

CLINICOPATHOLOGICAL STUDY OF CHANGE OF VOICE

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Abstract

Background: Change of voice is one of the common complaints in ENT practice and hoarseness of voice is the commonest symptom of changed voice quality. Hoarseness is invariably the earliest manifestation of conditions directly or indirectly affecting the voice apparatus. Though most common causes of hoarseness are benign and vocal abuse is the commonest among them, but we should always investigate for more sinister pathology like malignancy.

Objectives: To find out the symptoms, signs and pathological incidence, leading to change of voice for early diagnosis and interventional purpose.

Methods: Total 87 patients of change of voice, studied in 06 months duration from 1st January 2016 to 30th June 2016 in the Department of ENT & Head-Neck Surgery, Dhaka Medical College Hospital, Dhaka. The cases were selected according to the eligibility criteria by purposive sampling. Then the data were collected by the active participation of the patients interviewed by the preformed proforma of data collection sheet.

Results: Maximum number of cases of change of voice were due to carcinoma larynx (37.93%), then chronic laryngitis (20.99%), followed by vocal cord nodules (19.54%) and vocal cord polyps (8.05%). Laryngopharyngeal reflux was found in 45.95% patients of chronic laryngitis. Males were affected more than females (1.81:1). Most of the patients were in the age group of 21 to 50 years. Peak incidence was in the 4th decade. Labourers/ daily wage earners formed the predominant group. Majority of patients were from low socioeconomic class. Smoking, vocal abuse, smoking and infections were the common predisposing factors.

Conclusion: Hoarseness of voice is just a symptom with a very diverse etiology. The etiological data varies in different geographical location and from one center to other, so every case should be carefully and thoroughly evaluated to know the diagnosis and underlying pathology for early and prompt management.

Keywords: Change of voice, hoarseness of voice, laryngeal carcinoma, vocal cord nodule, vocal abuse.

DOI: <https://doi.org/10.3329/jdmc.v29i2.51185>
J Dhaka Med Coll. 2020; 29(2) : 116-125

Introduction

Change of voice can be defined as abnormal production of sound, perceived as hoarseness, raspiness, breathiness, harshness and low pitched voice. Proper knowledge of symptoms, signs & common causes are important for early diagnosis. We then take immediate necessary

intervention to bring the patient's voice back. Usually change of voice is a term, which is used to describe a change in quality of voice ranging from voice harshness to voice weakness.¹ There are three phases in speech. The pulmonary phase creates the energy flow with inflation and expulsion of air. This activity provides the larynx

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Received: 26-04-2020

Revision: 01-06-2020

Accepted: 21-10-2020

with a column of air for the laryngeal phase, in which vocal cords vibrate at certain frequencies to create sound that is unique to every individual. The oral phase occurs in the oral cavity where sound is modified and words are formed by the action of the pharynx, tongue, lips and teeth. Dysfunction in any of these can lead to voice changes. Disorders originating in either the lungs or oral cavity are not considered to be true hoarseness. True hoarseness from a laryngeal origin usually results in rough raspy voice.¹

Voice is an auditory perceptual term that means the audible sound produced by the larynx, which has such parameters as pitch, loudness, quality and variability.² In summary, change of voice is the abnormal quality of voice that is rough, harsh and has lower pitch than normal for the individual.³ Hoarseness of voice is a symptom, not a diagnosis and therefore requires a careful determination of the underlying cause in every case.⁴ Hoarseness can be divided into acute and chronic onset. Acute hoarseness persists up to 2 weeks, more than 2 weeks of hoarseness can be termed as chronic.⁵

Change of voice may be a feature of laryngeal obstruction or airway obstruction. Usually occurs in Infections, such as acute epiglottitis, diphtheria, croup, laryngeal abscess or oedema caused by airway burns, anaphylaxis, physical trauma and angio oedema.

Innervation of the laryngeal muscles are from the vagus nerve via its branches, superior laryngeal and recurrent laryngeal nerves. The recurrent laryngeal nerve controls abduction and adduction of the vocal cords. It has a long course, from the base of the skull to the mediastinum, on the left side it loops under the aortic arch and on the right under the subclavian artery.⁶ Vocal cord immobility most often caused by laryngeal nerve palsy or cricoarytenoid joint disease.⁷ Laryngeal nerve palsy has various causes, including lung cancer, thoracic aortic aneurysm, stroke and other focal brain lesions. In Parkinson's disease, Myasthenia gravis & motor neurone disease, voice change is a presenting feature.⁸ Hypothyroidism, acromegaly, rheumatoid arthritis affecting the cricoarytenoid joints

causes change of voice. Granulomatous diseases like sarcoidosis, tuberculosis, syphilis, Wegener's granulomatosis & autoimmune disorders can also affect the larynx and thereby precipitate change of voice.^{8,9} Congenital causes of change of voice in children are laryngeal web, laryngomalacia, laryngeal papillomas, congenital cyst, vocal cord nodules, and very rarely, malignancy.¹⁰

Voice quality can be evaluated using the GRBAS (Grade, Roughness, Breathy voice, Asthenia and Strain) assessment.¹¹ ENT assessment should be include Inspection of the larynx by indirect laryngoscopy and fiberoptic laryngoscopy. Management depends on the specific cause, but voice therapy and other non-surgical management is the first line treatment for most benign lesions of the larynx.¹²

Non-surgical management includes voice hygiene advice like adequate hydration, avoidance of vocal strain (shouting, throat clearing, excessive voice use), smoking cessation, alcohol reduction and by treating gastro-oesophageal reflux. Voice therapy techniques can be use to maximize vocal effectiveness.¹³ On the other hand, laryngeal papillomas require surgery first-line. Persistent nodules and polyps also require surgery. Various surgical techniques are used now a days to treat vocal cord paralysis.¹⁴

Voice therapy is often used as a adjunct to surgery. Any growth in glottis, supra glottis, pyriform fossa requires direct laryngoscopic excision or biopsy followed by histopathological examination. Tracheostomy is sometimes needed to relieve breathlessness due to mechanical effect of growth or tumor in larynx.¹⁵

This study will focus on the clinicopathological profile by evaluating age, sex, duration, symptoms, etiology and histopathological incidence, leading to change of voice for early diagnosis and intervention.

Materials and Methods

This is a cross-sectional study which was conducted in the Department of ENT and Head Neck Surgery, Dhaka Medical College Hospital, Dhaka with a sample size of 87 from

January' 2016 to June'2016 . All patients undergoing direct laryngoscopy or/and fibre optic laryngoscopy in the Department of ENT and Head Neck Surgery in Dhaka Medical College Hospital were included in the study. Patients were randomly enrolled matching the inclusion and exclusion criteria.

Results

Table-I

Age distribution of the study population with change of voice (n=87)

Age group (Years)	Study patients	Percentage (%)
0-10	03	3.44 %
11-20	07	8.05 %
21-30	13	14.94 %
31-40	25	28.74 %
41-50	11	12.64 %
51-60	18	20.69 %
>60	10	11.49 %
Total	87	100 %

Most of the patients are in the age group of 31-40 years (28.74 %) and then in the age group of 51-60 years (20.69 %)

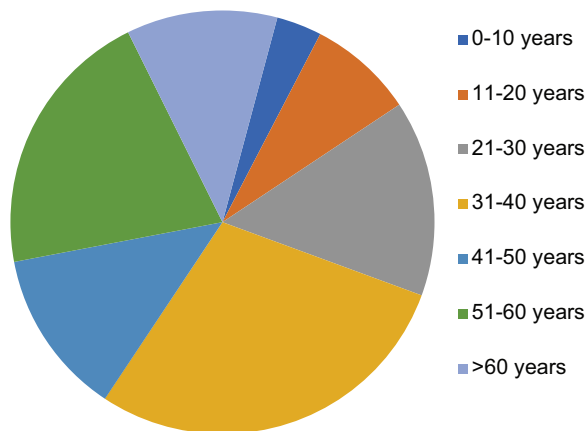


Figure shows age distribution of study population with change of voice

Table-II

Sex distribution of the study population with change of voice (n=87)

Gender	No of patients	Percentage %
Male	56	64.37 %
Female	31	35.63 %
Total	87	100 %

Male patient are more than female with male female ratio 1.81: 1.

Table III

Occupation/Nature of work causing change of voice according to Koufman and Isaacson classification¹⁷ in study population (n=87)

Koufman Classification level	Occupation/Nature of work	Study patients no	Percentae (%)
Level I Elite vocal performers	· Singers (n=1)	2	2.30%
	· Actors (n=1)		
Level II Professional voice users	· Political leader (n=2)	8	9.19%
	· Teachers (n=5)		
	· Telephone operator (n=1)		
Level III Non vocal professionals	· Lawyers (n=1)	1	1.15%
Level IV Non vocal non professionals	· Labourers/Daily wage earners (n=22)	76	87.35%
	· Housewife (n=21)		
	· Businessman (n=11)		
	· Clerks (n=4)		
	· Canvasser (n=18)		
	·		
Total		87	100 %

A large number of patients had habit of cigarette smoking. 38 patients out of total 87 patients with change of voice were smoker (43.68 %). So, it is the most pre disposing factor for hoarseness.

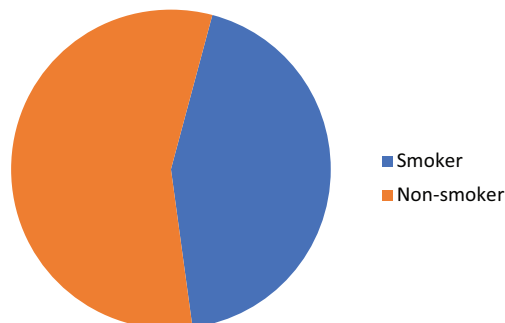


Figure shows relation of smoking & change of voice in study population.

Figure shows sex distribution of study population with change of voice.

In this study we found 2.30% elite vocal performers, 1 of them was singer & 1 was Actor. 9.19% professional voice users. Among them 2 person were political leaders, 5 were teachers and 1 person was telephone operator by profession. 1.15% non-vocal professionals, only 1 person was lawyer. 87.35% non-vocal non-professionals, among them daily labourers or daily wage earners were 22 in number, 21 were housewives, 11 were businessmen, 4 were clerks and 18 were canvassers.

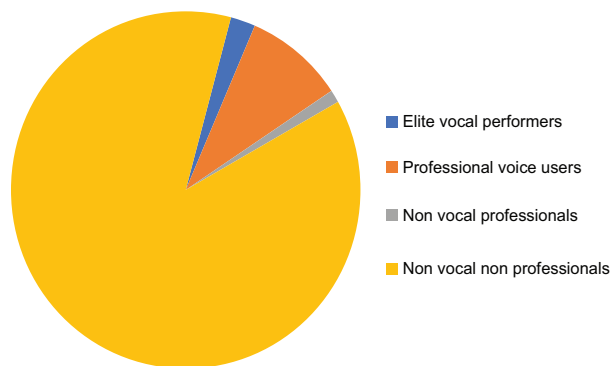


Figure shows Occupation/Nature of work causing change of voice according to Koufman and Isaacson classification in study population.

Table IV

Relation of smoking & Change of voice in study population (n=87)

Habit	No of patient	Percentage %
Smoker	38	43.68 %
Non smoker	49	56.32 %
Total	87	100 %

Table-V

Clinical presentation of study population (n=87)

Presentation	No of cases	Percentage %
Change of voice	87	100 %
Vocal fatigue	32	36.78 %
Irritative cough	26	29.88 %
Sore throat	16	18.39 %
Breathy voice	17	19.54 %
Cold / URTI	14	16.09 %
Difficulty in swallowing	10	11.49 %
Weight loss	09	10.34 %
Neck swelling	06	6.89 %
Haemoptysis	02	2.29 %
Respiratory distress	03	3.45 %
Heart burn	01	1.15 %
Vomiting	02	2.29 %

Apart from the symptom of change in voice (100 %). Other common presentations were vocal fatigue (36.78 %), Irritative cough (29.88 %), sore throat (18.39 %), Breathy voice (19.54 %) and common cold or upper respiratory tract infection (16.09 %) in descending order of frequency. Among the patients of laryngeal carcinoma 06 cases had palpable neck node, difficulty in swallowing was present in 10 cases and respiratory distress was present in 03 cases who were suffering from advanced carcinoma.

Table VI
Causes of change of voice in study population (n=87)

Disease / Causes	No of patients	Percentage %
Chronic laryngitis	20	22.99 %
Ca larynx :		
· Suraglottic (n=28)		
· Glottic (n=4)		
· Subglottic(n=1)	33	37.93 %
Ca thyroid	03	3.45%
Vocal cord polyp	07	8.05 %
Vocal cord nodule	17	19.54 %
Subglottic stenosis	01	1.15 %
Recurrent laryngeal papillomatosis	01	1.15 %
Post Thyroidectomy	01	1.15 %
Exuberant granulation tissue	01	1.15 %
Vocal cord palsy	01	1.15 %
Tubercular laryngitis	01	1.15 %
Functional aphonia	01	1.15 %
Total	87	100 %

Most common cause of change of voice is Carcinoma of larynx (37.93 %) and chronic laryngitis (22.99 %) in our study. Vocal cord nodules (19.54 %) and vocal cord polyps (8.05 %) also contributes to change of voice in our study population.

1 case was diagnosed as TB laryngitis and 1 case as functional aphonia.

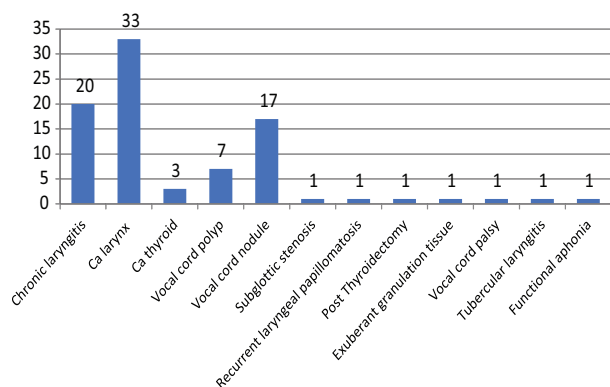


Figure shows number of cases of various causes of change of voice in study population.

Table VII

Duration of change of voice in study population (n=87)

Duration of hoarseness of voice	No of cases	Percentage
Within 3 months	42	48.27%
3 to 6 months	19	21.84%
6 to 12 months	9	10.34%
More than 12 months	17	19.54%
Total	87	100%

Patients were suffering from change of voice for a variable period of time. It was recorded in days, weeks, months and years. Duration of change of voice ranged from 2 days to 5 years. Most of the patients were presented within 03 months due to availability of free treatment provision at DMCH. 21.84% patient presented with hoarseness within 3 to 6 months. 10.34% presented within 6 to 12 months and 19.54% presented after 12 months and onwards. Educated persons, professional voice users and students reported early. The poor, illiterate and

patients with carcinoma larynx reported relatively late and sometimes reported with advanced disease. Patients with carcinoma larynx reported within 4 to 6 months and minimum time taken in case of glottic carcinoma (average 2 months) and maximum of 12 months for civil patient suffering from supraglottic carcinoma.

Table VIII

Distribution of age group according to cause in study population (n=87)

Disease / Causes	No of patients	Average age in years
Chronic laryngitis	20	35
Ca larynx :		
• Suraglottic (n=28)		
• Glottic (n=4)		
• Subglottic(n=1)	33	52
Ca thyroid	03	38
Vocal cord polyp	07	35
Vocal cord nodule	17	28
Subglottic stenosis	01	36
Recurrent laryngeal papillomatosis	01	12
Post Thyroidectomy	01	42
Exuberant granulation tissue	01	45
Vocal cord palsy	01	44
Tubercular laryngitis	01	35
Functional aphonia	01	18
Total	87	36

Most of the patients in our study were suffering from Carcinoma of the larynx. Mostly observed in elderly adult (6th decade) and old personnel. Acute and chronic laryngitis in 3rd & 4th decade. Vocal cord nodules and vocal cord polyps were common in middle age group. There was 01 case of recurrent laryngeal papilloma in a 12 years old child. 01 case case of functional aphonia of newly married young women was seen.

Table IX

Distribution of sex according to cause in study population (n=87)

Disease / Causes	No of patients	Male to female ratio
Chronic laryngitis	20	3:2
Ca larynx :		
• Suraglottic (n=28)		
• Glottic (n=4)		
• Subglottic(n=1)	33	Male
Ca thyroid	03	Female
Vocal cord polyp	07	2:1
Vocal cord nodule	17	1:1
Subglottic stenosis	01	Male
Recurrent laryngeal papillomatosis	01	Male
Post Thyroidectomy	01	Female
Exuberant granulation tissue	01	Male
Vocal cord palsy	01	Male
Tubercular laryngitis	01	Male
Functional aphonia	01	Female

Chronic laryngitis were found more common in male (3:2). Carcinoma larynx was excessively seen in male. Vocal cord nodule was seen equal in males & females. Vocal cord polyp showed male female ratio of 2:1.

Table X

Histopathological findings after direct laryngoscopic assessment & biopsy in study population (n=38)

Disease / Causes	No of patients	Percentage %
Ca larynx :		
• Suraglottic (n=28)		
• Glottic (n=4)		
• Subglottic(n=1)	33	55 %
Vocal cord polyp	07	11.67%
Vocal cord nodule	17	28.33 %
Recurrent laryngeal papillomatosis	01	1.66 %
Exuberant granulation tissue	01	1.66 %
Tubercular laryngitis	01	1.66 %
Total	60	100 %

Direct laryngoscopy was needed in 60 patients. Carcinoma of larynx were most commonly encountered in 33 cases (55 %). Vocal cord nodule was in 17 cases (28.33 %), vocal cord polyp were in 07 cases (11.67 %). Single case of recurrent laryngeal papillomatosis, Exuberant granulation tissue and Tubercular laryngitis was noted.

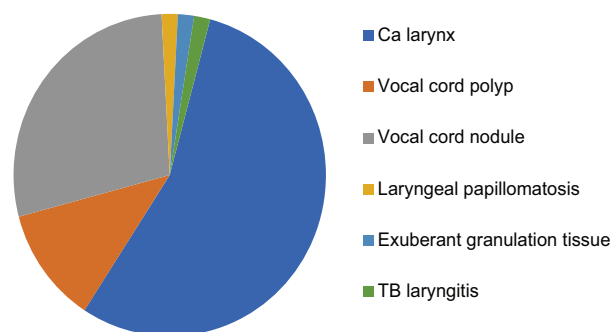


Figure shows percentage of diseases diagnosed by histopathological findings after direct laryngoscopic assessment & biopsy in study population.

Discussion:

A total of 87 patients were included in this study. Majority of patients were seen in age group of 31-40 years (28.74%) and 51-60 years (20.69%) followed by 3rd decade 21-30 years (14.94%). Baitha et al²¹ also found majority of patients (28.18%) in the age group of 31 to 40 years. Batra et al²⁶ found largest group comprising 25% in 31 to 40 years age group. Kumar H et al²⁵ found 31% patients in 31-40 years age group. In our study 56.32% patients were seen in age group of 21-50 years. This observation slightly differs from Deshmukh²³, Mehta AS²² and Baitha et al²¹ with 63.1%, 67.2% and 61.81% patients in 21-50 years age group respectively. So my study result slightly differs with the results of all these studies.

In this study, males were 56 (64.37%) and females were 31 (35.63 %), with male predominance and male female ratio of 1.81:1. This coincides with study by Karan Sharma et al¹⁸, Parikh N¹⁹, Ahmad et al²⁰, Baitha S et al²¹, Mehta AS²², Deshmukh²³, Banjara H et al²⁴, Ku-mar H et al²⁵, Batra et al²⁶ and Behera et al²⁷. All these studies were showing male

predominance and male female ratio between 1.65:1 to 2:1.

Koufman and Isaacson evolved a classification of vocal professionals based on their voice use and risk¹⁷.

1. Level I (elite vocal performers): Included sophisticated voice users like the singers and actors, where even a slight vocal difficulty causes serious consequences to them and their careers.
2. Level II (professional voice users): For whom even moderate vocal difficulty would hamper adequate job performance. Clergymen, lecturers, teachers, politicians, public speakers and telephone operators would classify in this level of voice users.
3. Level III (non -vocal professionals): It includes teachers and lawyers. They can perform their jobs with slight or moderate voice problems; only severe dysphonia endangers adequate job performance.
4. Level IV (non-vocal no- professionals): It includes labourers, homemakers, businessmen and clerks. These are the persons who are not impeded from doing their work when they experience any kind of dysphonia.

In this study, according to this classification, we found 2.30% elite vocal performers, 9.19% professional voice users, 1.15% non-vocal professionals and 87.35% non-vocal non-professionals. Banjara H et al²⁴ found 1.59% elite vocal performers, 3.59% professional voice users, 9.56% non-vocal professionals and 85.26% non-vocal non-professionals. So, our study correlates with study of Banjara H et al²⁴.

In this study, smoking was the most common predisposing factor found in 43.68% patients. Our study correlates with study of Banjara H et al²⁴ and Behera et al²⁷ with 43% and 43.75% patients were associated with smoking. Chronic mucosal irritation by heavy smoking, excessive intake of alcohol and tobacco chewing in Asian countries play significant role in etiology of hoarseness. It was observed that in India and other developing countries the prevailing lower economic status, poor nutrition and general health, vocal habits, smoking and drinking

habits, unhealthy environment, and different social customs influence the incidence of hoarseness¹⁹.

In this study, change in voice was found in all patients (100%). Other symptoms were vocal fatigue, cough, sore throat, fever, foreign body sensation, vocal fatigue, dysphagia, weight loss, dyspnoea, neck swelling, respiratory distress etc.

Mehta AS²², Parikh N¹⁹ and Baitha et al²¹ also found change in voice in all 100% patients. Other symptoms were also comparable with our study.

Vocal abuse was found in 36.78% patients. It correlates with study of Banjara H et al²⁴, Behera et al²⁷ with 31% and 35% patients with vocal abuse respectively. In our study, vocal abuse was main predisposing factor in vocal nodules, vocal cysts and vocal cord polyps. Smoking and tobacco chewing together constitute major pre-disposing factor in malignancy, acute and chronic laryngitis.

Duration of change of voice ranged from 7 days to more than 3 years. Most of presenting complaints 48.27% were seen within 3 months, 21.84% within 3 to 6 months, 10.34% within 6 to 12 months and 19.54% complaints were of more than 1 year duration. Batra et al²⁶ found 59% patients within first five months of appearance of symptoms and 86% of patients were found to present within first year of appearance of symptoms. Baitha et al²¹ noted duration range from 1 day to 5 years and 50% patients had duration of voice change in months. Chopra and Kapoor²⁸ found 68.65% patients with duration of change of voice of less than one year. Banjara H et al²⁴ found 20.72% complaints were of more than 1 year duration. In our study, 19.54% complaints were of more than 1 year duration. So, our study correlates with all these studies.

In this study carcinoma larynx (37.93%) was found the most common etiology of change of voice. Other cause were chronic laryngitis (20.99%), vocal cord nodule (19.54%) followed by vocal cord polyp (8.05%), carcinoma thyroid (3.45%), vocal cord palsy (1.15%), functional (1.15%), TB laryngitis (1.15%), Subglottic

stenosis (1.15%) and Recurrent laryngeal papillomatosis (1.15%) etc.

In this study, carcinoma larynx was found as most common cause of change of voice in 37.93% patients. My study result differs from the study of Banjara H et al²⁴, Baitha et al²¹, Kumar H et al²⁵, Parikh et al¹⁹, Saeed M and Mian FA³⁰ with carcinoma larynx as a cause of change of voice in 9.56%, 14.54%, 15%, 12% and 11% respectively.

Chronic laryngitis was one of the leading cause of change of voice (20.99%). Behera et al²⁷ found chronic laryngitis as the most common cause and found in 25% cases. Our study also correlates with study of Baitha et al²¹ with 21.81% cases with chronic laryngitis. Chronic laryngitis was associated with tobacco in 54.05% patients and laryngopharyngeal reflux in 45.95% patients. This is comparable to the study by Koufmann¹⁷ in which laryngopharyngeal reflux was associated with 40% cases of chronic laryngitis.

Vocal cord nodules were found in 19.54% patients. Among them around 60% was bilateral. Baitha et al²¹ and Mehta et al²² also found bilateral vocal nodules in most of the patients. Kumar H et al²⁵ found vocal nodules in 18% cases. Behera et al²⁷ found vocal nodules in 15% cases. Banjara H et al²⁴ found vocal nodules in 11.95% cases. Baitha et al²¹ found vocal nodules in 12.72% cases.

Vocal cord polyps were found in 8.05% patients. These result differs with study of Banjara H et al²⁴, Baitha et al²¹ with 3.59% and 4.54% cases respectively.

Direct laryngoscopy was needed in 60 patients. Carcinoma of larynx was most commonly encountered in 33 cases (55 %). Vocal cord nodule was in 17 cases (28.33 %), vocal cord polyp were in 07 cases (11.67 %). Single case of recurrent laryngeal papillomatosis, Exuberant granulation tissue and Tubercular laryngitis was noted.

Conclusion:

Change of voice is just a symptom with a very diverse etiology. The etiological data varies in different geographical location and from one center to other, so every case should be carefully

and thoroughly evaluated to know the diagnosis and underlying pathology for early and prompt management. A sequential history, physical examination and appropriate investigations can lead to appropriate diagnosis.

A patient presenting with change of voice in ENT OPD may have anything from a viral infection that just needs voice rest to an overtly malignant lesion, the treatment for which may be aggressive. Therefore early diagnosis of the underlying cause becomes all the more important in every case. The earlier a malignancy is identified, the better the prognosis. It is easier to get rid of abusive habits that have not had a lengthy period to develop. So early diagnosis and treatment may shorten the time period for which the patient remains dysfunctional.

Cessation of smoking and usage of other tobacco preparations and alcohol can lead to significant reduction in the incidence of laryngitis and carcinoma of larynx and in turn will reduce the burden of voice change.

Avoidance of vocal abuse can also lead to decrease the burden of change of voice. So, change of voice is an alarming symptom and it should not be ignored and thorough investigations should be done to make a final diagnosis.

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