Voice Rest after Microlaryngoscopy: Current Opinion and Practice

Alison Behrman, PhD; Lucian Sulica, MD

Objective: Although voice rest is often recommended after excision of benign mucosal vocal fold lesions, no standard of care exists regarding the use, duration, or extent of vocal restrictions. This prospective study is intended to explore current opinions and practices of otolaryngologists regarding the use of complete and relative voice rest. Study Design and Methods: A 16-item survey was mailed to all active U.S. members of the American Academy of Otolaryngology-Head and Neck Surgery (n = 7,321) regarding use of complete and relative voice rest after surgical excision of vocal fold nodules, polyps, and cysts. Treatment preference questions used a Likert 5-point scale with end anchors of 1 equaling “never” and 5 equaling “always.” Results: The response rate was 16.5% (1,208 respondents). Differences by lesion type were not statistically significant, suggesting that surgeons consider the mucosal disruption resulting from the surgery to be similar across lesions. Approximately 51.4% (620) favored complete voice rest. Approximately 62.3% (753) favored relative voice rest. Approximately 18% (213) of the respondents who “always” recommend complete rest also “always” recommend relative rest. The most common duration for both types of rest is 7 days. Conclusions: There is a clear preference for the use of voice rest, but the specific type (complete or relative) is controversial, and a notable percentage of respondents (15%) do not favor any type of voice rest. It is likely that the lack of uniformity of opinions and practices reflects the absence of empirical data. Prospective clinical trials are needed to guide clinical standards of care. Key words: Voice rest, phonosurgery, microlaryngoscopy, nodules, polyp, cyst.


INTRODUCTION

Voice rest may be recommended after excision of benign mucosal lesions of the vocal folds to optimize post-surgical outcome of vocal quality. This is based on the premise that voice rest prevents trauma to the vocal folds, thus facilitating mucosal repair and preventing scarring.1–8 Surgeons recommend postoperative voice rest despite the lack of unified standards of care regarding the extent and duration of the vocal restrictions2–8 and the paucity of empirical data supporting its contribution to postoperative mucosal repair.

There are no data from clinical trials. Koufman and Blalock9 conducted a retrospective review of 127 patients over a 10-year period who had microlaryngeal surgery for a spectrum of benign lesions as well as carcinoma in situ. Complete voice rest had been recommended for 26% of the patients, whereas the remainder had been advised to follow voice conservation guidelines. Postoperative dysphonia, defined as persistent dysphonia lasting longer than 4 weeks after surgery, occurred in 41% of the patients who had been given relative voice rest recommendations and in 27% of those patients who had been advised to follow absolute voice rest. Poor compliance with the voice rest recommendations correlated most strongly with postoperative dysphonia. Participation in preoperative voice therapy was found to be the next strongest predictive factor; that is, patients who participated in voice therapy before surgery demonstrated less postoperative dysphonia than those who did not have therapy. In this retrospective study, the criteria for assigning patients to complete voice rest or voice conservation were not randomized or specified, and therefore a potentially significant bias could have influenced outcome.

Given the lack of empirical data to inform the use of voice rest in clinical practice, recommendations to patients may be inconsistent among surgeons, and the standard of care remains undefined. The purpose of this study was to explore current opinions and practices of otolaryngologists in the United States regarding the use of complete and relative voice rest.

MATERIALS AND METHODS

A 16-item survey was mailed to all active U.S. members of the American Academy of Otolaryngology-Head and Neck Surgery regarding management of benign vocal fold lesions. Unmarked postage-paid return envelopes were provided. Instructions accompanying the survey specified that all of the questions related only to vocal fold nodules, polyps, and cysts and excluded...
all other laryngeal pathologies. Respondents were asked to report the number of years in practice and the number of surgeries for benign mucosal lesions performed within the previous 12 months. Treatment practice questions included the use of complete and relative postoperative voice rest (Table 1). Additional questions regarding use of voice therapy, surgery, antireflux medications, diagnostic procedures, and surgical procedures are not addressed in this report. Questions that addressed the frequency of use of a specific treatment or technique used a Likert 5-point scale with end anchors of 1 equaling “never” and 5 equaling “always.” The middle value (“3”) indicates that the respondent does not have a consistent opinion about a statement; rather, the opinion is dependent on other factors individual to the patient and not measured by this survey.

All responses were entered into a Microsoft Excel worksheet. Descriptive statistics were calculated and frequency histograms were graphed for each question. Wilcoxon’s rank sum tests were used to assess rank of mean scores by lesion type for each question. Kruskal-Wallis tests (a nonparametric analysis for ordinal data) were used to test statistical significance of differences among mean scores by lesion type, with a significance level of P < .05. Pearson correlation coefficients were calculated to assess relationships between number of years in practice or number of surgeries performed and the responses regarding voice rest practices.

RESULTS

A total of 1,208 completed surveys were obtained from the total mailing of 7,321 (a 16.5% response rate). The mean number of years in practice of the respondents was 13 (SD = 9.7) (Fig. 1). The mean number of surgeries performed within the past 12 months for nodules, polyps, or cysts of the vocal folds was 11.5 (SD = 15.6) with a range of 0 to 100 (Fig. 2). Approximately 65% of the respondents had performed 10 or fewer surgeries within the past 12 months. Only 20 (less than 2%) had performed 50 or more procedures.

Frequency histograms for the responses regarding use of complete or relative postoperative voice rest are displayed by lesion type in Figures 3 and 4. Differences in the distribution of responses on the Likert scale for the three lesion types were not statistically significant (P > .05). On average, approximately 51.4% of the respondents favored complete voice rest, while an average of approximately 62.3% favored relative voice rest (responses 4 and 5 on the Likert scale). Conversely, approximately 30.2% of the respondents were not likely to recommend complete voice rest, and an average of approximately 18.2% were unlikely to recommend relative voice rest (scale responses 1 and 2). The remainder responded with the middle value (“3”) regarding both complete and relative voice rest (approximately 18.4% and 19.5%, respectively). It is notable that 181 physicians (15%) “never” recommend either complete or relative voice rest. Ninety respondents (7.5%) indicated that the question regarding complete voice rest was “not applicable” for nodules, and 150 (12.4%) responded similarly to the question about relative voice rest. Less than 1% of the respondents indicated that the questions were “not applicable” to polyps or cysts.

The survey data do not provide information about the practice regarding using both complete and relative voice rest sequentially. Although the question was worded to address opinions regarding use of relative voice rest only, 213 of the respondents who “always” recommend complete voice rest also indicated that they “always” recommend relative voice rest. Therefore, it is unknown whether in-
individuals were actually interpreting the questions about complete and relative voice rest as being mutually exclusive.

In those cases in which complete or relative voice rest is recommended, the most common duration is 7 days (Fig. 5). There were no statistically significant correlations (P > .05) between opinions regarding use of complete or relative voice rest and years in practice or number of surgeries performed within the past 12 months.

DISCUSSION

The data from this survey suggest a lack of uniformity of opinion and practice. The findings indicate that there is a consensus of support for the use of postoperative voice rest, with at least one half of those surveyed favoring some type of voice rest for nodules, polyps, and cysts. Yet 15% never recommend any type of voice rest, and a substantial proportion (almost 20%), responded with the middle value (“3”), suggesting that other factors are considered important determinants in the decision to recommend postoperative voice rest. The lack of significant differences between lesion types suggests that surgeons consider the mucosal disruption resulting from the surgery to be similar across lesions. The survey did not probe the reasons supporting these opinions, and it is likely that a broad spectrum of beliefs is driving the responses obtained, including beliefs about the physiology of vocal fold mucosal healing, the role of patient compliance, lesion characteristics, surgical technique, and preoperative or postoperative voice therapy.

A few factors may have influenced the results of this survey. No definitions were provided for nodule, polyp, and cyst in the survey instructions. It is possible that the representation of these lesions is not consistent across physicians. In addition, no guidelines were provided to the respondents regarding age of the patient population under consideration. Diagnostic and treatment guidelines for children and adults are often different.

Vocal fold nodules, polyps, and cysts are benign, non-life-threatening mucosal lesions, important almost exclusively because of their negative effect on voice production. Therefore, in cases of surgical excision, optimizing postoperative outcome of vocal quality is paramount. From a laryngologic viewpoint, this means preventing mucosal adhesions, or scarring, that may disrupt normal voice production. Vocal fold scar is clinically significant when there is a loss of pliability and elasticity of the mucosal cover of the vocal folds. This often results in irregularity of mucosal wave vibration, focal adynamic segments and incomplete glottal closure. Symptoms may include hoarseness, insufficient loudness, and poor vocal stamina. Vocal fold scarring is generally considered to be one of the more intractable problems contributing to permanent vocal disability, and therefore prevention of scar formation is desirable. The potential for scar has driven the evolution of surgical technique to minimize disruption of the lamina propria during excision of benign vocal fold lesions.

Vocal fold rest may play a role in postoperative outcome by affecting mucosal repair and thereby preventing scar. The histologic progression of wound healing and scar formation have been well described in cutaneous tissues but not in the vocal folds. Mucosal vibration depends on the interaction of microarchitecture and aerodynamics that does not occur elsewhere in the human body. Phonation generates forces acting on and within the vocal fold tissues, such as dynamic shear forces and medial collateral force, which may influence the healing response. The repeated micro-trauma to the membranous vocal folds caused by these phonatory forces may further specify a unique histology. There is growing evidence that the fibrous proteins and interstitial elements of the extracellular matrix may contribute substantially to dynamic tissue viscosity and the ability of the tissue to withstand vibratory mechanical forces. Thus, the histology of vocal fold scar formation may be unique and data on wound healing from other biological tissues may not be applicable.

Data from animal models are available that explore wound healing in the vocal folds. Thibeault et al. examined the histologic and rheologic properties of lamina propria ultrastructure in a rabbit model. The vocal fold mucosa from 11 rabbit larynges was scarred by means of forceps biopsy and compared to normal rabbit vocal folds at postoperative day 60. Elastic shear modulus and dynamic viscosity were significantly higher in the operated vocal folds, resulting in increased mucosal stiffness. This

![Fig. 4](image-url) The distribution of responses regarding the recommendation of relative voice rest.

![Fig. 5](image-url) The distribution of response regarding the typical duration of recommended voice rest.
appeared to be related to newly formed, disorganized collagen scaffolding, not to an increase in collagen fibers.

Cho et al.\textsuperscript{16} investigated mucosal repair to the basement membrane zone (BMZ) after phonemicrosurgery in 20 healthy adult dogs. Ten dogs underwent left recurrent laryngeal nerve resection to prevent phonation and thereby simulate voice rest. Immunohistochemical staining and transmission electron microscopy were used to assess wound healing postoperatively at multiple time points from week 1 to 12. In the voice rest group, complete reformation of the BMZ was achieved at postoperative week 2 and mucosal cover healing was accomplished by week 8. The phonation group exhibited delayed healing of both the BMZ and mucosal cover.

Although there are no data from human clinical trials to provide evidence of the contribution of voice rest to mucosal repair, a reasonable rationale can be developed to support this hypothesis. The impact stress on the mucosa that occurs from the medial collision of the vocal folds during moderately loud phonation\textsuperscript{17} may contribute to persistence of the inflammatory stage of postoperative wound healing. This may heighten fibroblast activity in the proliferation/granulation stage, increasing formation of fibrous tissue. Similarly, impact stress associated with phonation may directly prolong this second stage of healing. Greater impact stress would be hypothesized to occur with loud or prolonged speech. Therefore, complete voice rest may minimize the inflammatory response of the mucosa and shorten the proliferation/protein synthesis stage, thereby facilitating healing.

Further, Gray\textsuperscript{18} found that benign lesion formation is sometimes accompanied by injury to the anchoring fibers of the BMZ. It may be that the shear forces resulting from the mucosal wave (especially large-amplitude mucosal wave vibration\textsuperscript{17}) could impair the normal healing response. Gray et al.\textsuperscript{19} proposed that some benign vocal fold lesions may arise from an aberrant healing response of initial inflammation due to chronic and repetitive re-injury of the vocal fold mucosa associated with insufficient vocal rest. Given that a benign lesion may itself represent a product of inflammation and impaired BMZ healing, the mucosal tissue may already be predisposed to less than optimal postoperative wound repair. As a result, voice rest may be essential for normal healing by limiting the impact and shear stress on the tissue.

Conversely, a rationale may be constructed to show that postoperative voice rest does not contribute to wound healing and may even potentially inhibit normal tissue repair. Given that scar was found to consist of disarranged collagen fibers,\textsuperscript{15} it may be that vibratory forces are essential for the orderly remodeling of the collagen fibers during the postoperative healing process. The absence of dynamic shear force and medial collisional force may risk disarrangement of these fibrous proteins and result in scar formation.

Further, the oscillation of the mucosa achieved during phonation moves mucous secretions off the vocal folds. Mucous secretions may be particularly copious postoperatively and may adhere to irregularities on the surface of the vocal fold mucosa at the excision site. Without the assistance of the pharyngeal mucosal wave, the resulting globus sensation may contribute to coughing and throat-clearing behaviors, which in turn may exacerbate the inflammatory stage of wound healing.

In addition, it may be that the oscillation of the mucosal wave during phonation increases capillary perfusion and mobilization of lysosomes, macrophages, and other cellular compounds associated with tissue inflammation. This increased mobilization may limit fibroblast formation and decrease overall healing time. Therefore, complete voice rest and resulting lack of mucosal wave may inhibit or delay wound healing. It may also be that increased capillary perfusion and mobilization may require large-amplitude mucosal oscillation, such as that found in moderately loud voice.

CONCLUSION

The use of postoperative voice rest in the case of nodules, polyps, and cysts is a common clinical practice, but support for it is by no means unanimous. Most surgeons recommend 7 days of complete or relative voice rest after microlaryngoscopy. However, there is a lack of uniformity of opinion and practice with regard to the type and duration of the voice rest, and a substantial portion of the otolaryngologic community supports the use of voice rest only under certain circumstances, the specifics of which are not revealed by this survey. Reasonable physiologic rationales can be developed both to support and to refute the utility of voice rest in mucosal repair. The lack of a clinical standard of care reflects the lack of empirical data regarding the efficacy of postoperative voice rest. Empirical data from well-designed clinical research are an essential component of evidence-based medicine. Such data are needed to inform the common use of postoperative voice rest for benign mucosal lesions of the vocal folds.

Acknowledgments

The authors thank Katherine Freeman, DrPH, for biostatistical consultation, the Academy of Otolaryngology–Head and Neck Surgery for providing the membership mailing list, and the Academy members who participated in this survey.

BIBLIOGRAPHY

6. Kleinsasser O. Microlaryngoscopic and histologic appear-