Histomorphological Pattern of Vocal Cord Lesions in a Tertiary Care Hospital

*Awal N,[1] Rahman MS,[2] Ray S,[3] Naha A,[4] Yasmin R,[5] Sharmin L,[6] Alam MS[7]

Abstract

Background: Voice is the most important component for human to communicate their ideas, emotion and personality with the outside world. Vocal cord lesion is one of the most common problems in the Otolaryngology Department. Even the smallest swelling on the free edge of vocal cord can cause voice disturbances and has significant social and psychological impact. The aim of our study was to find out the frequencies of the vocal cord lesions and to assess the various histomorphological characteristics of these lesions among the patients of various age groups in Bangladeshi population.

Methods: A retrospective, record review (secondary data analysis) study was carried out among 2054 patients who underwent surgery in Green Life hospital for any vocal cord lesion between the period of 2011 to 2021. The data was collected from an electronic database from Histopathology Department of Green Life Hospital.

Result: The study population consists of total 2054 cases with male and female ratio of 3.8:1. The age of the patient was between 5 to 95 years and the majority of the patients (27%) were presented with 3rd to 4th decades. Male (79%) were commonly affected than female (21%). Male patients showed higher percentage in 40-50 years age group (21%), while female patient showed higher percentage in 18-40 years age group (13%).

A total of 63 (3.1 %) cases were non neoplastic, 1966 (95.7%) cases were neoplastic, and 25 (1.2 %) cases were diagnosed as premalignant. The most common vocal cord lesion was vocal cord polyp (81.3%) followed by invasive squamous cell carcinoma 272 cases (13.2%).

Conclusion: The histopathological examination of vocal cord lesion is the gold standard diagnostic tool to evaluate voice disorders. The early diagnosis should be done carefully to evaluate underlying pathology for better management.

[Journal of Histopathology and Cytopathology, 2023 Jul; 7 (2):95-102]

Keywords: Vocal cord, Histopathology

1. **Dr Naila Awal, Assistant Professor, Department of Pathology, Green Life Medical College, Dhaka. nailaawal@gmail.com*
2. *Dr Md Saidur Rahman, Professor and Head, Department of Pathology, Sher-e-Bangla Medical College, Barishal.*
3. *Dr Subrata Ray, Assistant Professor, Department of Pathology, Sher-e-Bangla Medical College, Barishal.*
4. *Dr Abirvab Naha, Assistant Professor, Department of Otolaryngology- Head and neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka.*
5. *Dr Rumana Yasmin, Assistant Professor, Department of Pathology, Dhaka Central International Medical College, Dhaka.*
6. *Dr Lyzu Sharmin, Assistant Professor, Histopathology department, National Institute of Cancer Research and Hospital, Dhaka.*
7. *Dr Md. Shafiqul Alam, Associate Professor, Radiology and Imaging Department, Monno Medical College, Manikgonj.*

**For correspondence*

Introduction

Vocal cords are membranous infoldings of mucous membrane situated on both sides of epiglottis, which is involved in phonation and communication with others as well as expressing emotion and personality. Any pathological lesions of the vocal cord affect the voice quality and excessive growth in vocal cord can even causes breathing difficulty.

Accurate diagnosis is a very important key factor for management of disease. Occasionally, the otolaryngologist cannot establish the final diagnosis depending only on clinical manifestation alone without help of histopathological diagnosis. Biopsy followed by histopathology is needed to know the histological pattern or characteristics of the lesion to confirm the diagnosis.

This study was aimed to evaluate the histomorphological pattern of vocal cord lesions in different age groups and its prevalence in our population.

Methods

This was a record review (secondary data analysis) study of patients who underwent surgery for vocal cord lesion between the period from 2011 to 2021. The data was collected from an electronic database from the Histopathology Department of Green life Hospital.

Patients of different age groups with primary vocal cord lesions and complete medical data were included in our study. However, patients with secondary malignancy, nasal and nasopharyngeal pathology, inadequate samples, incomplete medical data, histologically inconclusive reports were excluded from our study.

The collected data were arranged in a table and based on patient's ID number, age, sex, diagnosis and histopathological findings. Data was analyzed by using Microsoft excel system.

This study was approved by the Ethical Committee of this institution under the number of 2023/01.

Result

From 2011 to 2021, we searched the electronic database of histopathology department, Green Life Hospital and found 2189 patients with vocal cord lesions. We excluded 135 cases that had inadequate samples, incomplete medical data or histologically inconclusive report. Thus, we analyzed 2054 cases for our study. Out of these 2054 cases, 46 % had right vocal cord lesions, 45 % had left vocal cord lesions and 9 % had bilateral vocal cord lesions.

Most of the patients with vocal cord lesions were male (79%, n=1625) and the rest were female (21%, n=429).

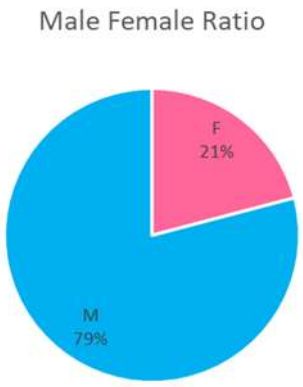

Figure 1. Distribution of vocal cord lesion according to gender

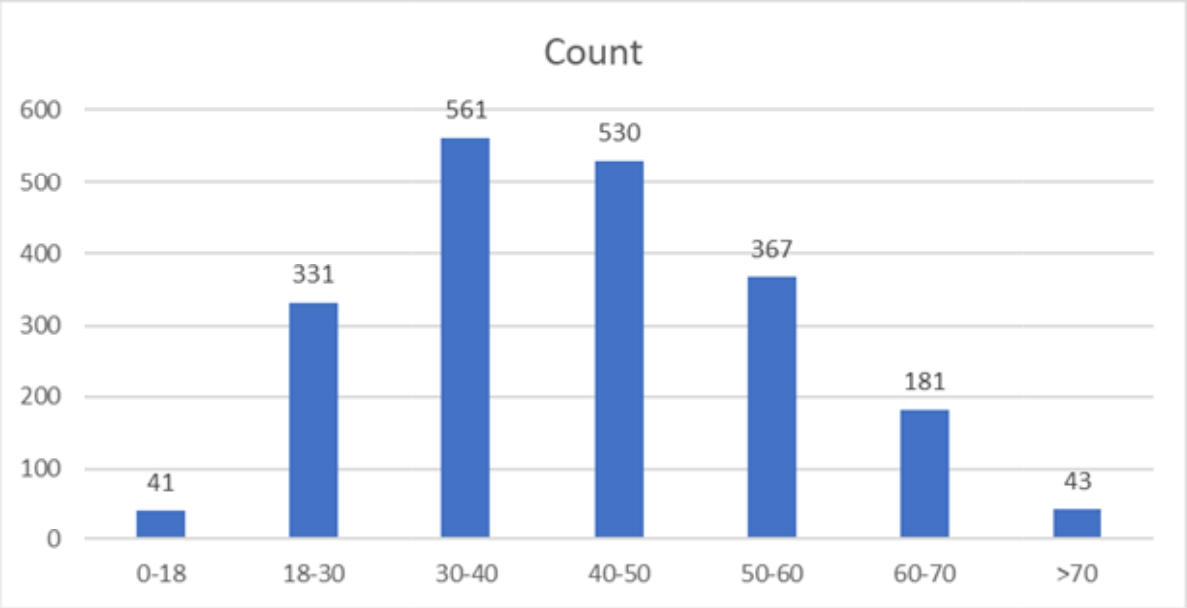

Figure 2. Age distribution of vocal cord lesions

Figure 2 shows that the most frequent age group for vocal cord lesions was 30 to 40 years (n=561, 27%) and the least frequent age groups were below 18 years and above 70 years (n=41 each, 2%). The youngest patient in our study was 5 years old and the oldest was 95 years old.

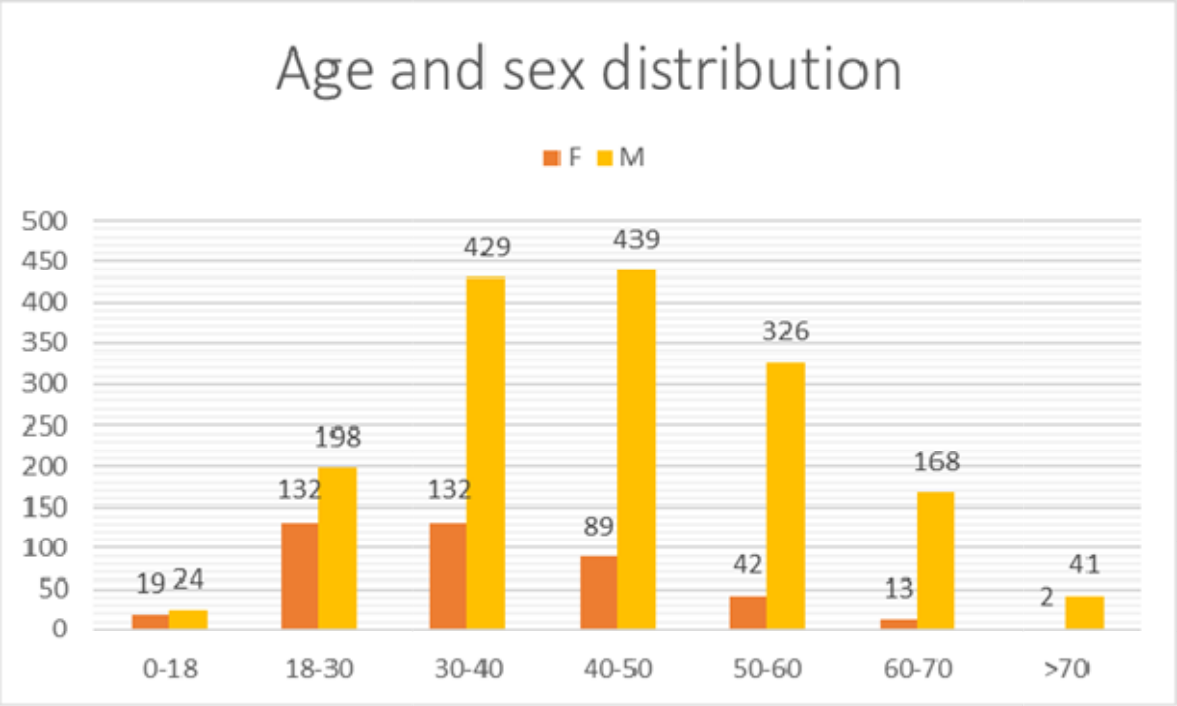

Figure 3. Age and gender distribution in vocal cord lesions

Figure 3 shows that there were more male patients than female patients (The ratio of male to female was 3.77:1). The highest percentage of male patients was in the 40-50 age group (21%), while the highest percentage of female patients was in the 18-40 age group (13%).

Table I: Distribution of Different types of vocal cord lesions (n= 2054)

Pathological lesion	Female	Male	Total	Percentage
Benign tumor	395	1297	1692	82.4%
Fibrous histiocytoma	-	3	3	0.1%
Granular cell tumor (Myoblastoma)	1		1	0.0%
Squamous papilloma	10	9	19	0.9%
Vocal Cord Polyp	384	1285	1669	81.3%
Malignant tumor	14	260	274	13.3%
ISCC-1	11	148	159	7.7%
ISCC-2	2	103	105	5.1%
ISCC-3	1	7	8	0.4%
Poorly Differentiated sarcoma consistent with Malignant Fibrous Histiocytoma	-	1	1	0.0%
Sarcomatoid Carcinoma	-	1	1	0.0%
Non neoplastic	20	43	63	3.1%
Aspergillosis	6	15	21	1.0%
Cyst	-	3	3	0.1%
Epidermoid Inclusion Cyst	10	13	23	1.1%
Granulation tissue	1	1	2	0.1%
Lymphoid hyperplasia	1		1	0.0%
Tuberculosis	2	11	13	0.6%
Pre cancerous	-	25	25	1.2%
CIS	-	14	14	0.7%
Vocal Cord Dysplasia	-	9	9	0.4%
Leukoplakia	-	2	2	0.1%
Grand Total	429	1625	2054	100.0%

Table I shows the different types of pathological lesions of vocal cord in 2054 patients. Most of them had benign neoplastic lesions (82%), followed by malignant lesions (13%). Vocal cord polyp was the most common benign non neoplastic lesion (81%). The ratio of non-neoplastic to neoplastic lesion was 1:22.

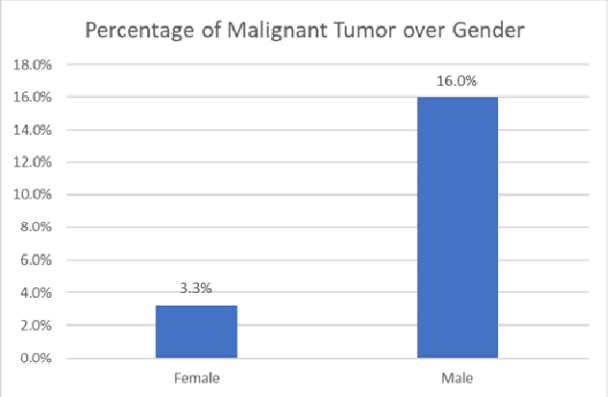

Figure 4. Gender distribution of malignant tumor

Figure 4 shows that a higher proportion of male patients had malignant tumors than female patients. The percentage of male patients with malignancy was 16%, while the percentage of female patients was 3.3%.

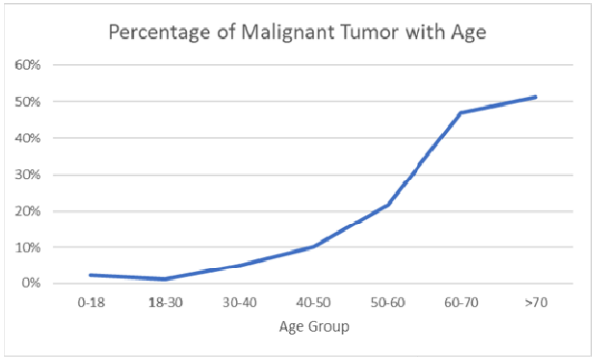

Figure 5. Distribution of malignant tumor according to age

Figure 5 illustrates that the risk of vocal cord malignancy increased with age. Half of the patients diagnosed with malignant tumors were older than 70 years.

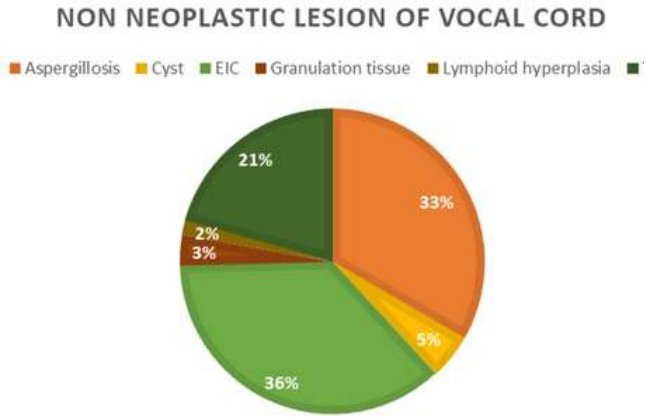

Figure 6. Distribution of nonneoplastic lesion of vocal cord

Figure 6 shows that among the non-neoplastic lesions of vocal cord, epidermoid inclusion cyst was the most frequent (36%), followed by fungal infection Aspergillosis (33%).

Microphotomicrographs of different types of vocal cord lesions

Figure 7. Vocal cord polyp (Case no: 1580)

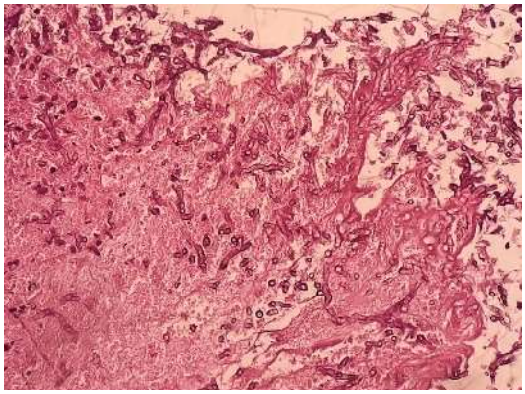

Figure 8. Aspergillosis (Case no: 2037)

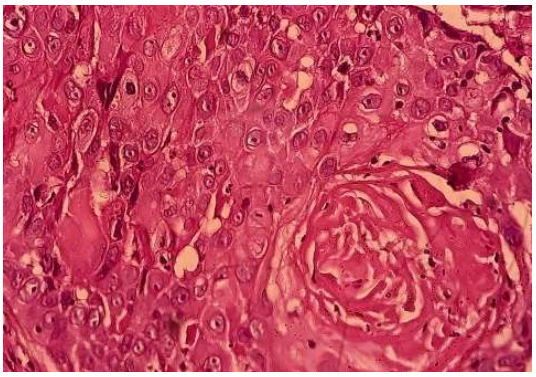

Figure 9. Invasive squamous cell carcinoma. Grade 1 (Case no: 2014)

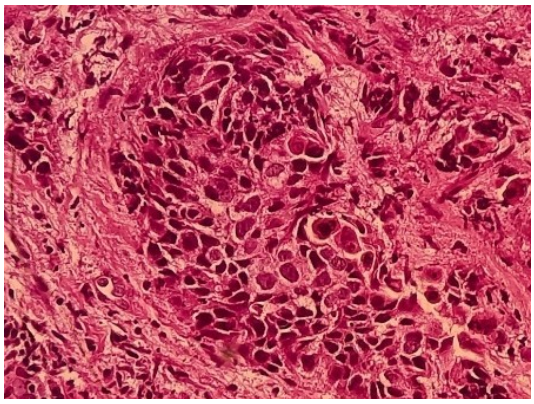

Fig 10. Invasive squamous cell carcinoma. Grade 2 (Case no: 2050)

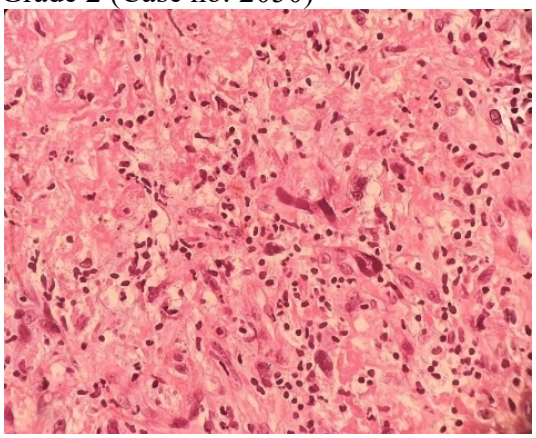

Figure 11. Sarcomatoid carcinoma (Case no: 102)

Discussion

In our study, vocal cord lesion was most commonly found in adult population corresponding their age 30- 40years age (561 cases, n=2054) when people use their voice more intensely in their professional activities. These findings correlate with the studies done by Chavan et al (29 %, n= 50) and Kale et al (40%, n= 30).[1,2]

It was found to be more common in male (1625, 79%) than female, The male female ratio of our study was 3.77:1, which was slightly higher than other studies. Rout MR found almost similar male female ratio (3.28:1, n= 30) in his study.[5] The higher incidence was found in male population may be because they have to deal more with outside world leading to vocal cord strain and stress. Occupational, smoking habit might be a contributary factor. As our study was retrospective, it was not possible to correlate the lesion with individuals' profession and personal habit.

Ahmed SU et al, Bangladesh, reported that vocal cord polyp, a benign lesion, was the commonest vocal cord problem in their study.[4] They observed that 48% of the participants aged 5-6 years old in their small sample (n=25) exhibited this condition. However, our study with a considerably larger sample (n=2054) revealed that vocal cord polyp was the predominant lesion (81.3%) among individuals in their third and fourth decades of life (30.91%). The incidence of this condition diminished with age, which might be attributed to some anatomical alterations of the vocal cord at that stage. The discrepancy between our study and Ahmed SU et al's study could be explained by the variation in sample size and age group.

Vocal cord polyp is covered with stratified squamous epithelium and may exhibit variety of changes in the stroma including edema, fibrosis, increase vascularity, hemorrhage, hyaline changes, inflammation and so on. Thelining epithelium of vocal cord polyp may vary from normal to hyperplastic and keratinized.

Regarding this histological consideration, we found the predominance of epithelial hyperplasia (31.99%) in vocal cord polyp, followed by hyperkeratosis (1.97%), parakeratosis and atrophy (1%). Some author considered hyperplasia and parakeratosis as significant and important aspect of the histological difference between vocal cord nodule and polyp,[11]whereas in other literatures some authors said that vocal cord polyp and vocal cord nodule share similar histological features.[12] Now it is widely accepted that only a histopathologic features,

vocal fold nodules or polyps cannot be differentiated.[6,12] Edema in the lamina propria was detected in all cases and congestion was found 991 cases (59.37%) which was almost similar with the study done by Martins RH et al.[6] The vascular congestion may be explained by mechanical cause like pedicle compression from edema which causes impaired blood flow.

The squamous papilloma was more common in young adults between the age of 16-30 years (36.84%).

The ratio between benign and malignant tumor in this study was 6.1:1. The risk of malignancy was higher in the advancedage group. The incidence was common in male than female probably due to smoking habit of male.

The squamous cell carcinoma of vocal cord was the second most common lesion in our study, which represented 99% of total malignant tumor of vocal cord. Among them 58% (159 cases) were well differentiated, 39% (105 cases) were moderately differentiated and 3% (8 cases) were poorly differentiated. These correlates with the study done by Sharma DK et al. which showed the incidence of well differentiated (50%), moderately differentiated 26% and poorly differentiated squamous cell carcinoma was 10%.

Almost 90% cases, carcinoma develop from precancerous lesion.[8] Precancerous condition is important to consider because early diagnosis, timely management, and regular follow up may prevent its malignant progression. It also determines the line of treatment therapy and prognosis. In our study, among precancerous lesion, vocal cord dysplasia was detected in 9 cases (36%), carcinoma in situ 9 cases (36%), carcinoma in situ with microinvasion 5 cases (20 %). The Leukoplakiawas found in 2 cases (8%).

During the last 60 years pathologists and otolaryngologists head and neck surgeons have made significant attempts to achieve a widely acceptable terminology and histological grading for laryngeal squamous intraepithelial lesions to predict the biological behavior and guidance for clinical management.[10]The current WHO classification (2017) recommends the use of a two-grade system low-grade and high-grade dysplasia with unification into high-grade dysplasia of former moderate dysplasia, severe dysplasia and carcinoma in situ.[10]We found 44.44% of high-grade dysplasia and 33.33% of low-grade dysplasia. It was higher than the study done by Bolkainy ET et al[9] (high grade dysplasia 36.6% and low-grade dysplasia 16.6%). The higher incidence of premalignant lesion may be due to long-term tobacco exposure, various occupational professions related to the textile industry, chemical industries dealing with wood processing.[8]

Among non-neoplastic lesion, epidermal inclusion cyst was common (23, 1.1 %) followed by fungal infection (22 cases, 1%)

There is no opportunity now a days for a gross examination to be made of advanced vocal cord TB due to rarity of the disease. In our study there were 13 cases of vocal cord granuloma, suggestive of tuberculosis. Personal habit like smoking, immunocompromised state and immunosuppressive drugs, even malignancy may be the cause for development of TB.

Conclusion

Our study revealed the prevalence and histomorphological patterns of vocal cord lesions over last 10 years. The vocal cord

polyp was the commonest lesion followed by invasive squamous cell carcinoma.

References

1. Chavan SS, Yewale AG. Clinicopathological profile of patients with benign laryngeal lesions. MedPulse International Journal of ENT. September 2017; 3(3): 26-28.
2. Kale MV, Borade TG, Gaikwad NS. A Descriptive Study of Benign Vocal Cord Lesions with Speech Prameters Operated with Micro laryngoscopy. Global Journal of Medical Research, 2020; 20(J3): 9–18.
3. Paltura C, Güvenç A, Bektaş S, Develioğlu O, KülekçiM,Risk Factors and Diagnostic Methods in Vocal Cord Mucosal Lesions.SisliEtfalHastan Tip Bul. March 21, 2019; 53(1): 49–53.
4. Ahmed SU, Kabir M, Alam ABMK, Hasan DM, Ahmed KU, Khan HS, Benign vocal cord lesions - a study of 25 cases. Bangladesh Journal of Otorhinolaryngology. Available from:https://www.orlhnsbd.org/journalpdf/5.pdf
5. Rout MR, Fathima, A study on vocal cord lesions.International Journal of Scientific Research. October 2020; 9(10):30-31.
6. Martins RH, Defaveri J, Domingues MA, de Albuquerque e Silva R. Vocal polyps: clinical, morphological, and immunohistochemical aspects. J Voice. Jan 2011; 25(1):98-106.
7. Sharma DK, Sohal BS, Bal MS, Aggarwal S, Clinico-Pathological Study of 50 Cases of Tumours of Larynx.Indian J Otolaryngol Head Neck Surg. 2013; 65(Suppl 1):S29–S35.
8. Mehta N, Tabassum S, Pharynx - Diagnosis and Treatment [Internet]. IntechOpen;May 2021. Chapter 9, Premalignant Conditions of Larynx [cited 2022 Nov 17]; p. 322.
9. El-Bolkainy T, Mohamed G, Badawy O, Precursor Lesions of the Vocal Cord: a Study on the Diagnostic Role of Histomorphology, Histometry and Ki-67 Proliferation, Pathology & Oncology Research. Jan 2020; 26(1):515-520.
10. Hellquist H, Ferlito A, Mäkitie A, Thompson LDR, Bishop J, Agaimy A, et al. Developing Classifications of Laryngeal Dysplasia: The Historical Basis. Advances in Therapy. April 2020;37:2667–2677.
11. Nunes RB, Behlau M, Nunes MB, Paulino JG, Clinical diagnosis and histological analysis of vocal nodules and polyps,Braz J Otorhinolaryngol. Aug 2013;79(4):434-40.
12. Çomunoğlu N, Batur Ş, Önenerk AM, Voice and swallowing disorder [Internet]. IntechOpen; October 2019. Chapter 2, Pathology of Nonneoplastic Lesions of the Vocal Folds [cited 2022 December04]; p. 1172.
13. Arifuzzaman M, Fattah SN, Islam MN, Hasan MM, Islam MM, Tabassum CT, et al. Clinicopathological Study OF Change OF Voice, Journal of Dhaka Medical College,