

Management of Dysphonia After Radiation Therapy



Craig R. Villari, MD^a, Mark S. Courey, MD^{b,*}

KEYWORDS

- Laryngeal cancer • Radiation • Dysphonia • Speech therapy
- Vocal fold augmentation

KEY POINTS

- Radiation of the larynx can lead to fibrosis and decreased mucosal wave propagation. These can result in changes of both subjective perception of and objective measures of voice.
- Speech therapy is the main treatment modality used for voice rehabilitation after radiation for early laryngeal malignancies. Therapy regimens designed to reduce inflammation and maintain or improve flexibility of voice may benefit patients who have received radiation.
- Surgical techniques addressing postradiation changes of the larynx are limited and have not been applied to large populations of affected patients.
- Further research is needed to more completely examine the role of behavioral, surgical, and pharmacologic intervention.

INTRODUCTION

To discuss rehabilitation of the irradiated larynx, a sound understanding of the physiology and function of the normal larynx and that of the irradiated larynx is required. These topics are covered elsewhere in this publication (see the articles by Niv Mor and Mauricio Gamez elsewhere in this issue). They serve as foundational building blocks for discussing behavioral, medical, and surgical intervention geared toward restoring the voice in the postradiation patient.

Radiation-induced dysphonia can develop after radiation therapy (RT) for a primary laryngeal cancer or when the larynx is in the radiation field for nonlaryngeal malignancy and cannot be, or is not, spared. Dysphonia related to radiation exposure appears to

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^a Department of Otolaryngology-Head and Neck Surgery, Emory University Hospital, Midtown Medical Office Tower, Suite 1135, Atlanta, GA 30308, USA; ^b Department of Otolaryngology-Head and Neck Surgery, University of California – San Francisco, 2330 Post Street, 5th Floor, San Francisco, CA 94115, USA

* Corresponding author.

E-mail address: Mark.Courey@ucsf.edu

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be dose dependent. In patients with nonlaryngeal primary head and neck malignancies, dysphonia becomes problematic when the dose to the larynx exceeds 50 Gy.¹ This dose is less than the treatment dose for laryngeal primary malignancies, but the resultant rate of dysphonia at this level of radiation exposure is unknown. Radiation is often chosen as a treatment modality for early laryngeal primary squamous cell carcinoma (T1 or T2 disease) given its excellent cure rates but usually requires doses in excess of 65 Gy.²⁻⁵ Resultantly, between 14% and 92% of patients report dysphonia after radiotherapy for early laryngeal malignancies.⁶⁻¹⁰

The timing of the development of dysphonia after RT is variable. Patients can present with dysphonia early during treatment or they may have initial improvement in their voice only to worsen 5 to 15 or more years after treatment; those with early onset can persist for years or may improve spontaneously. Acute voice changes stem from oxidative injury resulting in injury to both diseased and normal tissue; this can lead to mucosal edema and necrosis and resultant epithelial sloughing. As the acute phase subsides, a fibroblastic response develops, resulting in long-term deposition of collagen and fibrosis.¹¹ Fibrosis leads to reduced tissue viscosity, which dampens the normal vibratory patterns that are required for normal voice.¹² These tissue changes make rehabilitation difficult because there is currently no therapy that can improve the vibratory capacity of the vocal folds.

Because none of the treatment modalities have been clearly shown to help improve postradiation phonation, rehabilitation is often multifaceted, relying on both physician and speech-language pathologists to maximize outcomes. This article serves to first outline important factors in the evaluation of the patient and then discusses both surgical and nonsurgical interventions that may aid rehabilitation.

PATIENT EVALUATION OVERVIEW

Evaluation begins with obtaining a thorough history and physical examination. Aspects of the patient's history that are valuable for guiding treatment include staging of the primary malignancy, treatment course including radiation dose and completion date, response to treatment, antecedent voice concerns or disease, current vocal demand or vocal use, and current vocal concerns.

Many of these aspects can be identified with a review of the medical records from the treating radiation oncologist. A review of the initial staging can help the clinician appreciate the laryngeal subsite (supraglottic, glottic, or subglottic) of the primary tumor and the presence of nodal disease. This information will give the clinician an appreciation for both the anatomic focus of the radiation treatment and the size of the treatment fields if (ie, if radiation was also administered to neck disease). It will also allow the physician to focus their subsequent examinations to survey for recurrence or persistence of disease. A review of the treatment course is helpful to identify the total dose of radiation administered to the larynx and any breaks in treatment that could lead to higher concern for recurrence.

The patient's vocal history should be elicited with a thorough interview before the physical examination. Key portions of the history include preradiation voice changes and whether there was change to the voice throughout RT. The patient's current concerns should also be discussed and can highlight perceived changes in effort or strain of phonation, difficulty with projection, decreased pitch flexibility or loss of range, and breathiness. These concerns are discussed from a subjective perspective but can be quantified with the use of the Voice-Handicap Index (VHI) and the Voice-Related Quality of Life. These are completed by the patient and may be useful to quantify the patients' experience and concerns to follow their progression over time.

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