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POST-OPERATIVE CARE OF LARYNGEAL POLYPS

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Introduction

According to the literature post operative recovery of the voice following polypectomy is primarily related to surgical technique 1), nature and location of the polyp 2), and postoperative care 3). Numerous clinicians 2-5) have reported the development and modification of anesthesia, equipments, and procedures for improvement of surgical excision of laryngeal lesions. Reports are scarce, however, on the interaction of post-operative treatment and its relationship to surgical outcome 6-10). Questions concerning the use of vocal rest and hygiene remain and enigma to most clinicians and appear to be administered in a haphazard fashion. It was therefore, the purpose of the current study to determine how vocal hygiene and voice rest affected the surgical outcome of polypectomies.

Method

Subjects

The subjects for this study were 50 consecutive patients who were seen at Tokyo Senbai Hospital between 1984 and 1987, and who had underwent microsurgery for correction of laryngeal polyps. All subjects were followed for at least three months after the surgery. The demographic characteristics of these subjects is shown in Table 1.

Table 1.

Summary of the 50 polyp subjects by sex and age.

Male(24cases)	Age	Female(26cases)
5 cases	20~29 yrs.old	8 cases
5	30~39	5
4	40~49	11
9	50~59	2
	60~69	
	70~79	
1	80~89	

Medical examination and voice evaluation

All 50 patients were interviewed by a single examiner. Queries included information concerning occupation, patients'

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perception of onset of the problem, persistence of the dysphonia, and possible causes of vocal abuse or misuse. Visual examination of the vocal folds with a laryngeal mirror, and fiberscope coupled to a stroboscope were performed during voice tasks demonstrating pitch range, and habitual conversational pitch. These measures of vocal function together with the patient' extent of satisfaction, were used for the judgement of the degree of vocal improvement. These examinations were repeated at one month intervals post-operatively.

Treatment

Subjects were divided into two groups based on presence of absence of inflammation of laryngeal mucosa. Those subjects with inflammation were put on 7-10 days of strict vocal rest and anti-inflammatory treatment prior to surgery. Surgery was conducted under general anesthesia as a direct laryngoscopic procedure.

Figure 1 provides a diagramatic depiction of the polypectomy procedure performed on these subjects. The procedure was performed using a direct laryngoscope and a operating microscope. The polyp was grasped with forceps and excised either by scissors or a surgical knife. Care was taken to take only that tissue absolutely to remove the polyp. At the time of surgery, polyps were classified into groups based on the color, nature, and size. Those which looked red were classified as "red" and those which did not present redness were classified as "white". Those which were hemispheric and/or pedunculate were classified as "peduncle", and those which were widebased were classified as "wide". Polyps which were less that a half of the membranous portion were classified as "small", and those which were larger than a half of the membranous portion, "large".

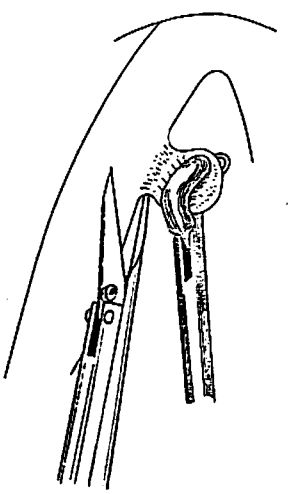

Figure 1. Diagram depicting excision of the polyp.

Post operatively, complete vocal rest was prescribed for all subjects. Vocal rest was extended for 2-4 days for the subjects who either were unable to follow this rigid vocal rest regime or had evidence of local redness or edema, and a vocal hygiene program (see Appendix) was initiated for all subjects following the period of total voice rest.

The vocal hygiene program consisted of two primary components; reduced loudness and decreased amount of taking. Videostoroboscopy was used to help determine the course of vocal hygiene. Subjects were advised to limit conversation to one-on-one situations with the listener no further away than an arm's distance from the speaker until the examiner had clear evidence that the asymmetry of the wave motion of the mucosa membranes of the vocal folds had nearly diminished. Initially subjects were instructed to limit their talking to 10 minutes per day. Both the amount of talking and loudness were gradually increased so that normal vocal behavior was resumed within one month following surgery. Examination of the vocal folds and of the practice of vocal hygiene were repeated post-operatively daily for the first 7 days, at least once a week for one month after the surgery, and every two weeks thereafter for the following two month. (For patients whose occupation required frequent voice production, various ways to reduce speaking time while continuing to work were introduced through clinician-patient problem solving.) Also at the time of these examinations interviews were conducted to determine if the subjects were following the vocal hygiene program, if they felt following vocal hygiene was important, and if the program needed to be modified to meet the needs of the individual.

Results

Vocal hygiene program

Table 2 shows the subjects' occupation. Based on occupational requirements of vocal use, 20 subjects were considered to be light vocal users, 3 were considered to be moderate users, and 27 heavy voice useres. Thirty of the subjects denied vocal abuse. On the remaining 20 heavy voice users, we collected detailed information on vocal abuse. As shown in Table 3, 18 patients reported heavy or abusive use of voice in activities such as spectator sports or singing in chorus in inappropriate vocal ranges.

Form and location of polyps

Table 4 shows the classification of the polyps and the time taken for the wound to heal. The smaller the polyps were, the shorter is took for them to heal. Bilateral polyps took longer healing time than did the unilateral polyps. Within 1 to 24 months, forty seven of the 50 subjects had satisfactory resolution of the polyps as evidenced by objective evaluation and patients' satisfaction. In the remaining three, one needed additional resection of the polyps and two had recurrence of polyps.

Vocal hygiene

Table 5 shows the subjects by occupation as they relate to those who were able to follow post-operative vocal hygiene recommendations versus those who were not. Except for company employees, vocal abuse was suspected based on the case history interviews. Four of seven company employees worked for business departments and were considered light vocal users at work but reported habitual coughs and vocal abuse associated with recreational activities. One out of the remaining four comapny employees worked at a reception desk in a social welfare center and he reported usage of a loud voice when talking to old people with hearing impairment. For two patients out of those seven who did not follow the vocal hygiene program, recurrence of polyps was found. Excluding the three subjects who had recurrence of the polyp or underwent a second procedure, 47 subjects were divided into two groups in order to examine recovery. One group considered of 23 patients who closely followed the vocal hygiene program, and the other group consisted of 24 patients who did not follow the vocal hygiene program or who did not recognize its importance. In the first group with good vocal hygiene, 21 patients out of 23 recovered within three months. Statistical results using a Chi square test revealed that the probability of recovery within three months was significantly higher for the good vocal hygiene group than for the poor vocal hygiene group ($p<0.1$). This held true even when the two patients who followed the vocal higiene program but took more than four months for recovery were compared with the 15 patients who did not follow the vocal hygiene and also took more than four months for recovery. Chi square test revealed that even with these slow recoveries it took significantly longer for the poor vocal hygiene group to recover than it did the good vocal hygiene groop.

Discussion

Patients

In the present study of 50 subjects with vocal polyps, 60% had occupations which implied some vocal abuse (eg. teachers, singers, actors, businessmen, or construction workers employed in very noisy enviroments). For the other 40%, who were housewives or company employees, 90% were found to frequently participate in some form of vocal abuse such as amateur singing in a chorus and loud cheering at spectator sports. Thus, 48 subjects (30 plus 18) out of 50 patients (96%) were considered to have polyps related, at least in part to vocal use. This ratio is extremely high compared to those in previous reports. The discrepancy seems to be attributable to methodological differences. In the present study we report a closer inspection of the subjects' case history. Another major difference between this study and those reported elsewhere is the absence of allergies or exposure to toxic fumes, and any antiinflammatory medications prior to the onset of polyps. Based on the absence of these factors and the presence of vocal abuse we conclude that the etiology of this disorder may be related to a larger extent than previously thought to vocal

abuse.

Nature of the polyps

Observation of the vocal folds during surgery revealed that the polyps were located between the anterior 1/3 and the posterior 1/3 of the vocal folds in all cases. As for the size of the polyps, small size polyps predominated over largar ones, in that, 45 cases (90%) were less than 1/3 of the total length of the vocal folds, or 1/2 of the membranous portion. Regardless of whether the forms of the polyps were predunculated or wide-based. Twenty five subjects with small polyps (64%) were cured within three months. For those polyps which were largar than 1/2 of the membranous portion, 4 cases out of 5 took more than four months to recover indicating size may be an important variable when considering voice recovery in cases of vocal fold polyps. This is not surprising since more of the vibratory surface would be effected and since part of our criteria for recovery was return of symmetrical vibration. Therefore, this data shuld be regarded with caution until more cases are observed to support our contention that largar polyps take a longer time for cure than smaller polyps.

The ratio of the red or dark purple polyps to the white ones was 31 versus 19 respectively. The percentage of the reddish polyps with plentiful blood vessels was 62%, which is much less than the previously reported 72% by Imai, et al. (1968), 75% by Koike, et al. (1968), and 82% by Sato (1957). The most likely source of variance may be described to our pre-operative treatments in which the patients with serious inflammation on or above the polyps had voice rest and medication with anti-inflammatory drug. When this 62% is coupled with the additional number of subjects who were treated with antiflammatory drugs the numbers more closely approximate previously reported figures by Imai, Koike and Sato.

Mass lesions, such as polyps, nodules, and polypoid degeneration were found on the opposite sides of the vocal folds for 12 cases (24%). This finding is compatible with the results of Ara, et al.(1985), who reported 29% of his case were judged to have involvement of the contralateral fold. In the past this finding has been interpretated to be evidence that they developed from nodules. The results of our study demonstrate different characteristics than those typically associated with nodules; the lesions did not appear more frequently in females; the lesions did not respond to vocal hygiene without surgery; and the bilateral mass lesions were difficult to cure with 8 cases out of 12 taking more than four months for remediation even after surgery.

Vocal hygiene

The length of the postoperative wounds generally ranged from 2-4 mm, which was less than 1/3 of the total length of the membranous portion of th vocal folds. It has been reported that

small wounds of this size are healed within two to four weeks in dogs. However, in the present study with humans it was the case only when the patients folllowed complete vocal rest for 14 to 28 days after surgery.

Practically, it is not reasonable to assume subjects who return to work, take care of children, or have high stress are likely to follow vocal rest. Therefore, we gave general guidelines for vocal usage after surgery, and encouraged patients to practice good vocal hygiene. The guidelines are described in the method section of this paper and the actual instructions given to the patients are in the appendix.

Generally, most laryngologist and speech pathologists are familiar with vocal hygiene. However, most patients are not aware of behaviors contributing to vocal abuse and misuse. It is considered essential that clinicians take time to explain about vocal abuse and misuse thoroughly and concretely to polyp patients. It may seem time consuming to do so, but we believe that is an integral part of treatment of this disorder, and that it is one of the most important responsibilities of surgeons and speech pathologists.

The specific content of the vocal hygiene program is individually tailored to the patient 6,11). Bless poitned out that it is more helpful and convincing to instruct patients how to solve problems of vocal abuse and misuse that will allow them to function as possible than it is to give a genuine program of a list of behaviors to be suppressed. For every behavior, patients are given alternative behaviors to use as substitutes. Direct voice therapy is conducted in conjunotion with vocal hygine counseling when patients have problems phonating(Table 6).

In conclusion, the present study of 50 patients with laryngeal polyps showed that vocal hygiene played a significant role for both wound healing and improvement of voice following surgery. This finding suggests that vocal hygiene should be considered an intrical part of the surgical regime.

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APPENDIX : Post-operative vocal hygiene-common practice.

(i) Care shuld be taken of your general physical and mental health. Any activities likely to result in exhaustion, insomnia, and stress should be avoided.

(ii) Vocal abuse and vocal misuse shuld be avoided. Reduce talking time as much as possible. If you must sing select songs which do not exceed the middle of your vocal frequency range. Avoid using extremes in either pitch of loudness.

(iii) Effortful phonation shuld be avoided. In traditional Japanese singing, such as Minyo and Nagauta, excessive straining of vocal folds in sometimes observed. This behavior, of course, must be eliminated. Also, phonation with glottal constriction during activities, such as lifting or pushing heavy objects, acrobics or other strenuous activity shuld be avoided.

(iv) Avoid phonating in very noise circumstances. In classrooms and factories people tend to talk in a loud voice against the ambient noise. You are advised to move close to the person you are speaking to in order to use a softer voice. In any case don't speak to anyone less than an arms length away from you. If you are school teacher, your voice will be more effectively delivered to the class members when you are speaking from the center of the classroom so that your voice dosen't have to be projected as far and reduces your need for using a loud voice.

(v) Avoid hard glottal attacks and frequent coughing. These activities require excessive adduction of the vocal folds. For the purpose of avoiding coughing sure any allergic condition is medically managed. Avoid nuts fovals that seem to elicit coughing. Suppress coughing as much as possible by relaxing the throat, massaging the neck and by drinking water. Another alternative is using a silent cough by swallowing saliva while pressing the anterior sides of the neck.

(vi) Avoid dust, dirt, dryness, and other factors which

irritate the pharyngeal and laryngeal membrane. Beans such as peanuts sometimes cause aspiration after they are broken to small pieces in the mouth and may cause coughing. Mustard may irritate the throat membrane. In winter, humidity of a room shuld be properly controlled since air is generally dryer in winter than in oter seasons. Drinking cold water is helpful to cool the heated tissues (i.e. vocal folds). Patients are advised to give up smoking after polyp surgery.

Table 2.

Summary of the 50 polyp subjects by occupation and vocal use.

Occupation	All Cases	Cases who were unable to follow vocal hygiene program
Employee of a company	16	7
Singer,acter,announcer	11	9
Teacher	8	5
Housewife	7	
Worker in noisy environment	3	2
Hostess or bartender	2	1
Fireman	1	1
Policeman	1	1
Student	1	
Total all occupations	50	26

Table 3.

Summary of sublects exhibiting heavy or abusive vocal use.

Primary vocal abuse or misuse	Number exhibiting use/abuse
Singing or exceeding one's vocal frequency	3
Excessive talking	2
Strained phonation	2
Chronic cough or throat clearing	2
Talking in noisy environments	2
Karaoke*	1
Mixed abuses	2
Total number of abuse/misuse cases	20

* Popular Japanese recreational singing or Japanese. Loud singing is generally done with recorded orchestral background in smoky bars or other noise environment.

Table 4.

Summary of the polyp classification and time taken for the post-operative wound to heal.

	1 mos.	2 mos.	3 mos.	4 mos.	6 mos.	12 mos.	24 mos.
peduncu-lated small	○○ ○○ ○●	○○ ○○ ○○ ○○ ○●	○○ ○	○○ ○● ●●	○	○	○
sessile	○○ ○●	○○ ○●	○○	●●	●	○	○
wide based large			○	○	●●		

●: Bilateral
○: Unilateral

Table 5.

Summary of the 50 subjects by vocal hygiene compliance and length of time taken for the post-operative wound to heal.

V. hygiene (+)		V. hygiene (−)
○○● ○○●	~ 1 mos.	●○ ○○
○○○●●● ○○○○●●	2 mos.	● ○
○● ○	3 mos.	●● ●
● ○	4 mos.	●●○○ ●●○
	6 mos.	●○ ●○
	12 mos.	● ●
	24 mos.	○ ○

● : Male
○ : Female

Table 6

Summary of stages of post-operative treatment.

Treatment	Voice RX	Evaluation Frequency	Findings
1 Absolute voice rest	None	Daily	Vfold is injected & hyperemic Mucosal wave reduced
2 Relative voice rest	Vocal hygiene* Use of relaxed voice	Daily	Slightly less injected & hyperemic
3 Reduced use of voice	Vocal hygiene* Vocal relaxation Respiration training*	Weekly	Vfold slightly injected Mucosal wave nearly normal
4 Normal vocal use without singing or loud voice	Same as Stage 3*	Biweekly	Movement normal
5 Normal use of voice no restrictions		Monthly	Movement normal Vfold normal in appearance

*If needed