Copyright @ 2012, López, M.

Critical Review:
Are laryngeal manual therapies effective in improving voice outcomes of patients with muscle tension dysphonia?

María López
M.Cl.Sc (SLP) Candidate
University of Western Ontario: School of Communication Sciences and Disorders

This critical review examined the effects of laryngeal manual therapies on the voice outcomes of patients with muscle tension dysphonia in four studies. Study designs included: three single group pre-posttest studies and one within group repeated measures study. The evidence from this review provides support for the beneficial effects of laryngeal manual therapies on the voice outcomes of patients with muscle tension dysphonia. Recommendations for future research and clinical practice are provided.

Introduction

Muscle tension dysphonia (MTD) is a voice disorder characterized by excessive muscular tension in the perilaryngeal areas (Roy & Leeper, 1993). The excessive tension is thought to restrict the normal movement of perilaryngeal muscles, thereby interfering with normal vocal production (Roy, 2008). The diagnosis of primary MTD is given in the absence of vocal fold pathology, whereas secondary MTD coexists with an underlying laryngeal disturbance (Stemple, Glaze, & Klaben, 2010). Historically, the term functional dysphonia (FD) was also used for voice disorders in the absence of organic conditions, and included both MTD and psychogenic dysphonia (Gallena, 2007). Given the variety of terms used in the literature, the terms MTD and FD are used interchangeably in this review.

Treatment of MTD involves the use of techniques to reduce muscle tension in and around the laryngeal area. Traditional approaches include techniques such as the yawn-sign, chewing, and progressive relaxation (Roy & Leeper, 1993). Another approach involves the direct manipulation of the laryngeal muscles through massage, known under the umbrella term of laryngeal manual therapies (LMTs) (Mathieson et al., 2009).

Two types of LMTs appear in the literature. Aronson (1990) described a manual laryngeal musculoskeletal tension reduction technique, now referred to as manual circumlaryngeal therapy (MCT), as a primary treatment approach for patients with FD. MCT involves kneading the laryngeal area while observing changes in voice quality. Aronson supported this technique as a primary treatment approach advocating that other approaches were not aggressive enough to overcome the resistive forces of muscle tension. Another laryngeal muscle tension reduction technique is termed laryngeal manual therapy, which involves kneading the laryngeal area without voicing (Mathieson et al., 2009).

One of the main differences between the two techniques is that MCT involves massaging the thyrohyoid space, while LMT assumes that the space will spontaneously enlarge due to the massage of perilaryngeal areas (Mathieson et al., 2009). Another notable distinction is that MCT requires voicing during massage, while LMT does not.

Improved voice outcomes following application of LMTs have been gaining importance in the literature. It has been suggested that LMTs may provide quick results in patients who are not receptive to traditional voice therapy (Van Houtte, Van Lierde, & Claeys, 2011). It has also been suggested that LMTs have the potential to be self-administered, which may improve efficiency of treatment (Roy, 2008). In addition, LMTs may address patient discomfort early on, which could increase their treatment compliance (Mathieson et al., 2009). The literature suggests that these techniques are common in clinical practice; however, objective evidence on their effectiveness is limited.

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding the effectiveness of LMTs as a technique to improve the voice outcomes of patients with MTD.

Methods

Search Strategy

Computerized databases including PubMed and SCOPUS were searched using the following keywords: ((laryngeal manual therapy) OR (manual circumlaryngeal therapy)) AND ((muscle tension dysphonia) OR (functional voice disorder) OR

(functional dysphonia)). No limitations were placed on the search.

Selection Criteria

Studies selected for inclusion in this critical analysis were required to investigate voice outcome measures after LMT or MCT on adults with primary MTD or FD. Reviews were excluded.

Data Collection

Results of the literature search yielded four articles consistent with the aforementioned criteria: single group pre-posttest design (3) and within group repeated measures design (1).

Results

Single group pre-posttest design

Roy and Leeper (1993) examined the immediate and short-term perceptual and acoustic effects of one session of MCT on patients with FD. The study used Aronson's (1990) manual laryngeal musculoskeletal tension reduction technique, hereinafter referred to as MCT.

Seventeen consecutive patients (ages 20-70 years; mean age of 46.9 years) participated in the study. They all presented with FD which ranged in duration from 4 days to 3 years (mean duration of 8.3 months). Diagnosis of primary FD was made by one of two ENTs.

The management protocol comprised of one session that ranged in duration from 60 minutes to 3 hours. Outcome measures were taken before and immediately after the MCT session. These measures included a perceptual evaluation (using a severity measures scale) and an acoustic evaluation (jitter, shimmer, and signal-to-noise ratio (SNR)) of connected speech and sustained vowel /a/. The severity measures scale consisted of a 7-point equal-appearing interval scale completed by four speech-language pathologists (SLPs) experienced in voice disorders. Interobserver and intraobserver reliability measures were established at and above 90% for connected speech and sustained vowel samples. A telephone interview 1 week post-treatment was also included to assess short-term maintenance of any changes after treatment (i.e., status of the voice, recurrence of vocal symptoms).

Treatment included one session of MCT, as described by Aronson (1990), and was administered by the same clinician. Indicators of a reduction in tension were a clearer voice quality and a reduction in pain and laryngeal elevation. Once an improved voice was established, it was shaped from vowels, to words, to sentences, and to conversation. The subjects were also encouraged to telephone a familiar partner to stabilize their voice.

Data were analyzed appropriately using *t*-tests. Results for the perceptual evaluation measure of severity for both the connected speech sample and the prolonged vowel showed significant improvement in 94% of patients ($p<0.0001$). Subjective analysis 1 week post-treatment showed maintenance of improvements in vocal quality in almost all patients who had shown improvement (93%).

For the acoustic evaluation, results showed significant improvements in the connected speech sample for jitter ($p<.01$), shimmer ($p<.001$), and SNR ($p<.001$). Results showed significant improvement in the sustained vowel sample for shimmer ($p<.05$) and SNR ($p<.001$), but not for jitter ($p<.07$). No significant changes were found in the modal vocal fundamental frequency (F0) for either connected speech ($p<0.5$) or sustained vowel ($p<.57$).

Overall, this study indicates a positive short-term effect of one session of MCT on the perceptual and acoustic voice outcomes of patients with FD. The strengths of this study include the reliability of the severity measures scale and adherence to a clearly outlined assessment and treatment protocol. Some limitations of the study include the lack of long-term follow-up data and the lack of a control condition. Another limitation is the lack of certain details from the methodology. For example, the management protocol ranged in duration from 1 to 2 hours; however, the authors did not provide explanations for this difference in time. The authors also acknowledged the limitation of having a single clinician administer the assessment and treatment, as the clinician's attitude can affect the effectiveness of therapy (Silverman, 1977). Given the study design, this study is at evidence level 3. Due to the significant positive changes found and the aforementioned strengths and weaknesses, the results of this article provide suggestive evidence for MCT as a treatment method for FD.

Roy, Bless, Heisey, and Ford (1997) examined the immediate and long-term auditory-perceptual and acoustic effects of one session of MCT on patients with FD. The aim of the study was to replicate and extend the results of Roy and Leeper (1993).

Twenty-five consecutive patients (mean age of 40.9 ± 13.0 years) participated in the study. They all presented with FD that ranged in duration from 5 days to 4 years (mean duration of 8.8 ± 12.2 months). Diagnosis of primary FD was made by a single ENT, and two SLPs

were involved in assessment and treatment using the same management protocol.

The management protocol was similar to that of the previous study by Roy and Leeper (1993). The following differences were noted. Outcome measures were taken before (intake condition), immediately after (post-1), and at two long-term follow-up visits (post-2 and post-3) after one session of MCT. Participants were instructed to contact the SLPs at the recurrence of symptoms. Raters for the severity measures were four SLP graduate students. Statistical analyses were conducted for listener reliability and acoustic measurement reliability.

The mean length of time between the initial treatment session and the first follow-up session (post-2) was 3.6 ± 5.5 months, and between the initial treatment session and the second follow-up session (post-3) was 16.5 ± 11.4 months. Due to relocation or travel distance, nine subjects (36%) were not included in the second long-term follow-up session.

Data were analyzed appropriately using repeated-measures Analysis of Variance (ANOVA) to evaluate time trends and Fisher's protected least-significant-difference procedure to compare means. Results showed significant decreases in the perceptual evaluation of severity measures between the intake condition and post-1 (p=.0001) and between the intake condition and each post-treatment follow-up mean (p<.0004). No significant differences were found between post-treatment means, indicating that the improvements were maintained. Relapse was assessed on an individual basis and revealed that 28% of subjects experienced partial recurrence, 1 subject experienced complete relapse, and 17% of subjects were rated as improved from their post-1 voices. The duration of relapse was typically short-lived, lasting less than 4 days.

All acoustic measures, with the exception of F0, showed significant improvement between the intake condition and the post-1 condition (p<.0004) and between the intake condition and each post-treatment follow-up mean (p<.0001).

Overall, this study indicates a positive long-term effect of one session of MCT on the perceptual and acoustic voice outcomes of patients with FD. Some strengths of this study were the inclusion of long-term follow-up data and the use of two clinicians in the management protocol. Efforts were also made to establish interrater and intrarater reliability for both perceptual and acoustic measures. Some limitations of the study include subject attrition and the lack of a control condition. The authors acknowledged that the attrition may have underestimated the frequency of recurrence. Given the study design, this article is at evidence level 3. Due to the significant changes found and the aforementioned strengths and limitations, the results of this article provide suggestive evidence for MCT as a treatment method for FD.

Mathieson, Hirani, Epstein, Baken, Wood, and Rubin (2009) examined the immediate and short-term perceptual and acoustic effects of one session of LMT on patients with MTD. The objective of the study was to determine appropriate acoustic and outcome measures for the evaluation of LMT.

Ten patients (ages 19-55 years; mean age of 30.3 years) participated in the study. They all presented with MTD which ranged in duration from 3 months to 4 years. Diagnosis of primary MTD was made by an ENT surgeon, and one SLP was involved in assessment and treatment using the same management protocol. None of the patients had received or were concurrently receiving any voice therapy or other intervention.

Outcome measures were taken immediately before, immediately after, and 1 week after the LMT session. These measures included an acoustic evaluation with various acoustic measures (e.g., F0, jitter, shimmer, relative average perturbation (RAP)), a formant frequency analysis, the vocal tract discomfort scale (VTD), and a palpatory evaluation of the perilaryngeal musculature. The VTD is a patient self-rating scale that was developed for the study.

Treatment comprised of one session of LMT which ranged in duration from 5 to 10 minutes. LMT was terminated when the perilaryngeal musculature was judged to have softened and the larynx could be moved easily from side to side.

Data were analyzed appropriately using repeated-measures ANOVA with the Greenhouse-Geisser correction to test changes over time and Cronbach's alpha to evaluate VTD scale reliability at each time point.

Results showed a significant change and large effect size in the RAP measure for the connected speech sample (p<.022) between the pre- and immediately post-treatment conditions compared with the 1 week follow-up. No other acoustic variables were significantly different.

Results from the VTD scale showed a few significant changes toward improvement from pre- to 1 week post-treatment. For the symptom frequency, there were significant changes between pre-treatment and 1 week

post-treatment for dryness (p=.016), tickling (p=.003), soreness (p=.001), and irritableness (p=.013). For symptom severity, there were significant changes for tightness (p=.003), dryness (p=.023), aching (p=.026), and soreness (p<.001) between pre-treatment and immediately post-treatment. Although these measures maintained 1 week post-treatment, tightness tended to recur.

Overall, this study indicates a positive short-term effect of one session of LMT on the perceptual and acoustic voice outcomes of patients with MTD. A strength of this study is the inclusion of the VTD scale with a variety of symptoms, which offered the opportunity to judge changes in patient comfort. A rapid increase in patient comfort may increase the patient's adherence to further therapy. Some limitations of the study include the small sample size, the lack of a control condition, the subjective nature of the palpatory evaluation, and the lack of long-term follow-up data. Given the study design, this study is at evidence level 3. Due to the significant changes found and the aforementioned strengths and weaknesses, the results of this article provide suggestive evidence for MCT as a treatment method for FD.

Within group repeated measures design

Van Lierde, De Bodt, Dhaeseleer, Wuyts, and Claeys (2010) compared the immediate perceptual and acoustic effects of two treatment techniques – vocalization with abdominal breath support (VABS) and MCT – on patients with MTD.

Ten patients (ages 18-65 years; mean age of 58 years) participated in the study. They all presented with MTD which ranged in duration from 2 to 18 months. No participants were following voice therapy at the time of the study. Diagnosis of primary MTD was made by one ENT, and one SLP was involved in assessment and treatment using the same management protocol.

The therapy design involved one session of VABS followed by a session of MCT, each lasting 45 minutes. Outcome measures were taken immediately before VABS (intake condition), immediately after VABS (post-treatment 1 condition), and immediately after MCT (post-treatment 2 condition). These measures included perceptual measurements of voice quality using the dysphonia severity index (DSI) and acoustic parameters (F0, jitter, and shimmer). The DSI uses voice measurements (MPT, highest frequency, lowest intensity, and jitter) to give a value of voice quality.

Data were analyzed appropriately using repeated-measures ANOVA. Given the small sample size, the nonparametric Friedman test and the Wilcoxon paired signed rank test were also conducted as controls. Results showed a significant change between the intake condition and the post-treatment 2 condition (p<.001) and between the post-treatment 1 condition and post-treatment 2 condition (p=.003). No significant difference was found between the intake condition and the post-treatment 1 condition (p=.2).

Overall, this study indicates a positive short-term effect of one session of LMT on the perceptual and acoustic voice outcomes of patients with MTD. Some limitations of the study include the small sample size and the lack of long-term follow-up data. The authors acknowledge the possibility of a cumulative therapy effect, however, state that it is not likely that the first treatment influenced the second treatment effects when examining the statistical analyses. They recommend the use of a matched control group in future studies. Given the study design, this article is at evidence level 3. Due to the significant changes found and the aforementioned strengths and limitations, the results of this article provide suggestive evidence for LMT as a treatment method for MTD.

Discussion

All four studies reviewed provided suggestive evidence of the beneficial effects of LMTs on the voice outcomes of patients with MTD. The main issue was the study design, which could be improved by conducting studies with control groups. Only one of the studies compared LMT with another therapy technique, VABS (Van Lierde et al., 2010). However, the study used a within-groups repeated measures design where the results may have been influenced by a cumulative therapy effect.

Another issue was the subjective nature of the laryngeal muscle tension evaluation. None of the studies employed objective measures of muscle tension, such as electromyography (EMG). Thus, improvements in voice cannot be attributed exclusively to a reduction in muscle tension. Alternative explanations include a placebo effect and clinician's instructions (Roy et al., 1997). Future studies could employ an objective evaluation of muscle tension or interrater reliability of the evaluation of muscle tension (Mathieson et al., 2009).

Another limitation is the lack of long-term follow up studies. Only one of the studies provided long-term follow-up data (Roy et al., 1997). Although the means suggest maintenance of the improvements, many patients reported a partial recurrence of dysphonic symptoms. This suggests that LMT may be used as a short-term treatment for MTD.

Given the limited research in the area of LMTs, it is suggested that future research consider the following variables:

- An objective measure of the evaluation of muscle tension should be developed.
- LMTs should be compared to other treatment approaches using different experimental groups or a control group.
- The length of time of application of LMT should be examined, given that the abovementioned studies varied from 5 minutes to 3 hours in treatment time.
- Future studies could examine the effects of more than one session of LMT, which could lead to better long-term outcomes.

Conclusion

At present, there is suggestive evidence regarding the effectiveness of LMTs as a treatment approach for MTD, due to the limited research directed at this question. However, given the positive short-term outcomes in the abovementioned studies, it is thought that LMTs are worth integrating into the treatment protocol early in the intervention of MTD.

Clinical Implications

The positive effects of LMTs on the voice outcomes of MTD have the following implications for clinical practice:

- LMTs can be considered early in the treatment of MTD in order to provide rapid relief of symptoms.
- Graduate SLP students may need further training in order to appropriately administer LMTs.

References

Aronson, A. E. (1990). *Clinical voice disorders: An interdisciplinary approach*. New York: Thieme.

Gallena, S. K. (2007). *Voice and laryngeal disorders: A problem-based clinical guide with voice samples.* St. Louis, MO: Mosby Elsevier.

Mathieson, L. (2011). The evidence for laryngeal manual therapies in the treatment of muscle tension dysphonia. *Current Opinion in Otolaryngology & Head and Neck Surgery, 19*(3), 171-176.

Mathieson, L., Hirani, S. P., Epstein, R., Baken, J., Wood, G., & Rubin, J. S. (2009). Laryngeal manual therapy: A preliminary study to examine its effects in the management of muscle tension dysphonia. *Journal of Voice, 23*(3), 353-366.

Roy, N. (2008). Assessment and treatment of musculoskeletal tension in hyperfunctional voice disorders. *International Journal of Speech-Language Pathology, 10*(4), 195-209.

Roy, N., Bless, D. M., Heisey, D., & Ford, C. N. (1997). Manual circumlaryngeal therapy for functional dysphonia: An evaluation of short- and long-term treatment outcomes. *Journal of Voice, 11*(3), 321-331.

Roy, N., & Leeper, H. A. (1993). Effects of the manual laryngeal musculoskeletal tension reduction technique as a treatment for functional voice disorders: Perceptual and acoustic measures. *Journal of Voice, 7*(3), 242-249.

Silverman, F. H. (1977). *Research design in speech pathology and audiology.* Englewood Cliffs, NJ: Prentice-Hall.

Stemple, J.C., Glaze, L., & Klaben, B. (2010). *Clinical voice pathology: Theory and management.* San Diego, CA: Plural Publishing Inc.

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.

Van Lierde, K. M., De Bodt, M., Dhaeseleer, E., Wuyts, F., & Claeys, S. (2010). The treatment of muscle tension dysphonia: A comparison of two treatment techniques by means of an objective multiparameter approach. *Journal of Voice, 24*(3), 294-301.