Evaluation of Dysphonic Patients by General Otolaryngologists

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Summary: Objective. To investigate the instruments used by general otolaryngologists to visualize the larynx, assess the perception of the instruments' capabilities, and understand their comfort diagnosing specific etiologies of dysphonia.

Study Design. Cross-sectional survey.

Methods. One thousand randomly chosen general otolaryngologists from American Academy of Otolaryngology—Head & Neck Surgery were mailed a survey.

Results. The response rate was 27.8%. Mean years in practice were 19.5. Mirror and fiberoptic laryngoscopy were most commonly used. Approximately 84.1% used stroboscopy and 33.7% reported laryngoscopy could assess vibration. Respondents were more comfortable diagnosing conditions with obvious laryngeal structural abnormalities compared with those without, such as central neurologic disorders ($P \leq 0.001$). Approximately 46.5% were concerned about overdiagnosing laryngopharyngeal reflux (LPR).

Conclusions. Although 84.1% of general otolaryngologists use stroboscopy, one-third may not appreciate the differences between stroboscopy and laryngoscopy. General otolaryngologists are less comfortable diagnosing voice disorders without obvious laryngeal structural abnormalities, and nearly 50% are concerned that they overdiagnose LPR.

Key Words: Laryngoscopy–Stroboscopy–Dysphonia–Voice.

INTRODUCTION

Dysphonia is caused by diverse conditions, including malignant, benign, behavioral, and neurologic diseases. Approximately one third of the adult population in the United States experience a voice problem at least once during their lifetime.[1,2] Their vocal impairments can lead to significant reductions in self-reported quality of life, a negative impact on work productivity, and medical evaluation.[1,2]

Specific treatment recommendations cannot be made without ascertaining the cause of dysphonia. Laryngeal examination is an essential aspect in the evaluation of dysphonic patients.[3] Various methods for visualizing the larynx exist, including mirror laryngoscopy, rigid indirect telescopic endoscopy, flexible fiberoptic endoscopy, and flexible distal chip endoscopy. Secondary to differences in light and image transmission, image quality varies by technique, and different examiners are often more familiar with one technique over another.[3] The addition of stroboscopy to still-light endoscopy has also advanced the evaluation of dysphonic patients. Assessing the vibratory properties of the vocal folds during stroboscopy improves the accuracy of diagnosis and enhances treatment planning for dysphonic patients.[4–6] Different disorders or complaints may call for specific examination techniques.[7–10] To provide optimal care to the patients, a clear understanding of the properties of each technique and the ability to interpret the examination are required.

How comfortable general otolaryngologists are in differentiating the causes of dysphonia and what techniques they commonly use to evaluate the larynx in dysphonic patients is not fully known. Such information may provide insights about the current state of evaluation of dysphonic patients in the general otolaryngology community and highlight areas for education. Our hypothesis is that the general otolaryngologists use a variety of methods for laryngeal examination, underuse stroboscopy, and are more comfortable diagnosing patients with laryngeal anatomic abnormalities than patients without such problems. The specific aims of this study are to:

1. Investigate the instruments used by general otolaryngologists in examining the larynx,
2. Evaluate the perception of general otolaryngologists on the purpose of the different instruments, and
3. Better understand the perceived comfort level of general otolaryngologists in diagnosing specific conditions causing dysphonia.

METHODS

Approval was obtained from the Duke University Medical Center Institutional Review Board. Because the focus of the study was about the evaluation of adult dysphonic patients in the general otolaryngology community, general otolaryngologists were selected as potential study participants from the American

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Academy of Otolaryngology—Head & Neck Surgery (AAOHNS) membership database. Otolaryngologists who were identified as active members and who self-identified themselves as practicing general otolaryngology were selected. Among the 3862 general otolaryngologists from the AAOHNS membership database, 1000 were randomly chosen to receive a mail-based, anonymous two-part survey. The first part of the survey collected descriptive information about years in practice, practice setting, primary specialty, the use of stroboscopy, the utility of laryngoscopy compared with stroboscopy, primary method for laryngeal examination, and comfort level in diagnosing dysphonia owing to specific etiologies (Table 1). Comfort level in diagnosis was assessed on a 7-point Likert scale anchored by "not comfortable" and "very comfortable." With regard to the question about comfort level in making certain diagnoses, the survey purposefully did not specify if this was based on auditory perception, with the aid of laryngoscopy or stroboscopy, or based on speaking or singing complaints, to allow the respondent to determine their comfort level based on their individual method of assessing dysphonic patients. Because part 2 of the survey had a different focus, collecting information on the treatment of dysphonia, it will be reported separately.

Each subject was assigned a random number to track correspondence. Otolaryngologists were mailed the survey; a description of the study; and a self-addressed, business reply envelope. Four weeks after the initial mailing, nonresponders received a second mailing. A third mailing was sent 4 weeks after the second mailing. Participation was completely voluntary and confidential. Subjects consented to the study by completing the survey. Surveys that were returned blank were not included as responses. Comparisons between responders and nonresponders were performed to evaluate the potential differences between these groups. Although data from nonresponders were limited to gender and geographic location (which was grouped by census regions), differences between responders and nonresponders could indicate that our responder sample was not representative of the overall sample.[11] Descriptive statistical analysis, Rank Sum tests, and Chi-squared analysis were performed using *SigmaStat* 2.03 (SPSS Inc., Chicago, IL).

RESULTS

One thousand otolaryngologists who classified themselves as primarily practicing general otolaryngology were identified from the AAOHNS membership. Ten did not have a mailing address and 8 had retired, leaving 982 who could receive a survey. Of the potential 982 respondents, 273 (27.8%) completed the survey, and 6 additional surveys were returned blank. Approximately 87.1% of respondents were male compared with 86.7% of nonrespondents who were male ($P = 0.9$, Chi-squared test), and geographic location for responders compared with nonresponders was 25.4% versus 20.6% Midwest, 41.2% versus 39.8% south, 16.2% versus 19.6% northeast, and 17.3% versus 14.4% west, respectively ($P = 0.3$, Chi-squared test).

The mean years in practice were 19.5 years with standard deviation of 10.9 years. The most common practice setting was group practice, and the primary specialty was general otolaryngology (Table 2). The main methods for laryngeal examination were flexible fiberoptic laryngoscopy and mirror laryngoscopy (Table 3). There were neither statistically significant associations between years in practice and method of laryngoscopy ($P = 0.9$, analysis of variance [ANOVA]) nor practice setting and laryngoscopy method ($P = 0.7$, Chi-squared test).

Stroboscopy was used by 84.1% of respondents with 57.0% referring for and 40.0% performing stroboscopy (3.0% did not specify). No statistically significant associations between years in practice and use of stroboscopy were seen ($P = 0.5$, ANOVA). Respondents working in groups (41.7%) and academic practices (33.3%) used stroboscopy more than those in solo (21.6%) and hospital practices (8.3%) ($P = 0.02$, Chi-squared test). Respondents were asked to answer questions about the purpose of laryngoscopy and stroboscopy. Although 92.3% thought that stroboscopy could assess vibration, 33.7% reported that laryngoscopy could be used to assess mucosal vibration (Table 4).

Respondents reported their comfort level, on a 7-point Likert scale, in diagnosing specific conditions causing dysphonia. The median and the 25th and 75th quartiles are shown in Table 5. For further analysis, etiologies were grouped into two groups: (1) conditions with obvious structural laryngeal abnormalities (nodules, polyps, granulomas, cysts, carcinoma, leukoplakia, and paralysis) and (2) conditions without obvious structural laryngeal abnormalities (spasmodic dysphonia, muscle tension dysphonia, Parkinson's disease, amyotrophic lateral sclerosis, vocal tremor, vocal fold paresis, and laryngopharyngeal reflux [LPR]). Because findings of vocal fold paresis and LPR may not be as notable as the conditions in group 1, vocal fold paresis and LPR were included with group 2. Otolaryngologists were less comfortable diagnosing group 2 (nonstructural etiologies) compared with group 1 (median 6, interquartile range: 4–6 versus median 7, interquartile range: 6–7, $P \leq 0.001$, Rank Sum test). Approximately 46.5% of respondents were concerned that they might be overdiagnosing LPR. Concern for overdiagnosis of LPR was neither related to years in practice, laryngoscopy method, nor use of stroboscopy ($P > 0.05$).

DISCUSSION

Diverse etiologies cause dysphonia, requiring an accurate diagnosis for treatment planning. A comprehensive laryngeal examination as well as awareness of and comfort with the differential diagnoses are necessary to provide optimal care to the dysphonic patient. Despite this, how the general otolaryngology community uses the various available techniques for laryngeal examination and their comfort in diagnosing specific conditions has not been fully elucidated. This study aimed to clarify these deficiencies in our knowledge so that education could be directed to optimize patient care.

Various methods were used to examine the larynx of dysphonic patients. Mirror laryngoscopy and flexible fiberoptic laryngoscopy were the two most common modalities (Table 3). Flexible laryngoscopy has been reported to be at least as sensitive as mirror laryngoscopy in evaluating laryngeal motion and gross disease.[12]

TABLE 1.
Physician Survey

1. How many years have you been in practice? _____

2. In what setting do you practice? ❒ Academic ❒ Solo private practice

❒ Group private practice ❒ Hospital practice

3. What is your primary specialty? ❒ Laryngology ❒ General otolaryngology ❒ Otology

❒ Facial plastics ❒ Sinus/rhinology ❒ Allergy ❒ Pediatrics ❒ Head and neck

4. Do you perform or refer your patients for stroboscopy?

❒ I perform videostroboscopy ❒ I refer for videostroboscopy

❒ I do not obtain videostroboscopy

5. What is the principal purpose of laryngoscopy? (mark all that apply)

❒ examine vocal fold vibration ❒ assess mucosal detail ❒ assess adduction/abduction

❒ assess lesion impact on vibration ❒ assess vocal fold closure

6. What is the principal purpose of stroboscopy? (mark all that apply)

❒ examine vocal fold vibration ❒ assess mucosal detail ❒ assess adduction/abduction

❒ assess lesion impact on vibration ❒ assess vocal fold closure

7. I feel comfortable recognizing dysphonia/abnormal voice.

❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7
Not comfortable very comfortable

8. I feel comfortable diagnosing someone who may have

Spasmodic dysphonia ❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7
Not comfortable very comfortable

Reflux-related dysphonia ❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7

Muscle tension dysphonia ❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7

(*Continued*)

TABLE 1.
Continued

Parkinson's related dysphonia	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Amyotrophic lateral sclerosis related dysphonia	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal tremor	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold paresis	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold atrophy	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold polyp	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold nodules	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold granuloma	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold cyst	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold cancer	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold leukoplakia	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7
Vocal fold paralysis	❒ 1	❒ 2	❒ 3	❒ 4	❒ 5	❒ 6	❒ 7

10. Are you concerned you might be over-diagnosing reflux-related dysphonia?

❒ Yes ❒ No

11. What is your primary method for evaluating an adult patient's larynx?

❒ Mirror laryngoscopy ❒ Flexible fiberoptic laryngoscopy

❒ Flexible distal chip laryngoscopy ❒ Rigid indirect laryngoscopy

❒ Rigid videostroboscopy ❒ Flexible videostroboscopy ❒ Direct operative laryngoscopy

In addition, because mirror and rigid laryngoscopy alter the normal phonatory anatomy, common opinion holds that flexible laryngoscopy is better suited for evaluating the neurologic integrity of the larynx.[10,13] However, this issue has not been empirically studied. In contrast, compared with flexible fiberoptic and flexible distal chip endoscopes, rigid telescopic examination has yielded information that would have altered treatment.[14] The familiarity and experience of the examiner with endoscope type may also influence the information obtained on the examination, suggesting that as technology advances, training with new equipment is necessary.[14] Although the method of indirect laryngoscopy may affect diagnosis and treatment decisions, this is not fully known. Further research may help in determining the most appropriate methods for laryngoscopy and explore how different methodologies and training impact the utility of different imaging techniques and the management of the dysphonic patient.

TABLE 2.
Practice Setting and Primary and Secondary Specialty Among Respondents (n = 273)

Characteristics	%
Practice setting	
Group	52.7
Solo	27.1
Academic	12.1
Hospital	4.4
Did not answer	3.7
Primary specialty	
General otolaryngology	86.8
Laryngology	9.2
Sinus	1.8
Otology*	1.8
Facial plastics*	0.4

* Respondents with otology and facial plastic as primary specialty also stated that they practiced general otolaryngology.

Although stroboscopy is a valuable instrument in the evaluation of dysphonic patients, our findings suggested that it may be underused. Stroboscopy has been shown to be helpful in differentiating between vocal fold polyps and cysts and between vocal fold nodules and unilateral vocal fold lesions with contralateral reactive changes.[15,16] Studies comparing laryngoscopic with stroboscopic examinations revealed that stroboscopy changed or modified the diagnosis in 10–47% of cases and was determined to be critical or helpful in 27.2–68% of cases.[4–6] In addition, based on stroboscopic findings, surgical counseling was altered owing to finding of contralateral lesions, and treatment decisions regarding surgery versus voice therapy were changed in 10.3% of cases.[6] Despite the utility of stroboscopy and its impact on the diagnosis and management of voice disorders, 16.9% of our respondents do not perform or obtain stroboscopy. In a prior survey, 56% of respondents were unlikely to perform or obtain stroboscopy before the surgical management of benign vocal fold lesions.[17] Although our study did not explore reasons for not performing or referring for stroboscopy, expense, access, expertise, and perceived need may have limited its use. There may also be a bias in that the studies on the utility of stroboscopy were performed in tertiary centers and its value may be different in the greater otolaryngology community. Studies are needed to examine how stroboscopy alters the diagnosis, treatment, and outcomes of dysphonic patients managed in the greater otolaryngology community.

TABLE 3.
Method of Laryngeal Examination

Methods*	%
Flexible fiberoptic laryngoscope	79.5
Mirror	21.6
Flexible distal chip laryngoscope	3.3
Rigid indirect laryngoscopy	1.8
Rigid stroboscopy	3.3
Flexible stroboscopy	2.9
Direct operative laryngoscopy	1.5

* Respondents could choose more than one answer.

TABLE 4.
Purpose of Laryngoscopy and Stroboscopy

Purpose Of Laryngoscopy*	%	Purpose of Stroboscopy*	%
Assess vibration	33.7	Assess vibration	92.3
Assess abduction/ adduction	93.8	Assess abduction/ adduction	38.1
Assess lesion impact on vibration	39.6	Assess lesion impact on vibration	81.7

* Respondents could choose more than one answer.

Despite the usefulness of stroboscopic evaluation, otolaryngologists may not appreciate the differences between laryngoscopy and stroboscopy. Although roughly 90% of respondents reported that stroboscopy can assess vibration, one-third responded that laryngoscopy can be used to evaluate vibration and a lesion's impact on vibration (Table 4). Although respondents may have been confused by the survey questions concerning the purpose of laryngoscopy and stroboscopy, thereby influencing their responses, further education about the unique attributes and advantages of stroboscopic evaluation may be needed. Stroboscopic findings important for diagnostic classification have been identified, such as roughness of the vocal fold edge, phase closure patterns, and phase symmetry.[18]

TABLE 5.
Comfort Level in Diagnosing Specific Conditions on 7-Point Likert Scale With 7 Being "Very Comfortable" and 0 Being "Not Comfortable"

Condition	Median	25th Percentile	75th Percentile
Laryngopharyngeal reflux	6	5	7
Spasmodic dysphonia	5	5	7
Muscle tension dysphonia	6	4	6
Parkinson's disease	5	4	6
Amyotrophic lateral sclerosis	4	3	5
Vocal tremor	5	3	6
Vocal fold paresis	6	6	7
Vocal fold atrophy	6	5	7
Vocal fold polyp	7	6	7
Vocal fold nodule	7	6	7
Vocal process granuloma	7	6	7
Vocal fold cyst	7	6	7
Carcinoma	7	6	7
Leukoplakia	7	6	7
Vocal fold paralysis	7	6	7

Furthermore, roughness of the vocal fold edge, glottal closure, and vocal fold vibration influenced treatment decisions.[18] Because particular stroboscopic findings affect diagnosis and management, studies examining how experience and training affects the accuracy of stroboscopic interpretation may be of value. Otolaryngologists must be able not only to use the diagnostic tools but also to correctly interpret their findings so that the patients receive optimal and cost-effective care.

Otolaryngologists' comfort level in diagnosing different causes of dysphonia depended on the specific condition. Respondents were more comfortable diagnosing voice disorders with associated structural laryngeal abnormalities, such as vocal fold lesions or vocal fold paralysis, compared with those without, such as neurologic disorders (Table 5). Concordantly, Sulica and Louis[13] found that 47% of patients ultimately diagnosed with vocal tremor had no diagnosis on referral and almost one-third had been misdiagnosed with spasmodic dysphonia. Chen and Garrett[19] et al noted that 42% of patients who had bulbar amyotrophic lateral sclerosis were initially misdiagnosed. Merati et al[10] reported the importance of correctly recognizing neuromuscular disorders affecting the larynx. Our study assessed physicians' comfort level in making diagnoses in dysphonic patients without obvious structural abnormalities, not accuracy. Because some conditions can coexist or present with similar symptoms, such as vocal tremor, spasmodic dysphonia, and muscle tension dysphonia, making a diagnosis can be difficult. Further training may mitigate these issues. Studies have shown that education and training can improve the ability to correctly differentiate between vocal tremor and spasmodic dysphonia.[20] Further education of otolaryngologists in the diagnosis of disorders causing dysphonia without obvious structural abnormalities may improve their comfort and ultimately benefit patients.

Moreover, almost one half of the respondents were concerned that they overdiagnose LPR. From 1990 to 2001, the number of annual outpatient visits for reflux-related disease increased by 306%, particularly among otolaryngologists, and the number of prescriptions for proton-pump inhibitors rose 14-fold.[21] Given the surge in office visits and proton-pump inhibitor prescriptions as well as the finding that almost one half of the respondents were concerned that they over-diagnose LPR, patients may be receiving inappropriate or ineffective treatment for their voice problem secondary to a misdiagnosis of LPR.[22] With regards to diagnosing LPR based on the Reflux Finding Score, the same diagnosis was made using the flexible fiberoptic and rigid endoscopes in 92.8% of cases but only in 60% of cases using the flexible distal chip and rigid endoscopes.[8,23] Although Eller et al[8] found fewer LPR findings on flexible versus rigid examination, Milstein et al[7] found more findings on flexible compared with rigid examination. Thus, clinical judgments may differ depending on the method of laryngeal examination, influencing treatment decisions, patient outcomes, and health care costs. However, our study did not measure accuracy of diagnosis but only the concern of overdiagnosis. Further study of how otolaryngologists diagnose the dysphonic patient without obvious structural laryngeal abnormalities, the accuracy of those diagnoses, and management of those patients would be beneficial.

Certain methodological issues need to be addressed. A selection bias may exist in that otolaryngologists more interested in voice disorders were more likely to participate. Although comparison of gender and geographic distribution between responders and nonresponders showed no statistically significant difference, nonresponder bias is possible and could have impacted results, such as stroboscopy utilization. Also, items in the survey may have been misinterpreted and thus inaccurate responses to some questions may have occurred. No definition of the specific voice disorders was provided, potentially affecting the comfort level reported by respondents. The survey did not enquire about whether otolaryngologists had easy access to a laryngologist, and such individuals may have had different responses to the survey. The survey had respondents choose one identifying practice area instead of stating a percentage of time spent within different practice areas, which may have limited our ability to further define the study population, as otolaryngologists who split their practice into laryngology and general otolaryngology may not have been identified. Although many practitioners may see patients with voice complaints, the goal of this study was to provide insights into the practice patterns of general otolaryngologists. Yet, future studies should continue to explore evaluation methods for dysphonic patients and to compare practice patterns between practitioners identifying themselves as general otolaryngologists and laryngologists.

Lastly, our response rate was 27.8% and may be owing to incorrect contact information, lack of incentive for participation, and length of the survey. Because of the anonymous nature of the survey, telephone call reminders, which may have increased the response rate, were not possible. Alternative survey methods may have enhanced our response rate. Although Internet-based surveys are one option, Internet surveys have had lower response rates than paper surveys among health professionals.[24,25] Additionally, Lusk et al[26] found that given a choice of mail and internet, health professionals preferred mail and that internet responders were more likely male and younger. Potentially, a combined mail and Internet-based approach could be used for future survey studies. Nonetheless, our response rate is similar to other mail-based survey studies of otolaryngologists.[19,27]

CONCLUSIONS

The two most common methods for laryngeal examination were mirror and flexible fiberoptic laryngoscopy. Although 84.1% of otolaryngologists perform or refer for stroboscopy, one-third may not appreciate the differences between stroboscopy and laryngoscopy. Otolaryngologists were more comfortable diagnosing voice disorders with obvious laryngeal structural abnormalities, and approximately 50% of respondents were concerned about overdiagnosing LPR. How diagnosis and treatment are influenced by evaluation method, such as the use of stroboscopy, in the greater otolaryngology community requires further investigation. Studies exploring otolaryngologists' diagnostic and management strategies for dysphonic patients, who

do not have obvious laryngeal structural abnormalities, are also worthy of investigation.

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