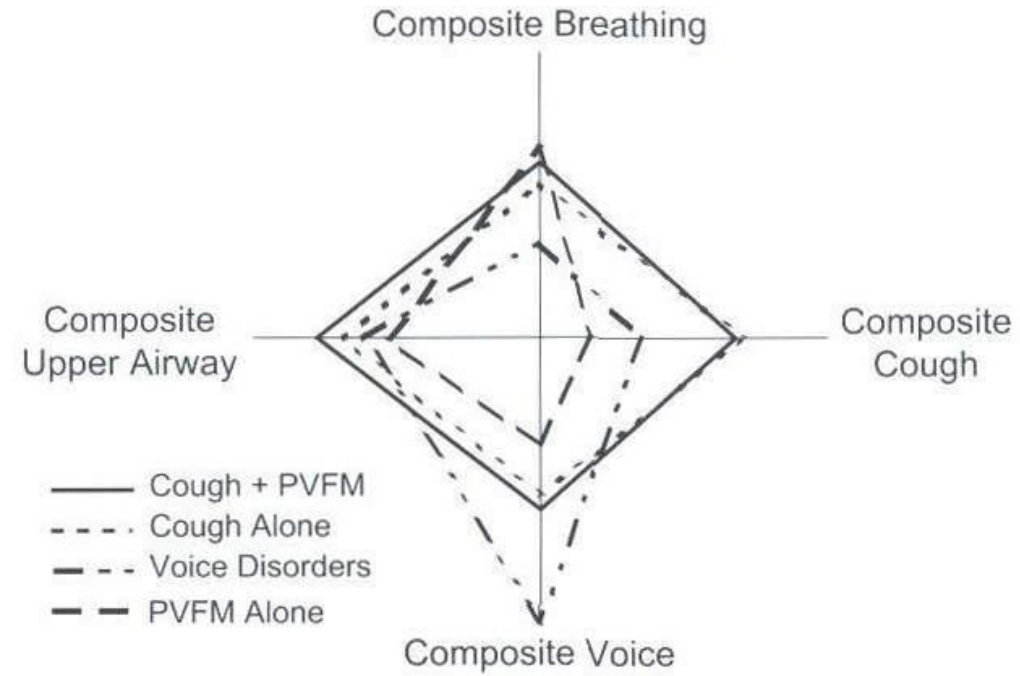


FIGURE 6. Diagram of composite symptom scores among the Cough + PVFM, PVFM Alone, Cough Alone, and Voice Disorders groups, highlighting similarities and differences among groups.

- ▶ Vertigan, Theodoros, et al (2007)
- ▶ Looked at incidence of voice problems in PVFM and chronic cough
- ▶ They examined the perceptual voice characteristics in 56 individuals with CC, 8 with PVFM and 55 with both CC and PVFM, 25 people with MTD only compared with healthy controls.
- ▶ They found that there was a high prevalence of abnormal voice quality in the CC and the PVFM groups compared to healthy controls.
- ▶ Most frequently reported perceptual characteristics in CC in descending order: strained, rough, breathy and glottal fry. Breathiness was the common description in PVFM.

- ▶ Vertigan, et al. (2008) also looked at the acoustic and electroglottographic voice characteristics in chronic cough and PVFM
- ▶ They found acoustic and EEG abnormalities in the CC and PVFM groups as compared to normal subjects.
- ▶ Abnormalities were noted in Maximum phonation time, jitter, harmonic to noise ratio, standard deviation of Fo and duration of the closed phase of phonation (measured by EEG and longer compared to normal, but shorter compared to voice disordered group)

- ▶ OHSU study (2016) looking at PVFM in adults (39 respondents of a survey of symptoms), we found that 69% reported moderate to severe voice symptoms in addition to their PVFM. Voice symptoms then improved s/p PVFM treatment.
- ▶ OHSU current study is looking at PVFM in adolescents. Most do not self report voice problems, but we describe laryngeal hyperfunction in at least 50% of the patients whose charts have been reviewed so far.

- ▶ There may be overlap in factors contributing to hyperfunctional laryngeal symptoms MTD, episodic laryngospasm, globus and cough
- ▶ Morrison, Rammage and Emami discussed “irritable larynx syndrome”.
- ▶ They hypothesize that “neural plastic change to brainstem laryngeal control networks...where the controlling neurons are held in a “spasm-ready” state and can be triggered by various stimuli”.
- ▶ Patients who may have irritable larynx included those with episodic laryngospasm (they see laryngospasm as extreme version of PVFM), dysphonia, globus, chronic cough, throat clearing and visible or palpable evidence of tension in the laryngeal muscles.

- ▶ For some patients, laryngospasm or dysphonia triggered by environmental stimuli (odors, chemicals, particles in the air), reflux, voice use or coughing
- ▶ They define irritable larynx syndrome as “hyperkinetic laryngeal dysfunction”. Diagnosis is excluded if there is visible laryngeal pathology, neurological disease or psychiatric diagnosis.
- ▶ Reviewed the charts of 39 patients with ILS:
 - Most common symptoms: laryngospasm and dysphonia
 - Other symptoms included globus, chronic cough and perilaryngeal pain
 - They did not note PVFM in these patients though contributors like GERD also noted in PVFM

- ▶ Vertigan, Bone and Gibson (2013) hypothesized the presence of a common “laryngeal hypersensitivity syndrome” common in the laryngeal dysfunction seen in chronic cough, PVFM, MTD and globus pharyngeus.
- ▶ Looked at 103 participants separated into 5 groups: Normal controls, chronic cough, PVFM, globus and MTD
- ▶ They used self report questionnaires as well as quantitative sensory testing. They found that all of the groups had increased sensory impairment compared to the controls.

- ▶ They found increased reflux symptoms index scores in all groups except for the normal. All were about equally abnormal.
- ▶ Asthma history was more common in the MTD and PVFM group than in the CC group. Rhinitis was more common in the MTD group than the globus group. ACE inhibitor use was low across all groups. Anxiety and depression scores were WNL for all groups with the exception of slightly increased anxiety in the globus group. Lung function was WNL in all groups, but the PVFM group had lower forced vital capacity values than the control group.
- ▶ Sensory symptoms were elevated across groups. Dominant symptom scores were high, but elevation of other symptoms also increased. I.e. PVFM group had the worst breathing scores, but cough, MTD and globus were also increased in this group.

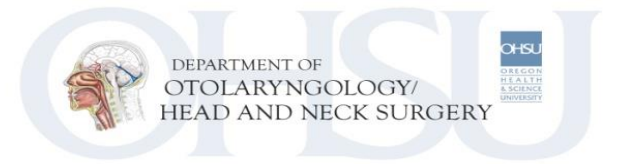
- ▶ VHI scores more impaired in each of the case groups compared to controls. VHI scores were worst in the MTD group, but CC, PVFM and globus groups also had abnormal scores.
- ▶ Cough reflex sensitivity was heightened in case groups compared to controls. Laryngeal sensitivity was highest in the cough and PVFM groups. Cough counts were highest for the CC group, but were also higher than control group in the PVFM and MTD groups.
- ▶ Their conclusion: “These findings may suggest a common mechanistic pathway active in these syndromes and might implicate a sensory neural dysfunction”. (perhaps similar to hypersensitivity to pain).

My patient complains of throat clearing, cough, globus sensation and dysphagia. Why does he need voice therapy?

Today, the role of voice therapy in:

- ▶ Globus sensation/Throat pain
- ▶ Chronic cough
- ▶ Muscle Tension Dysphagia

The Irritable Larynx Syndrome

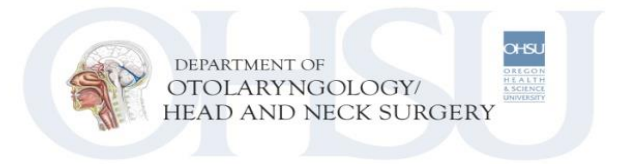


Morrison, Linda Rammage, and A. J. Emami
1999

- ▶ “We define the irritable larynx syndrome as **hyperkinetic laryngeal dysfunction** resulting from an assorted collection of causes in response to a definitive triggering stimulus. Inclusion criteria for ILS diagnosis are as follows:
 - ▶ 1. Symptoms attributable to **laryngeal tension, dysphonia and/or laryngospasm with or without globus and/or chronic cough**
 - ▶ 2. Visible and palpable **evidence of tension**, laryngoscopic lateral and AP contraction, palpation: SH, TH, CT, pharynx
 - ▶ 3. Presence of a **sensory trigger**: airborne substance, esophageal irritant, odor”

The Irritable Larynx Syndrome

Murray Morrison, Linda Rammage, and A. J. Emami
1999



- ▶ Chronic cough, throat clearing, and globus



“**muscle tightness in the laryngeal area.**”

- ▶ “While the **larynx usually looks structurally normal** in patients who complain of these symptoms, we have become increasingly aware of other physical findings that are probably important, including **abnormal laryngeal posture and palpable muscular tension** in and around the larynx.”

Laryngeal sensory dysfunction in laryngeal hypersensitivity syndrome

ANNE E. VERTIGAN,^{1,3,4} SARAH L. BONE^{3,4} AND PETER G. GIBSON^{1,2,4,5}

¹Priority Centre for Asthma and Respiratory Diseases, School of Medicine and Public Health, The University of Newcastle,
²Department of Respiratory and Sleep Medicine, ³Speech Pathology Department, ⁴Hunter Medical Research Institute,
Newcastle, and ⁵Woolcock Institute of Medical Research, Sydney, Australia

- ▶ -Respirology 2013

Laryngeal sensory dysfunction in laryngeal hypersensitivity syndrome

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- ▶ Quantified sensory dysfunction and identified extent of overlap among conditions
- ▶ Authors hypothesized that there is a common disturbance of laryngeal function in CRC, PVFM, globus and MTD which they termed “laryngeal hypersensitivity syndrome”
- ▶ They compared sensory symptoms and results of quantitative testing in pts with CRC, PVFM, globus and MTD

In the past: treating the symptom

Stop it, sip water, breath, silent cough

- ▶ Case Reports | February 01, 1973 The “Silent Cough” Method for Vocal Hyperfunction
- ▶ [Daniel H. Zwitman](#) and [Thomas C. Calcaterra](#)
- ▶ *Journal of Speech and Hearing Disorders*, February 1973, Vol. 38, 119-125. doi:10.1044/jshd.3801.119
- ▶ Coughing and throat clearing are vocally abusive activities that can be directly related to laryngeal disease. Methods of therapy include advising the patient to **avoid or eliminate these activities**, although the authors have found that **few patients benefit from such suggestions**. The action of coughing and throat clearing has been examined by means of indirect laryngoscopy and high-speed cinematography, and the stages of the cough from complete constriction of the folds to violent abduction are reviewed. Although the cough reflex is a natural protective mechanism that at times must be activated because of obstruction of the air tract, continual coughing and throat clearing frequently have a significant nonessential component. **The actions may be due to an over awareness of secretions in the larynx, the fruitless use of coughing or throat clearing to eliminate pain or discomfort, or unconscious habit.** Methods to treat this type of cough or throat clearing are explored, with special emphasis on the “silent cough,” a technique the authors devised as a substitute for unnecessary coughing or throat clearing. Case reports are presented to illustrate this method in therapy.

Laryngeal hyperfunction = globus sensation or throat pain

- ▶ Cough/throat clear  Response to laryngeal hyperfunction
- ▶ Reviewing exam can be invaluable
 - Need to “hook” or “buy in” the patient during the initial exam or they won’t come back
 - Relate hyperfunctional laryngeal behavior back to patient’s original complaint
 - Relief that it’s “nothing serious”

Voice Therapy

▶ **Voice therapy focused on**

- Reducing laryngeal load
- Negative practice

▶ **Observations:**

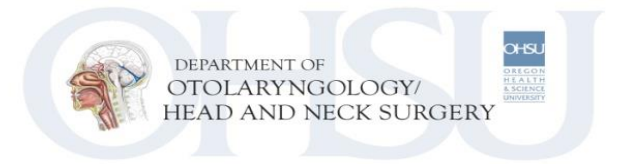
- Throat clearing triggered by talking
- Throat clearing resolved with balanced phonation in therapy
- Tenderness in the thyrohyoid space during laryngeal massage

▶ **Building awareness and relating symptoms back to complaints of throat pain**

- Began to notice increased throat discomfort when reading to his daughter (increased awareness)
- Reduced tension with improved optimal vocal technique

▶ Chronic Cough

Voice and Upper Airway Symptoms in People With Chronic Cough and Paradoxical Vocal Fold Movement

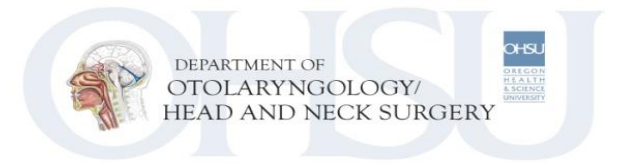


*†Anne E. Vertigan, *Deborah G. Theodoros, †‡Peter G. Gibson, and
§Alison L. Winkworth

**Brisbane, †‡Newcastle, and §Albury, Australia*

- ▶ A variety of triggers have been reported for CC, including **talking**, exercise, laughing, and cold air. These triggers are similar to those reported for PVFM and the **Irritable Larynx Syndrome**
- ▶ 25% of participants in both C and PVFM and C alone groups reported **coughing to deliberately relieve sensation from the throat**

Voice and Upper Airway Symptoms in People With Chronic Cough and Paradoxical Vocal Fold Movement



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**Brisbane, †‡Newcastle, and §Albury, Australia*

- ▶ Talking as common trigger for cough (Vertigan and Morrison)
- ▶ VF adduction suspected as mechanical stimulus for cough
- ▶ Cough receptors in the larynx are irritated by mechanical stimulation
- ▶ Hypothesis: “...In an already sensitive larynx, any coexisting hyperadduction of the vocal folds could exacerbate this stimulation and trigger coughing.”
- ▶ Treat any hyperfunction in context of treating cough

Cough Suppression Strategies

- ▶ ID precipitating sensations
- ▶ **ID triggers for cough**
- ▶ Distraction techniques
- ▶ Cough Suppression Swallow
 - Effortful swallow with head flexion and isometric pushing
- ▶ Relaxed throat breathing
- ▶ Pursed lip breathing
- ▶ **Reduce laryngeal constriction**

-Vertigan et al 2007

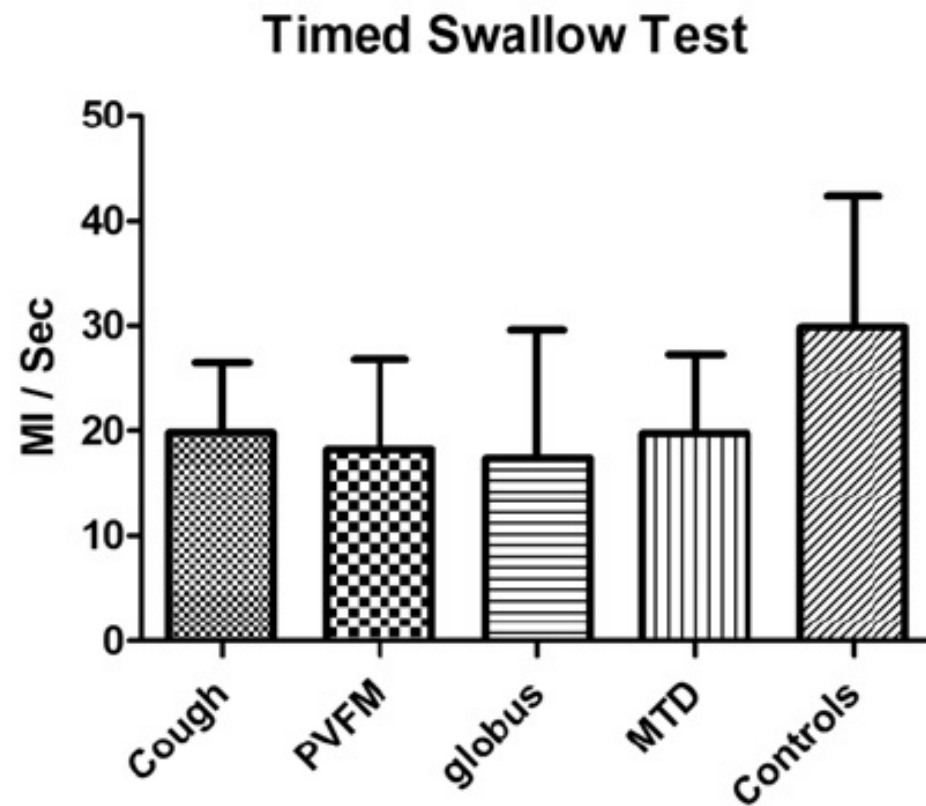
▶ Muscle Tension Dysphagia

Laryngeal sensory dysfunction in laryngeal hypersensitivity syndrome

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¹Priority Centre for Asthma and Respiratory Diseases, School of Medicine and Public Health, The University of Newcastle,
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Newcastle, and ⁵Woolcock Institute of Medical Research, Sydney, Australia

Swallow less efficient case groups than in control groups; all WNL (>10mL/s)



MTDg: Symptomology and Theoretical Framework

Kang, Hentz and Lott 2016

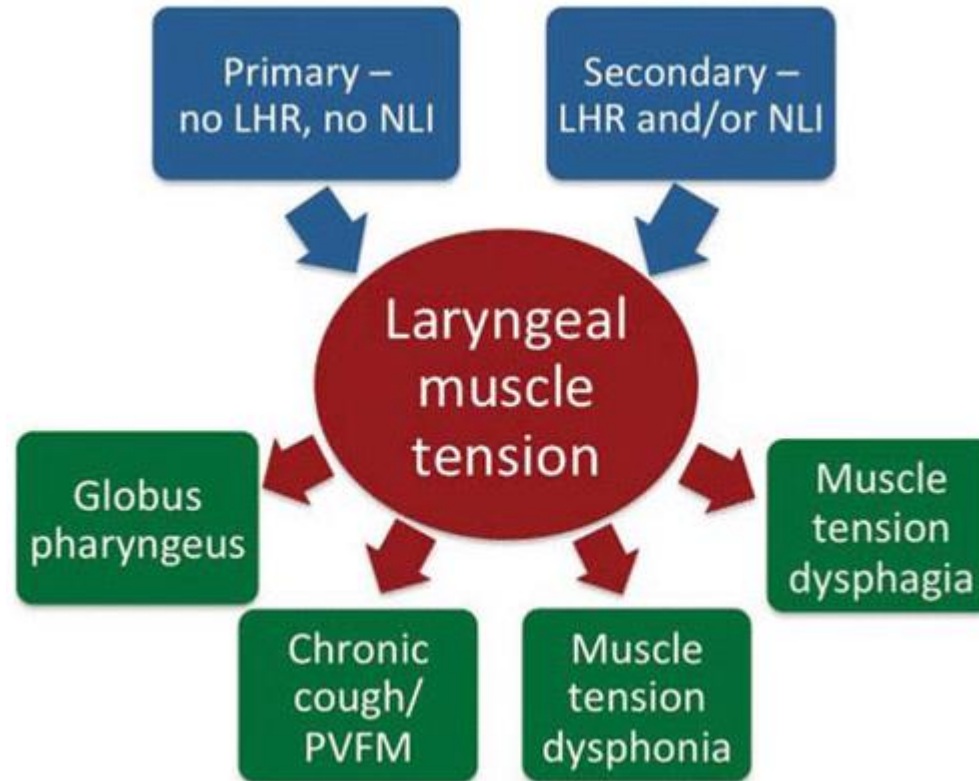
- ▶ 67 subjects met criteria
- ▶ Most c/o difficulty swallowing solids
- ▶ Many c/o throat discomfort
- ▶ Most c/o a sensation of food sticking in the throat

- ▶ Small percentage c/o coughing or choking when eating/drinking, difficulty swallowing liquids or saliva, noisy swallow or fatigue with swallowing

MTDg: Symptomology and Theoretical Framework

Kang, Hentz and Lott 2016

- ▶ Dysphonia reported in 55% of subjects (37/67)
- ▶ 40% of all subjects referred for SLP eval
- ▶ 59% of those followed up
- ▶ **13 subjects underwent voice therapy focused on unloading muscle tension**
- ▶ **All reported resolution of their dysphagia s/s**



Final Thoughts

- ▶ “The SENSATION to clear your throat or cough is real but the NEED to clear your throat or cough is NOT REAL” – Florence Blager
- ▶ Validate this for your patients
- ▶ Educate pts regarding the relationship between laryngeal sensations/symptoms and laryngeal hyperfunction
- ▶ Build awareness of how hyperfunction triggers these symptoms and how unloading the muscle tension can relieve symptoms
- ▶ Muscle Tension Dysphagia

References

- ▶ Altman, K.W., Atkinson, C. & Lazrus, C. (2005). Current and emerging concepts in muscle tension dysphonia: a 30-month review. *Journal of Voice*, 19(2), 261-267.
- ▶ Kang, C.H., Hentz, J.G., Lott, D.G. (2016). Muscle tension dysphagia: symptomology and theoretical framework. *Otolaryngology–Head and Neck*, 155 (5).
- ▶ Korn, G.P., Augusto de Lima Pontes, A., Abranches, D. & Augusto de Lima Pontes, P. (2016). Vocal tract discomfort and risk factors in university teachers. *Journal of Voice*, 30(4), 507e7-507e14.
- ▶ Lopes, L.W., Cabral, G.F. & Figueiredo de Almeida, A.A. (2015). Vocal tract discomfort symptoms in patients with different voice disorders. *Journal of Voice*, 29(3), 317-323.
- ▶ Morrison M, Rammage L, Emami A. The irritable larynx syndrome. *Journal of Voice*. 1999; **13**:447-455.
- ▶ Murray T, Branski R, Yu K, *et al*. Laryngeal sensory deficits in patients with chronic cough and paradoxical vocal fold movement disorder. *The laryngoscope*. 2010; **120**: 1576-1581.
- ▶ Murray T, Sapienza C. The role of voice therapy in the management of paradoxical vocal fold motion, chronic cough and laryngospasm. *Otolaryngol clin n am*. 2009; **43**: 73-83.
- ▶ Patel R, Venediktov R, Schooling T, *et al*. Evidence-based systematic review: effects of speech-language pathology treatment for individuals with paradoxical vocal movement. *Folia phoniatr logop*; **59**:256-267.

References

- ▶ Van Houtte, E., Van Lierde, K. & Claeys, S. (2011). Pathophysiology and treatment of muscle tension dysphonia: a review of the current knowledge. *Journal of Voice*, 25(2), 202-207.
- ▶ Vertigan A, Bone S, Gibson P. Laryngeal sensory dysfunction in laryngeal hypersensitivity syndrome. *Respirology*. 2013; **18**: 948-956.
- ▶ Vertigan A, Gibson P, Theodoros D, *et al*. A review of voice and upper airway function in chronic cough and paradoxical vocal cord movement. *Curr opin allergy clin immunol*; **7**: 37-42.
- ▶ Vertigan A, Theodoros T, Winkworth A, *et al*. Acoustic and electroglottographic voice characteristics in chronic cough and paradoxical vocal fold movement. *Folia phoniatr logop*; **60**:210-216.
- ▶ Vertigan A, Theodoros D, Winkworth A, *et al*. Perceptual voice characteristics in chronic cough and paradoxical vocal fold motion. *American journal of speech pathology*; 24:566-584.
- ▶ Yelken K, Gultekin E, Guven M, *et al*. Impairment of voice quality in paradoxical vocal fold motion dysfunction. *Jour of voice*; 24:724-727.