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## Are Patient-Reported Voice Outcomes Better After Surgery or After Radiation for Treatment of T1 Glottic Carcinoma?

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### BACKGROUND

Patients with early glottic carcinoma have several treatment options; endoscopic surgical resection and radiation therapy (XRT) are the most common choices. Both the carcinoma itself and its treatment can have an impact on voice. A variety of factors may be considered when a management plan is considered. *Survival* and overall *organ preservation* following treatment of T1 glottic carcinomas are thought to be similar between surgery and XRT.<sup>1</sup> Some question remains, however, about phonatory function following treatment; other factors such as location of tumor and psychosocial considerations may also play a role in these outcomes. The objective of this review is to examine the current literature with respect to *voice outcomes* after treatment of T1 glottic carcinomas with surgical excision or with XRT.

Intuitively, it is apparent that not all T1 tumors are equivalent with respect to voice impact, given the variety of tumor location and depth of invasion that could be included within the category of T1. Comparison of treatment modalities in terms of voice impact can be made using a variety of metrics, including patient-reported outcomes, objective acoustic measures, perceptual ratings, aerodynamic measures, and stroboscopic findings. Of these, this review focuses on patient-reported measures; these may be the most meaningful for patients facing a decision regarding treatment modality given the similarity in oncologic outcomes. The focus of this study is to summarize the current state of the literature on patient self-reported voice outcomes after treatment of T1 glottic cancers.

### LITERATURE REVIEW

There are numerous publications reporting voice outcomes after treatment of small series of patients with either surgical resection, XRT, or both. A subset of these studies uses the Voice Handicap Index (VHI) as an outcome measure. The VHI is a 30-item self-reported scale that

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includes questions to elicit the quality-of-life impact of voice disorders, and has physical, functional, and emotional subdomains.<sup>2</sup> As the most commonly utilized voice outcomes instrument, the VHI has been translated and validated in several languages, allowing review of data from a variety of cultural and linguistic perspectives.

Cohen et al.<sup>3</sup> published a meta-analysis in 2006 incorporating results from six studies for a total of 208 T1 glottic carcinoma patients treated with XRT and 91 treated with endoscopic CO<sub>2</sub> (carbon dioxide) laser excision. The meta-analysis, which took into account observed heterogeneity among the surgical group but not among the radiated group, demonstrated no significant difference in voice handicap between the two groups. Three of the included studies described patients treated with XRT only, two of the included studies described patients treated with surgical excision only, and one study included both patients who underwent surgical treatment and those who underwent XRT. Despite these limitations, this study is the most inclusive analysis to date comparing voice outcomes as measured by VHI after treatment with surgical excision or XRT.

Since that time, several additional studies including both treatment arms have been published. Sjogren et al.<sup>4</sup> reported voice outcomes in T1a mid-membranous vocal fold carcinomas treated with endoscopic CO<sub>2</sub> laser resection or XRT. In their study, 23 patients who underwent laser resection were compared to a historical cohort of 16 patients who underwent XRT. The mean follow-up time was over 4 years. They found no statistically significant difference between VHI among patients treated with surgery versus XRT, and noted that the voice handicap for most patients in both groups was minimal, with a few individuals reporting severe voice handicap.

Nunez-Batalla et al.<sup>5</sup> examined voice handicap in 19 patients treated with endoscopic CO<sub>2</sub> laser excision and 18 patients treated with XRT. All patients had T1 glottic carcinomas, including 19 T1a in the surgical group and 13 T1a and 5 T1b in the radiation group. The mean length of follow-up was approximately 3 years. In this study, the patients treated with endoscopic laser resection reported a significantly greater voice handicap than those treated with XRT. These differences were noted in the functional and emotional, but not physical, domains of the VHI.

A larger study by Oridate et al.<sup>6</sup> addressed the issue in 10 patients treated with endoscopic resection and 43 treated with XRT. Of these, 9 had T1a and 1 had T1b in the endoscopic resection group, whereas 32 had T1a and 11 had T1b disease in the radiation group. The global VHI scores in these two groups demonstrated no meaningful difference.

Several limitations are frequently encountered when examining the results of these studies. There is significant heterogeneity in terms of distribution of tumor staging (T1a and T1b), treatment methods (such as the extent of surgical resection or the radiation dose), and duration of follow-up, all of which are likely to influence long-term patient-reported outcomes. One of the key challenges is the high likelihood of selection bias incurred when a treatment is recommended for a given patient. Another challenge in synthesizing these data is the variety in cultural background and norms that may also influence patient-reported outcomes.

## CONCLUSIONS

The literature to date suggests that patient-reported voice outcomes as measured by the VHI are similar whether patients with T1 glottic carcinomas are treated with endoscopic surgical resection or XRT. All of the studies with the exception of one demonstrate possible selection bias, in which treatment modalities may be differentially selected. Future efforts may focus on determining how to refine the treatment decision-making tree.

## LEVEL OF EVIDENCE

The current literature on this subject is levels 3 and 4 per the Oxford classification of levels of evidence.

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