

## A clinical study on vocal cord paralysis in a tertiary health care setup in Andhra Pradesh, South India

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**Introduction:** Vocal cords (VCs) are delicate structures situated in the larynx and controlled by a number of muscles. A study was conducted to elucidate the symptoms and signs of VC paralysis and to identify the muscles involved and various systemic illnesses that cause VC paralysis. **Methods:** It was a cross-sectional, clinical study, conducted in the department of ENT, GSL Medical College, Rajahmundry. Individuals aged 15 to 75 years, who were cooperative for clinical examination were considered. Extremes of age, unwilling, critically ill, persons with Pulmonary Tuberculosis, HIV positive individuals were excluded. Meticulous tabulation of the symptoms and a thorough history was recorded. Detailed ENT examination including indirect and video laryngoscopy was performed on these patients. **Results:** A total of 38 individuals with VC paralysis were included. Gender wise, the male-female ratio was 0.9. Left VC palsy was identified in maximum persons (63.2%). The age group of 41-60 years is common (47%). In left VC palsy, dyspnoea (31.6%) was most common. Among the etiological factors, lung lesions and idiopathic cases accounted for 23.68% each. **Conclusion:** Fourth to the sixth decade of life is the commonest age group, females are commonly involved. Left VC paralysis accounted for the maximum number of cases. Hoarseness of voice and dyspnoea are the major symptoms and in about 23.68% cause of paralysis was not known (idiopathic).

**Keywords:** Vocal cord, Left, Pathology, Paralysis, Clinical study

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Panda Veeranjanyulu, Professor and Head of Department, Department of ENT, GSL Medical College, Rajahmundry, Andhra Pradesh, India. Email: <a href="mailto:dryadlapallisjay@yahoo.co.in">dryadlapallisjay@yahoo.co.in</a>	Yadlapalli A K, Panda V, Pindiprolu K D, Macharla V H, Adimulam N. A clinical study on vocal cord paralysis in a tertiary health care setup in Andhra Pradesh, South India. Trop J Ophthalmol Otolaryngol. 2020;5(6):144-149. Available From <a href="https://ophthalmology.medresearch.in/index.php/jooo/article/view/158">https://ophthalmology.medresearch.in/index.php/jooo/article/view/158</a>	

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## Introduction

Vocal cords (VCs) are delicate structures situated in the larynx and controlled by a number of muscles [1]. These respond to the flow of air across them by producing various sounds which are later articulated by peripheral mechanisms producing the speech. The etiological factors of VC paralysis vary widely among various countries, populations, and ethnic groups. The left VC in particular owing to its long intrathoracic course is highly vulnerable to invasion by a number of pathologies. These causative pathologies vary in incidence among various populations depending on the genetic susceptibility, dietary habits, smoking behavior, the competence of health care facilities. In this scenario of multiple etiological factors, etiopathological studies of VC paralysis are being carried out across the globe in different populations. There is a need for such a study in various parts of India, to have a detailed prevalence statistic among the various ethnic populations of this country. The findings of such etiopathological studies can guide the health services upgradation, health education, and directed spending of health care funds. The etiological spectrum varies from simple inflammatory conditions to advanced malignancy. Most of the time VC paralysis may be due to a local pathology of the larynx, hypopharynx, and externally, the thyroid [2]. Any thyroid swelling with VC palsy is mostly malignant as benign neoplasms rarely involve the recurrent laryngeal nerve [3,4]. Patients with intrathoracic diseases involving the lymph nodes, heart, lungs, arch of aorta, thoracic esophagus, lung, and bronchus may initially present with hoarseness of voice due to VC palsy without any signs and symptoms of the underlying disease. VC paralysis itself maybe just a sign of several well-described cortical, bulbar, skull base, cervical, or thoracic spinal neurological diseases. Hence knowledge of the etiopathological aspects of VC paralysis becomes essential for early diagnosis, investigations, and effective management of these cases. With these, a study was conducted to find various symptoms and signs of VC paralysis and also identify the muscles involved and various systemic illnesses that can cause VC paralysis.

## Methods

**Settings:** It was a cross-sectional, clinical study, conducted in the department of ENT, GSL Medical College, Rajahmundry, Andhra Pradesh, India

**Duration of study:** The study was conducted from August 2014 to August 2016.

**Sampling method:** Random sampling was considered in this study.

**Inclusion criteria:** Individuals aged 15 to 75 years, who were likely to cooperate for thorough clinical examination and investigations were considered in this study. Patients who were willing for admission and with a positive attitude, complete awareness, and cooperation to undergo the required medical and endoscopic evaluation were included in the present study

**Exclusion criteria:** Individuals with extremes of age, unwilling, non-cooperative, critically ill, and terminally sick were not considered. Open cases of pulmonary tuberculosis and tubercular laryngitis, HIV positive individuals, those with VC fixation, and also individuals with functional or hysterical aphonia were excluded.

**Sample size:** All the individuals who satisfy the inclusion criteria during the study period were included in the study.

**Ethical approval:** The study protocol was approved by the institutional ethical committee. Meticulous tabulation of the symptoms and a thorough history were recorded. Detailed ENT examination including indirect and video laryngoscopy was performed on these patients. A general screening survey of various other systems will be done on all these patients with VC neurological dysfunction. Referral to the appropriate department was done as per the necessity and expert advice was taken regarding further evaluation. Necessary laboratory and radiological investigations were done to pinpoint the diagnosis and to plan appropriate management.

**Statistical analysis:** The data were analyzed using Microsoft Excel and SPSS software version 22.0. Descriptive statistics such as percentage, mean, median were used in this study.

## Results

In this study, a total of 38 (100%) individuals with VC paralysis were included. Gender wise, 18 (47.37%) were male and 20 (52.63%) were females participants. In this study, the male-female ratio was 0.9.

In this report, left VC palsy was identified in the maximum number of cases (24; 63.2) followed by right (10; 26.3) and bilateral (4; 10.5). Among

Males, left VC palsy was diagnosed in 34.2 (13%) followed by right (5; 13.1%) and bilateral (1; 2.6%) VC palsy. Whereas among females also left VC palsy was diagnosed maximum (11; 29%) followed by right (5; 13.1%) and bilateral (3; 8%) (Table 1).

**Table-1: Gender wise distribution of the pathology among the study participants; n (%).**

Pathology	Male	Female	Total
Left VC palsy	13 (34.2)	11 (29)	24 (63.2)
Right VC palsy	5 (13.1)	5 (13.1)	10 (26.3)
Bilateral abductor palsy	1 (2.6)	3 (8)	4 (10.5)
Total	19 (50)	19 (50)	38 (100)

Age-wise, 8 (21.05%) members were included in the 21-40 years age group, 18 (47.37%) members patients in the 41-60 years group, and 12 (31.6%) were included in the 61-80 years age group (Table 2). In the 21-40 years group, pathology was detected in 7.8%, 7.8%, and 5.2% individuals, respectively in left, right, and bilateral VC palsy. Whereas in 41-60 years group, pathology was 31.6%, 13.1%, and 2.6% and in 61 – 80 years group, it was 23.7%, 5.2%, and 2.6%, respectively (Table 2).

**Table-2: Age-wise distribution of the pathology among the study participants; n (%).**

Age	Left VC palsy	Right VC palsy	Bilateral	Total
21-40	3 (7.8)	3 (7.8)	2 (5.2)	8 (21.05)
41-60	12 (31.6)	5 (13.1)	1 (2.6)	18 (47.37)
61-80	9 (23.7)	2 (5.2)	1 (2.6)	12 (31.6)
Total	24 (63)	10 (26.3)	4 (10.5)	38 (100)

In left VC palsy, dyspnoea (31.6%) was detected in the maximum number of cases followed by hoarseness of voice (18.4%), dysphagia with dyspnoea (7.9%), and dysphagia (5.3%). Whereas in right VC palsy, hoarseness of voice and dysphagia were detected in 7.9% each and dyspnoea, dysphagia with dyspnoea in 5.3% each. In bilateral VC defect, symptoms were detected in 2.6% each (Table 3).

**Table-3: Symptomatology of palsy among the study participants; n (%).**

Symptoms	Left VC palsy	Right VC palsy	Bilateral	Total
Hoarseness of voice	7 (18.4)	3 (7.9)	1 (2.6)	11 (29)
Dyspnoea	12 (31.6)	2 (5.3)	1 (2.6)	15 (39.5)
Dysphagia + Dyspnoea	3 (7.9)	2 (5.3)	1 (2.6)	6 (15.8)
Dysphagia	2 (5.3)	3 (7.9)	1 (2.6)	6 (15.8)
Total	24 (63.2)	10 (26.3)	4 (10.5)	38 (100)

**Table-4: Various etiological factors of VC palsy among the study participants.**

Etiological factor	Number	Percentage
Idiopathic	9	23.68
Neck nodes/cervical metastases	4	10.53
Lung lesions	9	23.68
Post thyroidectomy	4	10.53
CNS causes	2	5.26
Cardiovascular	3	7.89
Thyroid cancers	2	5.26
Mediastinal masses/ lymph nodes	2	5.26
Others	3	7.89

Coming to etiological factors of VC paralysis, Idiopathic cases accounted for 9 patients (23.68%), lung lesions accounted for 9 cases (23.68%), Neck nodes/masses accounted for 4 cases(10.53%), post thyroidectomy cases accounted for 4 cases (10.53%), Thyroid cancers accounted for 5.26% (2), Cardiovascular causes accounted for 7.89% (3), mediastinal masses/lymph nodes in 5.26% (2) and others in 7.89% (3) (Table 4).

## Discussion

VC paralysis is a relatively common presentation among the patients attending the Otolaryngology outpatient department. Many of these patients come with the chief complaint of hoarseness of voice with other associated symptoms like dyspnoea or dysphagia. It may be due to lesions situated at a multitude of locations. Lesions of the cerebral cortex, internal capsule, medulla oblongata, involvement of the motor nerve fibers in the vagus trunk, or its recurrent branch, peripheral nerves, or diseases in the muscles itself can cause VC paralysis. Pressure or invasion by various intracranial growths, growths at the base of the skull in the neighbourhood of the jugular foramen, lesions in the neck, or the thorax can cause VC paralysis.

In this study hoarseness of voice was the chief complaint in cases with unilateral paralysis of VCs. Other major symptoms like dyspnoea and dysphagia either alone or in various combinations and permutations were also noted. The present study reported that hoarseness of voice is associated with dyspnoea in 50% of cases of left VC paralysis. Dysphagia was noted in 8.33% of cases of left VC palsy (Table 3). Gupta et al. reported that hoarseness of voice as the major symptom in about 98% of cases. They also reported that dysphagia is another major symptom, 26.78% of cases [5].

Right VC paralysis cases presented with hoarseness of voice and dyspnoea in about 30% of cases and dysphagia was noted in 30% of cases. In bilateral abductor paralysis an equal incidence of hoarseness of voice, stridor, dyspnea, dysphagia were found as presenting symptoms (Table 3). Kashima et al. reported that over half of the patients with unilateral vocal fold paralysis suffer from at least mild dyspnoea [6]. In bilateral vocal fold paralysis, the most serious symptom is respiratory obstruction, which is evidenced by stridor, dyspnoea, retraction, and nasal flaring. Dysphagia along with the sudden onset of dyspnoea and dysphonia is the usual pattern seen in bilateral abductor palsy. Similar symptomatology is also encountered in hypopharyngeal malignancies. The onset of dyspnoea in the case of the VC palsy case warrants referral to the chest physician to rule out any underlying lung pathology.

Gender wise, in this study, a higher incidence was detected among females. Usually higher incidence of VC paralysis is expected among the male due to the higher prevalence of smoking, lung cancer, and other malignancies. Shafkat Ahmed et al. reported 3:1 as male-female ratio and the ratio was reported to be 2.3 by Gupta et al. Study [5]. Another study by Jayanthi Pavithran et al. showed an incidence predominantly in favor of males [8]. Even Srivastava R N et al. also stated that the male-female ratio of VC paralysis was 3:1 and most of the patients were in the fifth and sixth decades of life [9].

Age-wise, in this study, the incidence of VC paralysis was reported to be high in the age group 40-60 years (47.37%) followed by 61-80 years (31.58%) group. Gupta et al reported a high incidence of 26.67% in the fifth decade and an incidence of 21.67% in the sixth decade, a total of 48.34%, correlating well with the incidence in the present study [5]. Shafkat Ahmad et al reported a very high incidence of 77.2% in the fifth and sixth decades of life [7]. Jayanthi Pavithran et al. reported a peak incidence in the sixth decade of life [8].

The standard explanation for the higher incidence of left VC paralysis has been based on the anatomically long course of the left recurrent laryngeal nerve in the thorax and its close proximity to various important structures in the thorax [11,12]. In the present study, idiopathic cases accounted for a maximum incidence of 23.68%. Cuning et al also reported that the most common cause of VC paralysis is idiopathic [13]. Among

These six cases where having the right VC paralysis (66.66%), two cases were having left VC paralysis (22.2%), and one case showed bilateral VC paralysis (11.11%). In the present study, females showed a higher incidence of idiopathic causes (66.66%) against males (33.33%) Primary carcinoma of the lung with or without diffuse systemic metastases was recorded in four cases which presented with left VC palsy, 3 males and one female patient.

Kearsley et al. reported that malignancy, mainly lung carcinoma, was the leading cause of VC paralysis in a study [10]. Chen et al study in 2007 reported lung cancer as the etiology for paralysis [14] Ko et al. found that thyroid and lungs were the most common sites of tumor origin [15].

In the present study post thyroidectomy status accounted for four cases (40%), thyroid malignancies in two cases (20%) and enlarged cervical lymph nodes accounted for four cases (40%). Havas et al. demonstrated that iatrogenic causes such as surgery have replaced malignancy as the most common etiology [16]. Yumoto et al [17] and Rosenthal et al [18] demonstrated surgery and idiopathic factors as the main cause of unilateral VC paralysis.

Yumoto et al. reported surgery in 42.7%, malignancy in 22.4%, idiopathic in 17.4%, and injuries of the neck in 2.2% of cases as unilateral VC paralysis etiologies [17]. Rosenthal et al. stated surgery in 46.3%, malignancy in 13.5%, idiopathic in 17.6%, and neck trauma in 2.2% of subjects as reasons of unilateral VC paralysis [18].

The prognosis of VC palsy following thyroidectomy, if the nerve is only bruised or stretched and if signs of injury are delayed, it may be only paretic and recovery is possible. If the nerve is completely divided the resulting paralysis is permanent. Shafkat Ahmed et al. reported an incidence of 20.9% in post-thyroid surgery cases [7].

Merati et al. in a national survey by the American-Broncho Esophagological Association reported the incidence of various surgical procedures in patients with iatrogenic unilateral VC paralysis are as follows neck: thyroidectomy (65%), cervical spine decompression (4%), carotid endarterectomy (1%) and chest: pneumonectomy (6%), thoracic/mediastinoscopy (6%), esophagectomy (4%) and in the brain -craniotomy (9%) and others (3%) [19].

In procedures involving endotracheal intubation, VC paralysis occurs more on the left side than on the right according to previous reports. A similar pattern was observed in the present study also. This might be due to the fact that the tracheal tube is usually introduced from the right side by the right hand whereas the laryngoscope is held in the left hand and fixed in the right angle of the patient's mouth. Thus, the tracheal tube is in contact with the left VC. Kikura M et al. mentioned that VC palsy was increased three-fold in patients aged 50 or above, two-fold in patients intubated for 3 to 6 hours, 15 fold in patients intubated 6 hrs or more, and two-fold in patients with a history of diabetes mellitus or hypertension [20]. However, in this study systematic assessment of the quality and difficulty of tracheal intubation as a risk factor for various post-operative laryngeal morbidities.

## Limitations

Small sample size is the major limitation of this research.

## Conclusion

Age-wise, the fourth to sixth decade of life (47.37%) is the common age group and common among females. Left VC paralysis accounted for the maximum number of cases (63.16%) followed by right (26.32%) and bilateral (10.53%). Pathology wise, hoarseness of voice, dyspnoea are the major symptoms and in 23.68% cases, the causes of paralysis were not known and are idiopathic.

## What does this study add to the existing knowledge

VC palsy is common among both male and female, age group 41-60 years is commonly affected, and left side involvement is common. Dyspnoea is the major clinical condition followed by hoarseness of voice.

## Author's contribution

**Dr. Yadlapalli Ajay Kumar:** Concept, study design

**Dr. Panda Veeranjanyulu:** Manuscript preparation

**Dr. Pindiprolu Kameswari Devi:** Data analysis

**Dr. Macharla Venkata Harika:** Data collection

**Dr. Adimulam Naremani:** Manuscript preparation

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