



## Physiotherapy Management of Vocal Cord Paralysis in a Nigerian Hospital: A Case Report

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### ABSTRACT

**Background:** Vocal cord paralysis is disabling and can lead to morbidities such as dysphagia, dysphonia and aspiration. It can also lead to loss of quality of lives and productivity in sufferers. An appropriate understanding of etiologies, signs and symptoms, diagnosis and management are essential in offering patients appropriate treatments. This article discussed a case report of the physiotherapy assessment and management of a patient with vocal cord paralysis.

**Case Presentation and Treatment Outcome:** A case report of the assessment and management of a 38-year old male patient with vocal cord paralysis. Patient was referred from Ear, Nose and Throat (ENT) department to the physiotherapy department after an emergency tracheostomy done 2 months prior to referral. He was given appropriate physiotherapy intervention after a thorough assessment. Voice Handicap Index Score (VHIS) was used to assess voice projection of the patient. The Numerical Pain Rating Scale (NPRS) was used to assess the level of pain while tape measure was used to measure chest excursion. The CARE: CAse REport guideline for case reports was followed. All ethical procedures were followed as well. Treatment outcome revealed full AROM of the neck, increased chest excursion (from 2cm to 3.5cm), no hoarseness, no choking during deglutition and a Voice Handicap Index score of 25 after 10 treatment sessions. Pain level on Numerical Pain Rating Scale (NPRS) was reduced from 8/10 to 2/10.

**Conclusion:** Physiotherapy is effective in the management of vocal cord paralysis. Early referral to Physiotherapy is advised for good prognosis. Adequate teamwork and proper communication pathways should be encouraged in hospitals for good treatment outcome.

**KEYWORDS:** Physiotherapy management, vocal cord paralysis, Nigerian Hospital, case report

### INTRODUCTION

Vocal cord paralysis is a condition which can be originated from laryngeal nerve paralysis following surgical procedures, post-anesthesia complication or neurologic diseases [1]. The larynx is a dynamic structure involved in respiration, phonation, and deglutition. Damage or injury to the laryngeal nerves may result in vocal cord paresis or paralysis [2]. Vocal cord paresis implies various degrees of vocal cord hypo-mobility while vocal cord paralysis is complete vocal cord immobility due to neurological injury [3].

Vocal cord paralysis has an incidence of 42 per 10, 000 new cases seen [4]. Single vocal cord paralysis is much more common than double vocal cord paralysis [5]. Paralysis of the left vocal cord is reported 1.4-2.5 times more than right [6]. People of all ages and genders can get the condition, but common in women than men [7]. Vocal cord paralysis is prevalent in teachers than in other professions in South West Nigeria [7].

According to Fontenot et al. [8], the causes of vocal cord paralysis include autoimmune diseases such as myasthenia gravis, cancer such as lung cancer and thyroid cancer, connective tissue disorders like Marfan syndrome, infections like Lyme disease, injuries and other trauma to the neck, head and chest, neurological conditions such as multiple sclerosis (MS), Parkinson's disease and damage from a stroke. Others include poisonous substances such as lead and mercury, surgery such as heart surgery, thyroidectomy (thyroid gland removal) and mechanical ventilation (breathing tube) and tumors such as cancerous (malignant) tumors and noncancerous (benign) tumors which can push on the nerves and cause damage [8, 9-11].

The symptoms of vocal cord paralysis range from mild to severe. Sometimes, symptoms go away without treatment, or they may be long-lasting [12]. These symptoms include a breathy quality to the voice, hoarseness, noisy breathing, shortness of breath, loss



of vocal pitch, choking or coughing while swallowing food, drink or saliva, the need to take frequent breaths while speaking, inability to speak loudly, loss of your gag reflex, ineffective coughing and frequent throat clearing.

## DIAGNOSIS AND MANAGEMENT OF VOCAL CORD PARALYSIS

The diagnosis of vocal cord paralysis involves the use of Magnetic Resonance Imaging (MRI) and Computerized Tomography (CT) scan which shows detailed images of the brain, throat, vocal cords, voice box, thyroid gland and chest. Laryngoscopy is where a long, thin tube is inserted into the nose to examine the throat. The flexible tube has a camera on the end and images from the voice box and vocal cords are seen on a monitor. Laryngeal electromyography (LEMG) measures how the nerves control the muscles in the voice box. It evaluates and records the electrical impulses of the muscles [13].

The treatment of vocal cord paralysis depends on the cause, the severity of symptoms and the time from the onset of symptoms [14]. The treatment may include physiotherapy, medical and surgical or a combination of treatments [14].

### Physiotherapy management

Physiotherapy management involves exercises or other activities to strengthen the vocal cords, improve breath control during speech, prevent tension in other muscles around the paralyzed vocal cord or cords, and protect the airway during swallowing. Postural changes and muscle tension have been reported in association with voice production [15]. An appropriate muscle tone and a good posture are required for producing a good quality voice [16].

Transcutaneous Electrical Nerve Stimulation (TENS) has shown to promote pain relief in trapezius, sternocleidomastoid and suprahyoid muscles during the production of the /e/ vowel and reduce the level of dysphonia and hoarseness [17]. It is applied in the trapezius and SCM muscles bilaterally. Laryngeal massage improves vocal quality, muscle tension and pain [18]. This is done to the larynx, neck and shoulder girdle. Other protocols include passive stretching to the neck joints and intercostal muscles, breathing exercises and semi-occluded vocal tract exercises [17, 19].

Laryngeal massage assists the muscles of the larynx (voice box) to stretch and relax. It promotes circulation in the laryngeal area and relieves discomfort associated with excess tension. Laryngeal massage should result in reduction in height and stiffness of the larynx, as well as increase mobility and awareness of muscular tension. Once the larynx is released and range of motion is improved, a notable difference in vocal effort, quality, and vocal range will be seen.

Laryngeal massage is done in 5 different ways; massage above the Adams apple, around the Adams apple, corner of the sternocleidomastoid muscles (SCM), down the SCM muscles and move around the larynx.

Semi occluded vocal tract exercises are very important in the management. It simply means that the mouth is partially closed. When the mouth is partially closed, increased back pressure reflects at the lips back to the vocal folds to help the folds vibrate with more ease and less effort. It helps to improve the efficiency of how the vocal folds come together and produce a clear sound; it encourages relaxation and recovery without causing undue strain. It includes; humming, vocal straw exercise, lip buzz vocal, tongue trill exercise, jaw loosening exercises, vocal sirens exercise. For maximum benefit, use the straw 15 minutes a day [17].

In straw phonation, air should not escape around the lips or through the nose. The use of a vowel like /e/ rather than an /m/ will help to ensure that all acoustic energy stays in the vocal tract. The nose can be pinch on and off to ensure that air is not escaping through the nasal cavity. The opening of the straw plays the most important role in how much back pressure it creates. Smaller straws measure the amount of back pressure and efficiency over time.

### OUTCOME MEASURES

The Voice Handicap Index outcome measure is an outcome measure that assesses the patient's perception of the impact of their voice-disorder. It consists of 30 variables that is equally divided between three domains; functional, physical and emotional domains. Each variable is scored on a five-point scale (0-4), varying from never to always. The scores are expressed in subscales (0-40) and a total score (0-120). Score 0-30 is mild and shows minimal amount of handicap. Score 31-60 is moderate and often seen in patients with vocal nodules, polyps, or cysts. Score 60-120 is severe and often seen in patients with vocal fold paralysis [20]. It was used to assess the voice projection of the patient.

The Numerical Pain rating Scale (NPRS) was used to assess the level of pain while tape measure (measured in centimeter) was used to measure chest excursion. The NPRS is a scale of 0 to 10. Number 0 means no pain while number 10 denotes maximum pain.



## CASE PRESENTATION

A case of a 38-year old man, single and a teacher by profession was referred from Ear, Nose and Throat (ENT) department to the physiotherapy department of the University of Port Harcourt Teaching Hospital, Port Harcourt. Patient had an emergency tracheostomy done 2 months prior to referral. He was on tracheostomy (t) tube due to airway compromise. Flexible fiberoptic laryngoscopy done showed vocal cord paralysis. The weaning process off t-tube was not successful.

The presenting complaints were inability to talk for long, inability to speak loudly and consistent choking even on saliva. The past medical history of the patient was peptic ulcer (2008-2009) and goiter. Surgical history was thyroidectomy and tracheostomy. On observation, patient was afebrile to touch, acyanosed, anicteric, neither pale nor dehydrated, and was in no obvious respiratory distress. The blood pressure, pulse rate and respiratory rates were all normal.

On examination, patient had limited Active Range of Motion (AROM) of the neck, tightness of the intercostal muscles (Chest excursion 2cm), hoarseness of voice, frequent Choking during deglutition, frequent air intake during speech, low voice projection; a Voice Handicap Index Score (VHIS) score of 72, reduced air entry to the lobes of the lungs bilaterally and tightness of the trapezius, SCM>(R), and buccinators. Pain level on Numerical Pain Rating Scale (NPRS) was 8/10.

## Physiotherapy Management

The objectives of physiotherapy management were to relief pain, improve air entry to the lungs, relax tight muscles, improve range of motion (ROM), improve deglutition and reduce choking, strengthen weak muscles and improve vocal sounds. The means of achieving these aims were passive stretches to the intercostal muscles and accessory muscles of respiration, proper positioning in sitting, stretches to the buccinators and neck muscles, soft tissue mobilization to the trapezius muscles, laryngeal massage, active laryngeal mobilization and semi-occluded voice technique (SOVT). SOVT includes straw phonation and humming. Vocal exercises included alternate pitch vocals (Siren) and breathing control. Incision site inspection, counseling and home programme.

Patient was seen 3 times a week for 30-45minutes in each session for 3weeks and 1 day. Review after 7 treatment sessions showed full AROM of the neck, well reduced pain level, increased chest excursion to 3.5cm, nil hoarseness, nil choking during deglutition, improved air management during speech, improved voice projection and a score of 45 with voice handicap index. After 10 treatment sessions, patient was reviewed and had a Voice Handicap Index Score (VHIS) score of 25. Pain level on Numerical Pain Rating Scale (NPRS) reduced to 2/10. He was referred back to ENT for t-tube weaning and possible 2 more treatment sessions after t-tube weaning. Patient had a successful t-tube weaning and came back to inform the unit that he was fine and would be going back to his teaching profession. A 3-month follow up showed that patient was okay and doing very well.

The treatment outcome pre/post intervention is summarized on the table below:

## Treatment Outcome Pre/Post Intervention

	On Assessment (Baseline)	3 weeks and 1 day of Intervention
AROM of the neck	Limited and painful at all range (NPRS = 8/10)	Full and slightly painful only at end range (NPRS = 2/10)
Intercostal muscles	Tightness observed (Chest excursion = 2cm)	Improved chest condition (Chest excursion = 3.5cm)
Voice condition	Hoarseness of voice observed (Voice Handicap Index = 72)	Nil hoarseness and improved voice projection (Voice Handicap Index = 25)
Deglutition	Frequent choking observed	Nil choking
Speech	Frequent air intake during speech	Nil air intake

## SUMMARY OF CASE PRESENTATION AND TREATMENT OUTCOME

This is a case report of the assessment and management of a 38-year old male patient with vocal cord paralysis. Patient was referred from Ear, Nose and Throat (ENT) department to the physiotherapy department after an emergency tracheostomy done 2 months prior to referral. He was given appropriate physiotherapy intervention after a thorough assessment. Voice Handicap Index Score (VHIS) was used to assess voice projection of the patient. The Numerical Pain Rating Scale (NPRS) was used to assess the level of pain while tape measure was used to measure chest excursion. The CARE: CAse REport guideline for case reports was followed.



All ethical procedures were followed as well. Treatment outcome revealed full AROM of the neck, increased chest excursion (from 2cm to 3.5cm), no hoarseness, no choking during deglutition and a Voice Handicap Index score of 25 after 10 treatment sessions. Pain level on Numerical Pain Rating Scale (NPRS) was reduced from 8/10 to 2/10.

## DISCUSSION

This study presented a case report of the physiotherapy management of a 38-year old male patient with vocal cord paralysis following tracheostomy done 2 months prior to referral to Physiotherapy department, University of Port Harcourt teaching Hospital, Port Harcourt, Rivers State.

Several studies have reported vocal cord paralysis following laryngeal nerve paralysis involving tracheostomy and other related procedures. Robin et al. [1], Meyer et al. [2], Kazi et al. [21], Veldova et al, [22]. Veldova et al. [22] stated that unilateral vocal cord paralysis is one of the leading complications following a thyroidectomy procedure. According to Kazi et al. [21], “vocal cord paralysis is characterized by hoarseness of voice, breathing difficulties, pitch loss, and inability to talk loudly”. These were the exact signs presented by our 38 year-old patient.

The treatment outcome of this present case report revealed full AROM of the neck, well reduced pain level, increased chest excursion, nil hoarseness, nil choking during deglutition and an improved voice projection after ten days of physiotherapy intervention. The improved condition of the patient is evident on the scores of the Numerical Pain Rating Scale, Voice Handicap Index and the chest excursion etc. This is in consonance with the position of Miyata et al, [23] who stated that early administration of voice therapy enhanced vocal function and glottal closure in a patient with vocal cord paralysis. In the same vein, Kazi et al. [21] in their study posited that physical therapy with voice therapy which is a non-invasive and conservative line of management is a new territory which needs to be explored for a better and more effective management of patients with vocal cord paralysis.

## CONCLUSION

Physiotherapy is effective in the management of vocal cord paralysis. Early referral to Physiotherapy is advised for good prognosis. Adequate teamwork and proper communication pathways should be encouraged in hospitals for good treatment outcome.

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## ETHICAL CONSIDERATION

All ethical procedures were followed.

## CONFLICT OF INTEREST

The authors declared no conflict of interest.

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