Laryngoscope
Investigative Otolaryngology

ORIGINAL RESEARCH OPEN ACCESS

National Trends in Treatment of Acute Unilateral Vocal Fold Paralysis at Tertiary Care Voice Centers

Sydney Ring[1] | Nicholas Colwell[2] | Andrew J. Bowen[2,3] | Natalia Arroyo[4] | Koffi L. Lakpa[1] | Jaime Faus[5] | Miranda Rasmussen[6] | Peter Nordby[6] | Jiwei Zhao[7,8] | David O. Francis[2] | on behalf of the CoPE Collaborative

[1]Univeristy of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA | [2]Division of Otolaryngology-Head and Neck Surgery, Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA | [3]Metrohealth Medical Center, Cleveland, Ohio, USA | [4]Carbone Cancer Center, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA | [5]University of Wisconsin Survey Center, Madison, Wisconsin, USA | [6]Department of Surgery, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA | [7]Department of Biostatistics and Medical Informatics, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, USA | [8]Department of Statistics, University of Wisconsin, Madison, Wisconsin, USA

Correspondence: David O. Francis (dofrancis@wisc.edu)

Received: 4 March 2025 | **Accepted:** 19 March 2025

Funding: This work was supported by National Institute for Deafness and other Communication Disorders, NIH NIDCD R01DC021431.

Keywords: laryngology diagnostic practices | unilateral vocal fold paralysis | voice therapy

ABSTRACT

Objective: Acute unilateral vocal fold paralysis (UVFP) management differs across the United States. This study aims to characterize current trends in UVFP treatment at US tertiary care voice centers.

Data Sources: A survey was distributed to laryngologists at 51 tertiary care voice centers within the CoPE (Vocal Cord Paralysis Experience) Collaborative.

Review Methods: Participants provided information on voice center, laryngologist, and speech-language pathologist (SLP) characteristics, diagnostic practices, treatment decision-making, and therapies offered for acute UVFP (symptoms present for ≤6 months). National trends in diagnostic and treatment practices were evaluated.

Results: Among the 51 CoPE centers, 48 completed the questionnaire (17% Northeast, 33% South, 35% Midwest, 15% West). Most centers (77%) had 1–2 laryngologists managing acute UVFP, with SLP availability varying widely (0–8+ per site). Diagnostic practices varied significantly: only 26% of centers routinely measured mean airflow during phonation, 47% recorded maximum phonation time (MPT), and 53% assessed GRBAS. Treatment commonly included vocal fold injection augmentation, alone or combined with voice therapy, with injections typically administered 3–4 weeks after diagnosis (83%). Hyaluronic acid (95%), PROLARYN GEL (60%), and calcium hydroxyapatite (56%) were the most frequently used materials. Injection procedures were performed "often" in clinic settings (90%) and "rarely" or "never" in the operating room (42%) and hospital bedside (56%).

Conclusion: Significant variability exists in the diagnostic testing, evaluation, and treatment of acute UVFP across tertiary care centers. Future studies are warranted to explore the causes of these variations and assess the role of multidisciplinary approaches in optimizing UVFP care.

Level of Evidence: 3.

Fall Voice 2024, Phoenix, AZ October 24–262,024.

1 | Introduction

Unilateral vocal fold paralysis (UVFP) is a common cause of dysphonia treated by otolaryngologists and speech language pathologists (SLP) with an estimated annual incidence of over 20,000 in the United States [1, 2]. UVFP is caused by injury to one of the paired recurrent laryngeal nerves (RLN) resulting in an immobile vocal fold. Injury from head, neck, and chest surgeries represents the most common etiology followed by malignancy, trauma, and idiopathic causes [3]. Patients with UVFP experience dysphonia and thin liquid dysphagia that increase the risk of aspiration, all of which can have a profound impact on an individual's quality of life and lead to anxiety, depression, and the need to change employment [4].

Treatment of UVFP depends on its chronicity. Typically, clinicians delay invasive permanent treatments (i.e., laryngeal reinnervation, framework surgery) for 6–12 months after symptom onset to allow for spontaneous RLN recovery and resultant functional improvement. In the more acute setting (symptoms present for ≤ 6 months), clinicians offer several conservative treatments including vocal fold injection augmentation, voice therapy, and watchful waiting. Diagnostic and treatment decisions for acute UVFP are influenced by numerous factors such as the patient's degree of disability related to the UVFP, vocal demands, ability to protect their airway, degree of dysphagia, EMG findings, stroboscopic and vocal function factors, and comorbidities. In addition, physician and SLP experience and practice patterns inevitably shape treatment decisions.

Vocal fold injection augmentation with temporary materials is a safe and effective treatment modality for acute UVFP that results in near immediate improvement in voice and often swallowing [5–10]. Over the past 10 years, injection augmentation has transitioned from primarily an operating room-based procedure to one that is readily performed on awake patients [11–13]. While awake injection augmentation has made treatment of acute UVFP more accessible, there is no consensus on how providers decide where the procedure will be performed (e.g., in clinic, hospital bedside), when to inject relative to symptom onset, and which injectable to use.

Speech-language pathologists also play a crucial role in the diagnosis and treatment of acute UVFP. Voice therapy alone or in combination with injection augmentation can reduce undesirable compensatory hyper-functional behaviors that produce symptoms of strain, fatigue, and neck discomfort in this patient population. However, the effectiveness of voice therapy is less well characterized in the literature. A systematic review of 12 studies evaluating the effectiveness of voice therapy for UVFP found that therapy did improve voice; however, data were heterogeneous, and the level of evidence was low [14].

Certain patients also opt for watchful waiting or observation for their acute UVFP. This is a viable option for patients whose symptoms may not be as severe and/or who understand that in the first 3 to 9 months following injury, there is the potential for spontaneous recovery of function. Observation allows time for natural healing, which can prevent unnecessary interventions. If the patient feels that their symptoms warrant intervention, it is simple to transition from observation to active treatment with either injection augmentation and/or voice therapy. If no symptomatic improvement is seen within a year, more invasive permanent treatments are often considered [15].

While different treatment modalities exist for managing acute UVFP, little is known about current practice patterns across US tertiary care centers. Specifically, it would be useful to understand how variable practice patterns are in our specialty, which is striving to define standard-of-care practices for patients with UVFP. While we recognize that nuance and individualized decision-making are critical to patient care, this study aims to generally characterize current practice patterns. To address this knowledge gap, we leveraged a large, nationally representative, multi-institutional cohort to investigate overarching trends in acute UVFP management at tertiary care voice centers in the US, providing a foundational understanding upon which more detailed investigations can build.

2 | Methods

2.1 | Study Design

This study used a cross-sectional survey design to query clinicians at tertiary care voice centers—defined as specialized referral-based academic institutions staffed by fellowship-trained laryngologists and multidisciplinary teams—affiliated with the CoPE (vocal Cord Paralysis Experience) Collaborative about their current diagnostic and treatment approaches for acute UVFP. These centers represent a diverse range of geographic locations and practice settings and include laryngologists and speech-language pathologists with different fellowship training experiences. The study did not include community-based practices, where UVFP care also occurs. The study was deemed exempt by the University of Wisconsin Institutional Review Board (2023–1135). All participants provided electronic informed consent to be involved in this study.

2.2 | Survey Development

A team consisting of a laryngologist (DOF), a speech-language pathologist (NW), health services researchers (DOF, NA), a biostatistician (JZ), and a survey methodologist (JF) developed the questionnaires. Items were designed to capture detailed information about the management of acute UVFP (symptoms present for ≤ 6 months) including diagnostic approaches, treatment modalities, and follow-up practices. Questionnaires were designed and administered using Qualtrics^{XM} software, and the research team trialed surveys prior to dissemination to ensure clarity and functionality.

2.3 | Survey Components

The survey comprised multiple-choice and open-ended items, allowing for quantitative and qualitative data collection. Specifically, items asked about what data each voice center routinely collects on patients presenting with acute UVFP. These included the length of time patients had symptoms prior to presentation, types of symptoms, date of diagnosis, etiology, type of laryngoscopes used, whether stroboscopy was used, side of paralysis, whether vocal folds achieved closure and resting position,

instrumental voice evaluation parameters (e.g., mean airflow rate, maximum phonation time, GRBAS), treatments used, and timing of treatments. In addition, we collected data on the number of laryngologists and SLPs at each center that routinely care for patients with acute UVFP. Data were also collected on clinical workflow, specifically how often patients with acute UVFP were seen by both a laryngologist and SLP at their initial visit. Respondents were asked to estimate the number of patients with acute UVFP their center sees annually and how frequently as well as the timing that various treatment modalities are used (i.e., vocal fold injection augmentation, voice therapy, combination injection augmentation and voice therapy, watchful waiting, and others). For injection augmentation, the type of material was recorded, allowing centers to choose all that applied.

2.4 | Survey Administration

Questionnaires were administered electronically via email between March and May 2024 using a secure, web-based Qualtrics platform to the senior laryngologist at each site who was most familiar with their center's diagnostic and treatment approaches. This designee was asked to query their site's laryngology and speech-language pathology colleagues about their practice patterns and to summarize the site's approaches on the survey. Respondents were asked to complete the survey within 2 weeks of its receipt. To maximize the response rate, reminder emails were sent weekly to site participants who had not completed their questionnaires.

2.5 | Data Analysis

Survey responses were collated and coded for analysis. Quantitative data were analyzed using descriptive statistics, including the sum and percentage of total responding centers.

3 | Results

3.1 | Demographics

Of 51 CoPE sites, 48 completed the questionnaire (17% NE, 33% South, 35% Midwest, 15% West) (Figure 1; Table S1). Most centers (77%) reported having 1 to 2 laryngologists treating UVFP, while the number of SLPs varied, ranging from 0 to more than 8 per site. Specifically, 47% of institutions reported having 0 to 3, 43% had 4 to 7, and 9% had 8 or more SLPs.

3.1.1 | Regional Variations

The number of laryngologists treating UVFP varied by region. The West had the highest (14%) and the Northeast (0%) and South (6%) the lowest proportion of sites with more than 4 laryngologists. The number of UVFP patients seen annually differed by region, with a higher concentration of patients noted in the Midwest and South. The region that reported seeing the highest number of patients per center was the South, with 13% of centers caring for greater than 200 patients per year and 31% evaluating 100–200 patients a year. Among all centers, 89% report that patients are seen with an SLP concurrently at the first visit.

3.2 | Data Collection Practices

All centers surveyed consistently recorded the duration and types of symptoms, etiology, type of scope used, laterality, and the patient's ability to achieve full closure on stroboscopy. However, there was variability in additional testing. Only 26% measured mean airflow rate during phonation, 47% recorded maximum phonation time (MPT), and 53% routinely applied the GRBAS scale to patients with UVFP (Figure 2).

3.3 | Treatment Modalities

3.3.1 | Injection Augmentation

Injection augmentation, either alone or in combination with voice therapy, was the most reported treatment modality for acute UVFP. In all, 33% and 70% of centers used vocal fold injection augmentation alone and combined injection augmentation with voice therapy "extremely often" or "very often." Timing from diagnosis to injection varied among sites. Most performed injection augmentations 3 to 4 weeks (83%) or 1–2 weeks (76%) after a person is diagnosed with UVFP (Table 1). The most frequently used injectables, in order, were hyaluronic acid (95%), Prolaryn Gel (glycerin, sodium caboxymethylcellulose, and phosphate buffer; 60%), calcium hydroxyapatite (56%), autologous fat (41%) and Silk Voice (silk and hyaluronic acid; 17%). The included voice centers perform the vast majority of vocal fold injection augmentation in the clinic; 90% do clinic injections "extremely often" or "very often." In contrast, 42% and 56% of sites reported that they "rarely" or "never" perform injection augmentation in the operating room or hospital bedside (Table 1).

3.3.2 | Voice Therapy

Only 12% of voice centers use voice therapy alone "very often" or "extremely often" to treat acute UVFP. Voice therapy alone is used "sometimes" by 56% of sites, while 33% "rarely" used this treatment modality. The most reported duration of voice therapy was 5–8 weeks. While none of the centers reported that therapy was completed in this time frame "all of the time," 34% reported that it occurred "most of the time," 34% "some of the time," 24% a few times and 10% "none of the time."

3.3.3 | Watchful Waiting

Watchful waiting was an infrequent treatment option for acute UVFP. Specifically, 67% use watchful waiting "sometimes," 26% "rarely," and 7% "never" for acute UVFP. No site reported that watchful waiting was occurring "extremely often" or "very often."

4 | Discussion

The following investigation surveyed tertiary care voice centers across the country participating in CoPE regarding their volume and practice patterns for managing UVFP. Through this survey, this study aimed to discern the variability of practice patterns across the United States. Our investigation identified generalized

FIGURE 1 | Map depicting distribution of CoPE sites across the United States.

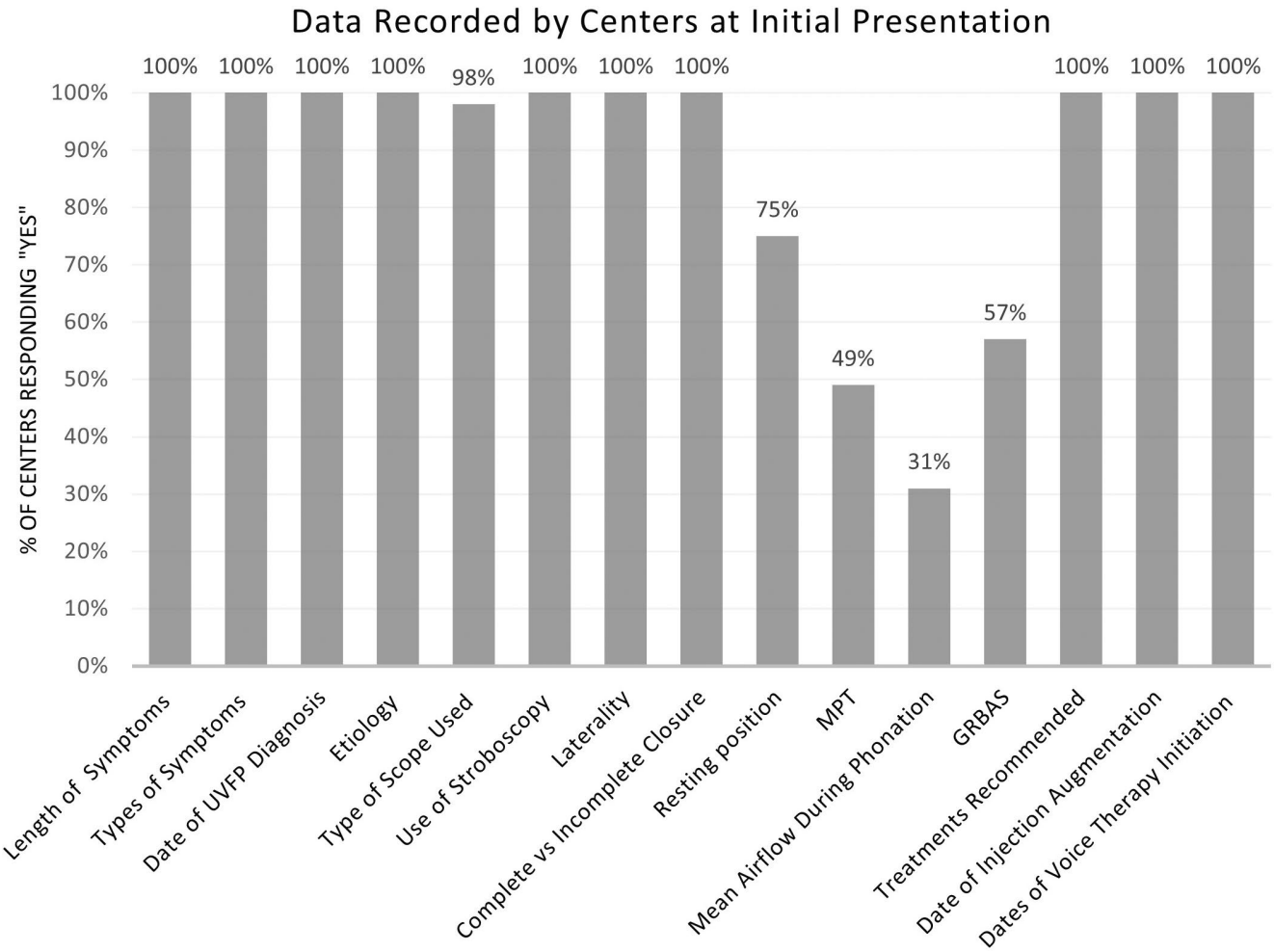

FIGURE 2 | Data recorded by centers at initial presentation.

TABLE 1 | Survey data*.

Treatment approach no. (%)	Extremely often	Very often	Sometimes	Rarely	Never
Voice therapy only ($n=43$)	1 (2.3)	4 (9.3)	24 (56)	14 (33)	0
Injection augmentation only ($n=43$)	8 (19)	14 (33)	19 (44)	2 (4.6)	0
Combination injection and voice therapy ($n=43$)	6 (14)	16 (37)	19 (44)	2 (4.6)	0
Watchful waiting ($n=43$)	0	0	29 (67)	11 (26)	3 (7.0)
Time to first voice therapy session no. (%)	**Most**		**Some**	**Few**	**None**
same day as consultation ($n=42$)	3 (7)		7 (17)	13 (31)	19 (45)
1–2 weeks ($n=41$)	8 (20)		14 (34)	16 (39)	3 (7)
3–4 weeks ($n=41$)	15 (37)		17 (41)	7 (17)	2 (5)
5–8 weeks ($n=41$)	4 (10)		12 (29)	18 (44)	7 (17)
Time to completion of voice therapy no. (%)	**All or almost all**	**Most**	**Some**	**A few**	**None**
Less than 1 week ($n=41$)	0	0	4 (10)	7 (17)	30 (73)
1–2 weeks ($n=41$)	0	0	8 (20)	11 (27)	22 (54)
3–4 weeks ($n=41$)	0	6 (15)	17 (41)	10 (24)	8 (20)
5–8 weeks ($n=41$)	0	14 (34)	14 (34)	10 (24)	4 (10)
9+ weeks ($n=43$)	4 (9)	7 (16)	11 (25)	12 (28)	9 (221)
Setting of injection no. (%)	**Extremely often**	**Very often**	**Sometimes**	**Rarely**	**Never**
In office/clinic ($n=43$)	16 (37)	23 (53)	1 (2)	3 (7)	0
Operating room ($n=43$)	2 (5)	5 (12)	18 (42)	17 (40)	1 (2)
Hospital bedside($n=43$)	3 (7)	4 (9)	12 (28)	16 (37)	8 (19)
Time from initial consultation to injection no. (%)	**All or almost all**	**Most**	**Some**	**A few**	**None**
Less than 1 week ($n=42$)	0	5 (12)	12 (29)	18 (43)	7 (17)
1–2 weeks ($n=42$)	2 (5)	10 (24)	20 (48)	10 (24)	0
3–4 weeks ($n=42$)	0	17 (40)	18 (43)	4 (10)	3 (7)
5–8 weeks ($n=43$)	0	4 (9)	13 (30)	17 (40)	9 (21)
9+ weeks ($n=42$)	0	2 (5)	6 (14)	18 (43)	16 (38)

(Continues)

TABLE 1 | (Continued)

Number of UVFP patients treated no. (%)	0–99	100–199	200+
Total ($n=42$)	25 (60)	17 (40)	1 (2)
West ($n=8$)	5 (63)	3 (38)	0
Midwest ($n=14$)	8 (57)	7 (50)	0
Northeast ($n=7$)	4 (57)	3 (43)	0
South ($n=13$)	8 (62)	4 (31)	1 (8)
Number of laryngologists treating UVFP no. (%)	**0–1**	**1–2**	**4+**
($n=47$)	7 (15)	36 (77)	4 (9)
Number of SLPs treating UVFP no. (%)	**0–3**	**0–7**	**8+**
($n=47$)	23 (49)	20 (43)	4 (9)

Type of injectable used no. (%)	Hyaluronic acid	Calcium hydroxyapatite	PROLARYN or radiesse gel	Autologous fat	Silk voice
	41/43 (95)	24/43 (56)	26/42 (62)	17/41 (41)	7/41 (17)

Note: * The *N* value for the table is based on responses. Not every center completed each question fully.

agreement in performing early intervention for UVFP with injection augmentation. There were, however, some major differences in the role of SLPs pertaining to voice therapy as well as in the use of watchful waiting.

4.1 | Assessment and Recording Practices

Our survey uncovered notable variability in the recording and assessment practices among institutions. While all centers consistently documented essential parameters such as symptom duration, etiology, and stroboscopic findings, less than half measured mean airflow during phonation (31%) and maximum phonation time (49%). The variability in using standardized measures like the GRBAS scale (57%) suggests a lack of consensus on comprehensive assessment protocols, potentially impacting the variability in treatment approaches across different centers.

4.2 | Injection Augmentation

Many of the factors that go into the treatment of acute UVFP with injection augmentation are not standardized and vary across the US, including the method of injection, the timing from presentation to injection, and which injectable material is used. We found that in-office injection was the most common treatment approach, occurring most frequently between 1 and 4 weeks after initial presentation. The most commonly used material was hyaluronic acid.

The method of injection augmentation (awake percutaneous or transoral vs. operative) does vary, and it is not clear that there is a distinct advantage in patient outcome between in-office and operative injections. Awake injections offer a notable advantage as they obviate the need for general anesthesia, which is ideal for patients who are not suitable candidates for general anesthesia [16, 17]. They also allow for real-time feedback for vocal improvement and allow for patients who have poor laryngoscopic exposure to be treated. Although office-based procedures are generally well tolerated, some patients may prefer general anesthesia. A systematic review by Ballard et al. concluded that injection augmentation performed awake, under local anesthesia, yields comparable voice outcomes to procedures conducted under general anesthesia [18]. Our survey results indicate that office injections do appear to be the most frequent approach, followed by the operating room. Increased preference for office-based injections is likely reflective of provider interest in avoiding anesthetic and the resources required for performing the injection in the operating room.

Injection materials can be categorized into temporary-term and long-lasting according to the duration of their effect. Even though temporary materials may require repeat procedures, this may be desired in acute UVFP, particularly in acute clinical scenarios where spontaneous neural recovery is likely. In such cases, normal vocal fold vibratory mechanics could otherwise become compromised by long-lasting material being retained, possibly leading to unfavorable voice quality and further invasive procedures [19].

Timing from initial presentation to injection is another important factor that goes into the treatment of acute UVFP. Bhattacharyya

et al. found that early vocal fold medialization after extubation following thoracic surgery significantly reduced the risk of post-injection pneumonia and shortened hospital stays compared to late intervention [20]. Friedman et al. suggested that early intervention within six months post-injury allows the vocal fold to achieve a more favorable resting position during early synkinetic reinnervation, potentially facilitating a more permanent medialized vocal fold position. Conversely, a vocal fold left untreated may adopt a less favorable lateralized position, making later medialization less effective [6]. Prendes et al. speculated that injection augmentation increases the degree of vibrotactile feedback from the opposing, nonparalyzed vocal fold, providing sensory feedback that promotes nerve regeneration [21]. Along these lines, the vast majority of our survey responders indicated performing most injections for patients with acute UVFP in the first four weeks after injury, which is what was ultimately recommended from these previous investigations. This is a positive finding that we believe demonstrates a general push within the laryngology community for evidence-based medicine decision-making in relation to procedural timing.

4.3 | Role of Voice Therapy

Our study found that voice therapy was infrequently a stand-alone therapy but was frequently paired with injection augmentation. The role of voice therapy administered by SLPs in the acute management of UVFP remains somewhat ambiguous, consistent with the lack of consensus in the literature [14, 22]. Voice therapy, however, can address compensatory hyper-functional behaviors and helps optimize vocal function [23]. Our survey suggests that voice therapy is primarily viewed as an adjunct to injection augmentation rather than a stand-alone treatment.

4.4 | Watchful Waiting

We found that watchful waiting was an infrequently used treatment modality. As described above, multiple recent studies have shown that injection augmentation safely improves symptoms compared to observation alone during this waiting period [10, 21, 24] and has largely promoted symptomatic patients receiving an early intervention rather than undergoing a period of observation. This could be related to the improved fellowship training opportunities, procedure room availability, and a general push towards evidence-based practice patterns among the laryngology provider population.

4.5 | Implications for Clinical Practice and Future Research

This study underscores the significant variability and general trends in managing acute UVFP across institutions. The aim of this study was to identify current trends and did not investigate the rationale for various treatment patterns; thus, this remains highly speculative. Differences in practice patterns may be related to the lack of consensus in the literature, the absence of standardized guidelines, variability in data collection, and differences in resources across institutions. Future research should aim to further understand the reasoning behind varied treatment approaches towards a goal of creating standardized treatment pathways. Exploring multidisciplinary approaches, particularly the timing and impact of concurrent voice therapy, is also essential to developing best practices in UVFP management.

5 | Limitations

This survey study has limitations that must be acknowledged. First, it relies on self-reported data, which is inherently subject to recall bias, reporting inaccuracies, and variability in interpretation. The senior laryngologist was asked to report on behalf of their center after querying the site's other laryngology and speech-language pathologists. Nonetheless, the answers on the survey provide only a summary of the practice patterns at each site. Additionally, the lack of standardized definitions and measurement protocols across institutions complicates direct comparisons and may introduce inconsistencies in reported practices. The survey also did not query respondents about their use of EMG in the evaluation and management of UVFP. EMG can have prognostic value, and its exclusion was an oversight that reduces the comprehensiveness of these findings. Finally, we aimed to evaluate the management patterns at tertiary care voice centers. It should be recognized that otolaryngologists and laryngologists in community practice provide state-of-the-art care for patients with UVFP. However, they were not the focus of this investigation.

Care of the patient with UVFP is highly personalized and depends on many factors. This survey study was not designed to capture the nuances of treatment decisions at the patient level. Instead, our goal was to understand how laryngologists and speech-language pathologists at tertiary care voice centers are treating patients. Questions were framed as “how often” their center performs a particular diagnostic test or treatment rather than providing vignettes about particular patient scenarios. We believe the product of this work is a better understanding of modern management of UVFP at tertiary care centers in the US.

6 | Conclusion

This survey provides valuable insights into the current trends and variations in the management of acute UVFP at tertiary care voice centers across the U.S. in the absence of standardized guidelines. Early intervention with injection augmentation appears to be the most common approach, with voice therapy playing a supportive role in a multidisciplinary setting. Regional differences in practices highlight the importance of continued research and dialogue within the laryngology community toward consensus on treatment strategies to improve patient outcomes. Future studies are needed to better understand the degree of heterogeneity of collective treatment approaches and the role of multidisciplinary management of UVFP.

Acknowledgments

The authors have nothing to report. Greg Postma, Julina Ongkasuwan, Lauren Tracy, Thomas Carroll, Paul C. Bryson, Michael J. Pitman, Seth M. Cohen, John T. Sinacori, Adam M. Klein, Nazaneen Grant, Benjamin

Anthony, Lee M. Akst, Brianna K. Crawley, Matthew R. Naunheim, Dale C. Ekbom, David G. Lott, Jonathan M. Bock, Valeria Silva Merea, Milan R. Amin, Andrew Phillip Stein, Jeffrey Marino, Laura Matrka, Josh Schindler, C. Blake Simpson, Philip A. Weissbrod, Brandon Baird, Gregory Dion, Matthew Clary, Matthew R. Hoffman, Shannon M. Kraft, Robbi Ann Kupfer, Stephanie Misono, Mark Gilbert, Jayme R. Dowdall, Rupali Shah, Libby J. Smith, Glenn T. Schneider, Michael M. Johns, Z. Michael Yang, Ted Mau, Breanne L. Schiffer, James J. Daniero, Albert L. Merati, Seth H. Dailey, C. Gaelyn Garrett, Margaret N. Huston, J. Pieter Noordzij, Isabela Schettini, Hayley Born, Alissa M. Collins, Benjamin J. Rubenstein, Jeanne L. Hatcher, Phillip C. Song, Rebecca L. Pittelko, Joel L. Blumin, Efstratios Achlatis, Kate Zochowski, Daniel S. Fink, Lisa Butcher, Christopher M. Bingcang, Robert Buckmire, Karla D. O'Dell, Lesley F. Childs, Marshall E. Smith, Patrick O. McGarey, Emily C. Wilson, Alexander Gelbard, Bharat Panuganti, Andrew Tkaczuk, Shumon Dhar, Kenneth C. Fletcher, Matthew Rohlfing.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. F. Masroor, D. R. Pan, J. C. Wei, M. L. Ritterman Weintraub, and N. Jiang, "The Incidence and Recovery Rate of Idiopathic Vocal Fold Paralysis: A Population-Based Study," *European Archives of Oto-Rhino-Laryngology* 276, no. 1 (2019): 153–158, https://doi.org/10.1007/s00405-018-5207-x.

2. S. A. Nouraei, S. E. Middleton, C. R. Butler, and G. S. Sandhu, "An Estimation of the Population Incidence of Adult Unilateral Vocal Fold Mobility Impairment in England," *Logopedics, Phoniatrics, Vocology* 40, no. 2 (2015): 93–94, https://doi.org/10.3109/14015439.2014.902497.

3. H. W. Wang, C. C. Lu, P. Z. Chao, and F. P. Lee, "Causes of Vocal Fold Paralysis," *Ear, Nose, & Throat Journal* 101, no. 7 (2022): NP294–NP298, https://doi.org/10.1177/0145561320965212.

4. D. O. Francis, A. E. Sherman, K. L. Hovis, et al., "Life Experience of Patients With Unilateral Vocal Fold Paralysis," *JAMA Otolaryngology. Head & Neck Surgery* 144, no. 5 (2018): 433–439, https://doi.org/10.1001/jamaoto.2018.0067.

5. T. J. Fang, Y. C. Pei, H. Y. Li, A. M. Wong, and H. C. Chiang, "Glottal Gap as an Early Predictor for Permanent Laryngoplasty in Unilateral Vocal Fold Paralysis," *Laryngoscope* 124, no. 9 (2014): 2125–2130, https://doi.org/10.1002/lary.24689.

6. A. D. Friedman, J. A. Burns, J. T. Heaton, and S. M. Zeitels, "Early Versus Late Injection Medialization for Unilateral Vocal Cord Paralysis," *Laryngoscope* 120, no. 10 (2010): 2042–2046, https://doi.org/10.1002/lary.21097.

7. J. A. S. Marques, A. Marronnier, F. Crampon, A. Lagier, and J. P. Marie, "Early Management of Acute Unilateral Vocal Fold Paralysis: Update of the Literature," *Journal of Voice* 35, no. 6 (2021): 924–926, https://doi.org/10.1016/j.jvoice.2020.02.021.

8. Y. C. Pei, T. J. Fang, L. J. Hsin, H. Y. Li, and A. M. Wong, "Early Hyaluronate Injection Improves Quality of Life but Not Neural Recovery in Unilateral Vocal Fold Paralysis: An Open-Label Randomized Controlled Study," *Restorative Neurology and Neuroscience* 33, no. 2 (2015): 121–130, https://doi.org/10.3233/rnn-140439.

9. P. M. Vila, N. K. Bhatt, and R. C. Paniello, "Early-Injection Laryngoplasty May Lower Risk of Thyroplasty: A Systematic Review and Meta-Analysis," *Laryngoscope* 128, no. 4 (2018): 935–940, https://doi.org/10.1002/lary.26894.

10. K. C. Yung, I. Likhterov, and M. S. Courey, "Effect of Temporary Vocal Fold Injection Medialization on the Rate of Permanent Medialization Laryngoplasty in Unilateral Vocal Fold Paralysis Patients," *Laryngoscope* 121, no. 10 (2011): 2191–2194, https://doi.org/10.1002/lary.21965.

11. M. J. Bové, N. Jabbour, P. Krishna, et al., "Operating Room Versus Office-Based Injection Laryngoplasty: A Comparative Analysis of Reimbursement," *Laryngoscope* 117, no. 2 (2007): 226–230, https://doi.org/10.1097/01.mlg.0000250898.82268.39.

12. M. G. Sardesai, A. L. Merati, A. Hu, and H. Birkent, "Impact of Patient-Related Factors on the Outcomes of Office-Based Injection Laryngoplasty," *Laryngoscope* 126, no. 8 (2016): 1806–1809, https://doi.org/10.1002/lary.25764.

13. D. C. Upton, M. Johnson, S. K. Zelazny, and S. H. Dailey, "Prospective Evaluation of Office-Based Injection Laryngoplasty With Hyaluronic Acid Gel," *Annals of Otology, Rhinology, and Laryngology* 122, no. 9 (2013): 541–546, https://doi.org/10.1177/000348941312200901.

14. C. Walton, E. Conway, H. Blackshaw, and P. Carding, "Unilateral Vocal Fold Paralysis: A Systematic Review of Speech-Language Pathology Management," *Journal of Voice* 31, no. 4 (2017): 509.e7–509.e22, https://doi.org/10.1016/j.jvoice.2016.11.002.

15. D. H. Lee, S. Y. Lee, M. Lee, et al., "Natural Course of Unilateral Vocal Fold Paralysis and Optimal Timing of Permanent Treatment," *JAMA Otolaryngology. Head & Neck Surgery* 146, no. 1 (2020): 30–35, https://doi.org/10.1001/jamaoto.2019.3072.

16. E. J. Damrose, "Percutaneous Injection Laryngoplasty in the Management of Acute Vocal Fold Paralysis," *Laryngoscope* 120, no. 8 (2010): 1582–1590, https://doi.org/10.1002/lary.21028.

17. P. S. Mallur and C. A. Rosen, "Vocal Fold Injection: Review of Indications, Techniques, and Materials for Augmentation," *Clinical and Experimental Otorhinolaryngology* 3, no. 4 (2010): 177–182, https://doi.org/10.3342/ceo.2010.3.4.177.

18. D. P. Ballard, J. Abramowitz, D. C. Sukato, B. Bentsianov, and R. M. Rosenfeld, "Systematic Review of Voice Outcomes for Injection Laryngoplasty Performed Under Local vs General Anesthesia," *Otolaryngology and Head and Neck Surgery* 159, no. 4 (2018): 608–614, https://doi.org/10.1177/0194599818780207.

19. N. Choi, H. Jin, H. J. Kim, and Y. I. Son, "Early Injection Laryngoplasty With a Long-Lasting Material in Patients With Potentially Recoverable Unilateral Vocal Fold Paralysis," *Clinical and Experimental Otorhinolaryngology* 12, no. 4 (2019): 427–432, https://doi.org/10.21053/ceo.2019.00444.

20. D. W. Chen, M. D. Price, S. A. LeMaire, J. S. Coselli, N. E. Liou, and J. Ongkasuwan, "Early Versus Late Inpatient Awake Transcervical Injection Laryngoplasty After Thoracic Aortic Repair," *Laryngoscope* 128, no. 1 (2018): 144–147, https://doi.org/10.1002/lary.26747.

21. B. L. Prendes, K. C. Yung, I. Likhterov, S. L. Schneider, S. A. Al-Jurf, and M. S. Courey, "Long-Term Effects of Injection Laryngoplasty With a Temporary Agent on Voice Quality and Vocal Fold Position," *Laryngoscope* 122, no. 10 (2012): 2227–2233, https://doi.org/10.1002/lary.23473.

22. X. Chen, P. Wan, Y. Yu, et al., "Types and Timing of Therapy for Vocal Fold Paresis/Paralysis After Thyroidectomy: A Systematic Review and Meta-Analysis," *Journal of Voice* 28, no. 6 (2014): 799–808, https://doi.org/10.1016/j.jvoice.2014.02.003.

23. G. Da Cunha Pereira, I. De Oliveira Lemos, C. Dalbosco Gadenz, and M. Cassol, "Effects of Voice Therapy on Muscle Tension Dysphonia: A Systematic Literature Review," *Journal of Voice* 32, no. 5 (2018): 546–552, https://doi.org/10.1016/j.jvoice.2017.06.015.

24. S. P. Verma and S. H. Dailey, "Office-Based Injection Laryngoplasty for the Management of Unilateral Vocal Fold Paralysis," *Journal of Voice* 28, no. 3 (2014): 382–386, https://doi.org/10.1016/j.jvoice.2013.10.006.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.