

ORIGINAL RESEARCH

Voice rest after vocal fold polyp surgery: A Swedish register study of 588 patients

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Funding information

The Swedish National Quality Register for Otolaryngology

Abstract

Objective: To evaluate the impact of voice rest on patient-reported voice outcome 4 months after vocal fold polyp surgery.

Methods: Preoperative information was collected about age, sex, and smoking habits and the voice handicap index-10 (VHI-10). Four months postoperatively, voice rest (total voice rest, spoke single words, and spoke normally), and pre and postoperative voice therapy were reported. This was correlated to voice satisfaction from a two-category subjective evaluation “satisfied/ not satisfied” and to VHI-10. Logistic regression models with relative risk for NOT being satisfied with voice after surgery were performed.

Results: Data from 588 patients were available. The group “spoke normally” showed the highest degree of patient satisfaction (92%). Younger patients (<59 years) were more satisfied than older (90% vs. 81.5%). High age and low VHI-10 scores before surgery were statistically significant for negative voice outcome. Gender or voice rest type did not significantly affect outcome. The largest improvement in VHI-scores was in the group who *spoke normally* and least in the group who *spoke single words*.

Conclusion: We found no significant difference in the two-category subjective voice outcome depending on voice rest. VHI-10 showed a statistically significant positive effect on self-evaluated voice outcome, with the largest improvement in the group with no voice rest. However, the clinical relevance of the VHI changes is unclear. The present study does not show any advantage of total voice rest as compared to relative voice rest or speaking freely. High age and low preoperative VHI scores were significant risk factors for worse voice outcome.

Level of evidence: 4

KEYWORDS

microlaryngeal surgery, VHI-10, voice therapy

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1 | INTRODUCTION

Vocal fold polyps are benign lesions that can lead to significant voice disability.¹ Behavior modifications and speech therapy may play a role in the management of this condition,¹ but surgery is also often needed.² After vocal fold surgery, voice rest is commonly recommended as this is thought to optimize healing of the vocal fold mucosa and improve postoperative voice quality.² The avoidance of phonation is believed to prevent mucosal injury that can result in scarring of the vocal folds.³ The depth of the vocal resection at surgery is also important to the risk of vocal fold scar development.⁴

However, few clinical studies have investigated the effect of voice rest after laryngeal surgery and empirical evidence supporting the use of vocal restrictions and/or voice rest is lacking.⁵ On the contrary, there is also evidence showing that early vocal stimulation during the proliferation phase may enhance the healing process in the vocal fold.³ It has been reported that mechanical stimulation of human vocal fold fibroblasts causes increased expression levels of proteoglycans and hyaluronic acid⁶ and that mechanical stimulation also promotes fibroblast proliferation and migration in the rabbit vocal fold.⁷ Early vocal stimulation during the proliferation phase may therefore enhance the healing process in the vocal fold.³ However, theoretical studies on the effects of vocal loading have also shown that longer continuous phonation (>20 min) results in increase of pro-inflammatory cytokines on the vocal fold surface.⁸ Thus, you could probably argue that there might be a limit where further phonation may be negative to healing, and this should be considered when giving patients postoperative recommendations.

There are no internationally established standard protocols for voice rest and the type and duration of recommended voice rest differ among clinicians in the literature.³ Recommended voice rest ranges from 3 days⁹ to 2 weeks,¹⁰ and in a 2017 survey among laryngologists across the United States, most surgeons recommended 7 days of voice rest despite lack of evidence supporting this duration.¹¹ The voice rest type ranged from complete silence to relative voice rest and the duration also differed depending on diagnosis and type of surgery performed.^{2,5,9}

As in the rest of the world, Sweden lacks consistency in postoperative voice rest following microlaryngeal surgery. The recommended type and duration of voice rest varies according to clinician, sometimes even at the same clinic.

It is important to consider the psychological and economic implications of voice rest after laryngeal surgery.¹² Absolute voice rest is both difficult to comply with¹³ and can have a negative impact on patient quality of life (QoL), including limited social interaction, communication difficulties, and inability to work.¹² Therefore, one could argue for avoidance of unnecessary voice rest postoperatively.

Since 2009, Sweden has a National Register for Phonosurgery. This register includes data on vocal fold surgery performed on benign lesions. Six diagnoses are included: unilateral vocal fold polyp, bilateral nodules, intracordal vocal fold cyst, vocal fold edema (Reinke's edema), sinus Morgagni/ventricular fold cyst, and vocal fold edge edema.

The aim of the present study was to evaluate what impact voice rest has on patient-reported voice outcome 4 months after vocal fold

polyp surgery both regarding subjective voice satisfaction and reported postoperative VHI score. The hypothesis set out to investigate was that "total voice rest for a few days" is NOT more beneficial for the reported outcome compared to "spoke normally" or "spoke single words for a few days."

2 | MATERIALS AND METHODS

The present study is a retrospective register study performed with data from the National Register for Phonosurgery in Sweden. The main outcome measure of interest is the patient's subjective experience of voice improvement after surgery. The register comprises three parts with questionnaires answered at different time points. The first form is filled in by the patient preoperative as close to surgery as possible (most often the same day) with questions about subjective voice concerns in speaking (yes/no) and singing (yes/no), smoking during the past 5 years, and employment. At the same time, the patient also fills in the Swedish version of the voice handicap index-10 (VHI-10), a patient-based voice handicap evaluation questionnaire with 10 questions.¹⁴ The score ranges from 0 (normal voice) to a maximum of 40. The second part of the register is a questionnaire completed by a medical secretary at the respective clinic using information drawn from medical records. Information collected covers where the surgery was performed, how the pre and postoperative laryngoscopy examination was performed, and diagnosis.

The third and final questionnaire is sent home to the patient 4-month postoperative by mail or email. The patient fills in the type of voice rest used with these choices: "total voice rest for a few days," "spoke single words for a few days," or "spoke normally." No definition is given on how many days the voice rest lasted. Questions about preoperative voice therapy (no/less than five sessions/five or more sessions) and postoperative voice therapy (no/less than three times/three or more times) are answered. Voice satisfaction 4-month postoperatively is reported in two ways. First, by self-evaluation (much better voice/better voice/no change/worse voice/much worse voice) that are categorized into two groups: "satisfied" when patients answered, "much better voice" or "better voice," or "not satisfied" when they answered "no change," "worse voice" or "much worse voice" compared to the preoperative voice. Second, voice outcome is reported by VHI-10. All answers from the questionnaires are then manually inserted into the register by personnel at the National Register Secretariat in Gothenburg, Sweden.

Patients with vocal fold polyp diagnoses who underwent surgery and answered the register survey were included in the study. The register lacks detailed information about the vocal fold polyps (e.g., position and extent of lesion). The patients gave informed consent prior to participation.

Categorical variables are presented as n (%). Continuous variables are described as the mean, standard deviation (SD), median, and range (min, max). Patients were grouped according to the type of voice rest they reported after surgery: "Complete silence for a few days," "Spoke single words for a few days," or "Spoke normally." For comparison between these voice rest groups, a generalized linear model with binomial distribution and a log-link were used for dichotomous variables and ANCOVA for continuous variables. Dichotomous

variables analyzed were voice satisfaction (satisfied/ not satisfied) and the clinically relevant change in VHI sum (≥ 6). Continuous variables analyzed were change in VHI sum. Explanatory variables available from the register were age, gender, voice rest, smoking, and pre and postoperative voice therapy. For the ANCOVA, age was categorized in 10-year intervals. Values of $P < .05$ were considered to indicate statistical significance. Due to the exploratory nature of the study, no adjustments for multiple comparisons were made. The data were analyzed with software SAS version 9.4.

The main objective was to compare the voice rest group “spoke normally” with the combined groups “total voice rest for a few days” and “spoke single words for a few days” with regards to patient satisfaction from the register report. The Central Ethical Review Board in Stockholm approved this study with application number 2016/1504-31.

3 | RESULTS

3.1 | Patient characteristics

In the Swedish National Register for Phonosurgery, 828 patients were operated for vocal fold polyp between January 2008 and December 2018 at 13 different Otorhinolaryngological clinics in

Sweden. Among them, 588 reported information about type of postoperative voice rest in the register (71%) and were included in the present study. Table 1 shows descriptive statistics of the patients both overall and sorted by postoperative voice rest used. In total, 305 (52%) were male and 283 female (48%). Mean age was 46 years (SD 14.9) with a range of 18–88 years. Information about smoking habits during the past 5 years was only available from 2013 where 141 patients (35%) reported smoking whereas 262 (65%) were nonsmokers. Mean VHI-10 score preoperatively was 22.3 (SD 9.4). In total, 182 patients (31%) received preoperative voice therapy but only 80 (14%) received voice therapy more than five times. Thirty-seven patients (6%) did not answer this question. Postoperatively, 112 patients (19%) received voice therapy in more than three sessions, whereas 468 (80%) did not. Information about surgical technique was not included in the questionnaires. However, in Sweden almost all microlaryngeal vocal fold polyp surgeries are traditionally performed with cold instruments (not with laser). The recommendation of voice rest after vocal fold polyp surgery differs in Sweden depending on local on-site traditions (Figure 1). In the southern part of Sweden, voice rest is usually not recommended whereas in the Stockholm/Uppsala region it is more common to recommend voice rest for a few days.

TABLE 1 Descriptive statistics including outcomes divided by voice rest group

	Overall	Complete silence	Spoke single words	Spoke normally
N	588	289	162	137
Age, years (mean (SD))	46 (14.9)	43 (13.8)	48 (16.9)	50 (13.6)
Age category, years (N (%))				
≤29	88 (15.0)	54 (18.7)	27 (16.7)	7 (5.1)
30–59	376 (63.9)	194 (67.1)	92 (56.8)	90 (65.7)
≥60	124 (21.1)	41 (14.2)	43 (26.5)	40 (29.2)
Gender (N%)				
Male	305 (51.9)	138 (47.8)	89 (54.9)	78 (56.9)
Female	283 (48.1)	151 (52.2)	73 (45.1)	59 (43.1)
Speech therapy >5 times before surgery, (N (%))				
No answer	37 (6.3)	14 (4.8)	10 (6.2)	13 (9.5)
No	471 (80.1)	217 (75.1)	137 (84.6)	117 (85.4)
Yes	80 (13.6)	58 (20.1)	15 (9.3)	7 (5.1)
Speech therapy >3 times after surgery (N (%))				
No answer	8 (1.4)	2 (0.7)	3 (1.9)	3 (2.2)
No	468 (79.6)	207 (71.6)	135 (83.3)	126 (92.0)
Yes	112 (19.0)	80 (27.7)	24 (14.8)	8 (5.8)
Not satisfied with voice after surgery (N (%))	69 (11.7)	32 (11.1)	26 (16.0)	11 (8.0)
VHI-10 sum before surgery (mean (SD))	22.3 (9.45)	23 (8.94)	22 (9.82)	21 (10.02)
VHI-10 sum after surgery (mean (SD))	5.2 (7.61)	5.40 (7.64)	6.3 (8.00)	3.6 (6.81)
VHI-10 sum difference before and after surgery (mean (SD))	16.9 (10.75)	17.4 (10.48)	15.8 (11.58)	17.3 (10.22)
VHI-10 sum difference of ≥ 6 (N (%))	466 (84.1)	238 (85.9)	127 (81.4)	101 (83.5)

Abbreviations: N, number; SD, standard deviation.

FIGURE 1 Recommendation of voice rest type after vocal fold polyp surgery in Sweden according to site

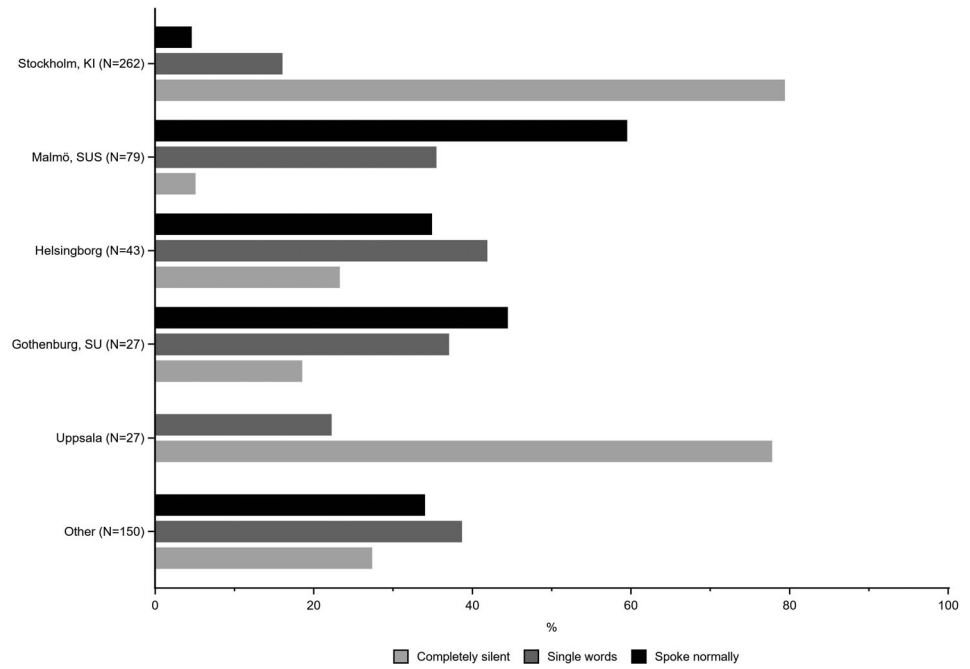


TABLE 2 Self-reported voice outcome 4 months after surgery according to type of voice rest used

	Not satisfied		Satisfied		All	
	N	%	N	%	N	%
Complete silence for a few days	32	11.1	257	88.9	289	100.0
Spoke single words for a few days	26	16.0	136	84.0	162	100.0
Spoke normally	11	8.0	126	92.0	137	100.0
All	69	11.7	519	88.3	588	100.0

Note: Not satisfied is defined as answers “no change,” “worse voice” or “much worse voice.” Satisfied is defined as answers “much better voice” or “better voice” 4 months after surgery. N = number.

3.2 | Self-evaluation of voice outcome with two-category evaluation (satisfied/not satisfied)

Table 2 shows self-reported voice outcome 4 months after surgery according to type of voice rest. In total, 88% of patients were satisfied with their voice outcome (answered as much better voice or better voice), whereas 12% were not satisfied or had unchanged voice. The voice rest type “spoke normally” showed the highest degree of patient satisfaction (92%), whereas the group “spoke single words for a few days” showed the least satisfaction (84%). Table 3 shows voice satisfaction related to different age groups. Patients up to 59 years were satisfied in around 90% of cases, whereas the older group patients' satisfaction rate was 82%. Tables 4 and 5 show logistic regression models with relative risk for NOT being satisfied with voice outcome 4 months after surgery with analyses of age at surgery, VHI before surgery, gender and voice rest type. In these models, type of voice rest used was dichotomized to “Spoke normally or spoke single words” versus “Total voice rest” (Table 4) or “Total voice rest or spoke single words” versus “Spoke normally” (Table 5). High age and

low VHI-10 scores before surgery were statistically significantly associated with negative voice outcome. Gender or voice rest type were not found to significantly affect subjective voice outcome statistically. However, the greatest relative risk for NOT being satisfied was found between total voice rest or speak single words versus speaking normally (RR 1.72, $P = .083$; Table 5). The two-category evaluation (satisfied/ not satisfied) did not give any statistically significant difference between the groups that received, or did not receive, voice therapy for voice outcome 4 months after surgery. Its inclusion in the model only marginally affected results for other explanatory variables. It was therefore not included in the final model (results not shown).

3.3 | Self-evaluation of voice outcome with VHI-10

When analyzing preoperative and postoperative mean VHI-scores between the voice rest groups, large improvements were found in all groups (Table 1 and Figure 2). In the ANCOVA-model, a statistically

significant change was found comparing different voice rest groups. The group that *spoke normally* (no voice rest) had larger improvement (2.44 VHI points) compared with the group that *spoke single words* ($P = .008$; Table 6). In addition, the group “*spoke normally*” showed greater improvement (1.64 more VHI points) than the group “*complete silence*” ($P = .049$). This means that improvement was greatest for the group *spoke normally* (= no voice rest) and least for the group *spoke single words*. The results were adjusted for age group, gender, and preoperative VHI (Table 6). To test for clinical relevance, we also tested the ANCOVA model with dichotomization for NOT receiving VHI reduction of ≥ 6 points 4 months after surgery. No statistically significant difference was found between any of the tested voice groups (data not shown).

TABLE 3 Age and self-reported voice outcome 4 months after surgery

	Not satisfied		Satisfied		All	
	N	%	N	%	N	%
Age (years)						
≤29	8	9.1	80	90.9	88	100.0
30–59	38	10.1	338	89.9	376	100.0
≥60	23	18.5	101	81.5	124	100.0
All	69	11.7	519	88.3	588	100.0

Note: Not satisfied is defined as answers “no change,” “worse voice” or “much worse voice.” Satisfied is defined as answers “much better voice” or “better voice” 4 months after surgery. N = number.

TABLE 4 Logistic regression models for NOT being satisfied with voice outcome 4 months after vocal fold polyp surgery

Comparison	RR	Lower CI	Upper CI	P
Age at surgery (years)	1.02	1.00	1.03	.046
VHI-10 (sum) before surgery	0.97	0.95	1.00	.017
Sex (female vs. male)	0.89	0.56	1.40	.631
Voice rest type (Spoke normally or Spoke single words vs. total voice rest)	0.99	0.63	1.58	.978

Note: Voice rest type “Spoke normally or spoke single words” compared with “Total voice rest.” Relative risk and 95% confidence interval. Abbreviations: CI, confidence interval; RR, Relative risk; VHI-10, voice handicap index-10.

TABLE 5 Logistic regression models with relative risk for NOT being satisfied with voice outcome 4 months after surgery

Comparison	RR	Lower CI	Upper CI	P
Age at surgery (years)	1.02	1.00	1.03	.026
VHI-10 (sum) before surgery	0.97	0.95	0.99	.010
Sex (female vs. male)	0.89	0.56	1.39	.600
Voice rest type (total voice rest or spoke single words vs. spoke normally)	1.72	0.97	3.35	.083

Note: . Voice rest type “Total voice rest or spoke single words” compared with “Spoke normally.” Relative risk and 95% confidence interval. Abbreviations: CI, confidence interval; RR, Relative risk; VHI-10, voice handicap index 10.

3.4 | Comparison between VHI-10 results and voice satisfaction

Table 7 shows the relationship between the patients' subjective voice outcome (satisfied/ not satisfied) and VHI-10 sum scores pre and postoperatively. In general, not satisfied patients had lower preoperative VHI scores (mean 19.1 for not satisfied and 22.7 for satisfied patients). They also had a smaller difference between their VHI-sum

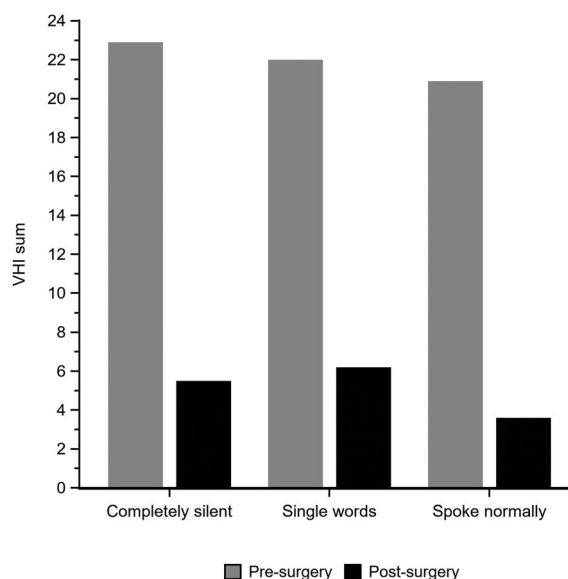


FIGURE 2 Preoperative and postoperative voice handicap index (VHI) scores in different voice rest groups

TABLE 6 Estimated differences in VHI-10 sum change

Comparison	Difference in VHI	Lower CI	Upper CI	P
Spoke normally versus silent	1.64	0.00	3.27	.049
Spoke normally versus spoke single words	2.44	0.65	4.24	.008
Silent versus spoke single words	0.81	-0.69	2.31	.291

Note: Paired comparisons with estimated mean value differences in VHI-10 sum change according to type of voice rest used. The first voice rest type in each line serves as reference and the change in VHI is in favor of this type.

Abbreviations: CI, confidence interval; VHI-10, voice handicap index 10.

TABLE 7 Relationship between voice outcomes (voice satisfaction and VHI-10 sum)

	Overall	Satisfied	Not satisfied
N	588	519	69
VHI-10 sum before surgery (mean (SD))	22.26 (9.45)	22.69 (8.99)	19.10 (11.90)
VHI-10 sum after surgery (mean (SD))	5.21 (7.61)	4.45 (6.61)	11.09 (11.48)
VHI-10 sum difference before and after surgery (mean (SD))	16.92 (10.75)	18.07 (9.73)	8.20 (13.74)
VHI-10 sum difference of ≥ 6 (N, (%))	466 (84.1)	433 (88.5)	33 (50.8)

Abbreviations: N, number; SD, standard deviation; VHI-10: voice handicap index 10.

before and after surgery (mean VHI score difference 8.2 for not satisfied patients and 18.1 for satisfied patients).

When a model extended with preoperative and postoperative voice therapy was also fitted to the data, postoperative voice therapy was found to be statistically significant for worse voice outcome. However, because we can assume that patients with postoperative voice problems to a higher degree are referred to voice therapy, this association may be an outcome in itself. Results for the main comparisons of voice rest changed only marginally when pre and postoperative voice therapy was included (results not shown).

4 | DISCUSSION

In our retrospective study of 588 patients who underwent vocal fold polyp surgery, we found no statistically significant difference in voice outcome 4 months after surgery when comparing subjective reported outcome (“much better voice,” “better voice,” versus “no change,” “worse voice,” or “much worse voice.”) between the different types of voice rest studied. However, when comparing VHI-10 result, we found a statistically significant effect comparing the “spoke normally” group (no voice rest) to the “spoke single words” group with best outcome for the group that “spoke freely” and least positive for the group that “spoke single words.” The “complete silence” group showed intermediate results. The VHI results were adjusted for age and sex. High age and low preoperative VHI scores were significant risk factors for worse voice outcome.

To the best of our knowledge, this is the largest study performed on self-reported voice outcome after vocal fold polyp surgery. Its strength is the number of patients included and the homogeneous cohort; one diagnosis (vocal fold polyp) and similar surgical techniques

used (cold technique). The primary outcome is the patient's own subjective experience of their voice, in contrast to studies only using visual examination of the vocal folds or perceptual assessments of the voice by a professional without concern for the patient's own opinion.

In literature, voice rest is commonly advised after vocal fold surgery with the aim of improving postoperative voice quality.² However, both the duration and type of recommended rest after phonosurgery vary among clinicians. According to a 2003 study by Behrman et al, complete voice rest was recommended for anywhere between 3 and 14 days following removal of vocal fold polyp. In contrast, some otorhinolaryngologists did not recommend any type of vocal restriction at all.⁵ The correlation between voice rest and vocal fold healing is, however, not clear.¹⁵

In addition, other factors such as health economy (duration of sick leave), as well as degree of subjective discomfort during the postoperative period must also be considered. Most patients with voice problems are in vocally demanding occupations.¹⁶ Hence, vocal restrictions may, apart from the negative impact on the patient's self-reported QoL, also result in loss of income or decreased employee productivity. In a prospective study by Rosseau et al, voice rest adversely affected patient QoL. Also, patients younger than 60 years were more negatively affected by voice rest, probably due to the difference in vocal needs for younger working patients versus older patients, where many were retirees. Patients experienced social restrictions, had difficulties communicating, and were unable to work, which led to feelings of frustration and being handicapped during voice rest.¹² This frustration might explain why self-reported compliance was low for voice rest in the same study. Only 42.4% of patients undergoing postoperative voice rest complied with the given recommendation.¹² This same pattern was also seen in the study by Whiting et al., where patients showed more difficulties in complying with

absolute voice rest than relative voice rest, both regarding self-assessed compliance and objective measurements of relative phonation time. Patients phonated less when recommended absolute voice rest, but they were certainly not completely silent.¹³

Our results of voice outcome are in line with the findings of Whitling, Lyberg-Åhlander et al. This study on 20 patients also reported high satisfaction after relative voice rest (corresponding to spoke normally in the present study) as compared to complete silence for 7 days. There was no intermediated group (corresponding to spoke single words), but the study included acoustic and perceptual analysis of voice as well as high-speed imaging of the vocal folds. In the short term, the absolute voice rest group improved morphologically to a higher degree. However, the relative voice rest group had equal or better long-term recovery.

In our study, the overall satisfaction rate with surgery is high (88.3%) regardless of voice rest type. This is in agreement with other studies performed on vocal fold polyp surgery regardless type of voice rest.¹⁷⁻¹⁹ The findings that higher age and lower preoperative VHI-scores were significant risk factors for worse voice outcome can be explained by the fact that the indication for surgery in those cases is mainly diagnostic rather than voice problem. Those patients are included in the register since the final diagnosis turned out to be vocal fold polyps.

The register reports self-evaluation of voice outcome in two ways and we chose to analyze and present both. We believe that VHI-10 scores alone may miss factors that can be of importance for the patients' subjective evaluation of voice. For example, in our material, 24 patients had a reduction of VHI score of more than 10 but still reported themselves as "not satisfied" with their voice outcome (results not shown).

There are difficulties in comparing our results with other studies because voice rest studies performed only on vocal fold polyp patients are lacking. Most studies mix several different diagnoses as vocal polyps, vocal fold cysts, Reinke's edema, leukoplakias, and cancer in situ.^{9,13,20} Vocal fold polyps are superficial lesions in the lamina propria and can be broad-based or have a narrow stem. In our material, we lack information about the exact position and size of the lesion due to the available information in the register, but that is a problem we share with other clinical studies.⁹ In contrast to polyps, vocal fold cysts involve deeper layers of the vocal folds and may also be associated with other pathological conditions such as sulcus or mucosal bridges.¹⁸ If surgery extends deeper, as may be needed in laryngeal diagnoses other than polyps, there may be a higher risk for vocal fold scarring²¹ and a mixture of diagnoses could affect the results.

Prospective studies performed include smaller study groups, as in the work by Kaneko and Kiagiadaki, where both only included 31 patients, and in the study by Whitling including only 20 patients. There are also differences in surgical techniques used, where some studies only use cold technique,^{9,13} others only laser²² while others mix both.²⁰ Furthermore, many studies do not define the type of voice rest used nor have a "no voice rest" group.

There are limitations to this study. This study is retrospective and information of how many days each patient rested their voice is

lacking (the questionnaire only says "a few days"). No monitoring was made of the patient's use of voice, so the real amount of phonation duration is unclear, and it may be difficult for patients to quantify the amount of voice use after 4 months. However, that situation is the same in most studies performed, except for the Whitling study. Also, the patients were not provided with standardized written information about the voice rest. One bias could be that patients with a subjectively hoarse voice after surgery have a tendency toward voice rest in contrast to patients who find their voice to be improved and therefore speak more freely. This could partly explain the fact that the highest VHI score change was in the group who spoke freely. Furthermore, objective measurements such as acoustic analyses, videostroboscopic (or high-speed endoscopic) data, or perceptual voice evaluation are lacking in this study. Neither is the duration of postoperative sick leave or degree of voice loading at work available from the register. These factors may be important to the voice results after 4 months. Additionally, information about smoking habits was registered only relatively recently in the quality register, so just 245 patients answered that question. Smoking was, however, investigated separately in a subgroup analysis (data not shown) and no significant effect on voice outcome was seen. Although we found a statistically significant effect comparing the "spoke normally" group (no voice rest) to the "spoke single words" group in favor for the group that spoke freely, the difference between the groups was <6 points. A 6-point difference has been shown to represent a minimal important difference in VHI-10.²³ Therefore, this result may not be clinically relevant. In the dichotomized ANCOVA model with VHI-sum difference of ≥ 6 , no statistical significance was found between the voice rest groups. We believe that this supports our conclusion that there is no advantage in recommending total voice rest.

In Sweden, most patients are put on sick leave for 1 week (in some cases longer) after phonosurgery. They are also advised not to cough and to avoid heavy lifting or throat clearing. Although we found no clear effects of pre and postoperative voice therapy in our study, it could still be argued that advice for careful phonation techniques given by a speech and language pathologist is motivated in selected patient groups. Also depending on the patient's preoperative voice, other techniques (e.g., tube phonation) could be recommended to avoid compensatory hyper or hypofunctional voice use. The optimal treatment of benign lesions of the larynx is probably complex and includes several factors such as good patient compliance, the surgical method applied and postoperative voice therapy.²⁴

5 | CONCLUSION

In this study on 588 patients operated for unilateral vocal fold polyps, we found no significant difference in self-reported voice outcome 4 months after surgery depending on voice rest when using voice outcome parameters "much better voice," "better voice" versus "no change," "worse voice" or "much worse voice." A statistically significant positive effect on self-evaluated voice outcome was found using the Swedish VHI-10, with the largest improvement in the group with

no voice rest, but the clinical relevance of these VHI changes is unclear. The present study does not show any advantage of total voice rest as compared with relative voice rest or speaking normally. High age and low preoperative VHI scores were significant risk factors for worse voice outcome.

ACKNOWLEDGMENT

The Swedish National Quality Register for Otolaryngology financially supported this work with statistical support and register administration.

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How to cite this article: Björck G, Hertegård S, Ekelund J, Marsk E. Voice rest after vocal fold polyp surgery: A Swedish register study of 588 patients. *Laryngoscope Investigative Otolaryngology*. 2022;7(2):486-493. doi:10.1002/lio2.775