

Unilateral Vocal Fold Paralysis: A Systematic Review of Speech-Language Pathology Management

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Summary: Objectives. Dysphonia due to unilateral vocal fold paralysis (UVFP) can be characterized by hoarseness and weakness, resulting in a significant impact on patients' activity and participation. Voice therapy provided by a speech-language pathologist is designed to maximize vocal function and improve quality of life. The purpose of this paper is to systematically review literature surrounding the effectiveness of speech-language pathology intervention for the management of UVFP in adults.

Study Design. This is a systematic review.

Methods. Electronic databases were searched using a range of key terms including dysphonia, vocal fold paralysis, and speech-language pathology. Eligible articles were extracted and reviewed by the authors for risk of bias, methodology, treatment efficacy, and clinical outcomes.

Results. Of the 3311 articles identified, 12 met the inclusion criteria: seven case series and five comparative studies. All 12 studies subjectively reported positive effects following the implementation of voice therapy for UVFP; however, the heterogeneity of participant characteristics, voice therapy, and voice outcome resulted in a low level of evidence.

Conclusions. There is presently a lack of methodological rigor and clinical efficacy in the speech-language pathology management of dysphonia arising from UVFP in adults. Reasons for this reduced efficacy can be attributed to the following: (1) no standardized speech-language pathology intervention; (2) no consistency of assessment battery; (3) the variable etiology and clinical presentation of UVFP; and (4) inconsistent timing, frequency, and intensity of treatment. Further research is required to develop the evidence for the management of UVFP incorporating controlled treatment protocols and more rigorous clinical methodology.

Key Words: Unilateral vocal fold paralysis–Voice therapy–Speech pathology.

INTRODUCTION

Unilateral vocal fold paralysis (UVFP) arises from a loss of innervation to one of the branches in the recurrent laryngeal nerve (RLN) and results typically in a dysphonia and occasionally dysphagia. Dysphonia can have a significant impact on patients' everyday communication demands and typically requires behavioral and/or surgical management. The RLN innervates all of the intrinsic muscles of the larynx, with the exception of the cricothyroid muscle. Given its recurrent nature and length, the left branch of the RLN is more susceptible to injury, which may be owing to neoplasms, traumatic injury, neurologic diseases, iatrogenic, or idiopathic causes.¹ The severity of these injuries varies depending on etiology and can be classified into three types: neuropraxia, axonotmesis, or neurotmesis.² Neuropraxia is a temporary block of nerve impulses as seen in local anesthetics. Axonotmesis is more severe, usually a disruption or cutting of the axon, leading to paralysis in the motor and sensory systems.³ There is potential for recovery with axonotmesis if the trigger causing the nerve damage is removed, with a prolonged recovery potentially months or years. Finally, neurotmesis is the most severe nerve damage where the entire nerve fiber is cut or damaged, resulting in a complete loss of motor, sensory, and autonomic function, with a potential for only partial recovery.⁴

UVFP results in immobility to one of the vocal folds, causing glottal incompetence because of poor vocal fold adduction.^{5,6} In comparison, vocal fold "paresis" is described as a muscular weakness,⁷ whereas vocal fold "palsy" is a term that includes both paralysis and paresis.⁸ The prevalence of voice disorders in the general population is 6.6%,⁹ and the incidence of UVFP among those with voice disorders has been calculated at 1.2%.¹⁰

People with UVFP typically experience perceptually hoarse, weak voices with associated vocal fatigue and potentially breathing, swallowing, and body stabilization difficulties.^{11,12} Dysphonia due to UVFP can have a significant impact on the quality of life and participation of patients, impacting on them functionally, physiologically, and emotionally,¹³ which may lead to associated stress and depression.¹⁴

Description of intervention

The aim of treatment for UVFP is to restore functional voicing and improve glottal insufficiency.⁵ Current management of UVFP is either through (1) surgical intervention, (2) speech therapy (voice) exercises, or (3) observation.³ Typically, the management of UVFP is influenced by factors such as presence of aspiration, nerve injury, nasoendoscopic findings, vocal demands, comorbidities, electromyography findings, and patient concerns.^{15,16} Depending on the above factors, people with UVFP may receive one or a combination of management options.

There are a number of systematic reviews of the clinical efficacy of surgical interventions for UVFP^{17–19} and of speech-language pathology intervention for the management of other types of dysphonia.^{20–24} However, to date, there are no systematic reviews of speech-language pathology voice treatment for adults with UVFP. It is important to undertake a review of the

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literature to determine current treatment trends used with this population and to assist with the planning and implementing of future research in this clinical area. The prevalence of UVFP and the significant burden it places on functional communication and the quality of life of patients require strong clinical evidence to ensure effective and timely treatment.

Aim

The aim of this literature review is therefore to critically evaluate the literature to determine the evidence base for the effectiveness of speech-language pathology voice treatment for the management of dysphonia arising from UVFP. The evaluation of the literature pertaining to the effectiveness of this intervention approach will be conducted through the rating of studies according to the National Health and Medical Research Council (NHMRC) levels of evidence (Intervention),²⁵ risk of bias assessment (where appropriate), and detailed critical appraisal.

METHOD

Search strategy

Seven electronic databases were searched, including PubMed, Embase, CINAHL, Web of Science, Scopus, CENTRAL, and Medline on January 23, 2016. Table 1 lists the search terms (both as keywords and as Medical Subject Headings terms) that were used to identify potentially relevant studies in the seven databases. The search was limited to human studies, but no language or time restrictions were applied. Additionally, the reference lists of the selected papers were searched for additional literature.

Identification of studies

Studies sourced from the electronic database search (January 23, 2016) were imported into *EndNote*, where duplicates were excluded. The remaining studies were imported into *Covidence* for electronic management and review by the authors. The review process was conducted in three stages; first, two review authors

(CW and EC) independently screened titles and abstracts obtained from the database searches to assess inclusion or exclusion. Articles in the search were assessed based on the following inclusion criteria: adult participants between the ages of 18 and 70 years, confirmed diagnosis of UVFP, presence of dysphonia, intervention provided by a speech-language pathologist, and studies with pre-post outcome data. Articles were excluded if they were editorials and review articles (ie, no intervention outcome data).

Any conflicts were resolved by discussion with the fourth author (PC). Following title and abstract screening, full-text articles were sourced for review. The same review authors (CW and EC) independently reviewed the full-text identified studies against the predefined inclusion and exclusion criteria. Again, any conflicts were resolved by consulting with the fourth review author (PC). Finally, the reference lists of the identified articles and gray literature were also scrutinized.

For each study, the following data were extracted to contribute to the critical appraisal (if available):

1. *Study*: publication year, study design, study location, mean age of study population, gender, number of participants;
2. *Cases*: type of UVFP, severity of paralysis and dysphonia, and time since onset
3. *Treatment*: type of voice treatment received, duration of treatment, frequency of treatment, home program or homework expectations
4. *Controls or groups*: controls used, other treatment allocation, randomization
5. *Outcomes*: reported results and tools for measurement

Study classification

Two tools were used to classify the current evidence for speech-language pathology management of UVFP in adults. First, the NHMRC levels of evidence²⁵ were used to provide a framework for determining the level of evidence (Table 2). Included studies were reviewed by the authors and allocated to one of the NHMRC levels of evidence based on their methodology.

Risk of bias assessment was conducted using the A Cochrane Risk Of Bias Assessment Tool: for Non-Randomized Studies of Interventions (ARCROBAT-NRSI)²⁶ on all comparative study designs to determine the rigor of intervention for nonrandomized studies. Risk of bias assessment provides scaffolding for an evaluation of study validity and assists with the establishment of a rigorous evidence base.²⁷ The authors provided consensus judgments on ACROBAT-NRSI²⁸ parameters and ranked them according to “high,” “low,” and “unclear” risk of bias.

RESULTS

Using our search strategy, we identified 3311 studies; 2310 were excluded after review of title or abstracts and 98 studies were excluded after full-text review. Fifteen full-text articles from the abstract screen were unable to be sourced for full-text review despite a conscious effort. Figure 1 illustrates the flow of data extraction from the seven databases to the final 12 papers for detailed critical appraisal.

A summary of each of the 12 studies included for critical appraisal are listed in Table 3.

TABLE 1.
Search Terms

Population	Intervention
1. Dysphon*	14. “Voice therap*”
2. “Recurrent laryn*”	15. “Voice exercise”
3. “Unilateral vocal fold”	16. Therapy
4. “Vocal fold par*”	17. “Speech pathology”
5. “Unilateral vocal cord”	18. “Speech therapy”
6. “Vocal cord par*”	19. Treatment
7. “Unilateral recurrent laryn*”	20. Management
8. “Laryn* palsy”	21. Rehabilitation
9. “Laryn* hemipleg*”	22. “Behavio* management”
10. “Glott* incompetence”	23. Intervention
11. “Vocal fold immobility”	24. “Voice training”
12. “Voice disorder”	
13. Combine 1–12 using “OR”	25. Combine 14–24 using “OR”
Combine 13 + 25 using the term “AND”	

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