

# Collaboration and Conquest: MTD as Viewed by Voice Teacher (Singing Voice Specialist) and Speech-Language Pathologist

\*Jeanne C. Goffi-Fynn and †,‡Linda M. Carroll, \*†New York, New York, and ‡Philadelphia, Pennsylvania

**Summary:** This study was designed as a qualitative case study to demonstrate the process of diagnosis and treatment between a voice team to manage a singer diagnosed with muscular tension dysphonia (MTD). Traditionally, literature suggests that MTD is challenging to treat and little in the literature directly addresses singers with MTD. Data collected included initial medical screening with laryngologist, referral to speech-language pathologist (SLP) specializing in voice disorders among singers, and adjunctive voice training with voice teacher trained in vocology (singing voice specialist or SVS). Initial target goals with SLP included reducing extrinsic laryngeal tension, using a relaxed laryngeal posture, and effective abdominal-diaphragmatic support for all phonation events. Balance of respiratory forces, laryngeal coordination, and use of optimum filtering of the source signal through resonance and articulatory awareness was emphasized. Further work with SVS included three main goals including a lowered breathing pattern to aid in decreasing subglottic air pressure, vertical laryngeal position to lower to allow for a relaxed laryngeal position, and a top-down singing approach to encourage an easier, more balanced registration, and better resonance. Initial results also emphasize the retraining of subject toward a sensory rather than auditory mode of monitoring. Other areas of consideration include singers' training and vocal use, the psychological effects of MTD, the personalities potentially associated with it, and its relationship with stress. Finally, the results emphasize that a positive rapport with the subject and collaboration between all professionals involved in a singer's care are essential for recovery.

**Key Words:** Singing voice Muscle tension dysphonia (MTD) Collaboration Retraining.

## BACKGROUND

Muscular tension dysphonia (MTD) is a current, often misdiagnosed problem among singers and nonprofessional voice users. Much of the literature has focused on the speaking voice and nonprofessional voice users in this complex and multifaceted disorder.<sup>1,2</sup> In its subtlety, it is often missed by voice teachers and singers alike until the symptoms include such changes as loss of range, change in *fach*, or extreme vocal fatigue. When a singer is no longer able to sustain their singing voice demands, they may go to a doctor, only to be told that there is “nothing wrong” with their vocal folds. In another scenario, after treatment of the acute vocal fold issues (including reflux, allergies, nodules, polyps, and others), the chronic, muscular compensation remains as the primary pathology resolves.<sup>3</sup> “It is one of the most debilitating problems that singers may confront [...], more commonly found in females than males and is typically exacerbated by stress ...”<sup>4</sup>

The traits of MTD include internal laryngeal variables (eg, increased subglottic pressure) and/or external variables (eg, allergies). The primary factors include (1) high breathing patterns (clavicular and thoracic), (2) increased subglottic pressure, (3) elevated vertical laryngeal position (VLP), (4) posterior glottic

chink, (5) hyperadduction of false vocal folds, (6) chest voice dominant phonation (excessive thyroarytenoid function), (7) reduced coordination of registers, and (8) “bottom-up” approach in singing voice technique.

Among the literature, there are four MTD classifications:

- Type I: Gap between the vocal fold free edges during phonation, with a conspicuous posterior gap between the vocal processes; considered a laryngeal isometric pattern.
- Type II: Approximation of the false vocal folds; a supraglottic constriction termed dysphonia plica ventricularis.
- Type III: Partial anteroposterior contraction of the larynx during phonation; the arytenoids are pulled forward toward the petiole of the epiglottis, obscuring the posterior one-half to two-thirds of the vocal folds.
- Type IV: Extreme anteroposterior contraction; complete sphincter-like closure of the larynx, in which the arytenoids actually contact and squeeze against the petiole; phonation is achieved by the vibration of the supraglottic structures, usually the arytenoids against the epiglottis.<sup>5</sup>

Additionally, a coloratura soprano (generally small neck, short vocal folds, extreme high  $F_0$  range in performance) is being reported as having a type where the back wall of the pharynx is squeezed or pressed against the arytenoid cartilages causing an additional “white” noise during phonation. This type may contribute to their voice classification, depending on the physical structures of the particular coloratura singer.

In short, the concept of MTD seems to be “a compensatory adaptation to glottal insufficiency ...”<sup>1</sup> Literature suggests that many factors contribute to MTD including vocal fold issues (ie, gastroesophageal reflux disease or vocal fold trauma), physical state (ie, medical issues not related to the voice such as

Accepted for publication December 18, 2012.

Originally presented at Voice Foundation National Conference, June 6, 2010, Philadelphia, PA.

From the \*Teachers College, Columbia University, New York, New York; †Department of Arts and Humanities, Program in Music and Music Education, New York, New York; and the ‡Department of Surgery, Division of Otolaryngology, The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania.

Address correspondence and reprint requests to Jeanne C. Goffi-Fynn, Teachers College, Columbia University, 525 West 120th Street, Box 139, New York, NY 10027-6696. E-mail: Jcg21@tc.columbia.edu

Journal of Voice, Vol. 27, No. 3, pp. 391.e9-391.e14

0892-1997/\$36.00

© 2013 The Voice Foundation

<http://dx.doi.org/10.1016/j.jvoice.2012.12.009>

injury or surgeries, disease, or allergies), high stress levels, excessive amounts of voice use, and excessive loudness demands.<sup>1</sup> Given the nature of the singing voice, any conditions of the body have the potential to affect the voice. Regarding singers, Keidar<sup>7</sup> includes personality, singing style, technical training, and options of medical care. Furthermore, the demands of singing versus speaking are not clearly understood and determining whether problems arise from the speaking voice, singing voice, or both remain murky. In the recent literature, five compensation categories were defined: (1) technical misuse, (2) learned adaptations after upper respiratory infection, (3) increased muscle tone due to reflux, (4) psychological and/or personality factors that may induce elevated tension in the laryngeal region, and (5) extreme compensation for minor glottic insufficiency and/or underlying mucosal disease.<sup>2</sup> Given the range of issues to be addressed, an interdisciplinary approach to treating all contributing factors is recommended.<sup>6</sup>

Among singers, issues of MTD are not well documented. "The majority of voice problems in singers and actors result from vibratory trauma and reflect a cumulative process of misuse and/or overuse ..." (p. 126) Keidar estimates between 10% and 20% of singers have some chronic voice disorders. Although research is limited in this area, it seems clear that there may be psychological issues involved in this disorder. Traits that may contribute include "overdoer" personalities (type A), vocal "overdoers" (someone who talks a lot) and stress. In addition, MTD is generally seen more often in women than men and higher voices may be more at risk.<sup>4,7</sup> Roy<sup>8</sup> refers to general traits among vocal nodules (VN) and vocal dysphonia (VD) patients. Although both demonstrate higher anxiety levels, VN patients were seen as socially dominant, more impulsive, and more aggressive. Generally, VD patients were more introverted.

### Purpose

The purpose of this study was to understand and document the process of retraining a singer with MTD, with particular attention toward the collaboration between speech-language pathologist (SLP) and singing voice specialist.

### METHOD

This study was designed as a qualitative case study to demonstrate the process of diagnosis and treatment between a voice team to manage a singer diagnosed (by her laryngologist) with MTD. Data collected included initial medical screening with laryngologist, referral to SLP specializing in voice disorders among singers, and adjunctive voice training with voice teacher trained in vocology. Perceptual assessments are included in the *Addendum*. Voice lessons were recorded in the end of the 2-year study along with interviews from singer's perspective. Current study involved four videotaped 1-hour singing lessons (transcribed and reviewed), informal interviews during the lessons (transcribed), journal entries for both participant and instructor, and follow-up questioning. Research questions include (1) What are the technical goals which may be addressed for a singer with MTD?, (2) What are other issues singers may confront with MTD? and (3) What pedagogical practices are effective in developing a healthy and expressive singer?

### RESULTS

The study subject was a 28-year-old coloratura soprano who had completed her Masters in Music at a highly regarded, selective northeastern conservatory setting. She reported dysphonia symptoms beginning during her masters degree program, which she states were never addressed. They were reported to be inaudible to those around her and sensed only to her, although her repertoire and *fach* was changing due to loss of range. Only upon graduation and facing the audition circuit, did her problems become more acute and were no longer able to be dismissed. "I had studied through a Masters (degree) I had been able to get through ... things got really bad after school ... I was 28 and doing auditions and I fell apart ..."

Upon medical examination, the vocal folds were found to be without vocal fold mass but had signs of MTD with incomplete closure at arytenoids during phonation and excessive thyroarytenoid function. Speech therapy and vocology assessment found MTD present and had additional factors of high breathing pattern (clavicular), increased perceived breath pressure, high larynx posture, excessive use of isolated chest voice (modal register) in upper frequencies, and an overall bottom-up approach to voice. The subject had recently returned to singing after a break for the birth of her first child.

### Technical issues in singing and speech

Initial work with speech therapist was crucial in retraining of subject toward a sensory rather than auditory mode of monitoring. Target goals included reducing extrinsic laryngeal tension, using a relaxed laryngeal posture, and effective abdominal-diaphragmatic support for all phonation events. Circumlaryngeal massage was used, with attention to rebalancing muscular forces of extrinsic against the intrinsic laryngeal muscles. Balance of respiratory forces, laryngeal coordination, and use of optimum filtering of the source signal through resonance and articulatory awareness was emphasized. Lip flutters were used in five note patterns, ascending and descending to coordinate the power-source-filter. This further established the "top-down" approach for balanced phonation. Tongue stretches (extended tongue with speaking and vocalizing exercises) were also used. Posture of head and neck when sitting and standing was addressed. Finally, a pattern of ascending and descending /u/ with emphasis on loft resonance beginning in middle voice was used in addition to ng-sniff exercise on "ng" with diminuendo lower note and change on the highest note to "ee" and "oh." At the end of six speech therapy sessions, the subject reported therapy "really opened me up to a new sound ..."

The subject was then referred to a specialized voice teacher who continued vocal retraining over a period of 2 years. Vocology assessment revealed the need for retraining of the singing voice in an effort to stabilize effective breath support system and encourage coordination of power-source (respiratory-laryngeal) coordination, including airflow resistance and monitoring excessive pressure. Panting and laughing helped alert the singer to respiratory and laryngeal muscle use. Specific attention toward the muscular engagement (placing hands above hips, with a laugh or careful throat clearing to demonstrate this engagement), less in filling forward or pushing out of

abdominal muscles, which may tend to oversupport. Panting while extending the tongue and yawning in the throat was used to encourage better balance between extrinsic/intrinsic musculature. Onset of phonation was addressed in this way, working to minimize pressure of onset, thus encouraging easier registration. Initial exercises were continued from SLP as well to aid in continuity. Overall body posture with particular attention to breathing patterns and head/neck alignment were also used. Suggestions included “lifting head from behind the ears” (mastoid processes), “pulling a string out of top of head, keeping knees flexible,” allowing for movement throughout lessons. Sitting posture with awareness of abdominal carriage was also addressed to optimize transfer of breath management to daily living skills.

VLP remained a strong focus area due to her use of abnormally high position. Circumlaryngeal massage and reduced tension in the thyrohyoid space was addressed, allowing the laryngeal posture to relax. Monitoring this space, between the hyoid and thyroid, and the ability to isolate tongue and jaw independent of the larynx were practiced. Massage of the base of tongue was also encouraged. Continued monitoring of tongue tension was addressed either with a slightly extended tongue (remaining forward and resting on lower lip) or exercises such as /ðɑ̃ ðo ðe/ (tha tho they) to encourage both easier phonation and relaxed and forward tongue position. An avoidance of rapid breath inhalation was an additional goal in the overall reduction of excessive muscular forces inhibiting relaxed, neutral VLP. Staccati are also used to encourage coordinated onset, easy registration. 5-5-4-4-3-3-2-2-1 with *messa di voce* on final note were used initially on /u/ modifying to /a/ when ascending generally. It should be noted that exercises are personalized for the individual student. Finally lip trills, trilled r, and “lingual raspberries” (sustained phonation with tongue extended) were also used in increasing difficult patterns, eventually opening into vowels.

Registration coordination was addressed in conjunction with more relaxed VLP, allowing access to whistle register as an extension of head voice frequency range. Establishing easy transition from head register to whistle register resulted in improved subject confidence for higher  $F_0$  access “I don’t think my high notes ever felt or sounded so easy ...” *Staccati* or slurs were used on a pattern of an ascending/descending 12th on /ðe ðɑ̃/ (they-tha) for the super high registration (flageolet register). Note that the variability of vocalizes from week to week followed a general trend of beginning in middle voice, increasing gradually in range in both directions, always descending AFTER an ascending pattern, finishing in the middle voice.

Extensive retraining of the upper register (D5 G5) was also necessary for this subject. During the retraining period, the singer was still working professionally and was engaged to sing a role more typical for a lyric soprano than coloratura soprano. Her past experience of vocal fatigue singing in the *passaggio* region re-emerged when trying to sing repertoire outside of her normal experience. She reported singing bottom-up, which led to significant vocal fatigue during the performance. Continued retraining on accessing *passaggio* control was stressed and the subject reported “It was always *passaggio* problems ... but top down has really helped ...” Decreasing pressure in this range is helpful in

balancing registration so continued work with occluded mouth /R, v, ð/ along with *messa di voce* continued to aid the “narrowness” often needed to help the voice turn over. Additionally, *staccato* exercises were continued including staccato octave with scale descending. Singing with a hand over the open mouth was helpful in this range as well, opening into a vowel such as /ɑ/ or /o/.

### Self-perception

Throughout the therapy and vocal retraining period, the subject evolved from initial difficulty accepting a less muscular technique to embracing the freer, more open, and more mature voice quality. Little research exists between the choice of repertoire and the development and maturity of a voice but anecdotal evidence abounds. Singers may be fearful of their voice lacking “youthful” quality, particularly in lighter or higher *fachs*, even when the effects of age have not emerged. Even changes in speaking voice are hard to sustain and maintain due to self-perception and muscle memory for vocal production.

Although confidence was initially an issue, this subject demonstrated and reported significantly improved confidence in speaking and singing voice use after therapy and retraining for MTD. Initially, however,

“There was a long time without those [high] notes ... I thought those notes were gone ... They said ‘she doesn’t have a big voice and doesn’t have high notes’ so repertoire was tough...”

Patient’s background and personal voice journals were helpful in identifying causes of anxiety. Competition in her graduate music school could be seen as one as well as the stress of finding work when finished. Financial difficulties from graduate school loans were another. Loss of range in voice and other difficulties unnoticed by others could affect confidence. As a singer with MTD, she seemed to exhibit characteristics more from VD traits, including introversion and anxiety. She describes herself as “4” on a scale from 1 to 10 (introvert-extrovert, 10 being extrovert) and “8” on a scale of anxiety (1 10, 10 being highest).

### DISCUSSION

Three important themes emerged from this study including retraining of voice (behavioral function of vocal use), rethinking of self (psychogenic), and rapport between singer and all professionals during the process. In this study, the subject did not have any of the physiological issues sometimes associated with MTD such as allergies or reflux nor pathologies on the vocal folds. Therefore, all retraining focused on the technical/behavioral aspects of voice use in both speaking and singing.

### Retraining of voice

Significant muscular imbalance can predispose voice users to laryngeal pathology, although again this was not noted in this case. Excessive muscular tension can also reduce voice endurance, vocal power, range access, and affect self-confidence and self-esteem and all these issues were present for this subject.

Addressing breath management and support, a basic skill in most vocal pedagogies, was the first of three general goals for the singer. “Of the three main methods of breathing, upper chest, rib, and diaphragmatic, it is generally conceded that the

best method for singing is a combination of the latter two ...”<sup>9</sup> However, Doscher goes on to say that rigidity in singing and in the basic structure is detrimental to most singers. Balancing air-flow with subglottal air pressure as well as the antagonistic balancing of inspiratory and expiratory muscles can lay the foundation in creating a balanced tone production. Doscher emphasizes the “realization that there are several ways to accomplish one’s goal ...”<sup>9</sup> Looking at singers with MTD, there may be a mismatch between the balance of breath flow and breath pressure. Some singers focus on too much pressurization (subglottal air pressure) and fail to balance the breath management with lower abdominal-diaphragmatic breathing patterns. This may result in clavicular breathing. Addressing lower breathing habits and lessening the pressure (imagery such as “a pillow of air”) especially during ascending passages can be beneficial for breath management and helping stabilize the VLP. Greater air-flow is generally not recommended and can be phonotraumatic.

It is important to recognize differences in terminology between voice training and speech pathology. “Support the tone” may suggest “that the voice is a physical object that has to be lifted from below by a supporting force.”<sup>9</sup> Many voice professionals are suggesting terms including breath management or breath energy to suggest a less muscular approach to singing.

Despite the wealth of literature on breath management and support, the concept of breath coordination may seem elusive to teach. High breathing (clavicular) is generally admonished but the need for balance of subglottal air pressure versus airflow, and the need of flexibility of breath may be missing in training. In singers, it is important to train the balance and resistive muscular forces from support (power subsystem) to phonation (source subsystem). Greater airflow in the female classical voice may be because of a difference in registration and a shorted closed phase.<sup>4</sup> This change, which is perceived as a change in registration, may be one of the factors why MTD seems to be more common in female singers than male singers.

Laryngeal positioning and suprahyoid musculature/articulation is the second goal to be addressed. From a functional point, this addresses the balance and resistive forces from phonation (source subsystem) to resonance and articulation (filter subsystem).

“Singers and teachers have, in the past, often shown a reluctance to address the larynx itself ...”<sup>10</sup> Chapman does add that the general laryngeal position is lowered although one surmises great variety among individuals. Laryngeal massage is discussed in the speech pathology realm but rarely is addressed in the vocal studio. Most voice teachers address laryngeal position through good posture and strap/extrinsic muscles including the elevators, depressors, and constrictors, which stabilize a larynx. Brown states “Good vocal production depends on keeping the surrounding muscles as free from strain as possible.”<sup>11</sup> Laryngeal position does affect formant frequencies, which contribute to the overall voice quality. Optimum laryngeal position has not been studied across body height, singing style, age, sex, and culture. Late maturity of the extrinsic muscles of the larynx may also be a factor.

An easier registration integration (top-down singing) was perhaps the third most crucial aspect in the retraining of this singer. Registration effects on resonance are commonly discussed among

the vocal pedagogues. Use of top-down approach in registration often eases the difficulty in balancing muscular and aerodynamic forces, allowing for reduced laryngeal compression and improved balance of breath management in the passaggio and midrange singing. Doscher summarizes “Breath management, laryngeal positioning, and resonance coupling combine to determine register events and eventual blending ...”<sup>9</sup> Lehman states “The head voice is the most valuable possession of all singers, male and female ... I must form the lowest notes in such a way that I can reach the highest ...”<sup>11</sup> Balance of the upper register may be more crucial to the female voice or at least in higher voice types such as tenors and sopranos. In this study, the singer is classically trained. These findings suggest current approaches to popular or contemporary commercial music singing including a chest (TA)-dominated approach and higher laryngeal position may be challenging to treat MTD.

### Rethinking of self-perception

Altering self-perception of one’s voice is always challenging for the serious vocal professional. The fact that the voice and the psyche are connected is indisputable given current research. Vocal identity by the singer may affect behavior and confidence once problems arise. Therefore, a combined therapy approach and teaching style may be of benefit in the management of MTD.

The stress of a performance career is documented,<sup>12</sup> and the role of stress of the voice is demonstrated.<sup>13</sup> There can be a conflict of the required physiology of the larynx as a valve in moments of stress. Because of the necessary valving action, the larynx must be able to constrict during moments of excursion. The need to relax the valving action may become difficult with stress. This can lead to a dominant laryngeal fixative position. Similarly, the adrenal needed for moments of stress (including performance) for many become too much and counterproductive. Often students say “I’m not working hard enough when I sing,” resulting in over singing, perhaps by 10-fold.<sup>9</sup> Personality issues (traits) are another factor, which suggests that certain types are more prone to injury (or overdoing). Roy’s determination of elevated stress patterns seen in patients with VD and VN can be commonplace in some singers with an amplified emotional reactivity. Performers are often extrovert personalities, which may influence some of the characteristics in VN including social dominance and impulsivity. Sensitivity to stress among singers can include loss of voice with no physical evidence. It may be helpful to remember that addressing physiological behavior alone does not address the patient fully, especially when dealing with dysphonia in singers.<sup>14</sup>

The loss of confidence can be detrimental for the singer’s psyche.

For me, the problem with the passaggio is the fear associated with that, and the fear when I see those notes on a page.

Improved performance preparation can build confidence. Learning “Mental Toughness” is recommended for performing artists.<sup>15</sup> These characteristics include being self-motivated and self-directed with a high regard for self. Guiding the student through a thorough preparation (pre-performance) and allowing for a gradual increase in levels of stress can be beneficial for the

singer in promoting and developing these skills. Performances should begin in a supportive, small environment before moving on to a larger, more critical audience. Setting realistic short-term and long-term goals is important to allow a positive experience for the singer.

### Rapport and support throughout the process

Rapport has been defined as a crucial part of the applied music instruction.<sup>16</sup> During the vocal recovery period, coordination between teachers, coaches, opera directors, physicians, and speech pathologists is essential to achieve healthy voice use, manage stress, work on career development, and self-esteem as a performer. The combined team approach allows the singer to achieve vocal recovery and career advancement while encouraging and allowing for individual responsibility for their own personal growth and vocal development. It is clear from this study that openness between the professionals and continued collaboration resulted in positive benefits for the singer. “Certainly, a willingness to listen is an essential characteristic of any successful teaching and one of those many hats a teacher must wear ...”<sup>9</sup> In particularly difficult cases, one might suggest additional support from a professional with a psychological background.

### CONCLUSIONS

There are significant challenges to the medical team in rehabilitation of a career-conscious singer with MTD. Doscher writes “The relationship between personal stress, poor posture, and lack of a reliable vocal technique is a close one ...”<sup>9</sup> Those singers with demands for reliable, easy access to higher fundamental frequencies may be at greater risk for MTD, particularly if self-confidence is lacking or if they have prior performance failures. This case study emphasizes the importance of interaction between medical and vocal professionals in the retraining of the MTD singer. Because of the multifaceted features of this disorder, a collaborative, supportive environment is recommended. Mutual goals should be established between the speech pathologist and voice teacher to address the muscular and technical retraining needs. Psychological support may also be helpful in psyche training of the singer. Medical monitoring remains an important aspect of MTD resolution. Finally, a cooperative relationship between all involved parties is recommended to resolve the dysphonia and return the singer to a performance career. “I’m just happy to where I stand right now ... I’m happy to be heading off ... I’m sure things will go well ...”

### REFERENCES

- Altman K, Atkinson C, Lazarus C. Current and emerging concepts in muscle tension dysphonia: a 30 month review. *J Voice*. 2005;19:261-267.
- Dromey C, Nissen S, Roy N, Merrill R. Articulatory changes following treatment of muscle tension dysphonia: preliminary acoustic evidence. *J Speech Lang Hear Res*. 2008;51:196-208.
- Oates J, Winkworth A. Current knowledge, controversies and future directions in hyperfunctional voice disorders. *Int J Speech Lang Pathol*. 2008;10:267-277.
- McCoy S. *Your Voice: An Overview*. 2nd ed. NJ: Inside View Press; 2005.
- Rubin JS, Sataloff RT, Korovin GS. *Diagnosis and Treatment of Voice Disorders*. 2nd ed. NY: Thompson Delmar Learning; 2003. pp. 175-177.
- Gilman M, Nix J, Hapner E. The speech pathologist, the singing teacher and the singing voice specialist: where’s the line? *J Sing*. 2010;67:171-178.

- Keidar A. A Singer’s Guide to Self Diagnosis. In: Davies DG, Jahn AF, eds. *Care of the Professional Voice*. 2nd ed. NY: Routledge; 2004. pp. 125-137.
- Roy N, Bless DM. Personality traits and psychological factors in voice pathology: a foundation for future research. *J Speech Lang Hear Res*. 2000;43:737-748.
- Doscher BM. *The Functional Unity of the Singing Voice*. Lanham, MD: The Scarecrow Press, Inc; 1994. pp. 18-26, 81, 193.
- Chapman J. *Singing and Teaching Singing: A Holistic Approach to Classical Voice*. CA: Plural Publishing, Inc; 2006. pp. 72.
- Brown O. *Discover Your Voice*. San Diego, CA: Singular Publishing Group; 1996. pp. 57.
- Sandgren M. Voice, soma and psyche: a qualitative and quantitative study of opera singers. *Med Prob Perf Art*. 2002;17:11-21.
- Lehmann AC, Sloboda JA, Woody RH. *Psychology for Musicians*. NY: Oxford University Press; 2007.
- Baker J. The role of psychogenic and psychosocial factors in the development of functional voice disorders. *Int J Speech Lang Pathol*. 2008;10:210-230.
- Emmons S, Thomas A. *Power Performance for Singers*. NY: Oxford; 1998.
- Clemmons J. *Rapport in the Applied Voice Studio*. Doctoral Dissertation: Columbia University, Teachers College; 2006.

### ADDENDUM

#### ASSESSMENTS USED BY SPEECH-LANGUAGE PATHOLOGIST

- Perceptual rating using **GRBAS**. **G**rade (the overall degree of voice abnormality), **R**oughness, **B**reathiness, **A**sthenia (voice weakness), and **S**train. Under this scheme, each parameter is quantified on a four-point scale, where 0 = normal, 1 = mild, 2 = moderate, and 3 = severe.
- $F_0$  range using five note ascending-descending slides on lip flutters, /a/ and /u/ starting at C4 ascending and then C4 descending, using comfortable loudness. (Clinician playing scales on piano while patient sings requested pitches).
- Vocal control and stability of CT versus TA function: sliding third on /u/ and /o/ from C4 to E5 (clinician playing requested pitches on piano).
- Visual assessment of facial, neck, torso, hand, and lower torso tension.
- Visual assessment of head/neck posture.
- Manual palpation of laryngeal, neck (anterior, lateral, posterior), and shoulders (attending to trapezius and scalenes).
- Assessment of voice quality in speaking and singing.
- Assessment of voice patterns (Hard Glottal Attack, breath/air flow management, breath-voicing pacing, tonal placement, self-monitoring of voice use).

#### ASSESSMENTS USED BY THE SINGING VOICE SPECIALIST/VOCALOGIST

- History taken from singer
  - How long have they had problems, when did they first notice symptoms, what was addressed or modified, why did they seek help?
  - Background issues involved including medical (respiratory illness, general sickness, allergies, reflux, and so forth) and repertoire (too difficult, too much, wrong repertoire).

- c. Speaking issues involved (how much talking during the day, teaching in schools, attending parties, eating out in loud restaurants, and so forth).
  - d. Personal issues such as age, lifestyle, smoker, drinker, stress in life.
  - e. Amount of training/background in music.
  - f. Goals/upcoming engagements.
2. Evaluation of singing repertoire
    - a. Aural assessment: Asked to sing a selection of their choice and performance is evaluated aurally (balance of breath management—breathy, pressed or flow phonation, registration balance—*messa di voce*, variety of color, intonation, amount of effort).
    - b. Visual assessment: Observation of repertoire performance (breathing patterns, tension, effort, ability to focus on music/intent of performance).
    - c. Kinesthetic assessment: Manual assessment of larynx and abdominals/intercostals, overall tension in body/posture issues.