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A Clinicopathological Study of Hoarseness of Voice

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Abstract: Hoarseness of voice refers to a laryngeal dysfunction caused by abnormal vocal cord vibrations. Hoarseness of voice is only a symptom and not a disease. Aetiology of hoarseness is very diverse and varies greatly. So every case of hoarseness must be carefully investigated to determine the underlying pathology. The present study was conducted for duration of thirty years in three Medical Colleges of West Bengal, India, to find the clinicopathological spectrum of hoarseness of voice. Out of the 765 patients presenting with hoarseness, 510 (66.7%) were males and 255 (33.3%) were females with an M: F ratio of 2:1. The highest incidence of (28.9%) was noticed in the age group of 21 to 30 years, followed by (24.4%) in the age group of 31 to 40 years and (17.8%) in the age group of 41 to 50 years. In the present study, Reinke's oedema was found to be the commonest pathology (26.7%), followed by vocal cord polyp (16.9%), vocal nodules (14.6%), chronic laryngitis (13.7%), carcinoma of the larynx (11.9%), vocal cord palsy (8.9%), and laryngeal tuberculosis (4.1%), acquired laryngeal web (1.8%), and recurrent respiratory papillomatosis (1.4 %). Out of the 765 cases, 674 (88.1%) were benign and 91 (11.9%) were malignant. Reinke's oedema, vocal cord polyp and carcinoma of the larynx were more common in men whereas vocal nodules were more common in women. Vocal abuse was an important predisposing factor for vocal nodules and Reinke's oedema. Smoking was found to be an important aetiological factor for Reinke's oedema, chronic laryngitis and carcinoma of the larynx. Incidence of laryngeal tuberculosis in India had decreased in the last ten years due to early detection and treatment of tuberculosis cases as a part of various National Programs like RNTCP. Incidence of recurrent respiratory papillomatosis had also decreased in the recent past due to improvement of hygiene and medical care. Microlaryngeal surgery and advancement of anaesthetic techniques along with invention of better endotracheal tubes had greatly reduced the chance of acquired laryngeal web formation.

Keywords: hoarseness, Reinke's oedema, vocal nodules, vocal cord polyp, vocal palsy, laryngeal tuberculosis.

INTRODUCTION

Speech is the most important vehicle of expression in mankind. It is one of the most complex and highly skilled learned behaviour which man is capable of. Voice is a natural medium well adapted to communicate emotional content, whereas speech is a cultural medium that is suitable to convey intellectual content. Speech may be used to express feelings but also to hide, disguise or deny them [1].

For production of voice, a driving force is necessary in addition to the larynx. Only vertebrates with their thoraco-abdominal diaphragms are able to use their larynx for producing voice by altering air flow from their respiratory bellows. The production of sound for communication of complex information is limited to the highest order of animal kingdom [2]. Although rarely life threatening, voice problems can cause tremendous alteration in daily living and should not be under estimated as a medical disorder [3]. Voice disorder can have a significant influence on vocational, social and emotional adjustment of patients. A person approaches an otolaryngologist when his voice sounds abnormal. Defect of quality of voice may arise from two sources, the larynx and the spaces of the respiratory tract. The problems associated with the larynx are known as phonatory disorders and those related to the respiratory spaces are called resonance disorder. The larynx is a magic box, situated in the neck, at the gateway of trachea and is responsible for phonation. Hoarseness is a type of phonatory defect.

Hoarseness is a vague term that is used to describe a change in quality of voice ranging from

voice harshness to voice weakness [4]. It implies that the formulation of meaning is not affected but the transmission of messages through the medium of sound is in some way impaired. The hoarseness refers to a laryngeal dysfunction caused by abnormal vocal cord vibrations. Hoarseness of voice is only a symptom and not a disease. So every case of hoarseness must be carefully investigated to determine the underlying pathology. The aetiology of hoarseness is very diverse and varies greatly. Hoarseness can be divided into acute and chronic in onset [5]. Acute onset may be secondary to viral infection, vocal abuse, smoking, trauma to the larynx [6] and thyroid surgery. Chronic onset may be caused by vocal polyps, vocal cord nodules, laryngeal papillomatosis, laryngeal neoplasm, tumors of the vocal cords, functional dysphonia, smoking, voice abuse, and gastroesophageal reflux [7], post nasal drip, malignant neoplasm of thyroid, oesophagus and lungs, neurological involvement by systemic diseases like diabetes mellitus [8], and chronic granulomatous diseases like tuberculosis [9]. The complaints of hoarseness may imply serious disease and it should not be ignored.

MATERIALS AND METHODS

The study was conducted across three Medical Colleges of West Bengal, India, over a period of 30 years from 1988 to 2018, to assess the clinicopathological profile for patients presenting with hoarseness of voice. The patients were selected from the patients attending the ENT outpatient department, presenting with hoarseness of voice.

All those patients presenting with hoarseness of voice were examined and only cases with complaints of hoarseness of voice for more than 15 days and having pathology confined to the vocal cords were included in the study. Patients with hoarseness of voice for less than 15 days or lesions extending beyond the vocal cords were excluded from the study. The patients presenting with other voice disorders were also excluded.

Thorough history was taken and a careful ENT and general examination was done in each case. During the initial phase of our study, indirect laryngoscopy was done in all cases which were later combined with fibre optic laryngoscopy upon availability of instruments. Routine hematological and biochemical tests including thyroid function tests in selected cases were done. Necessary imaging was done as required. Selected cases were admitted and conventional direct laryngoscopy or micro laryngoscopy was done under general anesthesia. Microlaryngoscopy was done using a Zeiss operating microscope fitted with a 400 mm objective lens. In the earlier part of our study, photographs were taken using a conventional SLR camera fitted with the side tube of the operating microscope. In the later part of our study, photographs were taken using digital cameras. Necessary surgeries were done. Biopsy was taken where needed and submitted to the pathologist for histopathological examination.

RESULTS AND DISCUSSION

In our study comprising of 765 patients presenting with hoarseness, 510 (66.7%) were males and 255 (33.3%) were females with an M: F ratio of 2:1. The finding was similar to the observation of Banjara *et al* [10] where a male preponderance was found with an M: F ratio of 1.9:1. This can be attributed to the fact that males indulge more in smoking, alcohol, pollutant exposure and misuse of voice.

Table-1: Sex Distribution of Patients

Sex	No. of Cases	Percentage %
Male	510	66.7%
Female	255	33.3%
Total	765	100.0%

Patients presenting with hoarseness of voice were seen distributed over all age groups. The youngest of our patient was 4 years of age and the oldest was of 75 years. The highest incidence of 28.9% was noticed in the age group of 21 to 30 years, followed by 24.4% in the age group of 31 to 40 years and 17.8% in the age group of 41 to 50 years. The patients within the age of 21 to 50 years contributed to 71 % of the cases. Baitha *et al*. [11] found majority of their patients (61.81%) in the age group of 21-50 years and most commonly (28.18%) in the 4th decade of life. Batra *et al*. [12] found 70% of the patients in the age group of 21-50 years and the largest group comprising of 25% in the age group of 31-40 years. Both the findings were close to our observations.

Table-2: Age Distribution of Patients

Age Groups(in years)	No. of Cases	Percentage%
0 - 10	51	6.7%
11 - 20	51	6.7%
21 - 30	221	28.9%
31 - 40	187	24.4%
41 - 50	136	17.8%
51 - 60	85	11.1%
61 - 70	17	2.2%
71 - 80	17	2.2%
TOTAL	765	100.0%

The study observed not much difference regarding the incidence of hoarseness of voice in rural (53.3%) and urban (46.7%) population. Saha [13] found that patient from urban areas had higher incidence (58%) of vocal cord lesions than patients from rural areas. The result of our study was described in table no. 3.

Table-3: Distribution of Residences of the Patients

Residence	No. of Cases	Percentage%
Rural	408	53.3%
Urban	357	46.7%
Total	765	100.0%

Only 339 patients (44.3 %) were smokers, while 426 (55.7%) were non-smokers. When hoarseness of voice was regarded as a whole, smoking was not an important factor. However in our study, we found smoking as an important aetiological factor for individual pathology like Reinke's oedema, chronic laryngitis and carcinoma of the larynx. Goswami *et al*. [14] and Marcotullio *et al.* [15] also found an association of smoking with Reinke's oedema.

Table-4: Addiction to Smoking

	No. of Cases	Percentage (%)
Smoker	339	44.3%
Non-smoker	426	55.7%
Total	765	100%

In this study, we laid stress on misuse or overuse of voice and upper respiratory tract infections as predisposing factors of hoarseness of voice. Out of the 765 patients in the study, 459 (60%) patients had predisposing factors, such as misuse or overuse of voice and chronic upper respiratory tract infections but in 306 (40%) cases, there were no predisposing factors. Sharma *et al*. [16] found that in (44%) cases, vocal abuse was associated with one or the other aetiological factors for benign lesions of the larynx. Siddapur *et al.* [17] also found an association of vocal abuse with the benign lesions of the vocal cords.

All the patients had chief complaint of hoarseness of voice. In addition to that, some patients had other complaints also as described in table no. 6.

Table-5: Predisposing Factors

Predisposing Factors Present				No Predisposing Factor
Misuse or Overuse of Voice	Recurrent Upper Respiratory Tract Infections	Both	Total	
238 (31.1%)	85 (11.1%)	136 (17.8%)	459 (60%)	306 (40%)

Table-6: Complaints in addition to Hoarseness

Complaints	No. Of Cases	Percentage (%)
Respiratory distress	11	1.4%
Neck swelling	17	2.2%
Combined respiratory distress and neck swelling	34	4.4%
Pain in throat	17	2.2%
Cough, haemoptysis and fever	17	2.2%
No other complaints	669	87.5%
Total	765	100.0%

In 11 patients of recurrent respiratory papillomatosis, there was respiratory distress in addition to hoarseness of voice. In few cases, there were additional complaints like pain in the throat, haemoptysis, cough, fever and neck swelling. In 669 patients, the only complaint was hoarseness of voice. It was observed that the onset was gradual in some cases and sudden in other cases. The progress of the ailment observed was slow, rapid, static or fluctuating as described in table no. 7.

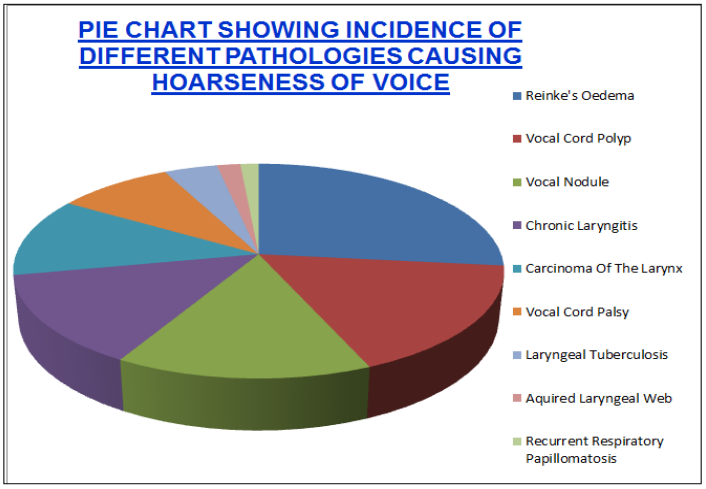
Table-7: Onset & Progress of Hoarseness

Onset			Progress				
Gradual	Sudden	Total	Slow	Rapid	Static	Fluctuating	Total
646 (84.4%)	119 (15.6%)	765 (100%)	476 (62.2%)	102 (13.3%)	68 (8.9%)	119 (15.6%)	765 (100%)

Reinke's oedema was found to be the commonest pathology in the present study and was responsible for hoarseness of voice in 204 (26.7%) cases, followed by vocal cord polyp in 129 (16.9%) cases, vocal nodules in 112 (14.6%) cases, chronic laryngitis in 105 (13.7%) cases, carcinoma of the larynx in 91 (11.9%) cases, vocal cord palsy in 68 (8.9%) cases, laryngeal tuberculosis in 31 (4.1%) cases, acquired laryngeal web in 14 (1.8%) cases, and recurrent respiratory papillomatosis in 11 (1.4%) cases. Out of the 765 cases, 674 (88.1%) were benign and 91 (11.9%) were malignant. Kumar *et al*. [18] in their study of 100 patients presenting with hoarseness, had found carcinoma of the larynx in 15% of cases. Vengala *et al*. [19] in their study of 146 cases of hoarseness of voice found vocal cord malignancy in 19 (13.01%) cases.

Table-8: Distribution of Pathologies

Sl. No.	Pathologies	No. of cases	Percentage (%)
1.	Reinke's oedema	204	26.7%
2.	Vocal cord polyp	129	16.9%
3.	Vocal nodules	112	14.6%
4.	Chronic laryngitis	105	13.7%
5.	Carcinoma of the larynx	91	11.9%
6.	Vocal cord palsy	68	8.9%
7.	Laryngeal tuberculosis	31	4.1%
8.	Acquired laryngeal web	14	1.8%
9.	Recurrent respiratory papillomatosis	11	1.4%
	TOTAL	765	100.0%



Reinke's Oedema

In our study, we observed Reinke's oedema in 204 cases out of which 136 (66.7%) were male and 68 (33.3%) were female. The age of the patients ranged from 20 to 47 years. Goswami *et al*. [14] in their study of 92 cases found 58 (63%) male patients and 34 (37%) female patients and the majority of the patients (89%) were between 21 and 50 years of age.

In 170 cases, out of 204 cases, vocal misuse or overuse was found to be present. Chronic upper respiratory tract infection seems to be another aetiological factor. Ballenger [20] considered misuse or overuse of voice as one of the main aetiological factors. Goswami *et al*. [14] in their study of 92 cases of Reinke's oedema also found that in 80% cases vocal misuse or abuse was present.

Out of the 204 patients in our study, 136 (83%) were smokers, which indicated that smoking was an important predisposing factor. Goswami *et al.* [14], Marcotullio *et al*. [15] and Ballenger [20] also considered smoking to be one of the main aetiological factors. In 170 cases of Reinke's oedema, the lesion was unilateral but in 34 cases both vocal cords were involved. Histological picture consisted of sub epithelial oedema with few blood vessels in some cases. There were no epithelial changes.

Vocal Cord Polyps

Out of the 765 cases of hoarseness of voice in our study, 129 were of vocal cord polyps. Vocal cord polyps were found predominantly in males (86%) during third, fourth and fifth decades of life. Maximum incidence was in the 5th decade and male female ratio was 6.1:1. Singh *et al*. [21] found male predominance with a male, female ratio of 2:1 in vocal cord polyp cases. Singhal *et al*. [22] found its highest incidence in the 3rd decade of life and a male female ratio of 3.7:1.

It was seen that out of 129 patients of vocal cord polyps in our study, 88 (68.2%) patients were smokers. Effat *et al.* [23] in their study also found similar results. Vocal fold polyps were larger in smokers than in non-smokers. Misuse of voice was present in 39 cases and chronic upper respiratory tract infection was present in 21 cases. In most of the cases, the lesions were situated in the mid portion of the vocal cords. In all 129 cases, the lesions were unilateral. Singh *et al*. [24] in their study also noted that in 94 % cases, vocal cord polyps were unilateral.

The polyps were reddish or greyish in colour, arising from a stalk or a broad base in some cases. In 17 cases, dilated blood vessels were seen over the polyps. The size of the polyps varied from 3mm to 10 mm in diameter. In all the cases, vocal cords were mobile. Hoarseness improved markedly after microlaryngoscopic excision of the polyps.

In 91 cases, the histopathological picture was of fibroangioma and in other 38 cases the picture was of chronic nonspecific inflammation with oedema. The histopathological changes were seen mainly in the sub epithelial stroma which was also observed by Kotby *et al*. [25].

Vocal Nodules

In our study, vocal nodules were found to be present in 112 cases. The youngest of our patients was 18 years of age and the oldest was of 37 years. It indicated that vocal nodules were more common in young patients. This was probably due to the reason that young individuals misused their voice much more than elder persons. Out of the 112 cases, 76 were female and 36 were male patients. The finding was similar to the observations of Buche *et al.* [26] who also found a female preponderance.

Of the 112 cases, all had misused or overused their voice and two of them had chronic upper respiratory tract infection along with misuse or overuse of voice. So misuse or overuse of voice and chronic upper respiratory tract infections were probably the most important aetiological factors. None of the patients were smokers. This correlates with the

observation of Won *et al*. [27], who mentioned that smoking was not significant in the aetiology of vocal nodules.

Histopathological examinations were done in all cases and all were found to be non-malignant. There were no epithelial abnormalities. It indicated that vocal nodules had no malignant potential in themselves. In all the cases, the lesions were bilateral and symmetrical and situated at the junction of anterior and middle third.

Laryngeal Tuberculosis

In our study spanning over last 30 years, we found 31 (4.1%) cases were of laryngeal tuberculosis. We got most of the cases of laryngeal tuberculosis during the initial 20 years of our study. In the last 10 years, there was a drastic decrease in the number of laryngeal tuberculosis and we got only 4 cases during that period. This can be attributed to early detection and treatment of tuberculosis cases in India as a result of various National Programs like RNTCP (Revised National Tuberculosis Control Program). Hegde *et al*. [28] in their study of 42 patients with benign lesions of the larynx found 6 (42%) cases of laryngeal tuberculosis. Chopra *et al*. [29] in their study of 67 patients found 3 (%) cases of laryngeal tuberculosis. Out of the 31 patients, 26 were males and 11 patients were females. Age of the patients was between 30 and 59 years. All the 31 cases were secondary to pulmonary tuberculosis. The presenting symptoms were hoarseness and cough. In 9 cases there was pain in the throat with referred earache, in addition to hoarseness and cough.

On examination of the larynx, granulation tissue was found over the arytenoids, posterior commisure, vocal cords and in 15 cases over the false cord also. In 14 cases, there was ulcer over the arytenoids. Histopathological picture consisted of tubercular granuloma with giant cells and epitheloid cells.

Recurrent Respiratory Papillomatosis

In our study of 765 cases, there were 11 (1.4%) cases of recurrent respiratory papillomatosis. The age of the patients were ranging from 4 years to 7 years. Among the 11 patients, 6 were males and 4 were females. The incidence had reduced gradually in the recent past due to improvement of hygiene and medical care. Soni *et al.* [30] in their study found the incidence of respiratory papillomatosis as 7.78%.

Other Pathologies

Chronic laryngitis was found in 105 (13.7%) cases. The patients were mostly males (62%). Predisposing factors found were smoking and exposure to smoke and dust. Agarwal *et al*. [31] found a 10.3% incidence of chronic laryngitis in their study.

Carcinoma of the larynx was found in 91 (11.9%) cases. Kiakojoury *et al*. [32] in their study found 2.5% cases of carcinoma of the larynx. In our study all the patients were male and smokers. Agarwal *et al*. [31] also observed that males were more affected because of addiction habits and exposure to different environmental conditions.

Vocal cord palsy was found in 68 (8.9%) cases. Roy *et al*. [33] in their study of 170 cases found 5 (2.9%) cases of vocal cord palsy. In our study, we found that in 41 (60.2%) cases it was unilateral while in 27 (39.7%) cases it was bilateral. In case of unilateral palsy, involvement of the left side was more common than of the right side. In our study, we found that thyroid surgeries, pulmonary tuberculosis, carcinoma of the oesophagus and bronchus as the main causes of vocal palsy, whereas in other cases it was idiopathic.

Table-9: Distribution of Vocal Palsy

Sides involved		No. of cases	Percentage (%)
Unilateral	left	29	42.6%
	right	12	17.6%
Bilateral		27	39.8%
Total		68	100%

Acquired laryngeal web was found in 14 (1.8%) cases. It was mostly found in the first half of our study. In most of the cases it was due to surgery of the both vocal cords in the same sitting [34]. Another cause of it was endotracheal intubation [35]. In our study, we found that repeated surgeries for recurrent respiratory papillomatosis, stripping of the both vocal cords in Reinke's oedema and intubation injury as the main aetiologies of acquired laryngeal web. Microlaryngeal surgery had greatly reduced the chance of post-surgical laryngeal web formation, while advancement of anaesthetic techniques and invention of better endotracheal tubes had reduced the chance of post intubation web formation.

CONCLUSION

In our study spanning over the last 30 years, we found that hoarseness of voice is distributed in all age groups but more common in 3rd, 4th, and 5th decades of life. Males were seen to be more affected than females.

Reinke's oedema, vocal cord polyp, vocal nodules and chronic laryngitis were the commonest causes of hoarseness of voice. Vocal abuse was found to be an important aetiological factor of vocal cord nodules and Reinke's oedema. The overall incidence of vocal nodules was more in females whereas incidence of Reinke's oedema, vocal cord polyp, chronic laryngitis, laryngeal tuberculosis and carcinoma of larynx were observed to be more in males. In cases of recurrent respiratory papillomatosis, respiratory distress was found to be the main presenting symptom. Laryngeal tuberculosis cases were secondary to pulmonary tuberculosis, and its incidence had reduced in the last 10 years as a result of the successful implementation of the 'Revised National Tuberculosis Control Program' (RNTCP) in India. Surgery near the anterior commisure of the larynx often resulted in laryngeal web formation, particularly when it was done by conventional instruments and without the help of an operating microscope.

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