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Original Article

Pathology Section

Clinico-pathological Study of Benign Vocal Fold Polyps and Nodules: A Single Institution Experience of 7 Years at a Tertiary Care Centre, New Delhi, India

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ABSTRACT

Introduction: Benign vocal fold polyps and nodules are pseudotumours that are frequently diagnosed in clinical practice, along with other benign pseudotumour conditions like Reinke edema and vocal cord cysts. These lesions are primarily caused by vibratory trauma. The present study aims to explore the clinical and histological differences between benign vocal cord polyps and nodules.

Aim: To compare the demographic and clinical profiles, as well as the basic histological changes, and evaluate the concordance between clinical and histopathological diagnoses in vocal fold polyps and nodules.

Materials and Methods: This retrospective observational study was conducted in the Department of Pathology at Hamdard Institute of Medical Science and Research, New Delhi, India for a period of six months, from January 2022 to June 2022. Data from the past seven years, from June 2012 to May 2019, were retrieved from the department archives. Biopsies of all cases with vocal fold lesions were processed, and sections were examined under light microscopy. The lesions were comparatively studied based on age, gender, profession, predisposing factors, type of lesion, and presenting symptoms. Basic histological features defining the lesions and the agreement between clinical and histological diagnoses were also studied. Descriptive statistics were used to measure the data.

Results: Out of 36 cases, 27 (75%) were diagnosed histopathologically as vocal fold polyps, while 9 (25%) were diagnosed as vocal fold nodules. Among the cases of vocal fold polyps, 14 (52%) were in the above 40-year age group, whereas only 4 (44%) cases of vocal nodules were in the above 40-year age group. Excessive voice abuse was the most common predisposing factor in 21 (58.3%) cases, and hoarseness was the most common clinical manifestation in 34 (94.4%) cases, observed in both types of lesions. There was an agreement of 85% (23/27) in clinical and histological diagnoses of vocal fold polyps and 100% (1/1) in vocal fold nodules.

Conclusion: The present study found a higher prevalence of vocal fold polyps compared to vocal nodules. Excessive voice abuse and hoarseness were the most common predisposing factor and clinical manifestation, respectively, in both types of lesions. Thus, the present study highlights the importance of considering various clinical factors and histopathological changes in the accurate diagnosis and management of benign vocal fold polyps and nodules.

Keywords: Epithelial hyperplasia, Hoarseness, Pseudotumour, Vocal abuse

INTRODUCTION

Voice production is the principal function of vocal folds, which enables audible communication through speech. Any irregularities in the anatomical aspects of the vocal folds lead to disturbances in voice production, resulting in abnormal vocal cord vibrations primarily manifested by hoarseness [1]. Any patient with hoarseness lasting for two weeks or longer should undergo visualisation of the entire larynx.

Irregularities in the vocal folds can be either primary (benign or malignant) or secondary to an underlying disorder. Benign lesions of the vocal fold can be true benign neoplasms (rare) or pseudotumours. The most frequently diagnosed benign lesions of the vocal folds are pseudotumours, which include vocal fold nodules, polyps, Reinke edema, cysts, and others. Additionally, their clinical appearances partly overlap [1].

Although vocal folds can withstand a significant degree of stress and strain, vocal polyps and vocal nodules may occur due to chronic misuse, primarily through vibratory trauma. Nodules are usually formed from constant vocal abuse over time, while polyps may originate from a single episode of abuse. Vocal polyps are small pedunculated or sessile lesions on the free edge of the true vocal fold. Vocal polyps mostly occur as single and unilateral occurrences. Vocal fold nodules are round neoplasms, usually located bilaterally symmetrically on the free edge of the true vocal fold, at the junction of the anterior and middle third of the fold. A large number of adult patients have occupations and lifestyle demands that involve more than normal use of their voice (such as teachers, singers, vendors, hawkers, receptionists, etc.), but patients from all groups of the population can be affected. Other predisposing factors include cigarette smoking, acid reflux, allergies, and infections [2].

Differentiating these lesions based on clinical grounds alone is not always easy; therefore, clinicians often resort to surgical intervention and subsequently confirm the diagnosis through histopathological examination. However, there may be instances of discordance between clinical and histopathological diagnoses. Histological differences in both lesions are usually assessed based on various parameters in the epithelium (hyper- and/or parakeratosis), basement membrane, and submucosa (edema, edematous lakes, fibrin, fibrin organisation, haemorrhage, vessel proliferation, inflammation, and small vessel morphology) [3]. Establishing a clinical-histological correlation is not always straightforward, but an accurate diagnosis is of utmost importance. Since only a few studies have been conducted in the past on the comparative clinical and histopathological study of vocal cord polyps and nodules, this type of study will aid in planning specific management and developing new therapeutic modalities for both lesions. It will also help differentiate these lesions from other benign vocal cord lesions.

Therefore, the aim of the present study was to investigate the differences in the clinical profiles of vocal fold polyps and nodules and to compare their clinical diagnoses with histopathological diagnosis.

MATERIALS AND METHODS

This retrospective observational study was conducted in the Department of Pathology at Hamdard Institute of Medical Science and Research, New Delhi, India for a duration of six months, from January 2022 to June 2022. Data from the past seven years, spanning from June 2012 to May 2019, were retrieved from the department archives.

Inclusion criteria: All specimens of vocal fold lesions that were finally diagnosed as vocal polyp and vocal nodule on histopathology were included in the study.

Exclusion criteria: Previously treated cases of vocal fold lesions (polyps and nodules) with recurrence, as well as other benign and malignant vocal fold lesions, were excluded from the study.

Study Procedure

A total of 76 cases of vocal cord lesions were reported during these seven years. Based on the inclusion and exclusion criteria, the study included a sample size of 36 cases.

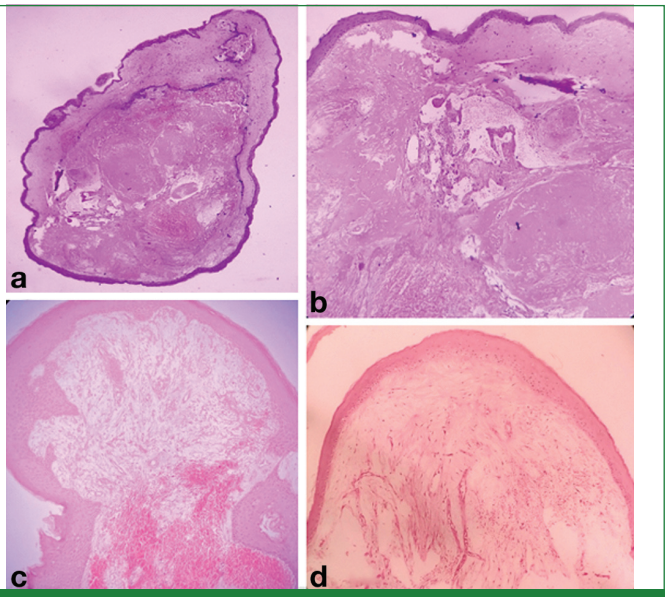
Clinical data of all the selected cases were retrieved from the histopathology requisition form and hospital records of the patients. All specimens (biopsies/surgical specimens) were fixed in 10% formalin, embedded in paraffin, sectioned at 3-5 µ, and stained with Haematoxylin and Eosin (H&E). The lesions were comparatively studied with regards to age, sex, predisposing risk factors, profession, symptoms, and basic histological features defining the lesion. Histological characterisation of the lesions as vocal polyps and nodules was based on changes in parameters like the epithelium, lamina propria, basement membrane, and vascular alterations [3]. The agreement between clinical and histological diagnoses was studied, and the pathological diagnosis was compared with the clinical diagnosis, classified as concordant or discordant.

STATISTICAL ANALYSIS

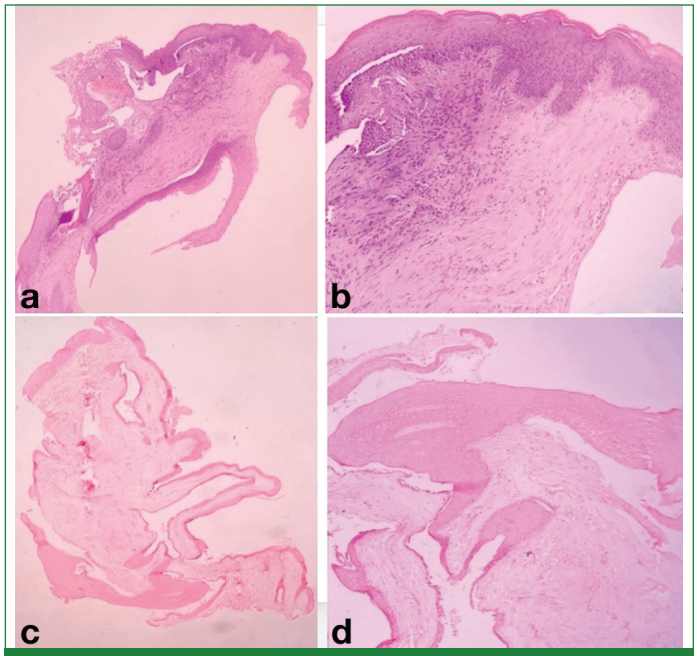
Descriptive statistical measures were utilised to present the data.

RESULTS

A total of 36 cases of benign vocal fold lesions, comprising vocal polyps [Table/Fig-1a-d] and vocal nodules [Table/Fig-2a-d], were included in the present study. Out of the 36 cases, 27 (75%) were diagnosed as vocal polyps, while 9 (25%) were diagnosed as vocal nodules [Table/Fig-3]. Overall, 26 (72.2%) cases were males and 10 (27.8%) cases were females, with a male-to-female ratio of 2.6:1. The male-to-female ratio was higher in vocal polyps (2.86:1) compared to vocal nodules (2:1) [Table/Fig-3]. The age range of the lesions was 14 to 68 years, with a mean age of 39.44. The maximum number of cases was seen in the 21-30 year age group and the 51-60 year age group, each comprising 9 (25%) cases, while cases were least common in the extremes of age for both lesions. 14 (52%) cases of vocal fold polyps were in the above 40-year age group, while only 4 (44%) cases of vocal nodules were in the above 40-year age group, as compared to vocal polyps [Table/Fig-3].



[Table/Fig-1]: Photomicrograph of Gelatinous vocal cord polyp: a) (10X, H&E stain) showing a benign polypoid thinned squamous mucosa with oedematous submucosa containing fibrin; b) Intact epithelium with focal thinning and fibromyxoid stroma with areas of haemorrhage c), fibromyxoid stroma beneath intact epithelium; d) (40X, H&E stain).



[Table/Fig-2]: Photomicrograph of vocal cord nodule: a) Showing focally hyperplastic lining epithelium with fibrosis and mild angioectacsia; b) Photomicrograph of another vocal cord nodules (10x): H & E Stain; (c), Intact epithelium, fibrosis and mild angioectacsia (40X); H&E Stain (d).

Age (years)	Polyp (n=27)		Nodule (n=9)		Total (n=36)	
	Male	Female	Male	Female	Male	Female
0-20	1	-	2	-	3	-
21-30	5	3	1	-	6	3
31-40	3	1	-	2	3	3
41-50	7	-	-	1	7	1
51-60	4	2	3	-	7	2
61-70	-	1	-	-	-	1
Total	20	7	6	3	26	10
M:F ratio	2.86:1		2:1		2.6:1	

[Table/Fig-3]: Comparative age and sex distribution of vocal fold lesion (Vocal polyp and nodule).

Predisposing risk factors for both lesions included excessive voice abuse (singing, talking, screaming), smoking, reflux, alcohol abuse, and allergies. Among these, excessive voice abuse 21 (58.3%) was the most common predisposing factor, while allergies 2 (5.55%) were the least common predisposing factor for both lesions. However, smoking was comparatively more common in polyps 13 (48.2%) than in nodules 1 (11.1%).

Clinical manifestations of both lesions included hoarseness, vocal fatigue, cough, foreign body sensation, dyspnoea, and stridor. Among these, hoarseness 34 (94.4%) was the most common clinical manifestation in both lesions, while stridor 3 (8.33%) was the least common in polyps. Vocal fatigue 16 (59.2%), cough 13 (48.2%), and foreign body sensation 10 (37.1%) were more commonly seen in polyps compared to nodules, with each symptom having a similar frequency of 33.3% in the latter.

A total of 8 (22.22%) cases belonged to the teaching profession, followed by housewives 7 (19%) and students 6 (16%). Other professions in which these cases were encountered included office workers 4 (11%), vendors 3 (8%), salesmen 2 (5.5%), hawkers 2 (5.5%), singers 2 (5.5%), and conductors 2 (5.5%) [Table/Fig-4].

Clinical profile	Polyp (n=27)		Nodule (n=9)		Total n (%)
	Male	Female	Male	Female	
Risk factor					
Excessive voice abuse (singing, talking, screaming)	11	5	4	1	21 (58.3)
Smoking	13	-	1	-	14 (38.8)
Reflux	6	2	3	2	13 (36.1)
Alcohol abuse	2	-	2	-	4 (11.1)
Allergies	1	-	1	-	2 (5.55)
Symptoms					
Hoarseness	19	7	5	3	34 (94.4)
Vocal fatigue	13	3	2	2	20 (55.5)
Cough	8	5	2	1	16 (44.4)
Foreign body sensation	7	3	3	-	13 (36.1)
Dyspnea	6	2	-	1	9 (25)
Stridor	-	1	2	-	3 (8.33)
Profession					
Teacher	5		3		8 (22.2)
Housewives	5		2		7 (19.4)
Student	4		2		6 (16.6)
Office worker	4		-		4 (11.1)
Vendor	3		-		3 (8.3)
Salesman	2		-		2 (5.5)
Singer	-		2		2 (5.5)
Hawker	2		-		2 (5.5)
Conductor	2		-		2 (5.5)

[Table/Fig-4]: Comparative clinical profile (risk factor, symptoms, profession) of vocal fold lesion (vocal polyp and nodule) (N=36).

Clinical and histological diagnoses showed an agreement of 85% (23/27) in cases of vocal polyps and 100% in cases of vocal nodules (1/1). 33.3% (12/36) of cases showed discordance between clinical and histological diagnoses. Out of the cases with different clinical and histological diagnoses, 8.33% were vocal polyps and 25% were vocal nodules [Table/Fig-5].

Clinical diagnosis	Number (%)	Histological diagnosis	Number (%)	Concordant/discordant % with clinical and histological diagnosis
Polyp	27 (75)	Polyp	23 (63.4)	Concordant in 85%
		Nodule	4 (11.1)	Discordant in 14.8%
Nodule	1 (2.77)	Nodule	1 (2.77)	Concordant in 100%
Vocal cord cyst	4 (11.1)	Polyp	1 (2.77)	Discordant in 100%
		Nodule	3 (8.33)	Discordant in 100%
Amyloidosis	1 (2.77)	Nodule	1 (2.77)	Discordant in 100%
Granulomatous	2 (5.55)	Polyp	1 (2.77)	Discordant in 100%
		Nodule	1 (2.77)	Discordant in 100%
Papilloma	1 (2.77)	Polyp	1 (2.77)	Discordant in 100%

[Table/Fig-5]: Agreement between clinical and histological diagnosis in vocal cord lesions (N=36).

DISCUSSION

Vocal fold polyps and nodules are benign lesions of the larynx commonly encountered in clinical practice. Although both lesions are associated with phonotrauma, there are significant differences in demographic, clinical, and morphological features. In the present study, the age of patients ranged from 14 to 68 years, with males being more common than females. The most common predisposing factor was excessive voice abuse, and the most common profession was teaching. The most common symptom was stridor.

Vocal polyps (75%) outnumbered vocal nodules (25%) in the present study, which is in agreement with a study by Bharathi MM et al., who found that vocal polyps were the most common benign lesions of the larynx [1]. Nunes RB et al., also found that vocal polyps were the most common benign vocal fold lesions [3]. However, most literature shows a prevalence of vocal nodules (28%-35%) over vocal polyps and other benign pseudotumour lesions, although the percentage may vary in different studies [4-6]. There may be a role of genetic and/or environmental factors influencing the prevalence of vocal polyps and nodules, which require further studies at the molecular level.

In the present study, both lesions were predominantly seen in males, with an overall male-to-female ratio of 2.6:1. The predominance of vocal polyps in males is in agreement with most previous studies [6-8], while vocal nodules were predominantly seen in females [6]. In contrast to the present study, increased occurrence of vocal polyps in females was found in a study by Martins RHG et al., [9]. The mechanical strain generated during the characteristic production of low-pitched sounds in men occurs in deeper parts of the lamina propria, causing the rupture of blood vessels and haemorrhage, predisposing them to vocal polyps [10].

There were two peak age groups in the present study, with the maximum number of cases seen in the 21-30 year and 51-60 year age groups, similar to a study by Chavan SS and Yewle AG [11]. The youngest patient in the present study was a 14-year-old male, and the oldest was a 68-year-old female. Cases of vocal polyps were more commonly seen after the age of 40 (52%), while vocal nodule cases (56%) were more commonly seen below the age of 40 years. Bharathi MM et al., found that vocal polyps were most common in the fifth decade of life [1]. Milovanovic J et al., found that vocal nodule patients were predominantly under 40 years old [12]. The different age distribution of vocal polyps and nodules may be related to the predisposing risk factors and types of occupation and profession.

The most common risk factor associated with both lesions in the present study was excessive voice abuse in the form of singing, talking, and screaming (59% for vocal polyps and 56% for vocal nodules). Smoking was the second most common factor in vocal polyps (52%), while it was seen in only one case (11%) of vocal nodules, in which reflux was the second most common factor. This is similar to the study by Chavan SS and Yewle AG, in which vocal abuse was found to be the most common habit present in both males and females as a predisposing factor, followed by smoking and alcohol [11]. In a study by Wani AA et al., vocal abuse/overuse was a predisposing factor in 45% of the cases [13]. In another study, vocal abuse (40%) and smoking (23.33%) were the most common predisposing factors [14]. However, Effat KG and Milad M found that voice abuse or misuse was the main factor in patients with vocal nodules, and smoking was the main risk factor in vocal polyps [15]. This is because tobacco compromises the vocal fold epithelium and increases hyaline degeneration in vocal polyps [15].

The most common symptom in the present study was hoarseness (94.4%), seen in both lesions. Vocal fatigue was the second most common symptom in both lesions. This is in agreement with various other studies [4,6,11,12]. These studies also showed that cough, foreign body sensation, and dyspnoea were other common symptoms, similar to the present study, but the percentages varied in different studies. In the present study, 94% of cases had a higher incidence of hoarseness, which was supported by various other studies [16,17].

The type of occupation has also been recognised as a risk factor for vocal fold diseases [18]. In fact, the type of occupation is related to voice demands and air pollution. The incidence of vocal fold nodules and polyps correlates with vocal overuse [19]. In the present study, 22.22% of cases belonged to the teaching profession, followed by housewives (19%) and students (16%). Other professions included office workers, vendors, salesmen, and hawkers, all related to their common habits of voice abuse. The results were similar to a study by Chinthapeta KK et al., in which teachers formed the largest group, while in a study by Thomas PM et al., teachers formed the third largest group [17,18]. Increased vocal use was predominantly linked to vocal fold polyps in street and other salespersons, receptionists, medical staff and speech and language therapists, and lawyers [17]. Considerable vocal use was mostly linked to the vocal nodules group in teaching staff, telephone operators, clerks, politicians, and managers, while immense vocal use, also linked to the vocal nodules group, was seen in singers, actors, TV and radio speakers [12]. In a study by Thomas PM et al., the prevalence of voice disorders among teachers was 36% for nodular lesions, and the overall association was 14.7% [20].

Although there is overlap in the histological features of vocal polyps and nodules, there is a predominance of one feature over another that aids in making a diagnosis in both lesions. In the present study, epithelial hyperplasia, fibrosis in the lamina propria, and mild angiectasia were predominant in vocal nodules, while unremarkable or thinned-out epithelium, edematous to fibromyxoid lamina propria, and marked vascular changes, with some showing haemorrhage and haemosiderin-laden macrophages, were predominant in vocal polyps. Mild inflammation in the lamina propria was seen in both conditions. Similar observations were seen in another study by Nunes RB et al., [3].

There was agreement in 85% of cases of vocal polyps and 100% of cases of vocal nodules between clinical and histological diagnosis. In 33.3% (12/36) of cases, the clinical diagnosis was different from the histological diagnosis, with 8.33% turning out to be vocal polyps and 25% as vocal nodules on histological diagnosis. This was almost similar to the study by Nunes RB et al., [3].

Regarding the management of these lesions, it was proposed by Nakagawa H et al., that, regardless of the maturity of the polypoid lesion, speech therapy should be proposed in all cases of vocal behaviour alterations [21]. It should be prioritised for laryngeal surgery regardless of whether the cause is intensive, inadequate, or abusive voice use.

Limitation(s)

As the total number of cases was small, the different result parameters may not be an exact reflection of the real values. Hence, further studies with larger sample sizes are needed to obtain more accurate and reliable results.

CONCLUSION(S)

Vocal polyps were more commonly seen than nodules, with excessive voice abuse and hoarseness being the common predisposing factor and clinical manifestation, respectively. The present study emphasises the role of various clinical factors and histopathological changes in the differential diagnosis of vocal fold polyps and nodules, thereby aiding in accurate typing and management of these two lesions. Modifying the risk factors may help decrease the prevalence of these lesions.

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