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Role of Fiberoptic Nasopharyngolaryngoscopy in the Diagnosis of Laryngeal Pathologies: A Study on Vocal Cord Polyps

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Abstract **Original Research Article**

Background: Vocal cord polyps are among the most prevalent benign laryngeal lesions in otorhinolaryngology practice and a leading cause of dysphonia in the working-age population. Prompt and accurate endoscopic characterization is essential to guide appropriate management. Fiberoptic nasopharyngolaryngoscopy (FNPL) offers real-time, high-resolution laryngeal visualization and has become an indispensable office-based diagnostic tool for these lesions. This study aimed to evaluate the role of FNPL in characterizing vocal cord polyps and to determine the association between voice abuse and polyp size. ***Methods:*** A cross-sectional observational study was conducted at the Department of Otorhinolaryngology, Narsingdi Sadar Hospital, Narsingdi, Bangladesh, from January to December 2025. A total of 150 patients with vocal cord polyps confirmed on FNPL were enrolled consecutively. Socio-demographic data, clinical presentations and predisposing factors were recorded on a structured proforma. Endoscopic parameters including side of involvement, site of attachment, morphological type, lesion size and glottic closure pattern were documented. Data were analyzed using SPSS version 25.0 and the chi-square test was applied to assess the association between voice abuse and polyp size. ***Results:*** The mean age was 43.8 ± 10.9 years, with male predominance (69.3%). Hoarseness of voice was universal (100%). Voice abuse was the leading predisposing factor (74.7%), followed by smoking (50.7%) and reflux symptoms (36.0%). On FNPL, the left vocal cord was most frequently involved (47.3%) and the junction of the anterior and middle third was the predominant site of attachment (74.0%). Pedunculated polyps were more common (59.3%) and medium-sized lesions (3-5 mm) predominated (57.3%). Incomplete glottic closure was observed in 78.7%. A statistically significant association was found between voice abuse and larger polyp size ($p = 0.041$). ***Conclusion:*** FNPL is a reliable, minimally invasive diagnostic modality for the comprehensive characterization of vocal cord polyps. Voice abuse is significantly associated with larger polyp size, underscoring the importance of voice hygiene counselling in clinical management.

Keywords: Fiberoptic nasopharyngolaryngoscopy, vocal cord polyp, hoarseness, voice abuse, laryngeal pathology.

INTRODUCTION

Laryngeal disorders represent a common category of conditions encountered in otorhinolaryngology practice, with vocal cord polyps constituting one of the most frequently diagnosed benign lesions of the larynx. These are localized, exophytic, fluid-filled masses arising from the lamina propria of the true vocal folds and are characteristically associated with dysphonia, vocal fatigue and impaired quality of life [1,2]. Studies from South Asian tertiary care institutions confirm that vocal cord polyps predominate among benign laryngeal lesions, accounting for the majority of cases presenting with hoarseness and that male patients constitute approximately 70% of affected individuals [3]. The lesions develop as a consequence of phonotraumatic injury, whereby mechanical stress and aerodynamic forces during prolonged or abusive vocal activities lead to vascular disruption and subsequent oedematous or haemorrhagic changes within the superficial lamina propria [2,4]. Once established, the polyp mechanically disrupts normal vocal fold vibration and impairs complete glottic closure, producing a characteristic breathy or hoarse voice that may progressively worsen without intervention.

Several risk factors accelerate this pathological process. Voice abuse and chronic phonotrauma are consistently identified as the primary drivers, while tobacco smoking introduces additional mucosal injury through direct irritant effects and histopathological changes in the vocal fold epithelium [5]. A prospective study tracking the spectrum of hoarseness in India documented that benign vocal cord lesions,

predominantly polyps, are more prevalent in middle-aged males engaged in vocally demanding occupations including teaching, business and preaching, with voice abuse identified as the foremost aetiological factor [6]. In Bangladesh, the coexistence of these occupational exposures with prevalent tobacco and betel nut use, coupled with environmental dust exposure, creates a particularly high-risk demographic profile that warrants systematic investigation.

Accurate diagnosis depends on clear laryngeal visualization. Conventional indirect laryngoscopy using a laryngeal mirror has historically been the standard outpatient method; however, it is limited by patient discomfort, a pronounced gag reflex, restricted access to posterior laryngeal structures and inability to assess dynamic vocal fold function [7]. Fiberoptic nasopharyngolaryngoscopy overcomes these constraints through a flexible transnasal approach under topical anaesthesia, enabling high-quality visualization of the nasopharynx, hypopharynx and entire larynx including subglottis and posterior commissure [8]. A comparative study of FNPL against indirect laryngoscopy in patients with laryngopharyngeal pathologies confirmed that FNPL provided superior diagnostic yield, particularly for assessing morphological details, lesion dimensions and functional glottic parameters that are directly relevant to surgical planning [8].

The diagnostic value of FNPL rests on its ability to characterize key lesion parameters — side of involvement, site of attachment, morphological type (pedunculated versus sessile), lesion size and glottic closure pattern — all of which carry direct therapeutic implications. A two-year audit of flexible nasopharyngolaryngoscopy use in a West African tertiary center confirmed the procedure's broad applicability, safety and high diagnostic yield across a range of upper airway disorders, with benign laryngeal lesions forming the largest diagnostic category [9]. Despite comparable patient profiles, systematic studies from Bangladesh documenting the endoscopic characteristics of vocal cord polyps are scarce. This study was therefore undertaken to evaluate the socio-demographic profile, clinical features, predisposing factors and detailed FNPL-based endoscopic findings in patients with vocal cord polyps and to assess the relationship between voice abuse and polyp size.

MATERIALS & METHODS

This cross-sectional observational study was conducted in the Department of Otorhinolaryngology, Narsingdi Sadar Hospital, Narsingdi, Bangladesh, from January to December 2025. total of 150 patients with vocal cord polyps confirmed on FNPL were enrolled consecutively during the study period.

Inclusion Criteria were:

1. Patients aged 18 years and above presenting with hoarseness or related laryngeal symptoms and diagnosed with vocal cord polyps on FNPL were included.
2. Patients willing to provide informed written consent and able to cooperate with the endoscopic procedure were eligible.

Exclusion criteria were:

1. Suspected or confirmed laryngeal malignancy
2. Other concurrent benign laryngeal lesions as the primary diagnosis
3. Vocal cord paralysis
4. Severe nasal obstruction precluding fiberscope passage
5. Bleeding disorders or anticoagulant use
6. Prior head and neck surgery or radiotherapy
7. Refusal to consent.

Data Collection Procedure

Written informed consent was obtained from each participant before enrolment, in accordance with the institutional ethical guidelines. A structured proforma was used to document presenting complaints, duration of symptoms, occupational history, vocal use patterns and predisposing factors including smoking, betel nut chewing, dust exposure and symptoms suggestive of gastroesophageal or laryngopharyngeal reflux.

All patients underwent FNPL performed by a single experienced otorhinolaryngologist using a flexible fiberoptic nasopharyngolaryngoscope (Karl Storz or equivalent). The nasal cavity was decongested with xylometazoline nasal spray and topical anaesthesia was achieved with 10% lignocaine spray. The fiberscope was passed transnasally and the larynx was examined systematically. For each polyp, the side of involvement, site of attachment, morphological type (pedunculated or sessile), approximate size (small <3 mm, medium 3-5 mm, or large >5 mm) and glottic closure pattern (complete or incomplete) were documented immediately after the procedure. All data were coded and stored securely with access restricted to the research team to ensure confidentiality; no identifying information was included in research records.

Statistical Analysis

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequency and percentage and continuous variables as mean and standard deviation (SD). The chi-square test was used to determine the association between voice abuse and polyp size, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Table 1: Socio-demographic Characteristics of Patients with Vocal Cord Polyps (n = 150)

Variable		Frequency (n)	Percentage (%)
Age Group (years)	18-29	18	12.0
	30-39	42	28.0
	40-49	53	35.3
	50-59	25	16.7
	≥60	12	8.0
	Mean age ± SD	43.8 ± 10.9 years	
Sex	Male	104	69.3
	Female	46	30.7
Occupation	Businessman/Service holder	48	32.0
	Teacher	31	20.7
	Homemaker	28	18.7
	Farmer	18	12.0
Voice professionals	Singer, Imam, Announcer	15	10.0
	Others	10	6.6

Table 1 describes the socio-demographic characteristics. The largest age group was 40-49 years (35.3%), followed by 30-39 years (28.0%), with a mean age of 43.8 ± 10.9 years. Males constituted 69.3% and females 30.7%. Businessmen and service holders formed the largest occupational group (32.0%), followed by teachers (20.7%), homemakers (18.7%), farmers (12.0%), voice professionals (10.0%) and others (6.6%).

Table 2: Clinical Presentation and Predisposing Factors among Patients with Vocal Cord Polyps (n = 150)

Variable		Frequency (n)	Percentage (%)
Presenting Symptoms*	Hoarseness of voice	150	100.0
	Vocal fatigue	106	70.7
	Throat discomfort/Foreign body sensation	84	56.0
	Frequent throat clearing	69	46.0
	Dry cough	43	28.7
	Dysphagia	18	12.0
Predisposing Factors*	Voice abuse/misuse	112	74.7
	Smoking	76	50.7
	Gastroesophageal reflux symptoms	54	36.0
	Exposure to dust/irritants	41	27.3
	Betel nut chewing	39	26.0
	Previous upper respiratory tract infection	23	15.3

Table 2 presents the clinical presentation and predisposing factors. Hoarseness of voice was universal (100.0%). Additional symptoms included vocal fatigue (70.7%), throat discomfort or foreign body sensation (56.0%), frequent throat clearing (46.0%), dry cough (28.7%) and dysphagia (12.0%). Among predisposing factors, voice abuse or misuse was the most prevalent (74.7%), followed by smoking (50.7%), gastroesophageal reflux symptoms (36.0%), dust or irritant exposure (27.3%), betel nut chewing (26.0%) and previous upper respiratory tract infection (15.3%).

Table 3: Fiberoptic Nasopharyngolaryngoscopic Findings in Patients with Vocal Cord Polyps (n = 150)

FNPL Characteristics		Frequency (n)	Percentage (%)
Side of Lesion	Right vocal cord	62	41.3
	Left vocal cord	71	47.3
	Bilateral	17	11.4
Site of Attachment	Junction of anterior and middle third	111	74.0
	Middle third	24	16.0
	Anterior third	9	6.0
	Posterior third	6	4.0
Morphological Type	Pedunculated polyp	89	59.3
	Sessile polyp	61	40.7
Size of Lesion	Small (<3 mm)	31	20.7

FNPL Characteristics		Frequency (n)	Percentage (%)
	Medium (3-5 mm)	86	57.3
	Large (>5 mm)	33	22.0
Glottic Closure Pattern	Incomplete closure	118	78.7
	Complete closure	32	21.3

Table 3 shows the FNPL findings. The left vocal cord was most frequently involved (47.3%), followed by the right (41.3%), with bilateral involvement in 11.4%. Polyp attachment was most common at the junction of the anterior and middle third (74.0%), followed by the middle third (16.0%), anterior third (6.0%) and posterior third (4.0%). Pedunculated morphology predominated (59.3% vs 40.7% sessile). Medium-sized polyps (3-5 mm) constituted the largest group (57.3%), followed by large polyps (22.0%) and small polyps (20.7%). Incomplete glottic closure was observed in 78.7% of cases.

Table 4: Association Between Voice Abuse and Size of Vocal Cord Polyp Detected by Fiberoptic Nasopharyngolaryngoscopy (n = 150)

Size of Polyp	Voice Abuse Present (n=112)	Voice Abuse Absent (n=38)	Total	p-value
Small (<3 mm)	18 (16.1%)	13 (34.2%)	31	**0.041**
Medium (3-5 mm)	67 (59.8%)	19 (50.0%)	86	
Large (>5 mm)	27 (24.1%)	6 (15.8%)	33	
Total	**112 (100.0%)**	**38 (100.0%)**	**150**	

Table 4 presents the association between voice abuse and polyp size. Among voice abuse patients (n=112), medium (59.8%) and large (24.1%) polyps predominated, while small polyps were proportionally more common in the non-voice-abuse group (34.2% vs 16.1%). This association was statistically significant (p = 0.041).

DISCUSSION

This cross-sectional observational study characterized the socio-demographic profile, clinical presentations, predisposing factors and detailed endoscopic features of vocal cord polyps in 150 patients through FNPL at a tertiary care center in Bangladesh. The findings provide clinically relevant local data and are examined in relation to existing published literature.

In the present study, the mean patient age was 43.8 ± 10.9 years and the 40–49-year age group was most commonly affected (35.3%). This is consistent with Vasanthi L *et al.,* who documented that benign vocal cord lesions predominantly occurred in patients in the fourth and fifth decades of life in their prospective clinical study from a tertiary hospital in India [10]. Menon and Mathew similarly reported that patients with vocal fold polyps clustered in the fourth to fifth decade, correlating this with cumulative occupational vocal demand combined with declining mucosal repair capacity [11]. Male predominance (69.3%) observed in this study closely parallels the 70.4% male preponderance reported by Vasanthi L *et al*. and aligns with Kenny *et al.,* whose scoping review attributed male excess in tertiary populations to higher rates of tobacco use, greater occupational vocal load and anatomical differences in vocal fold dimensions [10,12].

Regarding occupation, businessmen and service holders (32.0%) and teachers (20.7%) were the most affected groups, mirroring the findings of Vasanthi L *et al.,* who reported business professionals at 33.6% and teachers at 24% among patients with benign vocal cord lesions [10]. Voice professionals such as singers, imams and announcers comprised 10.0% of the cohort in this study, further underscoring the occupational dimension of the disease. Hoarseness of voice was universally present (100.0%), confirming its primacy as the cardinal clinical feature. The mechanical basis for this is straightforward: the polyp mass interferes with the normal mucosal wave and prevents complete glottic closure, producing a characteristic breathy or rough dysphonia, as described by Vasconcelos *et al*. in their comprehensive literature review [13]. Vocal fatigue (70.7%) and throat discomfort (56.0%) were the next most common symptoms, reflecting the systemic phonatory burden these lesions impose.

Voice abuse was identified as the leading predisposing factor (74.7%), followed by smoking (50.7%) and reflux symptoms (36.0%). Vasconcelos *et al*. established that repetitive phonotraumatic injury to the superficial lamina propria is the fundamental pathogenic mechanism for polyp formation, initiating vascular disruption and oedematous transformation that culminate in a polyp [13]. Trupthi *et al*. confirmed that voice abuse was the predominant risk factor in their study population and demonstrated that smokers exhibited significantly greater histopathological changes in the vocal fold mucosa, suggesting a synergistic effect between phonotrauma and tobacco use [5]. The association between laryngopharyngeal reflux and benign vocal fold lesions was systematically reviewed by Lechien *et al.,* who confirmed a statistically significant link mediated through pepsin-induced mucosal injury and inflammatory sensitisation of the laryngeal epithelium, providing mechanistic support for the 36.0% reflux prevalence in the present cohort [14]. The notable

prevalence of betel nut chewing (26.0%) reflects a culturally specific risk exposure in Bangladesh, adding a local dimension to the multi-factorial aetiology of vocal cord polyps.

On FNPL, the left vocal cord was the most frequently affected side (47.3%), with bilateral involvement in only 11.4%. Menon and Mathew, studying 163 patients, noted that unilateral dominance was the rule and attributed it to asymmetric laryngeal biomechanical forces and vocal cord tension differences [11]. Feshan *et al*. similarly documented predominantly unilateral cord involvement in patients with laryngopharyngeal pathologies evaluated by FNPL, consistent with the current findings [8]. Shrestha *et al*. confirmed in their tertiary care nasopharyngolaryngoscopy series that vocal cord polyps were among the most commonly identified pathologies, presenting almost exclusively with unilateral involvement [7]. The junction of the anterior and middle third was the dominant site of polyp attachment (74.0%), consistent with biomechanical models identifying this as the locus of maximum shearing stress during phonation [11].

Pedunculated morphology predominated over sessile (59.3% vs 40.7%). Kenny *et al*. noted in their scoping review that pedunculated polyps are generally more amenable to in-office endoscopic removal, while sessile polyps typically require microlaryngoscopy under general anaesthesia, making accurate morphological characterization by FNPL essential for surgical planning [12]. Medium-sized polyps (3-5 mm) were the most common size category (57.3%). Abubakar *et al.,* in their clinic audit of flexible nasopharyngolaryngoscopy, similarly reported a predominance of medium-sized benign laryngeal lesions and affirmed the modality's reliability in documenting lesion dimensions without general anaesthesia [9]. Incomplete glottic closure was observed in 78.7% of patients, directly reflecting the mechanical interference of the polyp mass with normal vocal fold apposition during phonation [11] and institutional experience from Bangladesh Medical University supports FNPL as a reliable outpatient tool for capturing these functional glottic parameters [12].

A statistically significant association was found between voice abuse and larger polyp size ($p = 0.041$). Among patients with voice abuse, 83.9% had medium or large polyps (3 mm and above), compared to 65.8% in those without voice abuse, with small polyps disproportionately represented in the non-voice-abuse group (34.2% vs 16.1%). This suggests that sustained phonotraumatic injury not only initiates polyp formation but drives progressive lesion enlargement. Trupthi *et al*. reported analogous findings, noting that the extent of histopathological changes was greater in patients with ongoing voice abuse [5]. The clinical implication is clear: patients with vocal cord polyps and concurrent voice abuse should receive structured voice hygiene counselling and voice therapy alongside surgical planning, as persistent phonotrauma may contribute to post-operative recurrence.

Limitations and Recommendations

This study was conducted at a single tertiary institution and the cross-sectional design precludes causal inference. Histopathological confirmation was not performed. Future multicenter longitudinal studies with voice acoustic analysis and post-treatment follow-up are recommended to strengthen these findings.

CONCLUSION

Fiberoptic nasopharyngolaryngoscopy is an effective, minimally invasive and well-tolerated office-based tool for the comprehensive endoscopic characterization of vocal cord polyps. In this study, polyps predominantly affected middle-aged males in vocally demanding occupations, with voice abuse, smoking and reflux as the principal predisposing factors. FNPL reliably documented lesion morphology, site of attachment, size and glottic closure pattern, all of which are essential for treatment planning. The significant association between voice abuse and larger polyp size highlights the necessity of integrating voice hygiene education into patient management.

Conflicts of interest: None declared.

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