

## Stroboscopedaryngoscopic Findings in Singing Teachers

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**Summary:** Professional voice users often present to otolaryngologists and laryngologists with specific voice complaints. The contributions of pathologic lesions to the patients' vocal complaints are not always clear on examination, and often, pre-morbid examinations of the larynx are not available for review. This study examines the incidence of laryngeal pathology among singing teachers. At a national convention of singing teachers, volunteers were recruited for a "free stroboscopedaryngoscopic examination." All volunteers completed a de-tailed questionnaire of their vocal and medical history and underwent stroboscopedaryngoscopic examination. Stroboscopedaryngoscopic examinations were completed in 20 volunteers, 7 of whom had voice complaints and 13 of whom perceived their voices to be normal. Vocal fold masses were common among the asymptomatic singing teachers. Evidence of reflux laryngitis was a common finding among both symptomatic and asymptomatic singing teachers. Asymmetries in vocal fold hypomobility were more common among those with voice complaints than was the presence of vocal fold masses in the population studied. **Key Words:** Singers—Singing teachers—Teachers—Reflux laryngitis—Vocal fold mass—Larynx—Stroboscopy—Videostroboscopy—Vocal fold hypomobility—Vocal fold paresis.

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### INTRODUCTION

Many of the studies that have explored the incidence of vocal fold pathology in singers have done so with the use of self-report questionnaires. In a study in which singing teachers and nonsinger controls were asked whether they ever had a previous or current voice problem, it was found that singing teachers were twice as likely to have had a self-re-

ported voice problem than controls (64% versus 33%).<sup>1</sup> In another study, when singers and non-singers were asked to report whether they ever had a previously diagnosed voice problem and whether they had any vocal disability within the year prior to the study, it was found that singers were 1.7 times more likely to have had a history of vocal disability in the year preceding the study (69% singers versus 41% nonsingers) and were twice as likely to have had a previously diagnosed voice problem when compared to the nonsingers (44% versus 21%, respectively)? These findings are congruent with the assumption that singers are more likely to experience and/or notice subtle voice changes and suffer disability from them, which suggests that they may also be

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Accepted for publication August 1, 2001.

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more likely to seek treatment. Thus, laryngologists should be familiar with the normal spectrum of laryngeal pathology within this population of professional voice users as well as with the relative contribution of pathologic findings to patients' vocal complaints.

There are only two studies in the English literature (Medline search from 1966 through January 2001) in which stroboscopic examination has been performed in singers without vocal complaints to determine the distribution of "abnormal" findings within this otherwise seemingly normal population of professional voice users.<sup>3,4</sup> In 1997, Elias et al reported the incidence of vocal fold pathology in 65 professional opera singers without vocal complaints.<sup>3</sup> Among these highly trained professional singers, the overall incidence of abnormal laryngeal findings was 58%. This included a 9% incidence of vocal fold lesions (3% nodules, 3% cysts, and 3% varices), a 7.5% incidence of asymmetries in vocal fold mobility, and a 42% incidence of findings consistent with reflux laryngitis. In another study investigating the incidence of vocal fold pathology among 65 college-level singing students, a higher incidence of signs of reflux laryngitis (73%) and a similar incidence of benign vocal fold lesions (5% cysts and 3% nodules) was found.<sup>4</sup> No asymmetries in vocal fold mobility were reported in that study. These studies have helped to define the spectrum of "normal" laryngeal findings in beginning and advanced singers. The majority of singers, however, cannot be placed into either of these categories. Many professional and amateur singers in the United States have a level of training in the middle of this spectrum, and many teach singing in addition to their other vocations and avocations. In the present study, we examined stroboscopic findings in 20 singing teachers in an effort to help define the incidence of pathology.

## METHODS

At a national convention of singing teachers, an invitation to participate in a research study and receive a free laryngeal videostroboscopic examination was announced on a meeting bulletin board. Twenty-four volunteers responded to the solicitation. All volunteers were asked to complete a detailed questionnaire

reviewing their personal singing and medical history. After completion of the questionnaire, a rigid stroboscopic examination was performed. All examinations were performed using the Kay Elemetrics (Lincoln Park, NJ) 70° rigid telescope and digital stroboscopy unit (model 9100S). Our protocol for stroboscopic examination and the questionnaire used have been described previously.<sup>5-8</sup> A light application of over-the-counter topical 1.4% phenol spray was applied as needed to prevent gagging.

Of the 24 volunteers, 4 were unable to complete the examination secondary to a hyperactive gag reflex and were excluded from the study. Stronger topical anesthetics were not used. Of the remaining 20 volunteers, there were 3 males and 17 females. The mean age was 50 years, range 22 to 76 years. All singing teachers enrolled in the study characterized themselves as classical singers; some also performed other styles of music (Table 1). Evaluation and interpretation of the stroboscopic examinations and evaluation of the questionnaires were performed independently of each other and in a blinded fashion by each of the authors.

**TABLE 1.** *Vocal Classification of Singing Teacher Volunteers*

Vocal Range	Number (n = 20)
Soprano	13
Mezzo-soprano	3
Alto	1
Tenor	0
Baritone	3
Bass	0
Musical Style	Number (n = 20)
Classical	20
Show	4
Spiritual	3
Pop	2
Nightclub	2
Jazz	1
Blues	1
Choral	1

## Results

Of the 20 subjects, 4 had specific complaints regarding their singing and speaking voices. Three additional volunteers initially reported on the questionnaire that they had no "voice problems," but later in the questionnaire admitted to experiencing "technical difficulties" with their voices. Table 2 lists the problems the volunteers reported experiencing, their past laryngeal histories, and their stroboscopy findings. All volunteers with specific or technical voice complaints are clas-

sified as having vocal complaints for the purposes of this paper. Although only 2 of the volunteers complained of heartburn, the questionnaire revealed that 13 of the 20 had symptoms consistent with laryngopharyngeal reflux. All of the volunteers had signs of reflux laryngitis on examination, which included findings of arytenoid edema, arytenoid erythema, postcricoid edema, interarytenoid pachyderma laryngis, and/or posterior cobblestoning. In only one of the volunteers was reflux laryngitis an isolated finding.

TABLE 2. *Vocal Complaints, Past History, and Current Stroboscopy Findings Among Singing Teacher Volunteers*

Volunteer #	Vocal Complaint	Technical Complaint	Years Training	Reflux Symptoms	Past History	Strobe Findings
1	Hoarse Fatigue Trouble with soft and high range	None	Some	AM hoarseness	None	Fluctuating L posthemorrhagic cyst, R reactive thickening Bilateral varices Reflux laryngitis Reinke's edema
2	Trouble with high range	None	Some	Throat clearing	None	L reactive thickening Bilateral varices Reflux laryngitis
3	Fatigue Trouble with low range	None	18 years	Heartburn Dryness	None	Reflux laryngitis Fluctuating
4	Fatigue Trouble with high range	None	8	None	None	Reflux laryngitis
5	None	Fatigue Trouble with soft	16	AM hoarseness	None	R cyst L reactive thickening L SLN paresis Bilateral varices Reflux laryngitis
6	None	Trouble with soft	4	AM hoarseness	None	R VF hypomobility Bilateral varices Reflux laryngitis
7	None	Trouble with register transition	16	AM hoarseness	None	R VF hypomobility Bilateral varices Reflux laryngitis
8	None	None	20	Cough	Vocal fold hemorrhage Nodules	R polyp L reactive thickening L sulcus vocalic L varices Reflux laryngitis

(continues)

TABLE 2. (continued)

Volunteer #	Vocal Complaint	Technical Complaint	Years Training	Reflux Symptoms	Past History	Strobe Findings
9	None	None	16	Throat clearing	None	Reflux laryngitis Bilateral varices
10	None	None	Some	None	Bilateral "swellings"	L cyst R reactive thickening R varices Reflux laryngitis
11	None	None	Some	None	None	Bilateral cysts Reflux laryngitis Bilateral varices
12	None	None	11	AM hoarseness Throat clearing	None	Bilateral sulcus vocalis R SLN paresis Reflux laryngitis
13	None	None	3	Dryness	None	L saccular cyst Bilateral varices Reflux laryngitis Reinke's edema L scar
14	None	None	4	None	None	R cyst Reflux laryngitis
15	None	None	14	None	None	Bilateral sulcus vocalis Bilateral varices Reflux laryngitis
16	None	None	20	Throat clearing	nodules	Bilateral cysts L fibrosis Bilateral varices Reflux laryngitis
17	None	None	7	AM hoarseness	Prenodules	R cyst, L reactive thickening Reflux laryngitis
18	None	None	25	None	None	L cyst, R reactive thickening Bilateral varices Reflux laryngitis
19	None	None	8	None	None	L cyst, R reactive fibrosis L VF hypomobility Bilateral varices Reflux laryngitis
20	None	None	22	Heartburn	None	R cyst, L reactive thickening L VF hypomobility Bilateral varices Reflux laryngitis

Abbreviations: L, left; R, right; SLN, superior laryngeal fold; VF, vocal fold.

The distribution of "abnormal" findings on stroboscopedaryngoscopic examination is presented in Table 3. All but 2 of the vocal fold cysts were accompanied by feeding varices at their bases, as was the one vocal fold polyp. Unilateral vocal fold hypomobility was defined as a unilateral decrease in vocal fold mobility in adduction, abduction, and/or longitudinal tension. Among the patients with vocal complaints, unilateral vocal fold hypomobility was evident in each of the 3 volunteers who complained of "technical difficulties." Fluctuating asymmetries in vocal fold hypomobility were defined as changing limitations in vocal fold mobility, with variations from moment to moment in which side appeared most sluggish. Fluctuating asymmetries in vocal fold hypomobility were present among 2 of the volunteers with specific vocal complaints; both of these volunteers had complaints of vocal fatigue. For the purposes of this paper, unilateral vocal fold hypomobility and fluctuating asymmetries in vocal fold hypomobility were grouped together into the general category of vocal fold hypomobility.

## DISCUSSION

Stroboscopedaryngoscopy is a useful tool in the evaluation of professional voice users with vocal complaints. Knowledge of the variability of vocal fold abnormalities in voice professionals, with and without vocal complaints, can be helpful in deter-

mining causal relationships between the stroboscopedaryngoscopic findings and the patients' complaints. In this population of singing teachers, there was a 35% (7/20) incidence of vocal complaints. Surprisingly, 43% (3/7) of those with complaints attributed their problems to their own technical inabilities and not to physiologic processes. Two of these individuals had voice training for more than 16 years, and one for 4 years. Their technical difficulties presented as vocal fatigue, trouble singing softly, and difficulty with register transition. All of these individuals were found to have evidence of vocal fold hypomobility. Given these findings and the nature of their symptoms, it is likely that the difficulties they were experiencing were related to their mobility problems. Among the other singing teachers with vocal complaints, 2/4 had evidence of fluctuations in vocal fold hypomobility; both had complaints of vocal fatigue. Thus, of all the volunteers with vocal complaints, 71% (5/7) had evidence of vocal fold hypomobility. The presence of a vocal fold mass was a less common finding (3/7 or 43%). Although there are too few volunteers in this study to form statistical analyses, the descriptive data suggest that vocal fold hypomobility may contribute to vocal complaints in singing teachers, especially those with vocal fatigue.

Among the singing teachers without vocal complaints, there was a high incidence of subepithelial vocal fold cysts (61% or 8/13). The majority of these cysts were accompanied by varicosities at their

TABLE 3. *Stroboscopedaryngoscopy Findings in 20 Singing Teacher Volunteers*

Finding	Vocal Complaint		No Vocal Complaint		Total	
	(n = 7)	(%)	(n = 13)	(%)	(n = 20)	(%)
Reflux laryngitis	7	(100)	13	(100)	20	(100)
Vocal fold cyst (unilateral or bilateral)	3	(42)	8	(62)	11	(55)
Vocal fold polyp	0	(0)	1	(8)	1	(5)
Varices	5	(71)	10	(77)	15	(75)
Sulcus vocalis	0	(0)	3	(23)	3	(15)
Reinke's edema	1	(14)	1	(8)	2	(10)
Vocal fold scar	0	(0)	1	(8)	1	(5)
Saccular cyst	0	(0)	1	(8)	1	(5)
Vocal fold hypomobility	5	(71)	3	(23)	8	(40)

bases, suggesting a traumatic etiology of the cysts.<sup>9</sup> The fact that benign vocal fold masses (polyps and cysts) were present in 69% (9/13) of these asymptomatic volunteers suggests that the presence of a mass lesion on the vocal fold is a relatively common phenomenon, at least among singing teachers, and that their presence does not necessarily imply that these lesions are contributing to vocal pathology in those with vocal complaints.

Signs of reflux laryngitis were present in all of the volunteers and were accompanied by other "abnormal" findings in 95% (19/20) of the volunteers. In a study investigating the incidence of reflux in patients with vocal fold masses, a threefold greater incidence of documented reflux episodes was found in patients with vocal fold masses than in controls.<sup>10</sup> These results support the commonly held notion that laryngopharyngeal reflux may play an important role in the development of laryngeal pathology and are congruent with other studies that have shown that reflux laryngitis is a common finding among singers.<sup>3,4</sup>

The greater incidence of signs of laryngopharyngeal reflux and vocal fold pathology in the present study in comparison to other studies may reflect the selection bias inherent in recruiting volunteers for "free examinations."<sup>3,4,10</sup> The motivations of the participants to volunteer for the present study were not explored. It is possible that even though no complaints were voiced in the asymptomatic group, these individuals may have been having some problems with the voice for which they compensated satisfactorily and could explain the higher incidences of signs of reflux laryngitis and vocal fold pathology in the present study in comparison to those reported by other studies.<sup>3,4,10</sup>

## CONCLUSIONS

Among the singing teachers who were studied, evidence of reflux laryngitis appears to be a ubiquitous

finding. Asymmetries in vocal mobility are more common among singing teachers with vocal complaints than in the asymptomatic group. Benign vocal fold masses are relatively common in the asymptomatic population of singing teachers, suggesting that caution should be exercised when attributing a patient's vocal complaints to the presence of a benign vocal fold mass and when considering surgical excision of these lesions.

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