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Original Research Article

Clinicopathological study of non-malignant lesions of larynx: a prospective observational study

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ABSTRACT

Background: Non-malignant lesions of the larynx constitute an interesting array of lesions. The significance of non-malignant lesions lies in the fact that it cannot only cause change in voice but, at times, can lead to breathing difficulty or life-threatening stridor.
Methods: This was a prospective observational study done between November 2019 - July 2020. All the details were filled up by the principal investigator in a structured study proforma. This proforma contains data regarding essential demographic details, clinical features, ENT examination, flexible video laryngoscopy findings, stroboscopy findings, voice handicap index, diagnosis and management. Statistical method and data analysis in this study we tried to describe the analysis process with appropriate methods and principles of statistics, using the data collected from the patients, participated in this study.
Results: The most common non-malignant lesion among the 50 patients studied was vocal cord polyp; second most common being the vocal cord cyst. The relation of hoarseness of voice, difficulty in breathing, smoking or alcohol intake with non-malignant lesions showed a statistically significant result. On interpreting the stroboscopic findings of various lesions, all cases of vocal nodule showed an hourglass-shaped glottic closure.
Conclusions: These lesions can create a lot of mental and emotional tension in the patient and the family. Early diagnosis of the lesions can lead to effective management and functional recovery. Stroboscopy is valued for its excellent ability to examine the structure and the function of the glottis during phonation.

Keywords: Larynx, Non-malignant lesions, Stroboscopy, Hoarseness, Video laryngoscopy

INTRODUCTION

Non-malignant lesions of the larynx constitute an interesting array of lesions. They have been defined as 'an abnormal mass of tissue in the larynx, the growth of which exceeds and is uncoordinated with that of normal tissue and persists in the same excessive manner after cessation of stimuli which evoked the change'.[1] Recently benign lesions of larynx are becoming quite common because of increased environmental pollution due to rapid industrialization and development. The incidence has increased because of talking loudly in noisy area in routine. Non-malignant lesions of larynx are a fairly common problem in ENT. The vocal cords have got a vital function of voice production and facilitate communication.[2] The significance of non-malignant lesions lies in the fact that it cannot only cause change in voice but, at times, can lead to breathing difficulty or life threatening stridor.[3] The non-malignant laryngeal lesions occur in a ratio of 2:3 to the malignant lesions.[4] Vocal cord polyps and nodules are the most frequent non-malignant lesions. Vocal abuse, either occupational or routine, is a dominant precipitating factor in the causation of common non-malignant lesions. Various studies opined that true benign neoplastic lesions are uncommon and occur in a ratio of 1:6 to the non-neoplastic lesions. This study is

important for the laryngologists not only for the symptoms they produce but also because of the necessity of distinguishing them from malignant lesions. Some of the tumours like papilloma (4%), granular cell tumour (2%) may undergo malignant change.[5,6] Non-malignant lesions seem to be caused primarily by vibratory trauma (excessive voice abuse). Cigarette smoking, infection, allergy, and gastric reflux are cofactors. Because of the advent of video laryngoscopy and stroboscopy, early diagnosis and treatment is possible. Small lesions can be excised endoscopically by CO_2 laser or by micro laryngeal instruments. Larger lesions extending beyond laryngeal framework often require pharyngotomy or laryngofissure.

Objective

The objective of this study was to analyze epidermeological details, incidence, pattern of clinical presentation and risk factors of the non-malignant lesions of the larynx.

METHODS

The study site is the department of ENT, Kerala Institute of Medical Sciences and study population are the patients who attended ENT out-patient department with hoarseness. This is a prospective observational study done between November 2019-July 2020.

The inclusion criteria of the study are the patients with complaints of hoarseness/change in voice, difficulty in breathing/ noisy breathing, foreign body sensation in the throat or pain on speaking and voice fatigue. The exclusion criteria includes patients with the clinical diagnosis of malignancy of larynx, patients with speech defect due to central nervous system lesions, patients with oral and pharyngeal pathology or patients with nasal and nasopharyngeal pathology.

After obtaining the Institutional Ethical Clearance the patients with hoarseness of voice were analyzed by age, sex, incidence, clinical features and risk factors. All patients were examined with flexible video laryngoscopy. All lesions of the larynx that show features of malignancy were excluded. All critically ill patients were excluded from the study. The next relevant and useful investigation was the stroboscopy. Relevant clinical history, physical findings, video laryngoscopic and stroboscopic findings were recorded by the principal investigator using the study proforma. With all this information, the analysis was done to obtain the aim of the study. Non-malignant lesions were treated by endoscopic excision or conservatively with voice therapy. Computed tomography was not done routinely for the patient.

The biopsy was done only in cases where the diagnosis has to be confirmed. In other cases, where the presentation and appearance were classical, it was avoided to save costs. All the details were filled up by the principal investigator in a structured study proforma. This proforma contains data regarding essential demographic details, clinical features, ENT examination, flexible video laryngoscopy findings, stroboscopy findings, voice handicap index, diagnosis and management. Statistical method and data analysis in this study we tried to describe the analysis process with appropriate methods and principles of statistics, using the data collected from the patients, participated in this study. All data entered into MS excel and analyzed using the statistical software SPSS.

RESULTS

Distribution of various non-malignant lesions of larynx

The most common non-malignant lesion among the 50 patients studied was vocal cord polyp; second most common being the vocal cord cyst. A rare case of a subglottic cyst presented in a one-year-old male baby was included in our study, and a case of laryngeal presentation of Wegener's granulomatosis was also included. Among the 50 patients studied, 96% of patients presented with hoarseness.

Moreover, 94% of the patients presented with vocal fatigue, 38% with reflux symptoms, the association of the symptoms with the various Non-malignant lesion of the larynx were studied. Dry cough: 22%, foreign body sensation and difficulty in breathing 8%.

Distribution and association of hoarseness with the lesions

The relation of hoarseness in the patients with Non-malignant lesions showed a p value of 0.032, which was statistically significant.

Distribution and association of difficulty in breathing/noisy breathing with the lesions

Association of patients presenting with difficulty in breathing and various non-malignant lesions shows a p value of <0.002, which was highly statistically significant.

Distribution and association of vocal fatigue with the lesions

The relationship of patients with a history of vocal fatigue among various non-malignant lesions of larynx showed a p value of 0.003, which was statistically significant.

Distribution and association of foreign body sensation in throat with the lesions

Patients with the non-malignant lesion of the larynx showed a significant relation with foreign body sensation in the throat with a p value of 0.006.

Other symptoms like reflux symptoms and dry cough did not show any significant association with various lesions with a p value of 0.108 and 0.367 respectively.

Risk factors distribution

Among our study population, 80% of the patients with vocal cord nodules, 77.8% of patients with a polyp, and 60% of patients with vocal cord cyst were closely related with vocal abuse.

However, the overall association of all lesions with vocal abuse as a risk factor was not statistically significant, with a p value of 0.335.

Distribution and association of smoking among the lesions

Among the study population, 80% of the patients with leukoplakia and 100% of patients with vocal process granuloma had smoking as one of the risk factors. Overall, smoking showed a strong relation as a risk factor contributing to the lesions with p value<0.001.

Distribution and association of alcohol consumption among the lesions

Similar to smoking, alcoholic patients also show a strong relationship as a risk factor contributing to the lesions with a p value of less than 0.001. Other risk factors such as dyspepsia, exposure to external irritants did not show a strong association with p value 0.408 and 0.787 respectively. In this study stroboscopy provided additional diagnostic information in 70% of the lesions, and changed the initial diagnosis in 14% of the lesions, and provides no additional diagnostic contribution in 16% of the lesions, stroboscopy offers additional information in 100%,77.8% and 70% lesions of vocal cord nodule, polyp and cyst respectively. Stroboscopy changed the initial diagnosis in 4 cases of vocal cord polyp and 2 cases of vocal cord cyst. Association of diagnostic values of stroboscopy with various lesions of larynx showed a p value of <0.001, which was statistically significant.

Table 1: Distribution of non-malignant lesions of larynx.

Lesions	Frequency	Percentage
Vocal nodules	5	10
Vocal cord polyp	18	36
Vocal cord cysts	10	20
Reinke's edema	1	2
Leukoplakia	5	10
Vocal process granuloma	3	6
Laryngeal webbing	1	2
Papillomatosis	3	6
Laryngeal cyst	3	6
Others	1	2
Total	50	100

Table 2: Distribution and association of hoarseness with the lesions.

Lesions	Hoarseness						P value
	Absent		Present		Total		
	N	%	N	%	N	%	
Vocal nodules	0	0	5	100	5	100	
Vocal cord polyp	0	0	18	100	18	100	
Vocal cord cysts	0	0	10	100	10	100	
Reinkes odema	0	0	1	100	1	100	
Leukoplakia	0	0	5	100	5	100	
Vocal process granuloma	0	0	3	100	3	100	0.032
Laryngeal webbing	0	0	1	100	1	100	
Papillomatosis	0	0	3	100	3	100	
Laryngeal cyst	2	66.7	1	33.3	3	100	
Others	0	0	1	100	1	100	
Total	2	4	48	96	50	100	

Table 3: Distribution and association of difficulty in breathing/noisy breathing with the lesions.

Lesions	Hoarseness						P value
	Absent		Present		Total		
	N	%	N	%	N	%	
Vocal nodules	5	100	0	0	5	100	0.002
Vocal cord polyp	18	100	0	0	18	100	

Continued.

Lesions	Hoarseness						P value
	Absent		Present		Total		
	N	%	N	%	N	%	
Vocal cord cysts	10	100	0	0	10	100	
Reinkes odema	0	0	1	100	1	100	
Leukoplakia	5	100	0	0	5	100	
Vocal process granuloma	3	100	0	0	3	100	
Laryngeal webbing	1	100	0	0	3	100	
Papillomatosis	2	66.7	1	33.3	3	100	
Laryngeal cyst	2	66.7	1	33.3	3	100	
Others	0	0	1	100	1	100	
Total	46	92	4	8	50	100	

Table 4: Diagnostic value of stroboscopy.

Lesions	Diagnostic value of stroboscopy								P value
	No diagnostic contribution		Provides additional diagnostic information		Changed the initial diagnosis		Total		
	N	%	N	%	N	%	N	%	
Vocal nodules	0	0	5	100	0	0	5	100	
Vocal cord polyp	0	0	14	77.8	4	22.2	18	100	
Vocal cord cysts	0	0	7	70	3	30	10	100	
Reinkes odema	0	0	1	100	0	0	1	100	
Leukoplakia	0	0	5	100	0	0	5	100	
Vocal process granuloma	3	100	0	0	0	0	3	100	<0.001*
Laryngeal webbing	1	100	0	0	0	0	1	100	
Papillomatosis	0	0	3	100	0	0	3	100	
Laryngeal cyst	3	100	0	0	0	0	3	100	
Others	1	100	0	0	0	0	1	100	
Total	8	16	35	70	7	14	50	100	

Note: *-Statistically significant at 5% level.

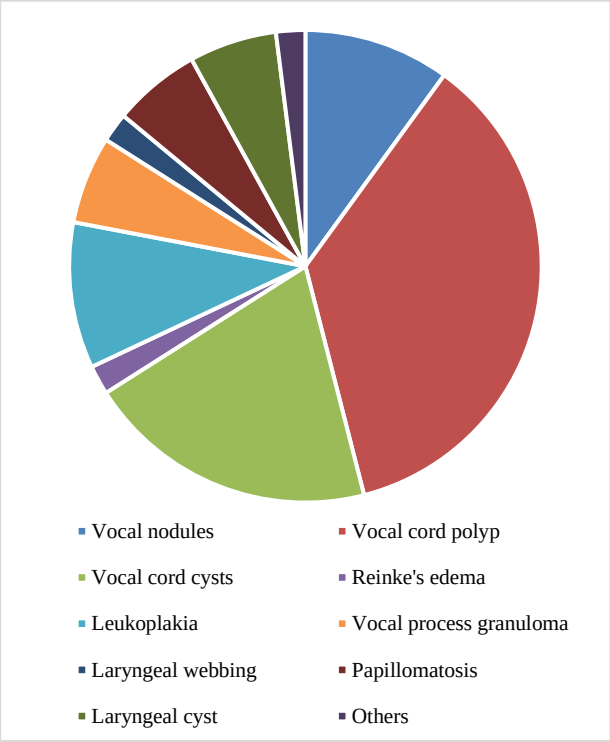

Figure 1: Distribution of non-malignant lesions of larynx.

DISCUSSION

50 patients who attended the ENT outpatient department with hoarseness, vocal fatigue, difficulty in breathing or foreign body sensation in the throat, and video laryngoscopy showed nonmalignant lesions of the larynx were included in our study.

Our study included all age groups; among them, the most common age group to present with nonmalignant lesions were between 41-50 years (20 cases), and 80% of the patients were above 41 years. The youngest patient was a 1-year-old male baby, and the oldest was a 76-years-old male.

In a study by Hedge et al the youngest patient was 7 years old, the oldest being 80 years.[7] The maximum number of cases were in the age group between 31 and 40 years (15 cases). The mean age in years was 38.74. In a study by Sharma et al third, fourth, and fifth decades of life were the most frequently involved groups.[8] We also had similar results. In our study, 30 patients were males, and 20 patients were females, male: female ratio being 3:2. Prakash et al who studied the pattern of presentation of benign lesions of the larynx in 2016, found it to be 2.57:1.[9] Study by Shaha et al showed a female preponderance in cases of nodules.[10]

Among the 50 patients studied, there were 11 teachers, 8 housewives, 3 lawyers, 3 bank employees, 2 priests, 1 professional singer, others were ticket collectors, businessman, telecom operator, retired officers, government office staff, college students. Singhal et al in their study, observed benign tumours of larynx among professional voice users and teachers (16%), salesman (16%) politicians (4%), bus conductors (6%) which was similar to our study.[11]

The most common nonmalignant lesion of the larynx in our study was vocal cord polyp with 18 cases, and the second most common was the vocal cord cyst with 10 cases. In a study by Mohan et al vocal cord polyps were observed in 38% of the patients.[12] In our study, the patients with nonmalignant lesions of larynx presented with the symptoms more frequently between 3-4 months (11 cases). In contrast to our study, in the study done by Baitha et al 50% of the patients presented within 1 month.[13] Vocal fatigue was the second most common symptom (94% of the patients). Cough and foreign body sensation was seen in 19.5% of the patients. We studied the association of various symptoms with different lesions. Hoarseness, vocal fatigue, dyspnea, and foreign body sensation showed a statistically significant p value. Among the 50 patients studied, vocal abuse (60% of the patients) was the most common risk factor. In the studies by Buchne et al and Ghosh et al 62.5% and 72% of the patients gave a history of vocal abuse, respectively.[14,15] Wani et al study (45%) had similar results.[16]

The other contributory factors were dyspepsia (30%), alcohol consumption (20%), smoking (22%) and exposure to external irritants like smoke, dust, incense (14%). Association of all risk factors with various lesions were studied, among which smoking and alcohol showed a strong relation in contributing to the lesions with a statistically significant p value. Prakash et al in their study, supported the view that these lesions may also be caused by some sort of nonoccupational abuse of voice.[9] This group constituted 38% of the cases in their study. Tobacco smoke and alcohol acted as aggravating factors in the causation of most benign lesions, particularly the diffuse polypoid laryngitis (Reinke’s edema).

In contrast to this study, the patient in our study with Reinke's edema was a non-smoker. Baitha et al found in their study that vocal abuse was the most significant risk factor for vocal cord nodule with p value<0.001.[13] In the case of vocal cord polyps, vocal abuse and smoking were important risk factors. These findings were similar to our study. Cui et al in their study, found smoking and alcohol to be the most important risk factors for causing vocal cord leukoplakia.[17] It was similar to our study in which 100% of the patients with leukoplakia were smokers and alcoholics. Zabret et al found no significant association of dyspepsia with benign lesions of the larynx; this was similar to our results, which showed no significant relation of dyspepsia with the non-malignant lesions of the larynx.[18]

In our study, the most common site of presentation was the vocal cords (41 cases) followed by the epiglottis (2 cases), sub-glottis (2 cases) and the vocal process of arytenoids (3 cases). Hedge et al had similar results, with nearly 93% of lesions arising from the true vocal cords.[7] Arytenoids and epiglottis were the next common site (15%) in their study. Reflux finding score was used to evaluate underlying laryngopharyngeal reflux in all the patients included in our study. 68% of the lesions showed reflux finding score of <7. On correlating with the various lesions, a p value of 0.108 was obtained, which was statistically insignificant. In a study by Chung et al the prevalence of laryngopharyngeal reflux was 66 percent in the vocal nodule group, 75 percent in the vocal polyp group and 90 percent in the Reinke's edema group.[19] In our study also 60% of the patients with vocal nodules and a patient with Reinke's edema had laryngopharyngeal reflux.

On interpreting the stroboscopic findings of various lesions, all cases of vocal nodule showed an hourglass-shaped glottic closure. Of the 18 cases of vocal cord polyps, 3 cases showed complete closure, while the remaining 15 cases showed an incomplete closure. Among the 15 cases with incomplete closure, 10 cases showed hourglass-shaped glottic closure, whereas remaining cases (huge multilobulated polyps) showed irregular closure. Among the patients with vocal cord cyst, 70% showed incomplete closure. The results were similar to the study done by Thomas et al and Janani et al in which almost all the patients with vocal fold lesions showed incomplete glottic closure. On analyzing the symmetry of the lesions, 88% of the laryngeal lesions showed asymmetry. Janani et al in their study, also had similar results.[20,21]

Nagata et al and Sataloff et al observed a slightly decreased amplitude of the mucosal wave in cases of vocal nodule, but the wave was generally symmetric.[22,23] Similarly, decreased or absent mucosal waves were observed on the side of the cyst. Vocal folds with small polyps generally have an intact mucosal wave, while larger polyps can show prominent decreased mucosal wave amplitude.[22,23]

In our study, VHI-10 was used to assess the impact of voice complaints on patients' quality of life. It was easily self-administered and scored quickly at the time of evaluation while preserving the original VHI’s utility and validity. The scoring of VHI-10 is from 0 up to 40.[24] In our study, the mean VHI among various lesions was around 15.53. However, in a study done by Mehta et al, the mean score was 11.16.[25]

Arffar et al studied the normative values of VHI 10 and concluded the VHI 10 score greater than 11 as abnormal. In our study, surgery was the prime mode of treatment. Only 7 cases had undergone conservative management with voice therapy and anti-reflux therapy. Of these, 4 were vocal cord nodules, and 3 cases were of vocal process granuloma. 86% of patients had undergone micro laryngeal excision either by cold steel method, laser, coblator, microdebrider.

Strength

In our study we were able to include all details like age, presenting symptoms, risk-factors, occupation, video laryngoscopy findings and mode of treatment of various lesions. We also did stroboscopy for vocal fold lesions to study their mucosal wave pattern. We also found the diagnostic value of stroboscopy for differentiating the vocal fold lesions.

Limitations

Limited sample size restricted the study from reliable assessment of various factors. The time period of the study was limited so we couldn't followup and study the recurrence rate of these cases.

CONCLUSION

A non-malignant laryngeal lesion produces symptoms that can vary from mild hoarseness to life-threatening stridor. We concluded that the most common non-malignant lesion causing hoarseness was the vocal cord polyps followed by the vocal cord cyst. The 41-50 years of age, male gender, was the most important socio-demographic risk factor of chronic voice disorders. At the same time, the results of the study confirmed that patients with the habit of voice abuse, smoking, alcohol intake as well as dyspepsia, and fume exposure were clinically more prone to the non-malignant lesion of the larynx. The present study emphasises that it is not only the surgery that is important in managing vocal fold lesions but also certain life-style modifications like proper vocal hygiene, cessation of smoking, avoidance of alcohol play a vital role in reducing the incidence of these non-malignant laryngeal lesions significantly. These lesions can create a lot of mental and emotional tension in the patient and the family. Early diagnosis of the lesions can lead to effective management and functional recovery. Stroboscopy is valued for its excellent ability to examine the structure and the function of the glottis during phonation. It provides information which is not available with any other diagnostic method. As such, the standard treatment of choice in all types of non-malignant lesions of the larynx should consist of a triad of approach by micro laryngeal surgery (either microscopic or endoscopic, with or without the use of lasers and other tools like coblator, microdebrider), voice rest and vocal rehabilitation.

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