Massage Therapists' Association of British Columbia

Clinical Case Report Competition

West Coast College of Massage Therapy

Summer 2010

Second Place Winner

Anders T. Lau

Effects of massage therapy on vocal tract discomfort associated with muscle tension dysphonia: A case study

P: 604.873.4467
F: 604.873.6211
research@massagetherapy.bc.ca
massagetherapy.bc.ca

MTABC 2010

Acknowledgements

Thanks and recognition go out to Paula Jasper (RMT), Mike Dixon (RMT) and Richard Cooper (BSc, BEd) for their support.

Abstract

Objective: This study explores the use of massage therapy in the management of muscle tension dysphonia (MTD) associated vocal tract discomfort (VTD). In this study, massage therapy modalities and laryngeal manual therapy are assessed in their ability to decrease tense laryngeal & hyoid musculature, impairment in accessory muscles of respiration and relieve dysphonia-associated anxiety.

Methods: Five 60 minute sessions were conducted over 19 days with a 52-year old music student with suspected MTD & VTD. Swedish & petrissage massage techniques, trigger point therapy and joint mobilizations were applied. The treatment focus was the musculature of the larynx, hyoid, and associated structures. Outcomes recorded included patient volume and pitch limits within pain. Patient feedback was taken via the VTD scale and Voice Handicap Index (VHI)

Results: The subject experienced a significant short-term decrease in VTD symptoms, both in frequency and severity. These symptoms returned within 2-3 days or sooner if excessive vocal use occurred. Volume and pitch ranges within pain were virtually unchanged.

Conclusions: Findings suggest that massage therapy can help reduce VTD symptoms in dysphonic patients. Further research into the effects of both manual and direct therapies on dysphonic patients is strongly encouraged.

Keywords: Functional Dysphonia, Muscle Tension Dysphonia, Laryngeal Manual Therapy, Massage Therapy, Vocal Tract Discomfort

Introduction

Dysphonia is a blanket term in which voice production is impaired. Muscle tension dysphonia (sometimes called *muscle misuse dysphonia*) is a specific subset of dysphonia in which excessive tension of the paralaryngeal musculature leads to a disturbed voice.(Van Houtte, Van Lierde, and Claeys, 2010)

Common Medical Intervention

Voice therapy may include remedial exercise and patient education to reduce vocal abuse & misuse patterns. (Altman et al., 2005) Additionally, manual therapies are emerging as a crucial aspect to treatment. (Mathieson, Hirani, Epstein, Baken, Wood, and Rubin, 2009) Manual circumlaryngeal therapy (MCT) and laryngeal manual therapy (LMT), the two most common manual therapies, vary in application & specific techniques, though both techniques aim to adjust laryngeal placement. (Mathieson et al., 2009)

Anatomy & Pathology

As described by Ahmad, Dargaud, Morin, and Cotton (2009), voice production is a complex process that involves three functional components – respiration, phonation, and articulation.

The diaphragm and external intercostals muscles as primary muscles of inspiration, with SCM and scalene muscles working as accessory muscles. (Tortora and Derrickson, 2006) Trigger point patterns within these muscles can decrease respiratory ability, leading to inadequate breath support. (Travell, Simons, and Simons, 1998)

Phonation involves intrinsic, extrinsic & paralaryngeal muscles in the larynx. In the posterior larynx, the paired arytenoid cartilages connect to the thyroid cartilage through two pairs of folds; the ventricular and vocal folds. Muscles within the larynx pull on the arytenoids causing the vocal folds to abduct or adduct, affecting the rima glottidis. (Tortora and Derrickson, 2006) Tension in the rima glottidis determines pitch in phonation as air vibrates while passing through the vocal folds. Conversely, decreased tension causes slower vibrations and lower pitches.

Further research by Ahmad et al. (2009) reveals that movements of the vocal folds and laryngeal positions change in relation to vowel and consonant

sounds; thus, different tension patterns affect different speech sets. In MTD, tension can build in both intrinsic and extrinsic muscles of the larynx, like the cricothyroid muscle. In addition, perilaryngeal muscles that overlap or attach to related structures like the hyoid bone can be affected. (i.e: suprahyoids, infrahyoids). (Angsuwarangsee and Morrison, 2002)

Articulation occurs through the use of muscles of the face & tongue. Muscles in the pharynx constrict and relax to produce different vowel sounds. Facial & glossal muscles move the tongue in order to pronounce consonants. (Tortora and Derrickson, 2006) Suboptimal articulation can be caused by improper TMJ movement, muscle imbalance/misuse or trigger point patterns.

Etiology

Van Houtte et al. (2010) have catalogued three categories contributing to excessive muscle activity, which give rise to MTD.

Psychological and/or personality factors have been noted with regularity amongst MTD patients, specifically towards introversion, neurotism, social anxiety, stress reactivity, and depression. (Van Houtte et al., 2010)

Vocal abuse/misuse is an important contributor; muscles responsible for voice production are overused beyond comfort, leading to incorrect vocal techniques. Disturbed gestures in respiration, phonation and resonance can lead to

loss of control of pitch and volume. These symptoms are seen mainly amongst professional voice users (such as teachers, singers and lawyers) who speak for varying lengths of time, volume and intensity on a daily basis. (Van Houtte et al., 2010)

Finally, MTD may present as a compensation for underlying conditions such as organic vocal fold lesions, gastroesophageal reflux or chronic laryngitis. (Altman et al., 2005) This presentation is called *secondary* MTD; the patient attempts to maintain normal pitch and volume in a structurally altered larynx, leading to tension and stiffness. With reflux, gastric acid in the larynx & pharynx can trigger closure of the glottis and tightening of laryngopharyngeal muscles alongside symptoms of choking or coughing.

Diagnosis & Assessment

MTD is diagnosed with objective and subjective examinations. A case history is taken, vocal function is evaluated and the larynx and pharynx are examined via endoscopy. (Dromey, Nissen, Roy, and Merrill, 2008)

The Dysphonia Severity Index (DSI) is used to establish a quantitative measurement of vocal quality specifically for dysphonic voices. The DSI is based on the weighted combination of 4 measurements; maximum phonation time (MPT), highest frequency in pitch projection, lowest intensity in volume

production, and jitter (shakiness in the voice). (Van Lierde, De Ley, Clement, De Bodt, and Cauwenberge, 2004)

Subjective information is obtained via questionnaires, which chart quality of life and psychosocial effects of patients' voice dysfunction. The Voice Handicap Index is often used to gauge changes in the functional, physical and emotional aspects of patients suffering vocal dysfunction. (Syed, Daniels, and Bleach, 2009) The VHI adapted from Jacobson et al. (1997) is included in Annex A: Appendix i.

A key symptom in MTD is vocal tract discomfort (VTD); Mathieson et al. (2009) observed that a significant number of patients presenting with MTD also experience VTD. The VTD scale polls patients on the severity and frequency of their symptoms using a variety of descriptions (tight, burning, tickling, etc) Unlike the VHI questionnaire, the VTD outlines specific feelings of discomfort which may change with treatment, vocal activity, or other ADLs. As the VTD scale is patient-dependant and can be used in a clinical setting with no special equipment or training, it is the primary diagnostic tool for this study. The VTD scale sourced from Mathieson et al.'s 2009 study can be seen at Annex B: Appendix i.

Subject Case History

KP is a 52-year old female accordion teacher & performer. She was referred by her voice teacher to help address her chronic vocal dysfunction. KP reports vocal dysfunction symptoms for almost 20 years. KP believes her dysphonia may be linked to previous voice use as a set director. Though she has not been diagnosed with MTD, she felt that her signs and symptoms matched the symptoms for MTD. KP is scheduled to visit the Pacific Voice Clinic in September to obtain a diagnosis.

KP's primary objective symptom was difficulty ascending in pitch, often feeling tension and tightness in her throat to the point of pain. She feels little to no difficulty descending in pitch and describes no other objective singing issues (she did feel discomfort after a few minutes of singing). The primary ADL affected was in speaking, as she feels her voice "tires out" quickly.

KP describes her discomfort as 'mild tightness' around the throat. On a visual analog scale (VAS), she described her pain as a 3.5/10 (1 being no pain, 10 being worst pain imaginable). After speaking for approximately 10 minutes, she often found her pain increasing to a 4/10.

KP has received many therapies to help relieve her dysphonic voice. She has received massage therapy (including intraoral and craniosacral work),

acupuncture, and regular yoga sessions. She found that the acupuncture brought slight improvement; yoga helped her relax (and decreased her throat tension) but did not experience specific dysphonia relief from massage therapy.

KP's self-reported level of stress was low; this was a marked decrease from January to April when she attended college full-time. KP expressed interest in increasing her personal awareness & control with speaking and was willing to try a new therapeutic approach to help manage her dysphonia.

Assessment

An initial scan exam, C-spine joint assessment & muscle testing were performed during KP's first visit. These exams were intended to note dysfunctions in posture and quality of movement rather than specifics ranges & values. The C-spine joint exam found active free-range flexion/extension within normal limits, though the patient experienced tension in the posterior neck at extension end-range

The three knuckle test was used to assess dysfunction in the muscles of mastication, which was negative. The anterior & anterolateral neck flexors were tested for strength against gravity and examiner resistance. Both muscle groups tested 4/5; KP noted pain referral into the right jaw during right anterolateral flexor testing. Upon palpation, KP was later assessed to have a myofascial trigger

point within her right SCM. There was no further orthopedic assessment performed after the 1st treatment.

Though the dysphonia severity index has been proven as an accurate and quantative measurement of dysphonia, (Dromey et al., 2008) it was not used due to lack of sound-isolating equipment and acoustic analysis software.

Maximum and minimum phonatory ability within pain thresholds was measured in decibels (dB) The patient was asked to phonate at an /a/ (as in 'ah') vowel in a comfortable pitch, then gradually increase in loudness until she experienced discomfort. The patient then repeated the exercise, gradually decreasing in loudness until she experienced discomfort.

Additionally, vocal range within pain & discomfort was measured. Starting at a comfortable note (G2, or G below middle C), the patient vocalized at an /a/ vowel and descended in pitch at a semitone per step until discomfort or vocal limitations arose. The patient then repeated the exercise, ascending in pitch at a semitone per step.

Each acoustic sample was taken 3 times and the mean value was recorded. All recordings were taken using a 3.5mm microphone (Vericorder Mini Mic) attached to an iPod Touch. The microphone recorded approximately 30cm from the patient. Loudness was assessed using the *SPL Meter* application (Studio Six

Digital) on the iPod Touch. Pitches were recorded using the *Voice Memos* application (Apple) then reviewed and verified using a KORG chromatic tuner (CA-30). All recordings were taken prior to sessions #1 & #3 and immediately after session #5.

The two subjective measures taken were the VHI and VTD scale as sourced from Jacobson et al. (1997) and Mathieson et al. (2009), respectively. VHI questionnaires were filled prior to session #1, 2 days after session #3 and immediately after session #5. The patient filled out a VTD scale before session #1 and was asked to fill out a scale every day they spoke or sang for 20+ minutes. The patient completed a total of 15 VTD scales over nineteen days, including one immediately after session #5.

Treatment Plan

Treatment goals for the patient were to reduce dysphonia-associated VTD, decrease vocal anxiety and increase pain-free phonation. Given the chronic & persistent nature of the condition, full recovery was not discussed as an outcome within the context of this study.

Altman et al., which found that poor breath support and visible cervical tension were present in 98% & 70% of MTD sufferers, respectively. Travell and Simmons (1998) established that trigger points can hinder typical muscle function

(respiration). Thus, the removal of myofascial trigger points would reduce cervical tension and also allow for better breath support in phonation.

As people use their voices daily, regular timing of treatments was crucial to preventing tension patterns from reemerging. For this study, 5 sessions were carried out over 19 days, with intervals ranging from 4-7 days. Session #1 was set at 120 minutes to allow for case history, assessment and treatment. Remaining sessions were set at 60 minutes; 5-10 minutes for patient feedback/assessment and 50-55 minutes for treatment.

Literature review reveals that laryngeal manual therapy is a general term referring to any therapeutic handling of laryngeal structures. Upon consultation with the case study advisor, the LMT applied in this study consisted of hyoid & cricothyroid massage in addition to mobilization of the cricoid cartilage & hyoid bone.

Treatment

Prior to contact, diaphragmatic breathing was introduced in order to discourage apical breathing and encourage use of primary muscles of inspiration. When a rhythmic breathing pattern was established, effleurage was applied along the entire back, followed by light palmar stroking alongside the erectors to introduce therapeutic touch to reduce sympathetic nervous system firing &

associated anxiety. Petrissage was applied to neck & shoulder musculature to decrease tissue adhesions and muscle hypertonicity. The upper shoulders and neck muscles were palpated for trigger points, which were then treated with muscle stripping & point pressure release. After 10-15 minutes of treatment, the patient was moved into supine position. The SCMs were treated unilaterally with picking up and light shearing.

Laryngeal Manual Therapy

The patient's laryngeal muscles were palpated with the therapist facing and massaging caudally. Fingertip kneading was applied to the anterior belly of digastric and mylohyoid with light pressure (to prevent irritating the submandibular space). Swallowing was encouraged to initiate hyoid movement & decrease laryngeal discomfort. The supra & infrahyoid muscles were palpated for tone and tenderness, with light digital stroking and pressure applied to hypertoned areas. When the hyoid muscles softened, the hyoid bone (held between digits #2 or #3 of both hands) was mobilized to assess movement and tension. Patterns in hyoid tension were traced to their muscle attachments and digital pressure was applied with swallowing. Once lateral hyoid movement was established, movement in the thyro-hyoid space was palpated. Hyoid glides (grade 1) were applied superiorly to open the space. Afterwards, the thyroid cartilage (held between both thumbs) was mobilized inferiorly, engaging the tissue stop. The

glide was held for 10-15 seconds and applied 2-4 times depending on mobility achieved; patient comfort was checked between each mobilization. To finish, light circulatory strokes were applied along the neck and shoulders. The patient was encouraged to phonate and swallow.

Palpation of lower structures (thyroid gland and treachea) caused a 'ticklng' or 'wooly' sensation in the patient's throat; therapist positioning was adjusted and the patient was encouraged to swallow; the sensations then ceased.

Diaphragmatic breathing was encouraged for 2-3 repetitions, after which phonation was encouraged. This homecare was expected to be performed twice daily.

Outcomes

Pre- and post- treatment measurements for patient loudness and pitch are presented in the table below:

	Before 1st treatment	Before 3rd treatment	After 5th treatment
Maximum volume	92 dB	90 dB	91 dB
Minimum volume	65 dB	60 dB	55 dB
Lowest pitch	C2	B2	B2

achieved			
Highest pitch achieved	F#4	F4	G4

While slight improvements were noted in volume & pitch range, the sample sizing is too small to claim a significant change in vocal ability. Regardless, the patient reported increased vocal control and 'release in the throat' during the last two rounds of acoustic testing.

The VHI questionnaire showed a remarked decrease in the functional limitations of KP's voice dysfunction, particularly with regards to interpersonal communication. The physical effects of did not change. The emotional effects decreased significantly around session #3 but increased slightly by session #5. However, all post-treatment scores were lower from pre-treatment remarks. The completed VHIs are in Annex A: Appendices ii-iv.

The patient's pre-treatment VTD scale listed moderate yet constant 'tightness, aching, soreness, [and] lumping in the throat' as well as mild and occasional 'burning, dryness, and irritability'. The patient did not report 'tickling' in any of her questionnaires. VTD symptoms were lower for up to 2 days post-treatment. Occasionally, the VTD symptoms reoccurred; although the patient

reported extended sessions of singing, speaking or socializing, sometimes in cold weather. An overview of VTD scores over 19 days is in Annex B: Appendix ii.

Subjectively, KP admitted to feeling more aware of her muscle tone and larynx positioning when breathing, speaking and singing. When relaxed and focusing on her postural awareness, she felt reductions in jaw tension and lumpiness in the throat, which improved her phonation. This focus and relaxation was lost if she was under stress or was attempting to multitask. KP remains positive about her prognosis.

Discussion

The purpose of this study was to examine the effects of massage therapy on muscle tension dysphonia-associated vocal tract discomfort. While there were significant changes in VTD post-treatment, many symptoms returned within 2-3 days (sooner if excessive voice use occurred). While LMT decreased MTD discomfort on a short-term basis, this study suggests MTD cannot be eliminated with massage therapy alone.

Van Lierde et al. (2004) treatment protocols consisted of 30 minutes of postural correction, breath & phonation exercises, followed by 20 minutes of manual manipulation. Van Lierde et al.'s (2004) study sample consisted of 4

patients who had reported no success with months of traditional voice therapy. Post-treatment, patients reported improved vocal use with lower DSI scores.

Considering the positive outcomes in Van Lierde et al. (2004)'s study, the importance of indirect therapy cannot be overlooked. This study's results show promise in the short-term effects of massage therapy in easing vocal discomfort. Further research involving both massage and traditional voice therapy may help discover the optimal balance in addressing MTD.

References

Altman, K., Atkinson, C., & Lazarus, C. (2005). Current and Emerging Concepts in Muscle Tension Dysphonia: A 30-Month Review. *Journal of Voice* , 261-267.

Angsuwarangsee, T., & Morrison, M. (2002). Extrinsic Laryngeal Muscular Tension in Patients with Voice Disorders. *Journal of Voice* , 333-343.

Dromey, C., Nissen, S., Roy, N., & Merrill, R. (2008). Articulatory Changes Following Treatment of Muscle Tension Dysphonia: Preliminary Acoustic Evidence. *Journal of Voice* , 196-208.

Mathieson, L., Hirani, S., Epstein, R., Baken, R., Wood, G., & Rubin, J. (2009). Laryngeal Manual Therapy: A Preliminary Study to Examine its Treatment Effects in the Management of Muscle Tension Dysphonia. *Journal of Voice* , 353-366.

Rattray, F., & Ludwig, L. (2005). *Clinical Massage Therapy.*

Syed, I., Daniels, E., & Bleach, N. (2009). Hoarse voice in adults: an evidence-based approach to the 12 minute consultation. *Clinical Otolaryngology* , 54-58.

Tortora, G., & Derrickson, B. (2006). *Principles of Anatomy & Physiology (11th ed.).*

Travell, J., Simons, D., & Simons, L. (1998). *Travell & Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual.*

Van Lierde, K., De Ley, S., Clement, G., De Bodt, M., & Cauwenberge, V. (2004). Outcome of Laryngeal Manual Therapy in Four Dutch Adults With Persistent Moderate-to-Sever Vocal Hyperfunction: A Pilot Study. *Journal of Voice* , 467-474.

Annexes

Annex A: Vocal Handicap Index (VHI)

Appendix i: Reference questionnaire

Annex B: Vocal Discomfort Tract (VTD) Scale

Appendix i: Reference scale

Appendix ii: Patient VTD scales over treatment period

Annex A: Voice Handicap Index questionnaire

Chart 1. Voice Handicap Index (adapted from Jacobson et al.; 1997)

0 = NEVER 1 = ALMOST NEVER 2 = SOMETIMES 3 = ALMOST ALWAYS 4 = ALWAYS

PART I: Functional aspect	
1) Do people have difficulties to understand your voice?	0 1 2 3 4
2) Do people have difficulties to understand you in noisy environments?	0 1 2 3 4
3) Does your family have difficulties hearing you when you call them at home?	0 1 2 3 4
4) Do you stop using the telephone because of your voice?	0 1 2 3 4
5) Do you avoid groups of people because of your voice?	0 1 2 3 4
6) Do you talk less to friends, neighbors and relatives because of your voice?	0 1 2 3 4
7) Do people ask you to repeat yourself when talking to you face-to-face?	0 1 2 3 4
8) Does your voice restrict you in your personal and social lives?	0 1 2 3 4
9) Do you feel left out in conversations or discussions because of your voice?	0 1 2 3 4
10) Has your voice problem caused you to lose your job?	0 1 2 3 4
PART II: Physical aspect	
1) Do you feel breathless when talking?	0 1 2 3 4
2) Does your voice vary during the day?	0 1 2 3 4
3) Do people ask: "What's wrong with your voice?"	0 1 2 3 4
4) Does your voice feel hissy or dry?	0 1 2 3 4
5) Do you struggle to produce your voice?	0 1 2 3 4
6) Is the clarity of your voice unpredictable?	0 1 2 3 4
7) Do you try to change your voice in order to sound different?	0 1 2 3 4
8) Do you make a lot of effort to speak?	0 1 2 3 4
9) Is your voice worse at the end of the day?	0 1 2 3 4
10) Does your voice fail in the middle of a conversation?	0 1 2 3 4
PART III: Emotional aspect	
1) Do you feel tense when talking to other people because of your voice?	0 1 2 3 4
2) Do people get irritated because of your voice?	0 1 2 3 4
3) Do you feel other people do not understand your voice problem?	0 1 2 3 4
4) Does your voice bother you?	0 1 2 3 4
5) Are you less sociable because of your voice?	0 1 2 3 4
6) Do feel impaired because of your voice problem?	0 1 2 3 4
7) Do you dislike it when people ask you to repeat yourself?	0 1 2 3 4
8) Do you feel embarrassed when people ask you to repeat yourself?	0 1 2 3 4
9) Does your voice make you feel incompetent?	0 1 2 3 4
10) Do you feel ashamed of your voice problem?	0 1 2 3 4

Annex B – Appendix i: Reference Scale

Vocal Tract Discomfort Scale (VTD)

The following are symptoms or sensations that you may feel in your throat, which may occur as part of your voice problem.
Please indicate the frequency with which they occur and the severity of the symptom / sensation by circling a number in the appropriate column.

	Frequency of sensation/symptom							Severity of sensation/symptom						
Patient:	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Date:	never		sometimes		often		always	none		mild		moderate		extreme
1. Burning	0	1	2	3	4	5	6	0	1	2	3	4	5	6
2. Tight	0	1	2	3	4	5	6	0	1	2	3	4	5	6
3. Dry	0	1	2	3	4	5	6	0	1	2	3	4	5	6
4. Aching	0	1	2	3	4	5	6	0	1	2	3	4	5	6
5. Tickling	0	1	2	3	4	5	6	0	1	2	3	4	5	6
6. Sore	0	1	2	3	4	5	6	0	1	2	3	4	5	6
7. Irritable	0	1	2	3	4	5	6	0	1	2	3	4	5	6
8. Lump in the throat	0	1	2	3	4	5	6	0	1	2	3	4	5	6

Annex B – Appendix ii: Patient VTD scales over treatment period