Coping Strategies, Personality, and Voice Quality in Patients with Vocal Fold Nodules and Polyps

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Summary: Emotional state affects the physiological mechanism involved in phonation. Differences in acoustical parameters of the voice under stress have been attributed to the coping mechanism used, which is based on the individual's perception of the situation. This study examines the relationship between coping strategies, personality, and voice in female subjects, ranging in age from 19.3-55.7 years, diagnosed with vocal nodules or polyps. The differences between coping strategies and personality are examined and compared with another group with no history of voice pathology. The relationship of personality and coping strategies to voice quality variables is reported. Results show that patients use emotional coping strategies more and cognitive coping strategies less than the comparison group. Type of voice pathology was found to be related to dominance, and a number of coping and personality variables were found to correlate significantly with voice quality. Key Words: Dysphonia—Voice—Nodules—Polyps—Coping—Personality—Emotion—Stress—Daily hassels—Lifestyle.

Nodules and polyps are among the common benign lesions of the vocal folds seen by the otolaryngologist. Occurring in the lamina propria of the vocal folds (1), they are localized at the junction of the anterior and middle thirds of the vocal folds, the site of maximal aerodynamic and muscular force during phonation.

These lesions differ histologically. Vocal polyps are unilateral fibrous vascular lesions of the laryngeal mucosa (2–5). They are of two types: edematous, pale, and translucent or angiomatous and red in appearance (6). Vocal nodules are bilateral epithelial lesions consisting of hyperplasia, with or without keratinization (6). Both of these lesions create aperiodic vocal fold vibration, which results in changes in pitch, intensity, and voice quality. They can also be responsible for the production of dysphonia.

An in-depth understanding of the cause of these lesions is necessary for appropriate clinical management. Chronic mechanical trauma in the form of vocal abuse and misuse is generally considered to cause these tissue changes. "Misuse and abuse of the voice can result in wear and tear of the vocal cords and result in epithelial thickening, referred to as nodules, polyps or chronic laryngitis" (7). Vocal abuse includes behaviors such as shouting, screaming, speaking in noisy environments, speaking for prolonged periods, conversing with deaf relatives, singing in noisy smoky atmospheres, use of hard glottal attack, inappropriate pitch, shouting over background noise, and excessive talking (8–13). Vocal misuse implies use of a faulty vocal technique and is a condition in which "the true vocal folds which are made up of voluntary muscle are forced to vibrate under undue stress and tension" (7). Al-
though it is accepted that vocally abusive behaviors are necessary for the development of these benign lesions, it is generally recognized that physiological, medical, and psychological factors contribute to their development. All of these variables should be considered in diagnosis and treatment.

**PHYSIOLOGICAL FACTORS**

Physiological factors that may contribute to the development of benign vocal lesions include: muscular compensatory behaviors such as excess muscle tension of the paralaryngeal and suprahoid areas, faulty posture, posterior glottic chink, larynx rise, and increased intra-abdominal pressure to force air through constricted vocal folds. Other suggested contributory factors are incorrect coordination of the respiratory and phonatory systems where valving of the glottis becomes the primary regulator of the airflow, incomplete glottic closure, high subglottic pressure, and compensatory hyperadducting behaviors of the vocal folds (14-16). High values for glottal waveform parameters of alternating current flow and maximal flow declination rate have been suggested to increase the potential for vocal fold trauma owing to high vocal fold closure velocities and collision forces (17). It has also been suggested that collision forces can lead to destruction of the softer tissues of the lamina propria, as is evidenced by the appearance of vocal fold nodules and the fact that they occur bilaterally (18,19). Individual differences in the vibratory patterns of the vocal folds, resulting from differences in vocal efficiency and the way the air and laryngeal musculature are used to produce voice can also be responsible for tissue damage (20). Other contributory factors include an increase in laryngeal effort and tension without an increase in respiratory effort (21), the level of tension in the vocalis muscle, (22), and, in the case of vocal polyps, a once occurring violent intense physical activity involving abrupt glottal closure (23).

**MEDICAL FACTORS**

Medical factors attributed to the etiopathogenesis of benign vocal lesions include: allergies, (8,24,25), endocrine imbalance (7,25), respiratory tract infections (26,27), irritation due to working in an atmosphere with fumes (12), vocal fold dehydration (28-30), ear and hearing problems (24,26), chronic cough (30), and gastric reflux (7).

**PSYCHOLOGICAL FACTORS**

Psychological factors related to the development of benign lesions of the vocal folds have been well documented in the literature. The relationship between emotional factors and faulty use of the voice has been described in a general way (8). Other studies have shown a correlation between disordered emotional states and the incidence of nodules (31). One of the factors involved could be the close relationship between personality and voice (see references 32–35 for reviews).

Aggressive personality has been found in patients with nodules and polyps (36). Heaver (37) found a number of psychopathological factors in patients with dysphonia including those with nodules. Based on clinical experience, Aronson (9) concluded that vocal nodules are found in adults who are talkative, socially aggressive, tense, and have acute or chronic interpersonal problems that generate tension, anger, or depression. Similarly, many pediatric studies indicate that children with vocal nodules differ in personality from those with a normal larynx. They have been found to be aggressive, have difficulty managing stressful situations (38,39), and were described as showing tenseness, frustration, or emotional disturbances (24). In a clinical study matching 30 children with nodules with 30 controls, Green (40) gives evidence to support the hypothesis that certain psychobehavioral characteristics typify children with nodules. Over 60% of the nodule group received ratings for aggressive traits: hysterical, arguing to have the last word, disobedient until threatened, and complained of others’ unfairness. They were also found to have disturbed peer relations.

This review of the literature strongly suggests that there are a number of psychobehavioral characteristics attributed to patients with nodules and polyps. The manner in which these variables are related to the formation of benign lesions is not clear and many of the findings are based on intuition and clinical experience (8,9). Morrison et al. (14) suggest a relationship between coping strategies and stress, and found that patients with muscular tension dysphonia have problems coping with stress. There are few clinical studies that look at the relationship between coping styles, stress, and dysphonia. Three recent studies have looked at this relationship in patients, including those with organic lesions of the vocal folds (41–43). They reported that the dysphonic subjects showed higher
levels of anxiety in stressful situations and that life events had an important influence in the etiopathogenesis of dysphonia. Style of coping had no influence on the life event strain. In another study (44), stress at the onset of the dysphonic symptoms was found to be of prime importance in the development of dysphonia in a group of patients with vocal cord granuloma. However, none of these studies offer a satisfactory explanation of the relationship between stress, coping, and dysphonia.

**VOICE AND EMOTION RELATIONSHIP**

It is generally accepted that there is a relationship between voice and emotion. The vocal musculature is a highly sensitive instrument and is strongly influenced by changes in the affective state. "The voice as the carrier of the emotional message becomes part of the emotion" (32). As the voice is our principal medium for communication, the emotions felt during vocal communication are heard in the voice. These emotions bring about changes in respiration pattern and muscle tension and, thus, manifest themselves in voice quality. Consequently, one could assume that in times of emotional stress, high levels of muscular tension in the organs involved in voice production may eventually lead to mass lesions of the vocal cords. A good way of conceptualizing this relationship can be found in Fig. 1, which is based on Morrison (7) and shows a bidirectional effect.

**EMOTIONAL STATE, COPING STYLE, AND VOICE RELATIONSHIP**

The relationship between emotional state, coping style, and voice is a complex one and is therefore difficult to study empirically. Any effort to define this relationship should be based on empirical research reported in the psychological literature. In a review of the effects of stress and emotion on the voice Scherer (45) suggests that vocal cues are important indicators of stress and other emotional states. The emotional state is considered to have an effect on respiration and the muscle tension involved in phonation and articulation, which in turn modifies the acoustic parameters of the voice, depending on the emotion expressed. Furthermore, acoustical analysis of voice in subjects undergoing stressful situations revealed individual differences in fundamental frequency for the same stress situation (46). These frequency differences were attributed to the coping mechanism used, which differed from one subject to another (47). A major aspect of coping involves cognitive appraisal, or the individual's perception of the situation (48,49). In consequence, differential physiological and behavioral responses among individuals in dealing or coping with a particular stress situation are to be expected. In vocal communication, these physiological changes would affect the tension of the respiratory, pharyngeal, and articulatory musculature, resulting in differential changes in voice.

**COPING**

Coping is defined as "constantly changing cognitive and behavioral efforts to manage specific external and or internal demands that are appraised as taxing or exceeding the resources of the person" (50). The literature divides coping strategies into two categories depending on whether the aim is at altering the problem causing the distress (problem focused coping) or at controlling the emotional response to the problem (emotion-focused coping) (51). The coping strategy used may be functional, meaning that it can buffer against stress, or dysfunctional in that it can exacerbate it (52). The concept of perceived control over a situation is an important one and influences the coping strategy used. Perception of a situation, as already mentioned, has an effect on how we cope in a given situation and is related to our personality. An individual, who exhibits low self-esteem, high sensitivity, impaired interpersonal skills, or high biological reactivity to stress, deals with emotional stress differently than an individual who demonstrates hardiness (53). Hardiness is a composite of challenge control and commitment. So a major insight is that perception
and coping is an individual phenomenon and has an effect on the voice.

Vocal cues can be considered valid indicators of emotional stress. It may, therefore, be assumed that there is a relationship between emotional state, coping, and voice through interactive effects on the physiological mechanism involved in phonation. Because an individual copes with stress and emotional states according to personal perception of the situation, we can expect differential voice changes as a function of stress and coping across individuals. The present study was designed to look at coping styles and personality in two different dysphonic groups of female patients with benign lesions of the vocal folds: one with vocal cord nodules and one with vocal cord polyps. More precisely, the major aim of the study was to examine the relationship between coping styles and personality in patients with vocal cord nodules and polyps.

METHOD

Subjects

The subjects in this study were 17 adult women, 10 with vocal cord nodules and 7 with vocal cord polyps, who consulted for dysphonia at the voice clinic of a university hospital. Male subjects were not included in this study because of the difficulty comparing the acoustical analysis of male with female voices. The inclusion criterion was diagnosis of either nodules or polyps on videostroboscopic examination by an ear, nose, and throat surgeon. All subjects were from middle class backgrounds holding various occupations: students, teachers, young mothers, administrative secretaries, beauticians, a laboratory technician, and a nurse. They ranged in age from 19.3 to 55.7 years with a mean age of 33.3 years. All subjects were of European origin and spoke French. They were nonsmokers and had no history of allergy, lung disease, psychiatric, or neurologic illness.

The comparison group was composed of 61 women with no vocal lesions, ranging in age from 19 to 73 years with a mean age of 33.3 years. All subjects were of European origin and spoke French. They were nonsmokers and had no history of allergy, lung disease, psychiatric, or neurologic illness.

Procedure and materials

All patients underwent a complete ear, nose, and throat examination by an otolaryngologist and a videostroboscopic examination to objectify the presence of laryngeal nodules or polyps. This was carried out using an Atmos endo-stroboscope attached to a Panasonic micro camera NVKS 152.

Data collection was carried out by means of an interview using a structured questionnaire. The 20-item questionnaire was designed to obtain information from subjects on circumstances prior to and surrounding the onset of dysphonia; their medical history; vocal history, including vocal use; type of work; working conditions; home environment; and lifestyle. Questions also included items to examine the presence of major life events, daily hassles, and any emotional stress that may be part of the patient’s lifestyle.

All questionnaires were administered orally by the same interviewer who was, in fact, therapist to all subjects. Instructions regarding the questionnaires were kept constant as were administrator responses to information given, so that data collection circumstances would be comparable. None of the subjects had insight into the questionnaires prior to data collection. All interviews were carried out on the therapist's first contact with the subjects and were part of the initial evaluation protocol for patients with vocal cord nodules and polyps. Subjects had received no treatment prior to data collection. All subjects were identified as being equally compliant.

Recording speech sample

All interviews lasted 45 to 60 minutes and were recorded on a Sony DAT TCD 3, with a mouth to microphone distance of 30 cm, as well as on a Sony video recorder. This was used to verify information given by subjects during the interview.

Acoustical analysis

Acoustical analysis was calculated from eight utterance segments for each subject, one of 5 seconds and seven of 20 seconds in length, taken from answers to questions at the beginning, middle, and end of the structured questionnaire interview.

Acoustical parameters extracted were: fundamental frequency measurements, which included the median of fundamental frequency, $F_o$, and variability of fundamental frequency or standard deviation of $F_o$ over the speech sample. Spectral measures included energy up to 500 Hz and energy up to 1,000 Hz. The median rather than the mean was used because its magnitude is less influenced by the distribution of its values in the sample and because it is a more robust measure of $F_o$. Analysis was made using the CSL 4300 (Kay Elemetrics).
Coping strategies and personality traits measurement

A written coping questionnaire (the 21-strategies Coping Index, COP-I) and written personality questionnaire (the 15-trait Personality Index, PERS-I) (54), both developed at the University of Geneva in French, German, and English, were filled out by each subject to obtain ratings of their coping strategies and personality. In this study all questionnaires were administered in French.

The Cop-I contains 21 strategies that can be combined according to the functional domain or modality that is directly affected by the coping attempt (cognition, emotion, the self, or the social domain). Items illustrating the nature of a specific coping strategy are presented as a set in a box. The subject completing the checklist by means of a 3-point rating scale indicates the probability of using a specific coping strategy in reaction to two typical life situations. In this study, oral instructions were given to each subject concerning completion of the questionnaire. Administration time was 20-25 minutes. Table 1 shows the means and standard deviations for the 21 coping strategies as well as the combined scores reflecting general coping for the 15 personality dimensions.

The Pers-I contains the 15 most important dimensions of personality or personality traits found in more than one established personality questionnaire or individual scales. Each personality trait is presented as a set in a box. Items denoting the extreme ends, or poles, of a dimension are positioned at the extreme ends of an 8-point rating scale. The respondent uses this rating scale to indicate to which pole he or she is leaning and to what degree or extent. In this study, oral instructions were given to each subject concerning completion of the questionnaire. Administration time was 15-20 minutes.

For the personality and coping questionnaires, we decided to compare the answers of the patient group with those of the comparison group from a previous study to obtain preliminary indications whether the characteristics of the patient group differed from those of a group with no known abnormalities. The responses of the comparison group to the questionnaires was part of a standardization program. These are instruments in development, which made it useful to administer them to a normal control group. It should also be kept in mind that the comparison group responded to the German versions of the two questionnaires. It was, however, regarded as more acceptable to use data from this group than data available from a French-speaking group consisting exclusively of college students.

As the response scale for the items of the personality questionnaire contained only six instead of eight points, z-scores over all dimensions were calculated for both versions to ensure comparability. As the strategies of the Cop-I had been slightly modified only 19 of the 21 strategies could be used for these comparisons.

RESULTS

Patients and comparison group differences

Caution should be used in the interpretation of the findings of this study because of the unequal cell sizes between the comparison N-61 and the clinical N-17 groups.

Coping strategies

On both the coping and personality questionnaires, the subjects differed from the comparison group. With regard to coping strategies, patients with nodules and polyps used emotional coping strategies more and cognitive coping strategies less (p = 0.01).

Personality traits

With regard to personality traits, patients indicated less depression, more altruism, and more internal control (t test, p < 0.05) than the comparison group. The latter trait refers to the belief that one’s fate is largely dependent on one’s own acts.

Voice quality

The mean speaking fundamental frequency of the patients was 218.9 Hz. The value reported by Stoicheff (55) for a normal group of women of the same age group (20 to 59 years) is 215.2 Hz.

A negative correlation was found between $F_o$ and standard deviation (SD). In this study, it was found that the lower the $F_o$, the higher the SD. Normally one would expect to find low $F_o$ with low SD.

Patient group differences

Coping and personality

As was to be expected, the two patient groups did not differ in the type of coping strategies used to deal with emotional upheaval and stress.

Regarding personality traits, the two patient groups differed in dominance and altruism; patients in the polyp group having higher scores on dominance and lower scores on altruism. Because these two variables are correlated negatively, their joint relationship to type of voice pathology was investi-
gated by means of a regression analysis. Type of voice pathology was found to be significantly related to dominance and to a lesser extent to altruism. It was found that dominance was the more important of the two personality variables, as only dominance was kept in the resulting regression equation (29% of variance explained).

**Voice quality**

No differences in voice quality variables were found for the two patient groups. Taking into account the information contained in the utterance samples and in the personality variables, an analysis of variance with type of voice pathology as between Ss factor, utterance 1 to 8 as within Ss factor, and dominance as a covariate was performed, which yielded no differences for the two groups with respect to the four voice quality variables.

**Personality traits and coping strategies to voice quality variables relationships**

Table 1 shows that a number of coping and personality variables were found to be correlated significantly with voice quality variables. As these variables are interrelated, regression analyses were performed to investigate the joint relationship of these variables to median F_o as well as F_o variability. It was found that median F_o is related to the use of the strategy "problem acceptance" only (32% of variance explained). F_o variability was found to be positively related to general emotional coping style and negatively to cognitive coping strategies (70% of variance explained).

**Structured questionnaire interview results**

It is interesting to note that during the interview in answer to the structured questionnaire, 15 patients reported stressful events prior to the onset of dysphonia. In response to the question: "Did you experience separation, divorce, or death prior to the onset of dysphonia?", the responses were three deaths, two divorces preceded by separation, two separations only, and one parental divorce with definite separation of the patient from her father after which she reported having no further contact with him. Of these, one subject reported having experienced all three events: separation, divorce, and death. In response to the question: "Did you experience change of work prior to the onset of dysphonia?", 11 patients reported yes (this included change of work, change of lifestyle or being fired). In addition, 11 reported to be in a situation of conflict prior to the onset of dysphonia, either with a

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**TABLE 1. Coping strategies and personality dimensions means and distributions**

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Mean</th>
<th>SD</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence</td>
<td>0.41</td>
<td>2.81</td>
<td>17</td>
</tr>
<tr>
<td>Extraversion</td>
<td>-0.06</td>
<td>3.19</td>
<td>17</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-1.96</td>
<td>2.66</td>
<td>17</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>0.12</td>
<td>2.91</td>
<td>17</td>
</tr>
<tr>
<td>Self-assurance</td>
<td>1.06</td>
<td>2.61</td>
<td>17</td>
</tr>
<tr>
<td>Hostility</td>
<td>-0.33</td>
<td>2.83</td>
<td>17</td>
</tr>
<tr>
<td>External control</td>
<td>3.24</td>
<td>0.57</td>
<td>17</td>
</tr>
<tr>
<td>Warmth</td>
<td>0.76</td>
<td>2.31</td>
<td>17</td>
</tr>
<tr>
<td>Dominance</td>
<td>1</td>
<td>2.72</td>
<td>17</td>
</tr>
<tr>
<td>Anger</td>
<td>-1.53</td>
<td>2.6</td>
<td>17</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>2.88</td>
<td>1.96</td>
<td>17</td>
</tr>
<tr>
<td>Excitement seeking</td>
<td>-1.06</td>
<td>2.38</td>
<td>17</td>
</tr>
<tr>
<td>Depression</td>
<td>-1.76</td>
<td>1.89</td>
<td>17</td>
</tr>
<tr>
<td>Altruism</td>
<td>2.71</td>
<td>1.31</td>
<td>17</td>
</tr>
<tr>
<td>Emotional stability</td>
<td>0.18</td>
<td>2.9</td>
<td>17</td>
</tr>
</tbody>
</table>

**TABLE 2. Correlations between voice quality variables and coping strategies (significant coefficients)**

<table>
<thead>
<tr>
<th>Voice quality variables</th>
<th>Median F_o of F_o (SD)</th>
<th>Energy up to 500 Hz</th>
<th>Energy up to 1,000 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coping Strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem acceptance</td>
<td>0.56*</td>
<td>-0.54*</td>
<td></td>
</tr>
<tr>
<td>Wishful thinking</td>
<td>-0.51*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substitution of affect</td>
<td>0.65*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-concept</td>
<td></td>
<td>-0.94*</td>
<td></td>
</tr>
<tr>
<td>modification</td>
<td>0.50*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeking confirmation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of denial</td>
<td>0.59*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive coping</td>
<td>0.47*</td>
<td>-0.02*</td>
<td>-0.44*</td>
</tr>
<tr>
<td>Emotional coping</td>
<td>0.62*</td>
<td></td>
<td>-0.50*</td>
</tr>
</tbody>
</table>

SD = standard deviation.
parent, spouse, child, or employer. At the time of interview, 9 of these reported to be still in a state of unresolved conflict and 11 reported to be in a state of anxiety concerning everyday lifestyle.

**DISCUSSION**

**Patients and comparison group differences**

**Coping Strategies**

The finding that both the nodule and polyp group use emotional coping strategies more and cognitive coping strategies less than the comparison group supports previous findings by Arnold that there is a relationship between emotional factors and faulty use of the voice (8). He considered nodules and polyps to represent local tissue reaction to mental strain imposed by inappropriate emotional adjustment to demands made by society. However, this study does not support the findings of others (41-43), who found no difference in style of coping between two groups of dysphonic patients and a group of controls with no dysphonia.

Based on the findings of empirical research in the psychological literature, it is highly likely that there is a relationship between emotional state, coping, and voice through an effect on the physiological mechanism involved in phonation. Emotional coping strategies would imply a tendency to engage in affective processes to deal with stressful situations. In view of the fact that the voice is one modality of affective expression, one would expect a modification of the muscle tension involved in respiration, phonation, and articulation to express the emotion felt, whether it be anger or anxiety, and, consequently, a change in the acoustic parameters of the voice. The acoustic output of this might be speaking with a greater vocal intensity while expressing anger or speaking at a higher pitch when anxious (52). Cognitive coping strategies would imply a tendency to use the cognitive mechanisms for problem solving and psychic coping. In the use of this strategy, no change in the acoustic parameters of the voice would be expected as the individual is not using affective processes to cope with the situation.

The effect of excessive muscle tension in phonation is well known and can lead to tissue damage of the vocal folds (7). In an earlier study, the same authors found tightness in the paralaryngeal muscle areas by palpation and visualization, and thus implied that the intrinsic muscles of the larynx would be in a similarly tense state (14). In patients with fleshy nodules, they found an open posterior glottic chink between the arytenoid cartilages on phonation. This was explained in terms of incomplete relaxation of the posterior cricoarytenoid muscles and increased tightness of the thyroarytenoid muscles on phonation to compensate for the space and to achieve apposition of the vocal cords anteriorly (56).

It could, therefore, be hypothesized that in periods of emotional stress there is a further increase in tension in the thyroarytenoid muscles. This would result in tighter apposition of the vocal folds and thus heighten the predisposition to mucosal changes on the vocal cords. “Excessive phonation through a tense larynx will eventually lead to mucosal changes on the vocal cords” (14).

It is also possible that the use of certain emotional coping strategies may increase the likelihood of certain physiological behaviors influencing nodule and polyp formation. For example, in anger, which is associated with the use of greater vocal intensity, there is probably greater friction on the vocal cords. Fant showed that acoustic intensity is proportional to the amplitude of vibration so the larger the amplitude, the greater the velocity of tissue movement and the greater the friction (57).

**Personality traits**

It is interesting that patients indicated less depression, more altruism, and more internal control than the comparison group. The fact that they demonstrated more internal control may lead to stress or internal tension, because they believe they are responsible for the state of things. It could be hypothesized that this internal tension may be transferred to the musculature involved in phonation and thus lead to vocal misuse.

This result can also be viewed as an unusual finding, as one would expect to find the opposite in people who are ill. It cannot be excluded that the patients’ answers may have been influenced by social desirability effects, especially as the anonymity of the responses could not be guaranteed. Patients may have consciously or unconsciously tried to present themselves favorably to the interviewer who was also their voice therapist.

**Voice quality**

It is worth noting that the mean speaking $F_o$ of the patients in this study was not statistically different from the values reported by Stoicheff (55) for a group of normal women. Murry (58) reported a sim-
ilar finding and concluded that "organically based voice disorders are not characterized by an SFF that is lower than that found in normal voices." Our perception of organically based voice disorders would lead us to believe that the speaking fundamental frequency (SFF) of these voices is lower than in normals, but, as Murry explains, this impression of lower SFF is caused by the perception of voice quality rather than the perception of pitch alone. In a more recent study, Hirano (59) found significantly lower mean SFF for both the nodule and polyp groups of his study. In view of the small number of subjects in the present study and the different languages of the speech samples on which the comparison values are based (French and Japanese), it would lead too far to speculate about the possible reasons for these results.

Patient group differences

Personality traits

It is interesting that the polyp group had higher scores on dominance than the nodule group. It could be hypothesized that patients with a dominant personality may be at a higher risk for the development of polyps. The idea could also be evoked that there may be a relationship between vocal register dominance and vocal polyps.

Personality traits and coping strategies to voice quality variables relationship

In the relationship of coping strategies and personality to voice quality variables, the variability of F0 plays an important role. Patients using emotional coping strategies showed greater variability of F0. It makes sense that people who tend to use emotional coping strategies, including substituting other effects, would speak with more lively inflections of the voice and show less regularity in their phona-

Structured questionnaire interview

It is interesting to note that 15 of the 17 patients in this study reported the occurrence of stressful events prior to the dysphonia. This result supports the findings of Mans et al. (44) who report that stress at the onset of dysphonia was found to be of prime importance in a group of patients with vocal cord granuloma. It is also worth noting that nine patients reported at the time of interview to be in a state of conflict with a person close to them. Eleven patients considered themselves to be anxious concerning their everyday life. These factors can be considered to be stressful and consequently influence vocal use.

CONCLUSIONS

These results invite speculation that certain coping strategies and personality variables may contribute to the formation of vocal nodules and polyps through an effect on the physiological mechanism. There may be increased tension in the intrinsic laryngeal muscles associated with certain personality traits and coping strategies. Matas (60) considered voice disorders to be "a prototype of disorders which reflect the intricate interplay of emotional, cognitive and physiological functions." However, these behaviors are unlikely to be the only variables responsible for benign tumor development. Physiological, anatomic, and medical factors may also play a contributory role.

Clinical implications

This study suggests that it is of interest to evaluate the personality and coping strategies of patients with benign tumors of the vocal folds before starting a voice therapy program. The diagnostic evaluation should include a structured questionnaire, designed to obtain information on the psychological, and social history. The existence of unresolved conflicts and the lifestyle of the patients need to be included to help in designing the treatment plan (61).

In addition to traditional voice therapy techniques particular attention should be given to:

1. Patients perception of daily hassles and the use of coping strategies.
2. Modification of one's perception of certain situations and coping strategies used in cases of dysfunctional coping.
3. Opportunity to express unresolved conflicts verbally in the therapy situation, in an attempt to help patients to acknowledge and resolve emotional stress.
4. Educate patients about the relationship between emotional stress and voice.

If the results indicated by this study are confirmed, the hope is to improve therapy by addressing the fundamental problem. Techniques that focus solely on behavioral modification of vocal abuse and misuse and techniques focused at the (laryngeal) mechanical level, ignoring the patients psychological, emotional, social situation, and lifestyle, have their place but do not get to the root of
the problem. Helping patients to use their voices well technically is of little help if the lifestyle of the patient and the coping strategies used are in conflict with therapeutic techniques. "It is necessary to consider psychological, organic, and social or enviromental factors involved in voice disorders, as well as such things as attitude, coping skills and lifestyle," (60). In conclusion, we must be able to combine our therapeutic techniques with the lifestyle, emotions, and coping strategies of our patients.

Further research is needed to objectify the findings of this study through the use of objective measures, such as electromyogram to examine muscular tension in the muscles of respiration and phona- tion in different emotional stress situations in patients with vocal nodules and polyps. It would also be of interest to carry out a similar study on a group of male subjects, to analyze the coping strategies used in this population. Another consideration would be to compare nodule and polyp groups with another group of patients presenting with a pathology also considered to have an emotional component.

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