Functional dysphonia—voice disturbance in the absence of structural or neurologic laryngeal pathology—is an enigmatic and controversial voice disorder that is frequently encountered in multidisciplinary voice clinics. Poorly regulated activity of the intrinsic and extrinsic laryngeal muscles is cited as the proximal cause of functional dysphonia, but the origin of this dyregulated laryngeal muscle activity has not been fully elucidated. Several causes have been cited as contributing to this imbalanced muscle tension; however, recent research evidence points to specific personality traits as important contributors to its development and maintenance. Voice therapy by an experienced speech-language pathologist remains an effective short-term treatment for functional dysphonia in the majority of cases, but less is known regarding the long-term fate of such intervention. Further research is needed to better understand the pathogenesis of functional dysphonia, and factors contributing to its successful management. Current Opinion in Otolaryngology & Head and Neck Surgery 2003, 11:144-148

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Abbreviations

FD      functional dysphonia

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The term “functional” implies a voice problem of physiological function rather than anatomic structure [9•]. In clinical circles, “functional” is usually contrasted with “organic” and often carries the added meaning of psychogenic [10]. Stress, emotion, and psychologic conflict are frequently presumed to cause or exacerbate functional symptoms. Some confusion surrounds the diagnostic category of “functional dysphonia,” because it includes an assortment of medically unexplained voice disorders: psychogenic, conversion, hysterical, tension-fatigue syndrome, hyperfunctional, muscle misuse, or muscle tension dysphonia [11–15]. Although each diagnostic label implies some degree of etiologic heterogeneity, whether these disorders are qualitatively different and etiologically distinct remains unclear. When applied clinically, these various diagnostic labels often reflect clinician supposition, bias, or preference. However, at the purely phenomenological level, there may be few empirically tractable differences that reliably distinguish these voice disorders.

More recently, “muscle tension dysphonia” has become the preferred diagnostic label to describe functional voice problems presumably related to dysregulated or imbalanced laryngeal and paralaryngeal muscle activity [12,16,17]. A variety of glottic and supraglottic contraction patterns have been associated with muscle tension dysphonia/FD, and several classification systems have been offered to describe these laryngoscopic features [16,18,19]. Often-cited laryngeal manifestations of dysregulated laryngeal muscle tension include the following: tight mediolateral glottic and/or supraglottic contraction, anteroposterior glottic and/or supraglottic compression, incomplete glottic closure, posterior glottic chink, and bowing [15,16,19]. However, researchers have recently challenged the existence of specific laryngo-
scopic clusters/features that uniquely and reliably distinguish FD from nondonysphonic speakers, and other voice disorder types including spasmodic dysphonia [9,20,21]. Many of the laryngoscopic patterns used to classify FD are frequently observed in individuals with normal voices and spasmodic dysphonia, and thus fail to distinguish such individuals from patients with FD [9,21]. Given the likely involvement of a variety of intrinsic and extrinsic laryngeal muscles—in diverse states of relaxation and contraction—myriad laryngeal configurations may be present in FD [22].

Although poorly regulated activity of the intrinsic and extrinsic laryngeal muscles is cited as the proximal cause of muscle tension dysphonia, the origin of this muscle activity has not been fully elucidated. It has been attributed to a variety of sources, including (1) technical misuse of the vocal mechanism in the context of extraordinary voice demands [11–13,15], (2) learned adaptations after upper respiratory tract infection [14,23], (3) increased pharyngolaryngeal tone secondary to the laryngopharyngeal reflux reflex [18], (4) extreme compensation for minor glottic insufficiency and/or underlying mucosal disease [24], and (5) psychologic and/or personality factors that tend to induce elevated tension in the laryngeal region [7,25–28].

**Psychologic factors in functional dysphonia**

A wide array of psychopathologic processes contributing to voice symptom formation in FD has been proposed [27,29]. The exquisite sensitivity and prolonged hypercontraction of the intrinsic and extrinsic laryngeal muscles, in response to stress, conflict, anxiety, depression, or inhibited emotional expression, is frequently cited as the common denominator underlying the majority of functional voice problems [7,30]. Other possible mechanisms include, but are not limited to, conversion reaction, hysteria, hypochondriasis, and various situational conflicts or personality dispositions that also induce excess or dysregulated laryngeal musculoskeletal tension [6,25,26,28]. However, research evidence to support these various psychologic mechanisms has seldom been provided. The empirical literature evaluating the FD–psychology relationship is characterized by divergent results regarding the frequency and degree of specific personality traits [6,31–34,35,36], conversion reaction [6,36], and psychopathologic symptoms such as depression and anxiety [6,31,34,35,36]. Despite significant methodologic differences among these studies, some interesting patterns do surface. These patterns suggest a general trend toward elevated levels of (1) state and trait anxiety, (2) depression, (3) somatic preoccupation/complaints, and (4) introversion in the FD population. Patients have been described as inhibited, stress reactive, socially anxious, and nonassertive, with a tendency toward restraint [31,33,34,35,36]. The interested reader is referred to Roy and Bless [28,41] for a more complete exploration of the putative psychologic and personality processes involved in FD, as well as related research.

Recently, a theory has been proposed to link specific personality traits to the development of FD [28,41]. The "Trait theory of FD" emphasized a theme of inhibitory laryngeal behavior, but attributed this muscularily inhibited voice production to specific personality typologies. In brief, the authors speculated that the combination of personality traits, such as introversion and neuroticism (trait anxiety), contributes to predictable and conditioned laryngeal inhibitory responses to certain environmental signals/cues. For instance, when undesirable punishing or frustrating outcomes have been paired with previous attempts to speak out, Roy and Bless postulated that this might lead to muscularily inhibited voice production in individuals predisposed by specific personality characteristics. The authors contended that this conflict between laryngeal inhibition and activation (that has its origins in personality and nervous system functioning), results in elevated laryngeal tension states and can give rise to incomplete or disordered vocalization in a structurally and neurologically intact larynx.

In research designed to test the theory and assess whether personality factors play causal, concomitant, or consequential roles in common voice disorders, Roy and colleagues [34,35] compared a vocally normal control group and four groups with voice disorders—FD, vocal nodules, spasmodic dysphonia, and unilateral vocal fold paralysis—using the Eysenck Personality Questionnaire. The Eysenck Personality Questionnaire—a popular personality assessment tool—generates scores for the personality superfactors: extraversion and neuroticism. Extraversion involves the willingness to engage and confront the environment, including the social environment. Extraverts (high extraversion) tend to be dominant, sociable, and active, whereas introverts (low extraversion) tend to be quiet, unsociable, passive, and careful. Neuroticism, the second personality dimension, can be likened to emotionality and is related to anxious, depressed, tense, and emotional characteristics. High neuroticism individuals tend to be emotionally unstable, worried, and highly reactive to environmental stimuli [34,35]. The results showed that distinct personality characteristics were present within the FD and vocal nodules groups, and were conspicuously absent in the other groups. Group comparisons revealed that the majority of FD and vocal nodules subjects were classified as introverts and extraverts, respectively. As compared to the other groups, the FD group scored significantly higher on the neuroticism dimension, thereby providing robust evidence to support the role of elevated neuroticism in FD development. Comparisons involving the spasmodic dysphonia, unilateral vocal fold paralysis, and control
subjects did not identify any consistent personality differences. On the whole, these differences in personality were compatible with the predictions of the Trait Theory of the dispositional bases of FD. In contrast, the disability hypothesis, which suggests that personality features and emotional maladjustment are solely a negative consequence of vocal disability, was not supported. The investigators concluded that the results largely support the contention that individuals with certain personality traits may be susceptible to developing FD [34••,35••].

Management of functional dysphonia

Despite considerable controversy surrounding causal mechanisms, the clinical voice literature is replete with evidence that symptomatic voice therapy for functional voice disorders can often result in rapid and dramatic voice improvement [4,7,10,15,21,42–46•,47–50].

Because excess or dysregulated laryngeal muscle tension is frequently offered as the cause of FD, many voice therapies including yawn-sigh, resonant voice therapy, visual and electromyographic biofeedback, progressive relaxation, and circulmonary massage aim to reduce or rebalance such tension [7,48]. Prolonged hypercontraction of laryngeal muscles is often associated with elevation of the larynx and hyoid bone, with associated pain and discomfort when the circulmonary region is palpated [5,22,51]. Several voice clinicians have described manual/digital techniques to determine the presence and degree of laryngeal musculoskeletal tension, as well as methods to relieve such tension during the diagnostic assessment and management session [7,22,51–53]. Aronson [7] speculated that therapy failure for muscle tension voice disorders may be caused, at least in part, by techniques that do not yield sufficient laryngeal tension reduction. He offered that indirect (ie, nonmanual) tension reduction techniques often fail because of the stubborn nature of excess laryngeal musculoskeletal tension. Instead, Aronson offered circulmonary massage as a direct method to induce laryngeal tension reduction. Skillfully applied, systematic kneading of the extralaryngeal region is believed to stretch muscle tissue and fascia, promote local circulation with removal of metabolic wastes, relax tense muscles, and relieve pain and discomfort associated with muscle spasms [22].

In a series of investigations, Roy and colleagues have evaluated the clinical utility of manual techniques with a variety of functional voice disorders [4,5,17,24]. Roy et al. [5] reported the immediate and long-term effects of manual circulmonary therapy for 25 female patients with FD. Perceptual, acoustic, and interview techniques were used to assess vocal function before and after treatment. Subjects demonstrated consistent improvement across perceptual and acoustic indices of vocal function immediately after treatment and during the follow-up period. Based on perceptual ratings, 96% of patients were rated as improved, with almost two thirds of all patients achieving normal voice return after the single treatment session.

The hypothesized physical effect of such circulmonary massage is reduced laryngeal height and stiffness and increased mobility. Once the larynx is “released/lowered” and range of motion is normalized, an improvement in vocal effort, quality, and dynamic range should follow. Roy and Ferguson [46•] combined knowledge of the source-filter theory of vowel production with formant frequency analysis to indirectly assess changes in vocal tract length after successful manual circulmonary therapy with 75 subjects with FD. The “length rule” of the source-filter theory states that the average frequencies of the vowel formants (local resonances in the vocal tract) are inversely proportional to the length of the pharyngeal-oral tract. In short, as the vocal tract increases in length, the average formant frequencies lower. Therefore, laryngeal elevation should shorten the vertical dimension of the pharynx, whereas lowering of the larynx should result in lengthening of the pharyngeal-oral tract. Therefore, a shorter vocal tract creates elevated formant frequencies; alternatively, a longer tract produces lower formants. These investigators reported significant lowering of the first three formant frequencies of the vowel /a/ after voice improvement. These findings were compatible with a decrease in laryngeal height and lengthening of the vocal tract as predicted by the source-filter theory, and provide corroborating evidence for Aronson’s [7] contention that voice improvement after manual circulmonary therapy for FD may be associated with lowered laryngeal position.

Certainly, direct symptomatic therapy for FD can produce rapid voice changes; however, in some cases, voice therapy can be a frustrating and protracted experience for both clinician and patient [1,53,54]. Because there are few studies directly comparing the effectiveness of specific therapy techniques, not much is known about whether one therapy approach for FD is superior to another. According to most sources, signs of voice improvement should typically be observed within the first voice therapy session; however some patients may require an extended, intensive treatment session or several sessions, depending on a number of variables including the therapy technique(s) selected, clinician experience and confidence in administering the approach, and patient motivation and tolerance. In cases of FD that are unresponsive or resistant to standard voice therapy, Dworkin et al. [55•] recently reported the use of transcricothyroid membrane lidocaine injection to successfully interrupt hyperactive glottal and supraglottal muscle contraction patterns observed in three patients with refractory muscle tension dysphonia/FD. When the lidocaine injection was followed by several minutes of voice therapy,
all three previously unresponsive patients experienced prompt and sustained voice improvement. The exact mechanism underlying the positive result remains uncertain; however, the authors hypothesize that the topical lidocaine bath acts on the mucosal mechanoreceptors of the laryngeal inlet, interrupting sensory feedback during phonation, and breaking the cycle of hyperfunctional vocal fold contraction that contributes to the dysphonia. Whether this procedure is best administered after traditional voice therapy has failed, or before voice therapy is offered, requires further investigation.

The long-term effectiveness of direct voice therapy for functional voice disorders also has not been rigorously evaluated [48,49]. Of the few investigations that exist, the results regarding the durability of voice improvement after direct therapy for FD are mixed [5,10,42,44]. It should be acknowledged that after direct voice therapy, only the voice symptom has been removed, not the underlying cause of the disturbance itself [26,32,37]. Therefore, the nature of precipitating and perpetuating factors, including possible psychologic dysfunction, needs to be better understood. If the situational, emotional, or personality features that contributed to the development of the voice disorder remain unchanged after behavioral treatment, it would be logical to expect that such persistent factors would increase the probability/risk of future recurrences [35**,42,56]. Therefore, in some cases, posttreatment referral to a psychiatrist or psychologist may be necessary to achieve more enduring improvements in the patient’s emotional/life adjustment and voice function [26,54,56]. This is especially appropriate in cases where dysphonic relapses are frequent and protracted.

Conclusions

Functional dysphonia—a voice disturbance in the absence of structural or neurologic laryngeal pathological factors—is an enigmatic and controversial voice disorder that is frequently encountered in multidisciplinary voice clinics. Recently, the term FD has been replaced in some clinical circles by the diagnostic label “muscle tension dysphonia,” which serves to highlight excess, dysregulated, or imbalanced activity of the intrinsic and extrinsic laryngeal muscles as the proximal cause of the observed dysphonia. Although many sources have been cited as contributing to this muscle tension, specific personality traits have been identified as important to its development and maintenance. Voice therapy by an experienced speech-language pathologist remains an effective short-term treatment for FD in the majority of cases, but little is known regarding the long-term fate of such treatment. Further research is needed to better understand the pathogenesis of FD, and factors contributing to its successful management.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:
• Of special interest
• Of outstanding interest

Speech therapy and rehabilitation


The relevant literature that explores possible psychopathological processes in FD, vocal nodules, and spasmodic dysphonia is reviewed. In addition, a complete explication of the Trait Theory of FD is provided along with its key mechanistic assertions.


This article provides a cursory review of the literature (circa 1998) pertaining to the FD-psychology relationship. The fundamental tenets and predictions of the trait theory are outlined.


A novel approach for treating refractory cases of muscle tension dysphonia is described.