

Original Research Article

Clinical Spectrum of Patients with Vocal Cord Palsy: A Prospective Observational Study from a Tertiary Care Centre in North India

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Abstract

Purpose: Vocal cord palsy (VCP) is a clinically important condition with diverse aetiologies and a variable presentation that ranges from subtle dysphonia to life-threatening airway obstruction. The variable presentation, diverse aetiologies and potential complications make VCP an important focus of otolaryngology practice, necessitating careful evaluation, diagnosis and management of patient in a tertiary care system.

Materials and Methods: A prospective observational study was conducted in the Department of Otorhinolaryngology, K.D. Medical College, Mathura, over 18 months (May 2024–November 2025). Seventy-five patients diagnosed with VCP on endoscopic laryngeal examination were evaluated with detailed history, clinical examination, laboratory tests and chest/neck imaging. Categorical data were analysed using the Chi-square or Fisher's exact test, with $p < 0.05$ considered significant.

Results: Patients were predominantly middle-aged to elderly (52.0% aged >50 years) with a male preponderance (62.7%). Hoarseness was the commonest symptom (90.7%), followed by voice fatigue (45.3%), dyspnoea (29.3%) and dysphagia (24.0%). Idiopathic causes were most frequent (41.3%), followed by iatrogenic causes (29.3%), of which thyroidectomy was the leading surgical cause (54.5%). Unilateral palsy predominated (81.3%) with left-sided involvement in 63.9% of unilateral cases. Dyspnoea and stridor were significantly associated with bilateral palsy ($p < 0.001$).

Conclusion: VCP in this study was largely a disorder of older males presenting with hoarseness. Idiopathic and iatrogenic (chiefly post-thyroidectomy) causes predominated, and bilateral palsy carried a significantly higher airway risk. A structured clinical and radiological work-up is essential before labelling a case idiopathic.

Keywords: Vocal Cord Paralysis; Laryngeal Diseases; Hoarseness; Thyroidectomy; Recurrent Laryngeal Nerve; Laryngoscopy

Introduction

Vocal cord palsy (VCP) is a clinically significant disorder characterised by partial or complete loss of mobility of one or both vocal folds. The vocal folds are essential for phonation, airway protection during swallowing and regulation of airflow during respiration, and impairment of their function may manifest with a wide spectrum of symptoms ranging from subtle voice change to severe respiratory distress [1, 2]. The variable presentation, diverse aetiologies and potential complications make VCP an important focus of otolaryngology practice, necessitating careful evaluation, diagnosis and management [3].

Mobility of the vocal folds is controlled predominantly by the recurrent laryngeal nerve (RLN), a branch of the vagus, while the superior laryngeal nerve innervates the cricothyroid muscle and modulates pitch. Any disruption of this neuromuscular control—whether from nerve injury, mechanical fixation or systemic neurological disease—can produce palsy, and the laterality (unilateral versus bilateral) together with the resting position of the affected cord carry important implications for clinical presentation and treatment [1, 4].

Unilateral VCP is reported more commonly than bilateral disease, usually with a male preponderance [5, 6]. The causes are conventionally grouped as iatrogenic, neoplastic, traumatic, infective, neurological and idiopathic. Iatrogenic injury particularly following thyroidectomy and other neck or thoracic procedures is a leading cause in many series [4, 6], while neoplastic, traumatic and idiopathic causes also contribute substantially. Bilateral palsy, although less frequent, is clinically more dangerous because of the risk of airway obstruction [7, 8]. Population-based data indicate an annual incidence of roughly one case per 100,000, with spontaneous recovery in about a third of idiopathic cases [9, 10].

Although several Indian and international studies have addressed the aetiology of VCP, regional data remain limited and aetiological patterns vary with the referral base, the local prevalence of malignancy and the availability of diagnostic facilities [11–14]. Characterising the clinical spectrum in a given setting helps identify high-risk groups, guides rational investigation and improves preventive and follow-up strategies. The present study was therefore undertaken to describe the presenting symptoms and aetiological factors of VCP in patients attending a tertiary care centre in North India.

Materials and Methods

Study design, setting and population

This prospective observational study was conducted in the Department of Otorhinolaryngology (ENT) at K.D. Medical College, Hospital and Research Centre, Mathura, Uttar Pradesh, over an 18-month period from May 2024 to November 2025. The study population comprised patients attending the ENT outpatient department who were diagnosed with vocal cord palsy on clinical and endoscopic examination. The study was designed and reported in keeping with the STROBE recommendations for observational studies.

Sample size

The sample size was calculated using the formula $n = (Z^2 \times p \times q) / d^2$, with $Z = 1.96$ (95% confidence), an estimated prevalence $p = 5\%$, $q = 95\%$ and absolute precision $d = 5\%$. This yielded $n \approx 73$, which was rounded to a final sample of 75 patients.

Eligibility criteria

Inclusion: patients diagnosed with vocal cord palsy on clinical and endoscopic examination. **Exclusion:** patients with laryngeal malignancy associated with mechanical vocal cord fixation. Palsy was defined operationally as impaired or absent movement of one or both vocal folds on video laryngoscopy, with incomplete adduction or abduction during deep breathing or phonation.

Study procedure

All patients presenting with hoarseness, voice fatigue, aphonia, breathing difficulty or swallowing difficulty were evaluated systematically after written informed consent. A detailed history was recorded, with emphasis on the onset, duration and progression of symptoms and on any past surgery involving the thyroid, neck, thorax or central nervous system. History of chronic illness (tuberculosis, diabetes, hypertension), trauma, malignancy, prior irradiation and neurological disease was elicited, together with personal habits including smoking, alcohol use, occupational exposure and significant weight loss.

A complete general and local ENT examination was followed by laryngeal endoscopy or video laryngeal endoscopy to assess vocal fold mobility and position during phonation and respiration. Findings were classified by laterality (right, left or bilateral) and patients were categorised as having unilateral or bilateral involvement. Investigations included complete blood count, erythrocyte sedimentation rate, random blood sugar and C-reactive protein, along with chest radiography (postero-anterior view) and contrast-enhanced computed tomography of the neck and chest to identify malignancy, infection or structural lesions; additional tests were performed when clinically indicated. All data were recorded in a pre-designed structured proforma.

Statistical analysis

Data were compiled in a spreadsheet and analysed using standard statistical software. Categorical variables were expressed as frequencies and percentages. Associations between categorical variables—such as presenting symptoms and laterality, and a history of thyroidectomy and laterality were tested using the Chi-square test, with Fisher's exact test applied where expected cell counts were small. A two-sided p-value <0.05 was considered statistically significant.

Results

A total of 75 patients with vocal cord palsy were included in the study. The majority were middle-aged or elderly, with more than half of the patients (52.0%) aged over 50 years. Patients older than 60 years constituted the largest age group (26.7%). Males were more frequently affected than females, accounting for 62.7% of cases, resulting in a male-to-female ratio of approximately 1.7:1 (Table 1).

Table 1 Age and sex distribution of the study population (n = 75)

Age group (years)	No.	%	Sex	No. (%)
≤20	3	4.0	Male	47 (62.7)
21–30	6	8.0	Female	28 (37.3)
31–40	11	14.7		
41–50	16	21.3		
51–60	19	25.3		
>60	20	26.7		
Total	75	100	Total	75 (100)

Farmers and labourers represented the largest occupational category (29.3%), followed by homemakers (24.0%) and office workers (20.0%). Nearly half of the patients had a history of smoking (48.0%), while alcohol consumption was reported in 37.3% of cases (Table 2).

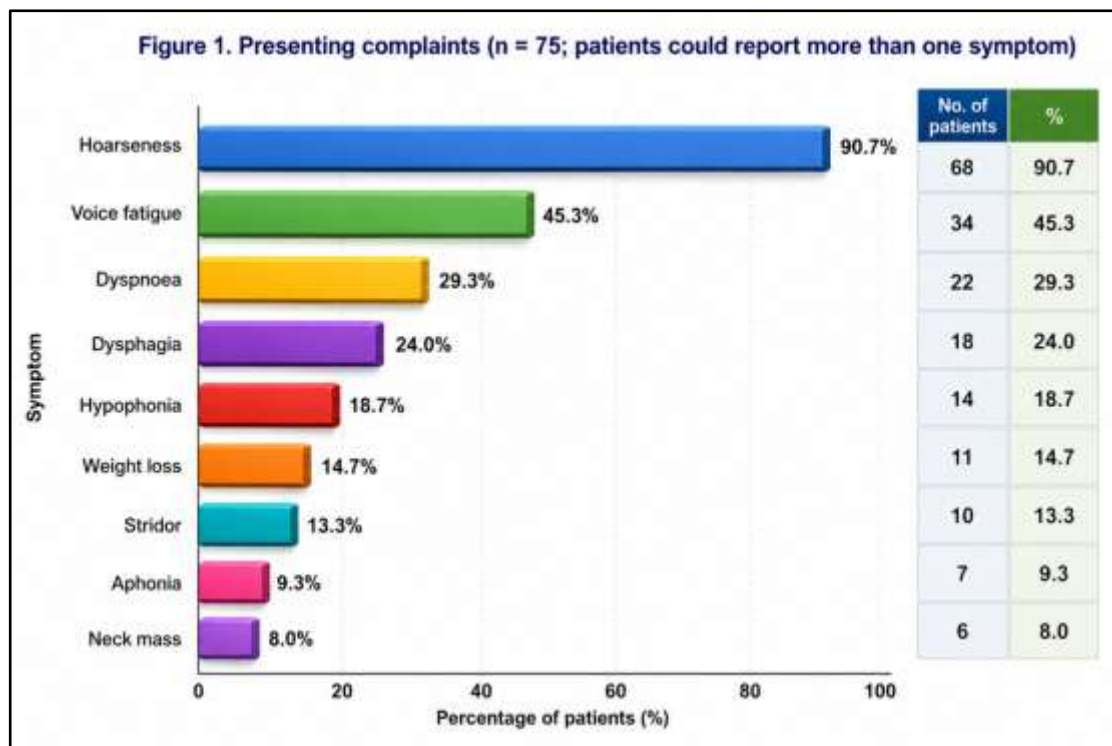
Table 2 Occupation and lifestyle exposure (n = 75)

Occupation	No.	%	Habit	Present, No. (%)
Farmer / labourer	22	29.3	Smoking	36 (48.0)
Homemaker	18	24.0	Alcohol	28 (37.3)
Office worker	15	20.0		
Shopkeeper	10	13.3		
Others	10	13.3		
Total	75	100		

Hoarseness was the predominant presenting complaint and was reported by 90.7% of patients. Other common symptoms included voice fatigue (45.3%), dyspnoea (29.3%), and dysphagia (24.0%). Hypophonia, weight loss, stridor, aphonia, and neck mass were observed less frequently (Table 3).

Table 3 Presenting complaints (n = 75; patients could report more than one symptom)

Symptom	No. of patients	%
Hoarseness	68	90.7
Voice fatigue	34	45.3
Dyspnoea	22	29.3
Dysphagia	18	24.0
Hypophonia	14	18.7
Weight loss	11	14.7
Stridor	10	13.3
Aphonia	7	9.3
Neck mass	6	8.0



Regarding etiology, idiopathic vocal cord palsy constituted the largest proportion of cases (41.3%), followed by iatrogenic causes (29.3%). Traumatic injury accounted for 10.7% of cases, while neurogenic causes, post-intubation injury, and oesophageal surgery contributed smaller proportions (Table 4).

Table 4 Aetiological distribution of vocal cord palsy (n = 75)

Aetiology	No.	%
Idiopathic	31	41.3
Iatrogenic	22	29.3
Trauma	8	10.7
Neurogenic	6	8.0
Post-intubation	5	6.7
Oesophageal surgery	3	4.0
Total	75	100

Idiopathic causes were the most frequent (41.3%), followed by iatrogenic causes (29.3%). Trauma (10.7%), neurogenic causes (8.0%), post-intubation injury (6.7%) and oesophageal surgery (4.0%) accounted for the remainder.(Table 4)

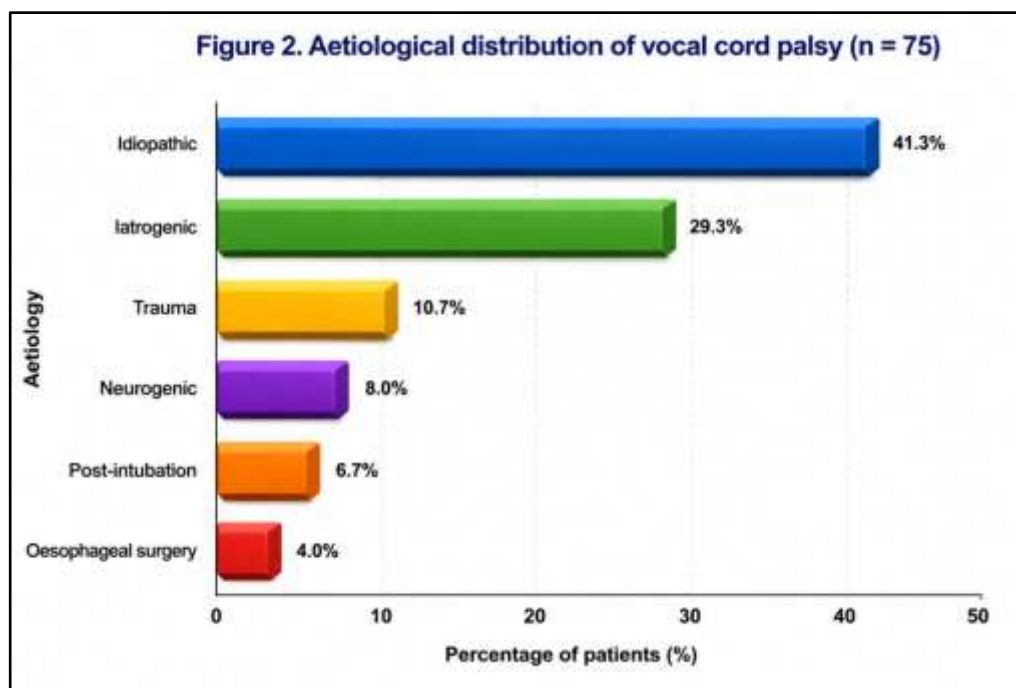


Table 5 Surgical causes among iatrogenic cases (n = 22)

Surgical cause	No.	% of iatrogenic
Thyroidectomy	12	54.5
Oesophageal surgery	5	22.7
Anterior cervical spine surgery	3	13.6
Skull-base surgery	1	4.6
Lung surgery	1	4.6
Total	22	100

Among iatrogenic cases, thyroidectomy was the leading cause (54.5%), followed by oesophageal surgery (22.7%) and anterior cervical spine surgery (13.6%).

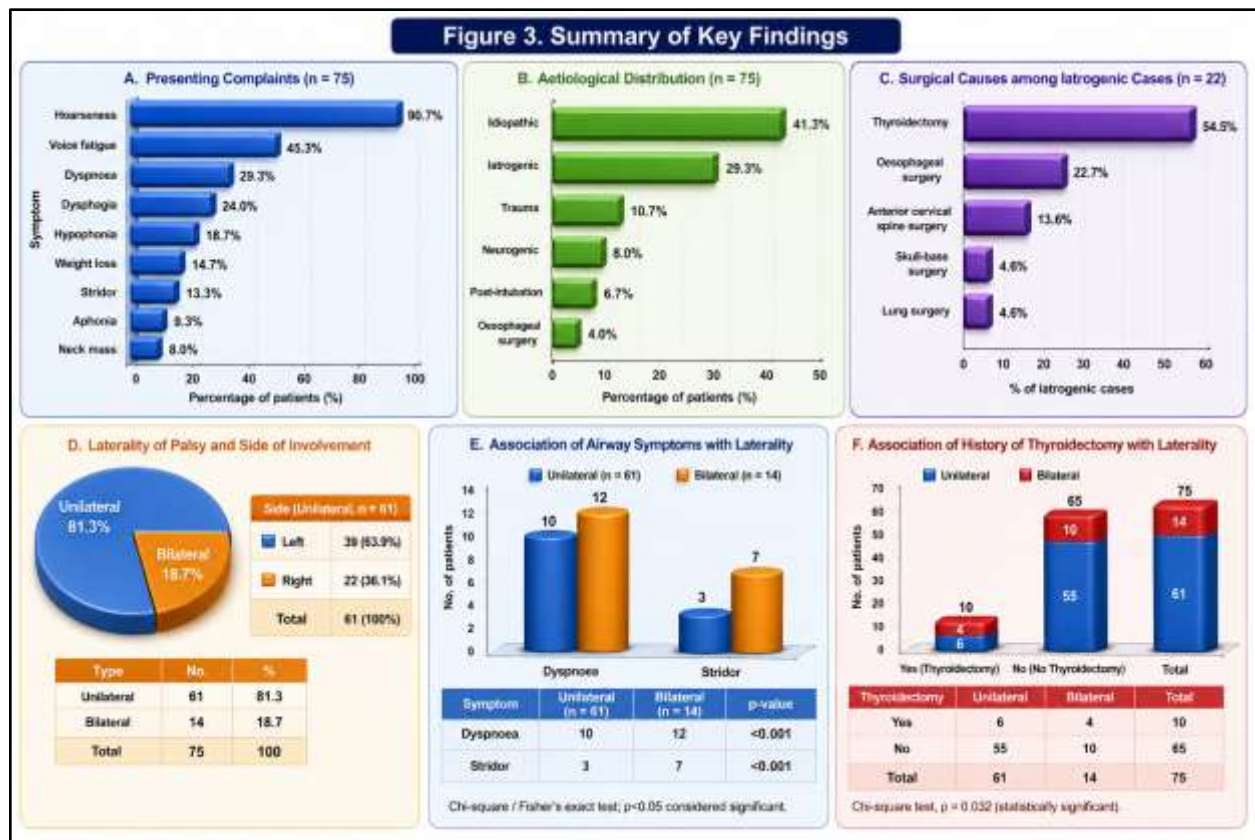
Unilateral vocal cord palsy was substantially more common than bilateral involvement, occurring in 81.3% of patients. Within the unilateral group, left-sided palsy predominated, accounting for nearly two-thirds of cases (63.9%), while right-sided involvement was observed in 36.1% (Table 6).

Table 6 Laterality of palsy and side of involvement

Type	No.	%	Side (unilateral, n=61)	No. (%)
Unilateral	61	81.3	Left	39 (63.9)
Bilateral	14	18.7	Right	22 (36.1)
Total	75	100	Total	61 (100)

A history of thyroidectomy was significantly associated with laterality ($p=0.032$): a relatively higher proportion of post-thyroidectomy patients had bilateral involvement.

Overall, unilateral left-sided vocal cord palsy was the most common clinical presentation. Idiopathic and iatrogenic etiologies accounted for the majority of cases, while bilateral disease was associated with significantly greater airway compromise and showed a significant relationship with previous thyroidectomy.



Discussion

This prospective study examined the demographic profile, presenting symptoms and aetiology of vocal cord palsy in a tertiary care population. VCP was predominantly a condition of older adults: 52.0% of patients were above 50 years and the largest group was older than 60 years. This pattern is concordant with earlier work Gupta et al. reported peak incidence in the fifth and sixth decades [11], Anil et al. found the 51–60-year group most affected [12], and a systematic review by Stonebraker et al. reported a mean age of 55.8 years [10]. The higher burden in older patients plausibly reflects the rising incidence of thoracic, thyroid and laryngeal malignancy with age, the greater frequency of neck and thoracic surgery, and age-related neuropathic and systemic disease. Younger patients are affected mainly through congenital or neurological mechanisms [8].

A male preponderance (62.7%; ratio 1.7:1) was observed, consistent with the 2.3:1 ratio reported by Gupta et al. [11] and the approximately 60% male involvement in the series of Anil et al. [12]; a regional study from South India by Yadlapalli et al. noted a slight female predominance, illustrating local variation [14]. Smoking (48.0%) and alcohol use (37.3%) were common; Anil et al. similarly documented a high smoking prevalence among affected males [12]. These shared risk factors for head-and-neck and lung malignancy underline the value of preventive counselling.

Hoarseness was the dominant symptom (90.7%), in keeping with the 92–98% voice-change rates reported by Anil et al. and Gupta et al. [11, 12], and reflects glottic insufficiency from impaired fold mobility. Dyspnoea (29.3%) and stridor (13.3%) showed a highly significant association with bilateral palsy ($p<0.001$). This accords with the consistent observation that bilateral palsy presents chiefly as an airway problem rather than a voice disorder and may require urgent intervention [7, 8, 24]. Dysphagia (24.0%) is also clinically important, since reduced glottic closure predisposes to aspiration [15].

Idiopathic disease was the commonest aetiology (41.3%), followed by iatrogenic causes (29.3%). A predominance of idiopathic cases mirrors several reports Anil et al. (38%) [12] and Toutounchi et al. (31%) [15] and systematic-review data confirm that idiopathic palsy remains common, with spontaneous recovery in roughly a third of patients [10, 23]. Other series, by contrast, identify malignancy or laryngeal growths as the leading cause [12, 16, 17], a difference attributable to referral patterns, regional cancer prevalence and diagnostic capability. The high proportion of “idiopathic” cases therefore warrants caution: a structured work-up, including contrast CT of the neck and chest, is essential before this label is applied, because such imaging uncovers occult mediastinal or pulmonary pathology in a substantial minority of otherwise unexplained cases [19, 20].

Iatrogenic injury was the second commonest aetiology, with thyroidectomy the leading surgical cause (54.5% of iatrogenic cases). Surgery, and thyroid surgery in particular, is repeatedly identified as a major contributor to VCP [4, 6], and intraoperative recurrent laryngeal nerve monitoring has been shown to help predict and reduce post-thyroidectomy palsy [22]. A history of thyroidectomy was significantly associated with laterality in our cohort ($p=0.032$), with relatively more bilateral involvement—clinically important because bilateral RLN injury can cause life-threatening airway obstruction and reinforces the need for meticulous technique and nerve monitoring [6, 7].

Unilateral palsy predominated (81.3%), matching the 82% of Anil et al. [12], 97% in the idiopathic review of Stonebraker et al. [10] and the long-term series of Spataro et al. [4]; most single insults affect one nerve. Among unilateral cases, left-sided palsy was commoner (63.9%), consistent with 63–68% left-sided involvement across studies [4, 10, 14]. This reflects the longer intrathoracic course of the left RLN, which loops under the aortic arch and is therefore more exposed to mediastinal, cardiovascular and thoracic-surgical insults [16]. Accurate aetiological classification and, where indicated, laryngeal electromyography and stroboscopy aid prognostication and the distinction of paresis from paralysis [21].

Limitations

This was a single-centre study with a modest sample size, which may limit generalisability and the statistical power of subgroup comparisons; small cell counts in the airway-symptom analysis warrant cautious interpretation. As a cross-sectional observational study it did not include longitudinal follow-up of recovery or treatment outcomes. Multicentre studies with larger cases and prospective follow-up are recommended.

Conclusion

Vocal cord palsy in this cohort was predominantly a disorder of middle-aged and elderly males, presenting most often with hoarseness. Idiopathic and iatrogenic causes—chiefly post-thyroidectomy together accounted for the majority of cases, and left-sided unilateral palsy was the commonest pattern. Bilateral palsy carried a significantly higher risk of airway symptoms, and a history of thyroidectomy was significantly associated with laterality. A high index of suspicion, structured clinical evaluation and appropriate neck and chest imaging are essential to exclude occult malignancy and other treatable pathology before a case is labelled idiopathic, while meticulous surgical technique and intraoperative nerve monitoring remain key to preventing iatrogenic injury.

Declarations

Funding: No funding was received for conducting this study.

Competing interests: The authors have no relevant financial or non-financial interests to disclose.

Ethics approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Institutional Ethics Committee of K.D. Medical College, Mathura, Uttar Pradesh.

Consent to participate: Written informed consent was obtained from all individual participants included in the study.

Consent to publish: Not applicable; no individually identifiable patient data or images are included.

Data availability: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Author contributions: All authors contributed to the study conception and design. Data collection and analysis were performed by Dr. Avinash Rathour under the supervision of Dr. Shivam Aggarwal and Dr. bhuwan bhaskar .Dr piyush kant singh The first draft was written by Dr. Avinash Rathour and all authors commented on previous versions and approved the final manuscript.

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