



Research Article

Risk Factors and Diagnostic Methods in Vocal Cord Mucosal Lesions

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Abstract

Objectives: This study was an examination of malignancy risk determined according to clinical characteristics and preoperative diagnosis in vocal cord lesions compared with the definitive pathology results.

Methods: This was a retrospective study of the files of patients who were admitted to a clinic due to hoarseness and/or a laryngeal lesion and underwent a suspension laryngoscopy (SL) between 2014 and 2018. The patient files were examined and the parameters of age, gender, smoking status, alcohol use, and the site of the lesion were compared for the risk of malignancy. The details of the preoperative diagnoses, peroperative findings, and definite pathology results were evaluated for agreement.

Results: In all, 296 cases were reviewed. Since some patients had undergone multiple SL procedures, only the final pathology results of these patients were included in the study and the final total was 260 patients. The study population consisted of 191 (73.5%) male and 69 (26.5%) female patients. Of the group, 169 (65%) were smokers and 13 (5%) consumed alcohol. The lesions were left-sided in 106 (40.8%), right-sided in 120 (46.2%), and bilateral in 34 (13.1%) cases. A total of 68 (26.2%) cases were malignant, 165 (63.5%) were benign, and 27 (10.4%) were determined to be premalignant. Analysis of patient age revealed that the risk of malignancy was significantly higher in patients in the fifth or sixth decade of life ($p<0.001$). Examination of gender and the risk of malignancy indicated that 64 (94.1%) of the malignant patients were male and 4 (5.9%) were female ($p<0.001$). It was also found that 64 of the malignant patients (94.1%) were smokers ($p<0.001$). Only 8 (11.8%) of the patients with malignant lesions used alcohol, and no significant relationship was found ($p=0.018$). The association of malignancy with the lesion site was similar ($p=0.89$). Logistic regression analysis determined that male gender increased the risk of malignancy 6.45% and smoking increased the risk 7.81%.

Conclusion: Microscopic examination of the lesion and palpation are very important in the diagnosis of patients with hoarseness and laryngeal lesion. Smoking, advanced age, and male gender increased the risk of malignancy of vocal cord lesions.

Keywords: Larynx cancer; suspension laryngoscopy; videolaryngostroboscopy; vocal cords.

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Detailed examination of the vocal cords forms the basis of treatment of benign or malignant lesions of the vocal cords. Since the beginning of the 19th century, when Manuel Garcia [1] began to study his own vocal cords, great progress has been made with the help of new technology. Currently, videolaryngostroboscopy (VLS) also contributes

to the diagnosis, treatment, recording, and re-examination of vocal cord diseases.^[2] VLS allows for the evaluation of glottic closure and vocal cords in the diagnosis of laryngeal lesions with the help of stroboscopic light.^[3]

Vocal cord examination with VLS is recommended in all patients who present with hoarseness. Patients with benign

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Table 1. Correlation between age of the patients and malignancy

	Decade of life							
	1	2	3	4	5	6	7	8
Malignant	0	0	0	5(7%)	25 (37%)	23 (34%)	9 (13%)	6 (8.8%)
Benign	3 (2%)	9 (6%)	40 (24%)	43(26%)	37 (22%)	29 (18%)	4 (15%)	0
Premalignant	0	0	1 (3.7%)	7 (26%)	5 (19%)	9 (33%)	4(15%)	1(4%)
								p<0.01

or malignant mucosal lesions are usually treated with suspension laryngoscopy (SL). SL is performed with the aid of general anesthesia.^[4]

VLS can be performed in an office environment, while SL can be applied only under operating room conditions; however, each method has its advantages. During VLS examination, closure and mucosal movements of the vocal cords are examined simultaneously. Topical anesthesia may be required in a small number of patients.

The results of a VLS examination can determine the patients who may need a further microlaryngoscopy.^[5] In addition, in patients with an excessive gag reflex or for whom a vocal cord examination cannot be performed due to the presence of a mass lesion, an SL is performed with a laryngeal suspension under general anesthesia. This method affords better magnification of the glottic region, palpation of the vocal cords is possible, and the depth of the lesion can be determined to guide treatment decisions.^[6] However, there are some risks related to the general condition of the patient since it is performed under general anesthesia.

VLS is also effective in diagnosing many patients with auditory diseases; however, SL should be performed for definitive diagnosis and treatment. Surgeons often report that they have seen lesions using SL that they did not see previously during VLS, or that the diagnosis of the patient changed after SL. The aim of this study was to evaluate the clinical features of vocal cord lesions and the risk of malignancy as well as to determine the correlation between preoperative diagnosis and definitive pathology.

Methods

Our study was conducted in accordance with the ethical rules of the Helsinki Declaration. The study was initiated after obtaining approval from the ethics committee of Gaziosmanpasa Taksim Teaching and Research Hospital (75 is the protocol number. Date is 08.08.2018). A retrospective screening of the files of patients who were diagnosed with a laryngeal lesion with VLS and SL was performed to treat the lesion.

Patient files were examined, and the data of age, gender, smoking, alcohol use, and the malignancy rate of the lesions were compared. In addition, preoperative diag-

noses of the patients, peroperative findings, and definitive pathology results were evaluated.

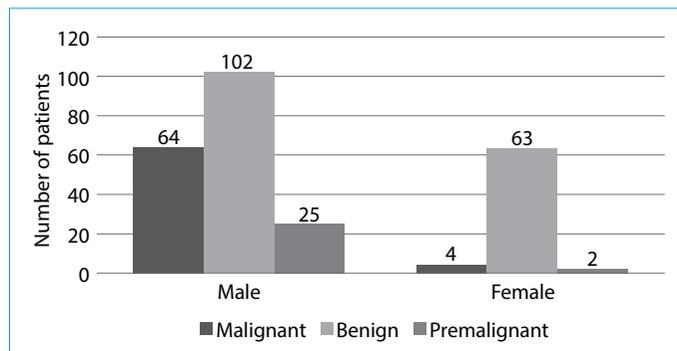
Statistical Analysis

The study data were described using frequency and percentage. Nominal variables were evaluated with Fisher's exact probability test (chi square test with Yates correction). Risk factors that affected malignancy were determined using multinomial logistic regression analysis.

The consistency of the preliminary diagnosis and the final diagnosis was evaluated using the Kappa test. The bidirectional limit of significance was established as $p < 0.05$. The analyses were performed using the NCSS 10 software program (NCSS LLC., Kaysville, Utah, USA).

Results

A total of 296 files were found to be eligible for the study. Because some patients underwent multiple SL procedures, only the final pathology results of these patients were included in the study. Therefore, a final total of 260 patients were evaluated. Of these patients, 191 (73.5%) were male and 69 (26.5%) were female. In the group, 169 (65%) were smokers and 13 (5%) patients consumed alcohol. The lesions were left-sided ($n=106$, 40.8%), right-sided ($n=120$, 46.2%), and bilateral ($n=34$, 13.1%). The VLS procedure revealed malignant ($n=68$, 26.2%) benign ($n=165$, 63.5%), and premalignant ($n=27$, 10.4%) lesions. Analysis of the age of the patients revealed that the risk of malignancy was significantly higher in the fifth and sixth decades of life ($p < 0.001$) (Table 1). The risk of malignancy was greater

**Figure 1.** Correlation between gender and malignancy.

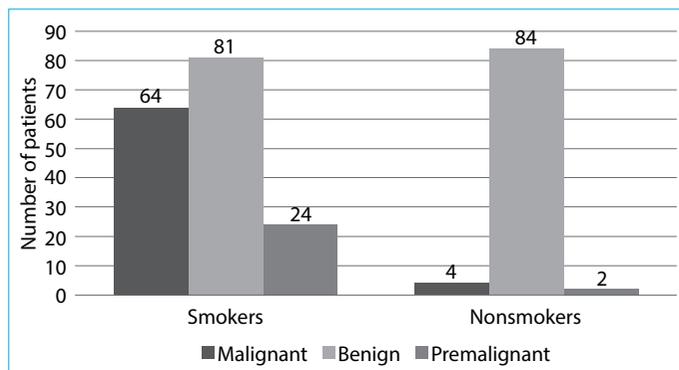


Figure 2. Relationship between smoking and malignancy.

in men (n=64, 94.1%) compared with women (n=4, 5.9%) ($p<0.001$) (Fig. 1). Sixty-four patients with malignancies (94.1%) were smokers, and smoking increased the risk of malignancy significantly ($p<0.001$) (Fig. 2). Only 8 (11.8%) patients with malignant lesions consumed alcohol; no significant relationship was found between alcohol use and the risk of malignancy ($p=0.018$). Groups defined according to laterality of the lesion demonstrated comparable rates of malignancy ($p=0.89$). Logistic regression analysis indicated that male gender and smoking increased the risk of malignant disease 6.45 and 7.81 times, respectively. Comparison of the preoperative diagnoses and pathological diagnoses revealed a 46% variation.

Discussion

The diagnosis and treatment of mucosal lesions of the vocal cords is an important part of the ear nose and throat disease practice. Rigid/flexible laryngoscopy or visualization of the vocal cords with VLS provides a great benefit to physicians in the diagnosis of these patients. During VLS, mucosal lesions or functional irregularities in the vocal cord are evaluated using direct or stroboscopic light. The patient's gag reflex or a high-lying epiglottis limits the use of this examination method (Fig. 3-5). SL, performed under general anesthesia and with the advantage of a microscope, allows for the vocal cords and surrounding structures to be examined with gentle touches as well as for the treatment of any lesion.

In both cases, recordings made during the procedure may prove useful in re-evaluation of the disease, consultation with other doctors, or training inexperienced doctors.

In this study, 296 patients who underwent SL in our clinic were examined. Since some of these patients had multiple operations, they were evaluated according to definitive pathological diagnosis and the study was conducted using the results of 260 patients. When the definitive pathological diagnoses were examined, the findings were 62 (23.8%) patients with squamous cell carcinoma, 27 (10.4%) cases of

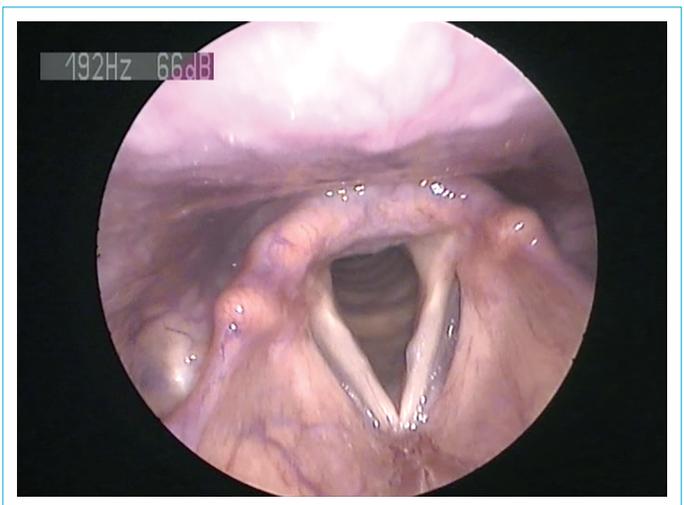


Figure 3. Preoperative videolaryngostroboscopic appearance of a left vocal cord cyst.

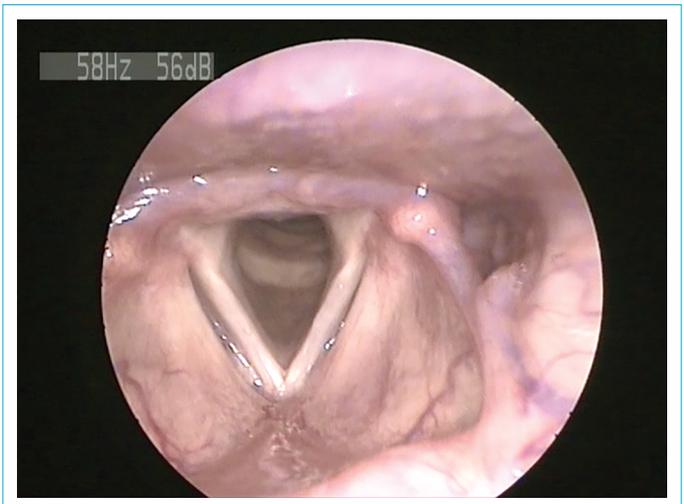


Figure 4. Postoperative third month videolaryngostroboscopic appearance of the lesion in Figure 1.

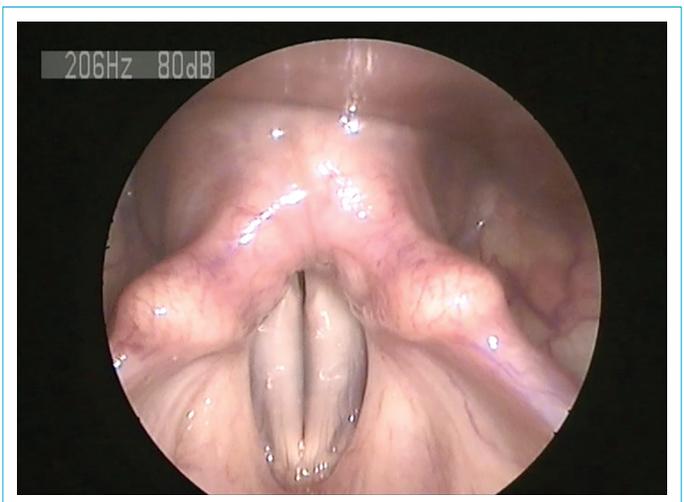


Figure 5. Adduction videolaryngostroboscopic image of the same lesion.

dysplasia, 7 (2.7%) of Reinke's edema, 17 (6.5%) instances of a cyst, 44 (16.9%) patients with polyps, 50 (19.2%) findings of nodules, 47 (18.1%) patients with non-specific inflammation, and 6 (2.3%) cases of verrucous carcinoma.

As reported by Dailey et al.^[5] and Poels et al.^[7], most benign vocal cord lesions are vocal cord nodules. When we examined the preoperative diagnoses, only 6 (2.3%) patients who were operated on with the indication of vocal cord nodules were confirmed to have nodules at a rate similar to that reported by Akbulut et al.^[8] The postoperative confirmation of the presence of vocal cord nodules in 50 patients indicated a discrepancy between the pathological examination and the laryngeal examination findings. We think that the reason is related to a conflict in the pathological reporting of benign mucosal lesions in Reinke's space, as noted by Poels and Akbulut.^[7, 8]

Considering that the treatment for vocal cord nodules primarily involves speech therapy, we foresee the development of a new arrangement in the definition of benign lesions in the coming years.

When all the postoperative diagnoses were examined, 68 (26.2%) patients had a malignant disease, and most of these patients were in their fifth or sixth decade of life. We found that 165 (63.5%) patients who had benign disease were in their third, fourth, or fifth decade of life. These findings were similar to the case series analyzed by Beynon et al.^[9] in 2018, which examined the demographic data of 5000 head and neck cancer patients.

In the same study, 84% of the patients were male and 69% were current smokers. In our study, 64 (94.1%) patients were male and 64 (94.1%) patients with malignancy were current smokers. When we performed the correlation analysis, we concluded that male sex, advanced age, and smoking increased the risk of cancer by as much as 7.81 times. Our research also revealed a finding of laryngeal carcinoma in 5 (7.4%) cases in the 20 to 40 age group of young adults. This finding is similar to the 11.2% rate determined by Toporcov et al.^[10] in an epidemiological study. We also concluded that alcohol and laterality of the lesion did not increase the risk of malignancy.

There are some limitations to our study. The analysis was performed based on the history and examination findings drawn from patient files. The size of the lesion, the status of glottic closure, and the presence of a secondary pathology could not be evaluated. Therefore, we suggest that precise documentation of the patient's complaints and the location and size of the lesion will be very useful to follow-up efforts after recording VLS images, or alternatively, we recommend at least the inclusion of any laryngoscopic images of the glottis in the file.

Conclusion

VLS and SL are used in the diagnosis and treatment of vocal cord diseases. Each method has certain advantages. It is easy for the doctor to perform VLS in polyclinic conditions, it is easily reproducible, and it also illustrates glottic movements in addition to the lesion.

SL is performed under operating room conditions while the patient is asleep, which limits the application of the procedure. However, microscopic vision and the ability to perform both diagnosis and treatment are superiorities of the SL method. Vocal cord movements of a patient admitted to the clinic with hoarseness should be evaluated with VLS, and SL should be performed to examine and potentially treat suspected lesions. In our study, it was determined that advanced age, male gender, and smoking significantly increased the risk of malignancy in lesions of the vocal cords.

Disclosures

Ethics Committee Approval: The study was examined by the ethics committee of our hospital and it was determined that there was no ethical in its publication (75/2018).

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors report that there is no conflict of interest between them.

Authorship contributions: Concept – C.P., A.G.; Design – Ö.D., S.B.; Supervision – M.K.; Materials – C.P., S.B.; Data collection &/ or processing – A.G., Ö.D.; Analysis and/or interpretation – C.P., M.K.; Literature search – A.G.; Writing – C.P.; Critical review – Ö.D., M.K.

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