

Dysphonia in Performers: Toward a Clinical Definition of Laryngology of the Performing Voice

*Joel Guss, †Babak Sadoughi, ‡Brian Benson, and §Lucian Sulica, *Walnut Creek, California, and †§New York, New York, and ‡Hackensack, New Jersey

Summary: Objectives. To identify causes of dysphonia in performers and compare causes and aspects of treatment of dysphonia in performers and nonperformers.

Study Design. Case-control study.

Methods. A chart review of all new patients presenting with a chief complaint of dysphonia over a 1-year period was performed. The prevalence of laryngeal disorders was reviewed and differences between performers and nonperformers were analyzed. The odds ratio of the prevalence of each disorder was computed against performer status as a risk factor.

Results. Four hundred seventy-six new patients complaining of dysphonia presented over 12 months; 74 were vocal performers. The median duration of symptoms in performers was 90 days. Phonotraumatic lesions were significantly more prevalent in performers (63.5% vs 28.6%, $P < 0.001$), particularly bilateral mid-fold swelling (4-fold increase in performers), pseudocysts (3-fold increase), and vocal fold hemorrhage/ectasia. Neurologic disorders (vocal fold paralysis and spasmodic dysphonia), neoplastic pathologies, and age-related phenomena (atrophy/presbyphonia) were significantly more common in nonperformers. Overall and diagnosis-specific rates of surgical intervention were equal between the two groups.

Conclusions. Phonotraumatic injury is responsible for the majority of dysphonia in vocal performers, to a significantly greater extent than in nonperformers and requires the implementation of standard therapeutic strategies. Awareness of the specific risks and management needs of the performer is of paramount importance to the practice of laryngology of the performing voice.

Key Words: Dysphonia—Performing voice—Phonotrauma.

INTRODUCTION

Vocal performers have long been considered a special subset of patients with voice disorders. In fact, the expression “performing voice” is sometimes used to refer to the medical and surgical care of this group of patients as a field separate from the main body of laryngology. Although the phrase is well established in professional discourse, the actual clinical scope and therapeutic implications of such a field remain ill-defined.

Performers are certainly unique in that their livelihood depends on the ability to produce voice of a particular quality, with increased frequency range and intensity, and sustained duration of phonation in high-stress public performance situations. The increased vocal demands of professional performance, therefore, create the potential for phonotrauma. Conversely, the technical abilities and laryngeal architecture of voice professionals might mitigate some of the risk of developing organic laryngeal pathology. It is not clear to what extent the risk of developing laryngeal pathology differs between performers and nonperformers. Some have explored the prevalence of self-perceived voice problems in performers¹ as well as the frequency of abnormal findings in asymptomatic

volunteers.² Yet, the prevalence of specific laryngeal pathologies among the range of performers presenting for the medical evaluation of a voice complaint has not been described, and the difference in causes of dysphonia between performers and nonperformers remains to be elucidated.

The goal of this investigation is to identify the causes of voice disorders in performers and examine differences in diagnosis and clinical presentation of dysphonia in performers compared with nonperformers. In so doing, we seek to ascertain whether “laryngology of the performing voice” has clinically distinctive features.

METHODS

Review of records

After obtaining Institutional Review Board approval, the medical records of new patients who presented with a chief complaint of dysphonia to an adult laryngology practice at an urban university medical center over a period of 1 year were reviewed. Patients presenting with nonvoice complaints, including dysphagia, cough, throat pain, globus sensation, stridor, or dyspnea were specifically excluded, as were asymptomatic performers presenting for baseline examinations. All patients completed the standard intake form used by the clinic, provided a detailed medical history, and underwent a complete head and neck examination. In addition, each patient underwent stroboscopy, using either a rigid glass rod peroral laryngoscope (model 9106; KayPENTAX, Lincoln Park, NJ) or a distal-chip flexible nasolaryngoscope (VNL-1170K; PENTAX Medical, Montvale, NJ), recorded for subsequent review. All patients' evaluations and surgical procedures were performed by the senior author (L.S.).

Accepted for publication October 8, 2013.

From the *Department of Head and Neck Surgery, Kaiser Permanente Medical Center, Walnut Creek, California; †Department of Otolaryngology-Head and Neck Surgery, Beth Israel Medical Center, New York, New York; ‡Voice Center, Hackensack University Medical Center, Hackensack, New Jersey; and the §Sean Parker Institute for Voice Disorders, Department of Otolaryngology, Weill Cornell Medical College, New York, New York.

Address correspondence and reprint requests to Lucian Sulica, Sean Parker Institute for Voice Disorders, Department of Otolaryngology, Weill Cornell Medical College, 1305 York Avenue, New York, NY 10021. E-mail: lus2005@med.cornell.edu

Journal of Voice, Vol. 28, No. 3, pp. 349-355

0892-1997/\$36.00

© 2014 The Voice Foundation

<http://dx.doi.org/10.1016/j.jvoice.2013.10.004>



FIGURE 1. A hemorrhagic polyp of the right vocal fold in the context of severe inflammatory change of both vocal folds in a 27-year-old rock vocalist.

Nomenclature

Performers were defined as those patients whose principal professional activity mandates public vocal performance. In practice, this included singers across several genres, actors, and broadcasters as detailed below. Students were included if their principal field of study was vocal performance. Avocational vocalists who derived their livelihood from a nonperforming activity were excluded. Schoolteachers, exercise instructors, salespeople, and other professions that are often included within the rubric of professional (as opposed to performing) voice users were not included in the performer group in this study.

All patients were classified according to primary diagnosis, extracted after a detailed review of the medical and stroboscopic examination records was undertaken. Multiple primary diagnoses were considered in each patient when they were felt to be equally contributive to the symptomatology. For the purposes of this study, diagnostic categories were standardized as follows: a polyp was a red, focal mass lesion with or without associated hemorrhage (Figure 1); hemorrhage referred to subepithelial extravasation of blood without focal mass effect; a vascular ectasia referred to any focal vascular abnormality without blood extravasation, including but not limited to a varix, vascular lake, and unusually prominent blood vessel (Figure 2); a cyst was an encapsulated subepithelial mass (Figure 3); a pseudocyst was a rounded or fusiform translucent lesion on the vibratory margin of the vocal fold (Figure 4); sulcus referred to a linear or fusiform atrophy of vocal fold mucosa



FIGURE 3. A subepithelial cyst of the right vocal fold in a 28-year-old attorney.

yielding volume loss and vibratory stiffness (Figure 5); contact lesion referred to mucosal irregularity over the vocal process of the arytenoid cartilage, including contact ulcer and granuloma; mid-fold fibrosis (MFF) was used to refer to a phenotypically varied group of typically sessile lesions of the vibratory margin of variable stiffness and mass (Figure 6)—these were almost always bilateral, although in some cases asymmetric, and encompassed lesions commonly referred to as “nodules,” “nodes,” or “singer’s nodes” as well as a series of more ambiguous phonotraumatic masses familiar to most otolaryngologists who treat voice disorders. In broad outline, this classification of mucosal lesions corresponds to that used by Bastian,³ Cornut and Bouchayer,⁴ and Zeitels et al⁵ in their surgical reviews and more fully elucidated by Hantzakos et al.⁶

Other less standardized diagnostic categories were also included: Vocal fold paresis referred to a partial neurogenic motor dysfunction suspected based on decreased vocal fold adduction or abduction, decreased tone and/or increased amplitude and phase asymmetry in the mucosal wave, associated with a history of early vocal fatigue, breathiness, and pitch limitation or instability; reflux laryngitis referred to a constellation of findings commonly attributed to gastric acid and pepsin-mediated irritation of the vocal fold, including edema, erythema, diffusely increased vascular markings, and/or epithelial thickening (not subepithelial fibrosis attributable to phonotrauma).

For purposes of analysis, individual diagnoses were grouped into etiologic categories. Phonotraumatic laryngeal disorders included bilateral MFF, polyps, pseudocysts, cysts, hemorrhage, vascular ectasia, and sulcus vocalis. Neurologic disorders



FIGURE 2. Bilateral varices in a 36-year-old soprano.



FIGURE 4. A left pseudocyst in a 26-year-old musical theater actor.

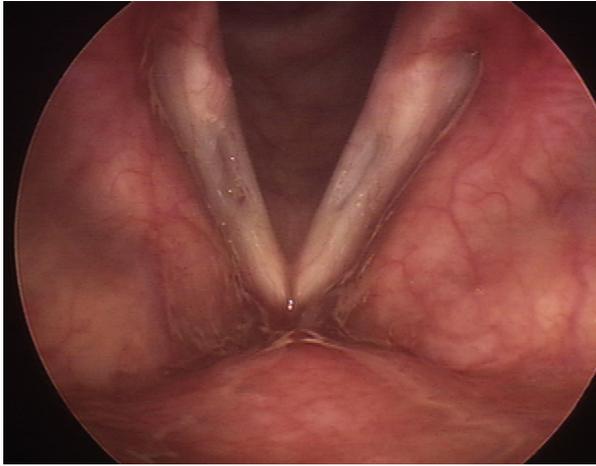


FIGURE 5. Bilateral sulcus deformity in a 37-year-old attorney.

included both unilateral and bilateral paralysis and paresis, tremor, Parkinsonian hypophonia, and spasmodic dysphonia. Reflux-related disorders included the broad category of reflux laryngitis and contact lesions. Inflammatory and infectious disorders encompassed acute infectious laryngitis (viral or bacterial), acute or chronic fungal laryngitis, and rheumatoid nodules but not reflux-related inflammation. Carcinoma, leukoplakia, and papilloma were included in the category of neoplastic disorders. Functional disorders included muscle tension dysphonia and psychogenic or other behavioral dysphonia patterns. Structural lesions encompassed age-related atrophy, Reinke edema, and laryngocele. Trauma and scar included iatrogenic scar, idiopathic scar or stenosis, and blunt or penetrating laryngeal injury.

Statistical analysis

The prevalence of various clinical disorders was recorded and compared between performers and nonperformers using chi-squared analysis. A binomial logistic regression analysis was performed and the odds ratio of the prevalence of each disorder was computed in performers versus nonperformers (IBM SPSS Statistics Version 20.0; IBM, Armonk, NY). An alpha risk level of .05 or less was used as reference for statistical significance.

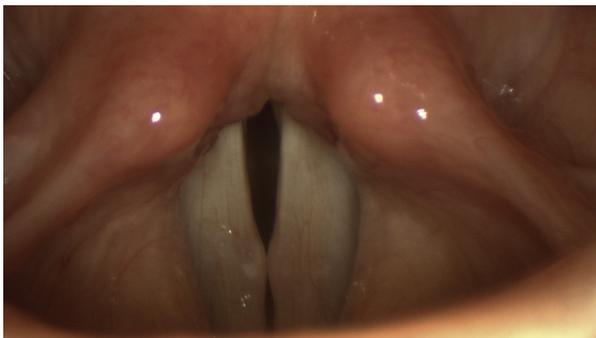


FIGURE 6. Bilateral MFF lesions in a 22-year-old musical theater student.

RESULTS

A total of 476 new patients with a chief complaint of dysphonia was seen over the 1-year study period. Of these, 74 (16%) were classified as performers according to the criteria outlined above and 402 as nonperformers. The average age of performers was 35 years (range: 12–65 years). There were 40 women (54%) and 34 men (46%). Ten patients (13%) were smokers. Sixty-nine patients (93%) were principally singers; genres included musical theater (39%), classical and opera (27%), pop and rock (22%), and cantorial (5%). Five patients (7%) were actors or broadcasters. Of note, smokers were found only among pop and rock vocalists and actors or broadcasters. Consistent demographic data were not available in nonperformers.

The median time between onset of the episode of dysphonia under evaluation and the initial visit was 90 days (range: 2 days to several years). Nine performers (12%) presented within 1 week of onset of voice change, 27 (36%) within 1 month, and 52 (70%) within 1 year. Only one patient had a history of vocal fold surgery.

Table 1 presents the prevalence of each diagnosis among performers and nonperformers. Phonotraumatic lesions were the most common etiology (63.5%) in performers, whereas they were only second (28.6%) in frequency to neurologic etiologies (40.8%) in nonperformers. Phonotraumatic lesions were significantly more common in performers ($P < 0.001$). Among specific phonotraumatic lesions, bilateral MFF, pseudocysts, hemorrhages, and vascular ectasia were significantly more common in performers ($P < 0.001$, $P = 0.021$, $P < 0.001$, $P = 0.020$, respectively). There was no statistically significant difference in the prevalence of vocal fold polyps, cysts, and sulcus vocalis.

Neurologic ($P < 0.001$), neoplastic ($P = 0.039$), and structural ($P = 0.002$) lesions were significantly more common in nonperformers. The uneven distribution of neurologic disorders was largely weighted by the predominance of unilateral vocal fold paralysis in nonperformers ($P < 0.001$). Vocal fold paralysis, Parkinson hypophonia, and spasmodic dysphonia were diagnosed exclusively in nonperformers, as were neoplastic and structural processes. No significant difference was noted between performers and nonperformers with respect to reflux-related (8% and 5%, respectively), inflammatory (9% and 6%, respectively), functional (3% and 2%, respectively), or traumatic (0% and 4%, respectively) disorders, which, as individual lesion categories, covered only modest etiologic contributions.

Within the lesion categories demonstrating statistically significant differences in prevalence, a regression analysis was performed to establish an association of the diagnosis with the status of performer. Phonotraumatic lesions were the only area where some association was observed in our population, specifically MFF and pseudocysts, for which performers were noted to have an odds ratio of 4.43 ($P < 0.001$) and 2.9 ($P = 0.027$), respectively, compared with nonperformers.

Table 2 lists the incidence of surgical intervention in each group. There was no striking difference between the two groups in the overall incidence of surgery; less than one in five new patients eventually underwent surgery. The incidence of surgical intervention for individual diagnoses is shown as well. The

TABLE 1.
Prevalence of Each Diagnosis in Performers and Nonperformers

Diagnosis	Number of Cases (%)		Pearson χ^2 ; <i>P</i> Value	Odds Ratio of Performer Status	Regression <i>P</i> Value
	Performers (<i>n</i> = 74)	Nonperformers (<i>n</i> = 402)			
Phonotraumatic	47 (63.5)	115 (28.6)	<0.001*		
MFF	20 (27.0)	31 (7.7)	<0.001*	4.4	<0.001*
Polyp	8 (10.8)	31 (7.7)	0.372	—	0.374
Pseudocyst	7 (9.5)	14 (3.5)	0.021*	2.9	0.027*
Cyst	3 (4.1)	20 (5.0)	0.734	—	0.735
Hemorrhage	5 (6.8)	0 (0)	<0.001*	—	0.993
Vascular ectasia	1 (1.4)	0 (0)	0.020*	—	0.993
Sulcus vocalis	3 (4.1)	19 (4.7)	0.800	—	0.800
Neurologic	14 (18.9)	164 (40.8)	<0.001*		
Vocal fold paresis	13 (17.6)	61 (15.2)	0.602	—	0.602
Unilateral vocal fold paralysis	0 (0)	64 (15.9)	<0.001*	—	0.997
Bilateral vocal fold paralysis	0 (0)	10 (2.5)	0.170	—	0.997
Parkinson/multisystem atrophy	0 (0)	5 (1.2)	0.335	—	0.997
Vocal tremor	1 (1.4)	8 (2.0)	0.711	—	0.713
Spasmodic dysphonia	0 (0)	16 (4.0)	0.081	—	0.997
Reflux-related pathologies	6 (8.1)	22 (5.5)	0.376		
Reflux laryngitis	4 (5.4)	8 (2.0)	0.085	—	0.098
Contact lesion (ulcer/granuloma)	2 (2.7)	14 (3.5)	0.732	—	0.733
Inflammatory (nonreflux)	7 (9.5)	24 (6.0)	0.264		
Acute infectious laryngitis	5 (6.8)	14 (3.5)	0.186	—	0.194
Fungal laryngitis	0 (0)	5 (1.2)	0.335	—	0.997
Rheumatoid nodules	0 (0)	3 (0.7)	0.456	—	0.997
Other chronic laryngitis	2 (2.7)	2 (0.5)	0.056	—	0.089
Neoplastic lesions	0 (0)	22 (5.5)	0.039*		
Carcinoma	0 (0)	11 (2.7)	0.150	—	0.997
Leukoplakia	0 (0)	3 (0.7)	0.456	—	0.997
Papilloma	0 (0)	8 (2.0)	0.221	—	0.997
Functional disorders	2 (2.7)	7 (1.7)	0.577		
Aphonia/falsetto	0 (0)	5 (1.2)	0.335	—	0.997
Muscle tension dysphonia	2 (2.7)	2 (0.5)	0.056	—	0.089
Structural disorders	0 (0)	49 (12.2)	0.002*		
Atrophy/presbyphonia	0 (0)	32 (8.0)	0.012*	—	0.997
Laryngocele/saccular cyst	0 (0)	3 (0.7)	0.456	—	0.997
Reinke edema	0 (0)	14 (3.5)	0.103	—	0.997
Trauma and scar	0 (0)	18 (4.5)	0.063		
Idiopathic scar	0 (0)	6 (1.5)	0.290	—	0.997
Postoperative scar/web	0 (0)	4 (1.0)	0.389	—	0.997
Intubation injury	0 (0)	6 (1.5)	0.290	—	0.997
External injury	0 (0)	2 (0.5)	0.543	—	0.997

Notes: Results are provided as the total number of patients, and in parentheses as a percentage of the total number of patients within the group. Wherever applicable, the odds ratio of lesion prevalence is displayed, reflecting the risk profile of performers versus nonperformers.

* Statistically significant difference or odds ratio ($P < 0.05$).

overwhelming majority (83%) of indications for surgery in performers encompassed phonotraumatic lesions; for nonperformers, paralysis (37%), polyps (21%), and neoplasms (19%) were the most frequently operated on lesions, whereas phonotraumatic lesions altogether represented only 41% of the interventions. No individual diagnosis exhibited a statistically significant difference in the incidence of surgery between the two groups, although a consequent imbalance was noted in our study population in the case of pseudocysts, surgically

treated 57% of the time in performers compared with 14% of the time in nonperformers.

The median time between the initial visit and surgery for performers was 82.5 days (3 days to 14 months).

DISCUSSION

The present study represents one of the first attempts to describe the demographics, diagnosis, and treatment of performers presenting to a laryngologist with a voice complaint in comparison

TABLE 2.
Incidence of Surgical Intervention for Each Diagnosis in Performers and Nonperformers

Diagnosis	Performers (n = 74)			Nonperformers (n = 402)		
	All Lesions	Surgical Intervention (% of All Operated Lesions)	Incidence of Surgical Intervention Within Lesion Category (%)	All Lesions	Surgical Intervention (% of All Operated Lesions)	Incidence of Surgical Intervention Within Lesion Category (%)
Phonotraumatic	47	10 (83.3)	21	115	30 (41.1)	26
MFF	20	2 (16.7)	10	31	4 (5.5)	13
Polyp	8	2 (16.7)	25	31	15 (20.6)	48
Pseudocyst	7	4 (33.3)	57	14	2 (2.7)	14
Cyst	3	1 (8.3)	33	20	6 (8.2)	30
Hemorrhage	5	—	—	0	—	—
Vascular ectasia	1	—	—	0	—	—
Sulcus vocalis	3	1 (8.3)	33	19	3 (4.1)	16
Neurologic	14	2 (16.7)	14	164	29 (39.7)	18
Vocal fold paresis	13	2 (16.7)	15	61	2 (2.7)	3
Vocal fold paralysis	0	—	—	74	27 (37.0)	36
Parkinson/multisystem atrophy	0	—	—	5	—	—
Vocal tremor	1	—	—	8	—	—
Spasmodic dysphonia	0	—	—	16	—	—
Reflux-related pathologies	6	—	—	22	—	—
Inflammatory (nonreflux)	7	—	—	24	—	—
Neoplastic lesions	0	—	—	22	14 (19.1)	64
Carcinoma/leukoplakia	0	—	—	14	7 (9.6)	50
Papilloma	0	—	—	8	7 (9.6)	88
Functional disorders	2	—	—	7	—	—
Structural disorders	0	—	—	49	—	—
Trauma and scar	0	—	—	18	—	—
Total	76	12 (100)	16	421	73 (100)	18

Notes: No statistically significant difference was noted between the two groups in any category.

to nonperformers from the same community. We chose to employ a narrow definition of “performer,” including only individuals that generate—or in the case of students, intend to generate—the bulk of their livelihood from public vocal performance. We recognize that broader definitions exist: the term “professional voice,” in particular, has occasionally been substituted for performing voice and extends inclusion to a wide group of individuals with extensive occupational vocal demand but who are not subject to intense artistic or technical performance scrutiny. Many of these, such as teachers, form an important group of patients with voice disorders, yet were excluded from the performer group on which this study focuses.

Phonotraumatic lesions were significantly more common in performers than in nonperformers in this study, in accordance with expectations. Of note, although, most of this difference was accounted for by bilateral MFF, pseudocysts, and vocal fold hemorrhage; the latter was diagnosed exclusively in performers. However, the quantitative magnitude of the association between the status of performer with the presence of certain phonotraumatic lesions (4-fold increase in MFF, 3-fold increase in pseudocyst) was remarkable and prompts the need to consider the status of performer as a genuine pathophysiological risk factor for those pathologies.

There was no significant difference in the prevalence of polyps and cysts between the two groups. We suspect this may be the result of a different sensitivity to voice change between performers and nonperformers rather than an absolute increased incidence of these diagnoses. For example, MFF, hemorrhage, or pseudocysts may be likelier than polyps or cysts to yield only pitch limitation, irregularity or inconsistency in voice quality, and decreased vocal stamina that might more frequently go unnoticed by the nonperformer.⁵ On the other hand, a polyp or cyst may be more likely to affect routine phonation in the modal register,^{7,8} which is apparent to both performers and nonperformers. A full exploration of this notion would require a detailed examination of lesion characteristics and acoustic parameters that is beyond the scope of the present work. We note, although, that Phyland et al¹ have previously shown that while singers and nonsingers reported similar numbers of voice impairment symptoms in their speaking voice, the self-rated significance or sense of disability was significantly greater in singers.

Nonphonotraumatic disorders, particularly neurologic, neoplastic, and structural lesions were generally more common in nonperformers. Some neurologic diseases such as vocal fold paralysis and spasmodic dysphonia were seen exclusively in nonperformers, along with such tobacco-related pathologies as carcinoma, leukoplakia, and Reinke edema, and age-related problems of vocal fold atrophy and presbyphonia. Although we did not have extensive demographic data at hand for nonperformers, it is reasonable to assume that much of this difference is due to important demographic discrepancies between the two groups, relating to the selection criteria we used.

Laryngopharyngeal reflux, and specifically reflux laryngitis, was not more prevalent in either group and did not represent a remarkable etiology of new-onset dysphonia in our study. The clinical diagnostic criteria of laryngopharyngeal reflux disease rely on scant evidence and have perhaps too often led it to

become a diagnosis of convenience, used to explain hoarseness for which another cause is not immediately evident on continuous light endoscopy. All patients in this study did undergo stroboscoped laryngoscopic evaluation, and symptoms were attributed to reflux laryngitis infrequently. A more rigorous diagnostic investigation would include 24-hour double-probe pH or impedance testing; practical considerations, however, lead to this typically being reserved for empiric treatment failures.

Similarly, functional and acute inflammatory disorders represented insignificant fractions of either group, with no preponderance in performers versus nonperformers. This illustrates the lack of veracity of common assumptions about performers, their supposed high rate of psychogenic manifestations, and perceived propensity to seek urgent specialized care for otherwise trivial seasonal ailments. None of those tendencies was verified in our study, where performers appeared just as likely to be affected as nonperformers.

Of interest, the most common performance genre among vocalists presenting with hoarseness was musical theater. It has been suggested that musical theater performers are less likely than classical vocalists to be trained in proper vocal technique and hygiene and may exhibit a more pressed mode of phonation.^{9,10} Although this characteristic voice quality is desirable for this type of performance style, it may predispose the performer to develop phonotraumatic lesions. Additionally, the phonotraumatic stress of the strenuous eight-show-a-week Broadway standard is self-evident. Within this cohort, the vocal demands of the broadcasters and actors are relatively less.

A median duration of symptoms before the initial visit of nearly 3 months was somewhat longer than that expected of performing vocalists. Only one third of patients presented within 1 month of onset; nearly a third tolerated more than a year of symptoms. Performers' attitudes toward pursuing evaluation and treatment of voice problems are complex. One recent study found that although the vast majority of contemporary singers acknowledged that their voice was important to their profession, only 43% responded that they were likely to seek medical attention for a voice disorder. Over one-third cited inadequate health coverage as a factor.¹¹ Another conceivable explanation of reluctance to seek voice-related medical care may lie in the potential impact of a laryngeal pathology and its management needs on ongoing and future performance commitments. This can be perceived by performers as a career-jeopardizing event and generate anxiety.

There was no significant difference between performers and nonperformers in the incidence of surgical intervention, somewhat in defiance of our expectations. Just below one in five new patients complaining of dysphonia eventually underwent a surgical procedure, regardless of their group assignment. This gives the lie to the prevalent notion that laryngology of the performing voice is a relatively nonoperative endeavor and suggests that performers are just as likely to seek definitive treatment as nonperformers. Surgery in performers has been examined in some detail by other authors.³⁻⁵ Although this investigation does not seek to address surgical outcomes, our impression corresponds to that in the literature, that surgery

in the properly evaluated and well-informed performer is safe and effective in returning him or her to performance.

Surgery for carcinoma, leukoplakia, papilloma, and vocal fold paralysis accounted for nearly half of the procedures in nonperformers. These are diagnoses that were seen exclusively in nonperformers and are generally clear indications for surgery. When considering the rate of surgical intervention for phonotraumatic lesions, there was no significant difference between the two groups for any diagnoses. There was a trend toward a higher rate of surgery for pseudocyst and paresis in performers that did not reach statistical significance. We postulate that with a larger sample size, this would represent an even more significant trend, as the effect on pitch stability, range, and endurance of these subtle laryngeal abnormalities often imposes career-altering limitations on phonation. On the other hand, there was no such trend for bilateral MFF even with substantial sample sizes (20 performers, 31 nonperformers). We hypothesize that performers may be more compliant with voice therapy, voice rest, and lifestyle changes than nonperformers thus improving the success rate of medical management for such amenable diagnoses as MFF.

This study suggests that laryngological care of performers has a principal focus on the prevention and management of the consequences of phonotrauma; as expected, such lesions predominate in performers and occur with significantly greater frequency than in nonperformers. It also indirectly suggests that evaluation and care must be tailored to relatively small voice derangements by the standards of nonperforming patients; findings that are of little consequence in most patients are significant in the performing population. Surgery, and particularly microsurgical treatment of mucosal lesions, is as important a part of treatment as it is in nonperformers.

The retrospective nature of this study is an important limitation that prevents more detailed conclusions. The data are relatively limited and do not include acoustic and aerodynamic information, blinded diagnostic evaluation of stroboscoped laryngoscopy, demographic data in nonperformers, or specific exploration of patients' attitudes toward their voice disorders and the rationale for their decision making. Another potential confounder is that data regarding the frequency of surgical treatment is only available for patients who pursued follow-up care and surgery at this center. It is not unusual for professional vocalists to seek multiple opinions; some may have pursued treatment elsewhere. However, the study does serve to frame questions for focused prospective investigation regarding hoarseness in performers.

CONCLUSIONS

Performers and nonperformers generally present with dysphonia of differing etiology, although there is considerable overlap. Lesions related to phonotrauma predominate in performers and are significantly more common than in nonperformers. Furthermore, there may be a higher sensitivity to small abnormalities that are inconsequential in other individuals. Rates of diagnosis-specific surgical intervention are similar between the two groups.

Although laryngology of the performing voice relies on conventional science rather than esoteric concepts, its practice requires particular attention to the specific risks and demands of the performer, particularly with respect to the management of phonotrauma. Future prospective studies are needed to further characterize the presentation, natural course, treatment, and outcomes of voice disorders in performers and nonperformers.

REFERENCES

1. Phyland DJ, Oates J, Greenwood KM. Self-reported voice problems among three groups of professional singers. *J Voice*. 1999;13:602–611.
2. Lundy DS, Casiano RR, Sullivan PA, Roy S, Xue JW, Evans J. Incidence of abnormal laryngeal findings in asymptomatic singing students. *Otolaryngol Head Neck Surg*. 1999;121:69–77.
3. Bastian RW. Vocal fold microsurgery in singers. *J Voice*. 1996;10:389–404.
4. Cornut G, Bouchayer M. Phonosurgery for singers. *J Voice*. 1989;3:269–276.
5. Zeitels SM, Hillman RE, Desloge R, Mauri M, Doyle PB. Phonomicrosurgery in singers and performing artists: treatment outcomes, management theories, and future directions. *Ann Otol Rhinol Laryngol Suppl*. 2002;190:21–40.
6. Hantzakos A, Remacle M, Dikkers FG, et al. Exudative lesions of Reinke's space: a terminology proposal. *Eur Arch Otorhinolaryngol*. 2009;266:869–878.
7. Cho KJ, Nam IC, Hwang YS, et al. Analysis of factors influencing voice quality and therapeutic approaches in vocal polyp patients. *Eur Arch Otorhinolaryngol*. 2011;268:1321–1327.
8. Dursun G, Karatayli-Ozgursoy S, Ozgursoy OB, Tezcaner ZC, Coruh I, Kilic MA. Influence of the macroscopic features of vocal fold polyps on the quality of voice: a retrospective review of 101 cases. *Ear Nose Throat J*. 2010;89:E12–E17.
9. Bjorkner E. Musical theater and opera singing—why so different? A study of subglottal pressure, voice source, and formant frequency characteristics. *J Voice*. 2008;22:533–540.
10. Koufman JA, Radomski TA, Joharji GM, Russell GB, Pillsbury DC. Laryngeal biomechanics of the singing voice. *Otolaryngol Head Neck Surg*. 1996;115:527–537.
11. Gilman M, Merati AL, Klein AM, Hapner ER, Johns MM. Performer's attitudes toward seeking health care for voice issues: understanding the barriers. *J Voice*. 2009;23:225–228.