Clinical Research

ENT Updates 2019;9(1): 59-63
DOI: 10.32448/entupdates.539745

ENT updates
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The Effect of Surgery on Cord Vibration in Patients with Vocal Cord Polyps: Retrospective Videolaryngostroboscopy Study

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Abstract

Objective: Vocal cord polyps are benign lesions of the larynx that are frequently seen and are treated surgically. These lesions generally develop in the free edge of the vocal cords, and form an incomplete glottal closure accompanied by irregular vibration of the vocal cords. In this study, the aim is to investigate the effect of surgery on vocal cord vibration in patients with vocal cord polyps who are treated with the endolaryngeal cold knife microsurgery.

Method: Patients treated with endolaryngeal microsurgery at our clinic between 2014 and 2016, who were reported as vocal cord polyps by postoperative pathology result, and who regularly coming for follow-up examinations were included in the study. Using a scale which was first described by Hirano and Bless and modified and confirmed to be reliable in a study performed by Gürbüz et al., the preoperative and postoperative second month images of the patients were statistically compared.

Results: 10 of the 25 patients included in our study were female (40%) and 15 were male (60%). In all patients, vocal cord polyps were unilateral, and were located in anterior 1/3 of the vocal cord in 12 patients (48%), and in medial 1/3 of the vocal cord in 9 patients (36%). It was determined that impaired vocal cord vibratory functions showed statistically significant recovery in the postoperative period compared to the preoperative period ($p<0.05$).

Conclusion: Successful endolaryngeal cold knife microsurgery excision can correct impaired vibratory functions of vocal cords in patients with vocal cord polyps.

Keywords: Endolaryngeal microsurgery, Polyp, Videolaryngostroboscopy, Vocal cord

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Received: January 3, 2019; **Accepted:** March 12, 2019

Online available at:
www.entupdates.org

Introduction:

Vocal cord polyps are the most common benign lesions of larynx (1,2). Generally they are located in the free edge of the vocal cords, anterior and medial 1/3 junction, and are unilateral, with varying dimensions (2-4). They can be pedunculated, sessile, translucent or hemorrhagic. *(Figure 1)* Vocal overuse and misuse, infections, allergy, endocrine disorders, laryngopharyngeal reflux and smoking are important etiological factors in the formation of vocal cord polyps. (5-7). They have symptoms such as hoarseness, rough voice, harsh voice, feeling like having a lump in the throat. Videolaryngostroboscopy (VLS) is an important examination method which is used in diagnosis and post-treatment care of vocal cord polyps. In general, excision with microsurgery (endoscopic/microscopic laser or cold knife), followed by voice therapy is the current treatment approach to vocal cord polyps (5,8).

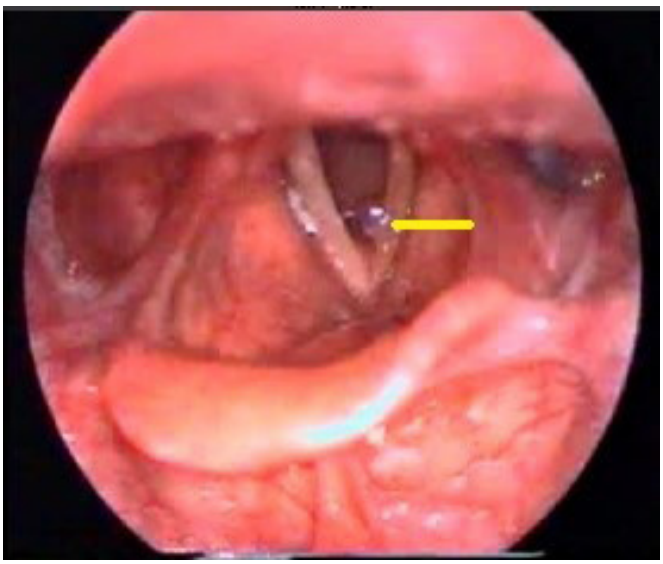

Figure 1. Hemorrhagic polyp in anterior 1/3 part of left vocal cord

In this study, the aim is to investigate the effect of surgery on vocal cord vibration in patients with vocal cord polyps who were treated with the endolaryngeal cold knife microsurgery.

Material - Method:

Prior to this retrospective study, ethics committee approval was obtained from Eskisehir Osmangazi University Ethics Committee. (Date: 09/07/2018 Number: 2018/138) 25 patients treated with endolaryngeal cold knife microsurgery between 2014 and 2016 in our department, who were reported as vocal cord polyps by postoperative pathology result and who regularly appeared for follow-up visits at 6-month intervals and did not receive preoperative and postoperative voice therapy, were included in the study. Age, sex, profession, initial complaints, complaint durations, and smoking history of the patients were examined from patient files, and were recorded. Polyp localization and characteristics were evaluated based on VLS images of the patients recorded preoperatively using *Xion® 3 CCD CHIP full HD (XION medical, Berlin, Germany)* endostroboscopy system.

An ENT specialist who did not perform the surgery also evaluated preoperative and postoperative month two VLS records of the patents to investigate the effect of surgery on vocal cord vibration. The scale which was first described by Hirano and Bless (9) and modified and confirmed to be reliable in a study performed by Gürbüz et al. (10) was used during the evaluation. The scale was used to examine vocal cord edge irregularity, lateromedial movement amplitude, mucosal wave, non-vibratory portion of the vocal cord, periodicity, compression of false cord, false vocal cord vibration, and supraglottic anteroposterior contraction parameters. (Table 1) Means scores obtained preoperatively and in postoperative month 2 were statistically compared using IBM-SPSS 21.0 package software. The Wilcoxon test was used in preoperative and postoperative analysis of data and the p value<0.05 was accepted to be statistically significant.

Results:

Of the 25 patients included in our study 10 were female (40%), and 15 were male (60%). In our study, the mean age was 47 (29-65). 9 of the patients were teachers (36%), and 4 (16%) were religious officials. 7 of the patients were non-smokers (28%), whereas 18 were smokers (72%). Average cigarette consumption of the patients was calculated to be 17 years/20 cigarettes/day. The main symptoms of the patients included in the study were hoarseness and harsh voice. 12 of the patients (48%) had reflux complaints. The average duration of the symptoms was calculated as 23.9 months.

In all patients, vocal cord polyps were unilateral, and were located on the left side in 9 patients (36%), and on the right side in 16 patients (64%). Polyps were located in anterior 1/3 of the vocal cord in 12 patients (48%), and in medial 1/3 of the vocal cord in 9 patients (36%), and in posterior 2/3 of the vocal cord in 4 patients (16%). Of

Table 1: Scale used in VLS examination

Percent of vocal fold edge irregularity	Regular	1-25 %	26-50%	51-75%	76-100%
	0	1	2	3	4
Lateromedial movement amplitude	Normal 0	Slightly decreased 1	Moderately decreased 2	Severely decreased 3	No movement 4
Mucosal wave	Normal 0	Slightly decreased 1	Moderately decreased 2	Severely decreased 3	No movement 4
Non vibratory portion of vocal fold	Normal 0	1-25 % 1	26-50% 2	51-75% 3	76-100% 4-5
Periodicity	Normal 0	Sometimes irregular 1	Mostly irregular 2	Always irregular 3	
Compression of false cord	Normal 0	Slight compression 1	Moderate compression 2	Complete compression 3	
False cord vibration	None 0	Mild 1	Moderate 2	Severe 3	
Percent of supraglottic antero-posterior contraction	None 0	1-25 % 1	26-50% 2	51-75% 3	76-100% 4

Table 2: Statistical analysis of parameters evaluated in VLS examination.

	Preoperative average score	**Average score of postoperative month 2**	***P value**
Percent of vocal fold edge irregularity	1.36	0.16	<0.001
Lateromedial Movement amplitude	1.36	0.12	<0.001
Mucosal wave	1.32	0.20	<0.001
Non vibratory portion of vocal fold	1.36	0.24	<0.001
Periodicity	1.04	0.20	<0.001
Compression of false cord	0.92	0.24	<0.001
False cord vibration	0.24	0.04	0.025
Percent of supraglottic antero-posterior contraction	1.40	1.08	0.011

*Wilcoxon matched pair signed-rank test.

the vocal cord polyps, 14 were pedunculated (56%), and 11 were sessile (44%). It was observed that 9 of the pedunculated polyps (64.2%), and 1 of the sessile polyps (9%) were hemorrhagic.

Furthermore, in all records examined preoperatively, it was noted that glottal closure was insufficient during vibration, and asymmetrical and aperiodic vibration was present in the vocal cord subject to the polyp. It was determined that vocal cord vibratory functions showed statistically significant recovery in the postoperative period compared to the preoperative period ($p<0.05$). *(Table 2)*

Discussion:

Vocal cord polyps, the most common type of benign lesions of larynx, are mainly unilateral and seen in the free edge, anterior 1/3 and medial 1/3 of the vocal cord (7,11,12). They can be pedunculated, sessile, translucent or hemorrhagic (11-13). In our study, all of the polyps were unilat-

eral in consistency with the literature. The most frequent types were sessile and hemorrhagic, located in anterior - medial 1/3 section. Although a literature review reveals that vocal cord polyps are more frequent in male, it can also be seen in female (6). 60% of our patients were male, and 40% were female.

Vocal overuse and misuse, infections, allergy, endocrine disorders, laryngopharyngeal reflux and smoking are important etiological factors in the formation of vocal cord polyps. (5-7). As described in the literature, 18 (72%) of our patients were long-term smokers. 13 of the patients were members of a profession in which voice is widely used. Twelve patients had reflux complaints. Endocrine disorders, one of the etiologic factors, was not noted in our patients. However, it should be remembered that hypothyroidism causes Reinke's edema and plays a role in the formation of polyps (6, 14).

Indirect laryngoscopy, flexible-rigid laryngoscopy and VLS can be used to detect vocal cord lesions. VLS is useful in showing vibratory functions of vocal cords (10). Vocal cord polyps and nodules modifies vibrational characteristics of the vocal cord, prevents full glottal closure in phonation, and causes dysphonia. Again subject to the polyp, asymmetrical and aperiodic vibration occurs in the vocal cord (7,15). Vocal cord vibration may be impaired due to scars that form after surgical treatments. VLS which enables to evaluate the effects of surgery on vocal cord vibratory function and is widely used in our clinics is quite useful in diagnosing vocal cord polyp and post-treatment follow-up.

In general, excision with microsurgery (endoscopic/microscopic laser or cold knife), followed by voice therapy is the current treatment approach to vocal cord polyps (5,8). Publications suggesting that preoperative voice therapies increase postoperative success are also present (16). Our patients were applied polyp excision using microlaryngoscopic endolaryngeal cold knife. This surgical procedure should be performed in a manner to preserve the vocal cord structure, particularly the vocal ligament, with a view to preventing potential postoperative scar formation, vibratory disorders and secondary dysphonia.

Gürbüz et al.(10) and Erdinç et al.(7) reported that vocal cord vibratory functions and voice quality recovered after successful endolaryngeal microsurgeries, and particularly the results of excisions performed with hydrodissection showed higher success. In our study, it was determined that vocal cord vibratory functions showed statistically significant recovery in postoperative month 2 compared to the preoperative period ($p<0.05$). In order to evaluate voice quality, objective voice quality analysis used in several studies and voice quality assessment surveys such as Voice Handicap Index are needed. (7,8,10,16,)

Conclusion:

Excision applied carefully and attentively using appropriate microsurgery instruments under a high quality surgical microscope can successfully restore impaired vibratory functions of vocal cords without undergoing preoperative or postoperative voice therapy.

Conflict of Interest: No conflicts declared.

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Please cite this article as: Pınarbaşlı M.O., Alaiye A., Turan S., Aydın A.H., Uzun T., Kaya E., Gürbüz M.K., The Effect of Surgery on Cord Vibration in Patients with Vocal Cord Polyps: Retrospective Videolaryngostroboscopy Study. ENT Updates 2019;9(1): 248–257