Critical Review:
The Hands On Approach: Perilaryngeal Manual Therapies in the Treatment of Muscle Tension Dysphonia

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This critical review examined the use of perilaryngeal manual therapies as a treatment for muscle tension dysphonia. Despite methodological flaws and smaller sample sizes in some of the studies reviewed, there appears to be sufficient evidence to support the cautious clinical use of these therapies in treating muscle tension dysphonia, especially manual circumlaryngeal therapy. Larger randomized controlled trials should be performed to strengthen the evidence base for these treatments.

Introduction

Muscle tension dysphonia (MTD) is a voice disorder that can present in the absence of organic or neurological disorders (Van Houtte, Van Lierde, & Claeys, 2011). Other terms that have been used to describe MTD are functional voice disorder, hyperfunctional voice disorder, non-organic voice disorder and occupational voice disorder (Aronson & Bless, 1990; Marszalek et al., 2012; Mathieson, 2011; Oates & Winkworth, 2008; Roy, 2008; Rubin, Lieberman, & Harris, 2000). The etiology of MTD is assumed to be unbalanced and/or excessive laryngeal or perilaryngeal muscle activity that can lead to vocal fold hyperadduction, constriction, or bowing (Van Lierde, Bodt, Dhaeseleer, Wuyts, & Claeys, 2010). The extreme phonatory effort that is characteristic of MTD places unwarranted physical stress on the vocal tract. In some cases, this can lead to variations in its function, with symptoms ranging from vocal fatigue to aphonia, and ultimately result in physical trauma to the vocal folds (Mathieson et al., 2009).

Aronson & Bless (1990) first detailed manual treatment for the reduction of perilaryngeal musculoskeletal tension, which they described as a “powerful resistive force”. Citing the frequent ineffectiveness of less direct methods, such as progressive muscle relaxation, they employed manual treatments of stroking, kneading and stretching of muscles around the larynx.

Subsequently, various perilaryngeal manual therapies (PMTs) have arisen from multiple disciplines, including speech pathology, osteopathy, and physiotherapy. The two most prominent in the literature are manual circumlaryngeal therapy (MCT) (Roy & Leeper, 1993) and laryngeal manual therapy (LMT) (Rubin, Lieberman, & Harris, 2000). While having many similarities in approach, LMT differs from CMT in that it includes a pre-treatment palpatory evaluation, is bimanual, and does not require phonation during treatment. Other treatments described in the literature include Voice Massage (VM), and osteopathic myofascial techniques (OMTs). All treatments are similar in that their goal is to reduce perilaryngeal muscle tension to restore normal vocal tract function (Leppänen, Laukkanen, Ilomäki, & Vilkman, 2009; Marszalek et al., 2012; Rosing-Schow & Pedersen, 2010).

However, despite detailed techniques provided by various disciplines, it has been argued that PMTs can be difficult to teach and measure, being something of an art rather than an empirical approach. As a result many clinicians may not utilize PMTs in treating MTD or be familiar with the evidence base surrounding these techniques.

Objectives

The primary objective of this paper was to outline and critically evaluate studies testing perilaryngeal manual therapies as a treatment for muscle tension dysphonia.

Methods

<u>Search Strategy</u>
Online databases, including AMED, PubMed, CINAHL, Scopus, PsycINFO, Cochrane Library, and the University libraries search engine were searched using the following search strategy: (muscle tension dysphiona) OR (functional voice disorders) OR (hyperfunctional voice disorders) AND (perilaryngeal manual therapy) OR (laryngeal manual therapy) OR (circumlaryngeal manual therapy). There were no limitations placed on the search.

<u>Selection Criteria</u>
Only primary research articles assessing the effects of PMTs on participants with MTD or those considered at risk for MTD were included for review.

<u>Data Collection</u>
Studies in this review included both randomized controlled trials and single group pre-posttest designs.

Results

The seminal article in the field is Roy and Leeper's 1993 study analyzing pre, immediate and short-term effects of one episode of MCT treatment. The single group design included 17 participants (mean age 46.9) with MTD diagnosed by an Otolaryngologist (ENT). Detailed description of the treatment and participants selected was provided. Perceptual evaluation was conducted with a 7-point equal-appearing interval severity scale, which showed inter/intra observer reliability at or above 90%. Four Speech-Language Pathologists conducted the perceptual evaluation before, immediately after, and one week post-treatment (post-treatment evaluation was conducted by telephone). Acoustic measures (pre and immediate post-treatment) included the jitter, shimmer, signal-to-noise ratio (SNR) and fundamental frequency (F0) of connected speech and the sustained vowel /a/. Significant improvements were found for connected speech and sustained /a/, although jitter showed no improvement in sustained /a/ and F0 showed no improvement in either variable. The severity rating scale showed significant improvement both immediately following treatment (94% of patients) and one-week post treatment (93% of those who initially showed improvement). Overall, these results offer compelling evidence that treatment of MTD with MCT is effective in the short term after one treatment session. Further follow-up with patients (e.g. 3 months) would provide stronger evidence for the long-term efficacy of this treatment.

Since this study, Roy and colleagues have published several articles using similar procedures and study designs. In a more recent article, Roy also reviewed his own and related studies demonstrating the efficacy of MCT in treating MTD (Roy, 2008). The purpose of the review was not to provide a critical analysis, and reviews such as this are subject to bias given that it is one researcher reviewing their own work. Nevertheless, the amassed evidence replicating positive treatment effects for MCT in adults with MTD is compelling.

In another study by Mathieson, Hirani, Epstein, Baken, Wood, and Rubin (2009), the authors used a single group, pre-posttest design with ten adults (mean age 30.3 years) with MTD diagnosed by an ENT. Participants in the study received a single 45-minute treatment of LMT. Detailed info was provided on the treatment, participants and measures used, including the self-rated vocal tract discomfort scale (VTD), which has shown to be a valid measure in MTD treatment (Woznicka, Niebudek-Bogusz, Kwiecien, Wiktorowicz, & Sliwinska-Kowalska, 2012). Acoustic data were appropriately analyzed using ANOVA and the univariate Greenhouse-Geisser test to account for increasing variability over time in repeated measures designs. A significant effect was found for the acoustic measure relative average perturbation (RAP) during connected speech ($p<.022$). However, other acoustic variables did not show any significant difference. For perceptual measures, Cronbach's alphas were appropriately used to evaluate the VTD ratings from baseline through post-treatment. Significant improvements in symptom severity (not so for symptom frequency) were found. Considering the small sample size, lower level research design (level 3), and poverty of acoustic evidence, this study provides suggestive evidence of the short-term efficacy of a single treatment of LMT on patients with MTD.

A study conducted by Marszalek et al., (2012) using a single group pre-posttest design looked at the effect of OMTs on 40 teachers (mean age of 48.25 years) with ENT diagnosed MTD. Treatment consisted of two half-hour OMTs sessions over the course of a week. Other treatments (e.g. vocal training) were also conducted during the week. A range of statistical methods were appropriately used to analyze the resulting outcomes (Shapiro-Wilk test; Wilcoxon; McNemar Chi-square). Results revealed statistically significant improvements on measures of posture, tension and tenderness. Significant results were also found for videostroscopy variables including glottal closure and vibration amplitude. This study benefits from a larger sample size, and use of direct visualization of vocal tract with videostroboscopy. However, the use of concurrent treatments with OMTs confounds the results obtained. This study also lacks any follow-up data on maintenance of treatment effects. Therefore the study provides only suggestive evidence of the efficacy of OMTs in treating MTD.

In another study by Leppänen, Laukkanen, Ilomäki, & Vilkman (2009), authors used a mixed randomized controlled trial designed to assess the efficacy of VM in preventing symptoms of MTD in 60 female teachers (mean age 40.6 years) over the course of a school term. Participants were randomly assigned to either a vocal hygiene lecture (VHL) group or VHL and VM group. All subjects then received the VHL; additionally, the Voice Massage group received five 1-hour VM treatments over the course of the term. At the start and end of the term, as well as before and after a teaching day, subjects recorded a speech sample for acoustic analysis. A twice-daily questionnaire about vocal quality, difficulty of phonation, and voice fatigue was also completed. Statistical analyses were appropriately used for subjective, and objective data (Wilcoxon signed-ranks test; Mann-Whitney U tests; ANOVA). Perceptual data showed a significantly more positive effect at the end of term in the VM group compared to the VHL group (e.g. Tiredness of the throat increased in the VHL group, but decreased in the VM group). These results show promise, especially considering the high-level (1) research design, larger sample size, and longitudinal data collection. Unfortunately the study did not provide a detailed explanation of VM treatment itself, which would make it difficult to replicate. Also, it is difficult to know if the treatment effects seen were due to VM alone or some interaction between VHL and VM together. Also, participants were all volunteers, female, and from a specific region of Finland, which detracts from the representativeness of the sample. Therefore this study provides only suggestive evidence of the effectiveness of VM in preventing MTD symptoms in female teachers.

In a follow-up to the previous study, authors Leppänen, Laukkanen, Ilomäki, & Vilkman (2009) analyzed potential longer-term (6 and 12 months) self-evaluated effects of VM and VHL compared to VHL in female teachers. An additional treatment was also included for comparison, a voice-training group (n=30), whose data were not reported in the original study although they were part of the original randomized controlled design (they also received the VHL lecture). In the current study, all groups reported by questionnaire subjective data related to symptoms of MTD (fatigue, hoarseness, pain on phonation) at 6 months and again at 12 months. As in the previous study, sufficient information on participants including factors such as age, teaching experience and average number of pupils in the classroom was reported. However, little information was provided on the treatment of "voice training" itself, except that it was conducted in five 1-hour sessions over nine weeks. Statistical analysis using ANOVA was appropriately used to compare the groups at 6 and 12 months post-treatment. Results found significant decreases in MTD symptoms in all three treatment groups, with no significant differences between groups at 12 months. There was also significant attrition across groups from pre to post treatment measures (n=90/n=49), which would have confounded any significant difference found for VM. Despite the benefit of the initial level 1 research design and long-term outcome data, this study provides equivocal evidence of the effectiveness of VM in preventing symptoms of MTD in female teachers.

In another study by Van Lierde, De Ley, Clement, De Bodt, & Van Cauwenberge (2004), authors studied the effects of LMT on four adults with moderate to severe MTD in a single group pre-posttest design. The participants were given measures before beginning weekly LMT sessions (25 in total), and one week after the final treatment. However, aside from receiving LMT during sessions, participants also received concurrent abdominal breath-support and voice training. Although no statistical analysis was used, normative data were provided for pre-posttest comparison. All subjects showed improvement on the GRBAS scale (Grade of hoarseness, Rough, Breathy, Asthenic, Strained), which has been shown to have good reliability (Webb et al., 2004). All subjects also improved on Dysphonia Severity Index (DSI) scores (weighted combination of maximum phonation time, highest frequency, lowest intensity, and jitter), a valid multivariate measure of voice quality (F. L. Wuyts et al., 2000). However, despite the positive outcomes, the results are hampered by the lack of statistical analysis, and the small sample size of the study. The confound of the inclusion of abdominal breath-support and voice training with the LMT further detracts from the evidence strength, allowing for only suggestive evidence of LMT's effectiveness.

In the final study, Van Lierde et al., (2010) used a single group research design to measure the effects of a single session of two treatment techniques on MTD: vocalization with abdominal breath support (treatment I) and MCT (treatment II). Ten subjects (four females, six males) diagnosed by ENT with MTD participated in the study. Treatments I and II were performed consecutively, each for 45 minutes, with the DSI used as an outcome measure pre and post both treatments. Details of the treatment procedure, participant information and rationale for use of the DSI were well documented. Statistical analyses were appropriately used to measure differences in DSI values pre and post treatments I and II (ANOVA; nonparametric Friedman test; Wilcoxon paired signed rank test). Significant treatment effects were found from pre treatment I to post treatment II, as well as post treatment I to post treatment II. No significant effects were found from pre to post treatment I. In other words, treatment I did not produce a significant effect on DSI values. Despite these positive results for MCT treatment, limitations of the study, duly noted by the authors, reduce the strength of evidence. These include the smaller sample size, and lack of perceptual or self-rating measures. Also, performing the treatments sequentially on the same group confounds the apparent effectiveness of MCT as there is no way to be certain the treatment effects were not cumulative. Due to the lower research design level (3) and the aforementioned limitations, this study provides only suggestive evidence of the effectiveness of MCT as a treatment for MTD.

Discussion and conclusion

Despite the apparently growing interest of PMTs as a treatment for MTD, the overall evidence for their clinical use is predominantly suggestive to date. However, Roy and colleagues do provide more compelling evidence for the use of MCT in treating MTD. Despite this, larger scale randomized controlled trials need to be conducted to strengthen the evidence base for these treatments. Long-term follow-up in studies is also essential as MTD may be chronic or recurrent. Also, the need for continued development and standardization of outcome measure protocols is great. The studies in this critical review and in the broader MTD literature tend to employ varied outcome measures, often with exclusive use of either subjective or objective measures. It seems logical that a combination of self-rating, perceptual and acoustic outcome measures would provide a more valid and comprehensive measure of treatment efficacy than either measure alone.

Clinical Implications

PMTs may provide relief of MTD symptoms either alone, or in combination with other traditional voice therapies. They may also be effective at preventing MTD in populations at risk.

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