

# Vocal cord disorders: uncommon causes of dyspnea

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Dyspnea is a subjective sensation of difficult or uncomfortable breathing experienced by the patient. The etiology includes myriad causes starting from cardiopulmonary to psychogenic. The evaluation of dyspnea needs to be thorough so as to take into account all possible causes. Vocal cord disorders are a group of conditions uncommonly leading to dyspnea. These patients are usually wrongly labelled as difficult-to-treat asthma and consequently experience significant morbidity. Two cases of vocal cord disorders were presented with dyspnea and initially attributed to pulmonary causes and will be discussed in the present study.

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## Introduction

Vocal cords are known as the guardian of the airways as they prevent the entry of foreign bodies into the larynx. Their movements also regulate airflow into the lower airways. Dysfunctional movements of the vocal cord limit the airflow into the lungs and lead to a sensation of difficult breathing or dyspnea in the patient along with stridor, hoarseness and wheezing [1]. This is often misdiagnosed as asthma. As most guidelines rely on symptom assessment as a marker of control, these patients are labelled as ‘difficult to treat’ and receive improper treatment for prolonged periods of time [1]. Two such cases were encountered where the eventual diagnosis was confirmed as vocal cord disorders.

### Case 1

A 62-year-old hypertensive male presented complaining of breathlessness and hoarseness of voice for 3 months. He had been intubated and ventilated 3 months back following an episode of generalised tonic-clonic seizure secondary to hyponatremia (attributed to thiazide use). He was extubated after 2 days of mechanical ventilation. Following this, he developed breathlessness on mild exertion (mMRC grade II), which persisted without progression for the next 3 months. Clinical examination result was within normal. Spirometry showed evidence of fixed obstruction (Fig. 1). Chest radiography and computed tomography (CT) results of the chest were normal. Figure 2a and b showed the fiberoptic bronchoscopy (FOB) at the level of the vocal cord (the rest of the FOB was normal). Ear nose throat consultation was obtained to rule out mechanical derangement of laryngeal structures (posterior glottic stenosis and arytenoid dislocation). Figures 3 and 4a and b depict the normal spirometry and FOB findings, respectively.

As observed in Fig. 1, there was markedly reduced excursion of the vocal cords during both phases of respiration. This is characteristic of bilateral vocal fold (cord) immobility (BVFI) or more specifically bilateral vocal fold paralysis (BVFP). As compared with normal vocal excursion, the vocal cord movement (Fig. 4a and b) was grossly reduced, which led to the diagnosis.

### Case 2

A 40-year-old woman presented with intermittent episodes of shortness of breath for the past 5 years. They were sudden in onset, nonprogressive, unrelated to seasonal changes, without any aggravating or relieving factors and occasionally associated with stridor. Symptoms showed no improvement with bronchodilators. Physical examination was unremarkable. Spirometry was performed during an episode of shortness of breath and showed variable extrathoracic obstruction (Fig. 5). Chest radiography was normal. Figures 3 and 4a and b depict the normal spirometry and FOB findings, respectively. Figure 6a and b reveals FOB at the level of the vocal cord (the rest of FOB was normal).

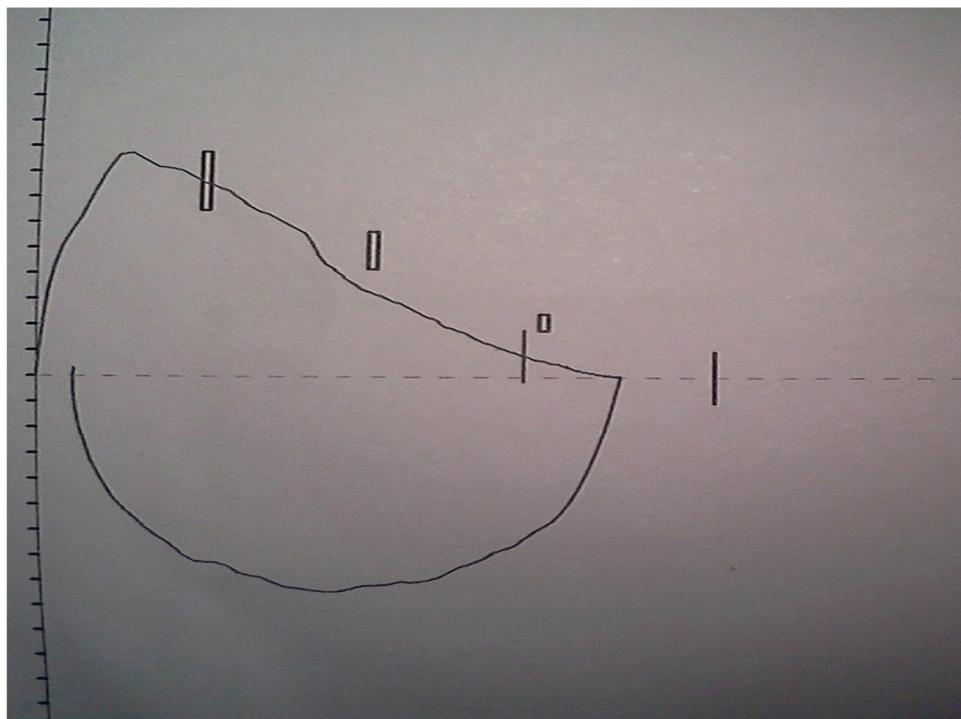
A diagnosis of vocal cord dysfunction (VCD) or paradoxical vocal cord motion (PVCM) was made.

There was a definite female predominance; however, it may be encountered in men, as well as in children [2]. The typical bronchoscopic or laryngoscopic features

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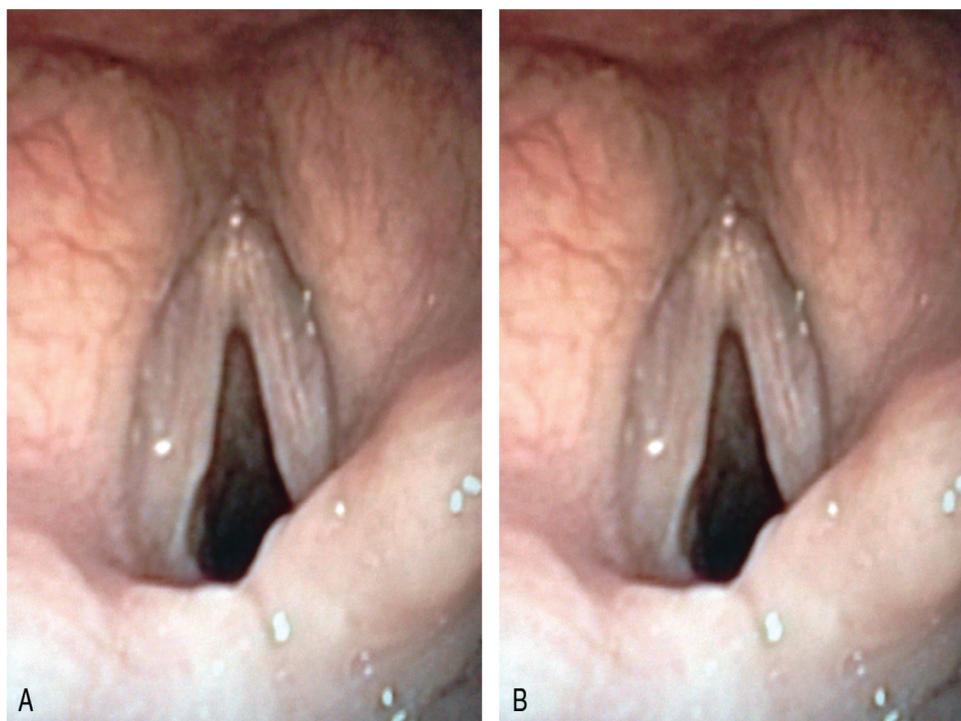
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Figure 1



Spirometry showing fixed obstruction.

Figure 2



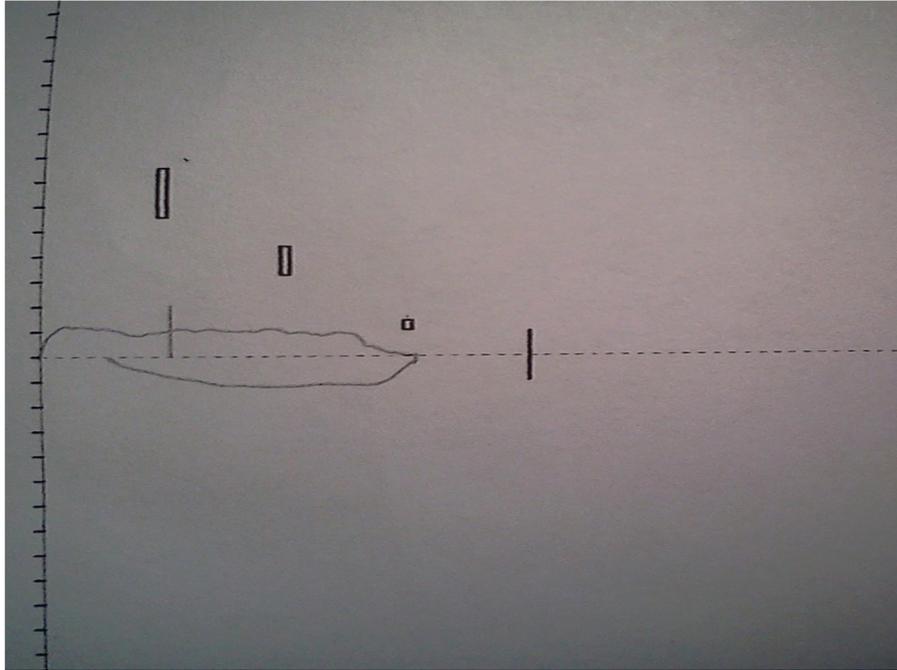
(a) Vocal cords at the end of expiration. (b) Vocal cords at the end of inspiration.

seen were paradoxical adduction of anterior portion of the vocal cords during inspiration with a chink-like space at the posterior aspect of the vocal cords [3]. Therapy includes a multidisciplinary approach including speech therapy, patient counseling and

treatment of coexistent asthma (if present) with or without psychotherapy [4].

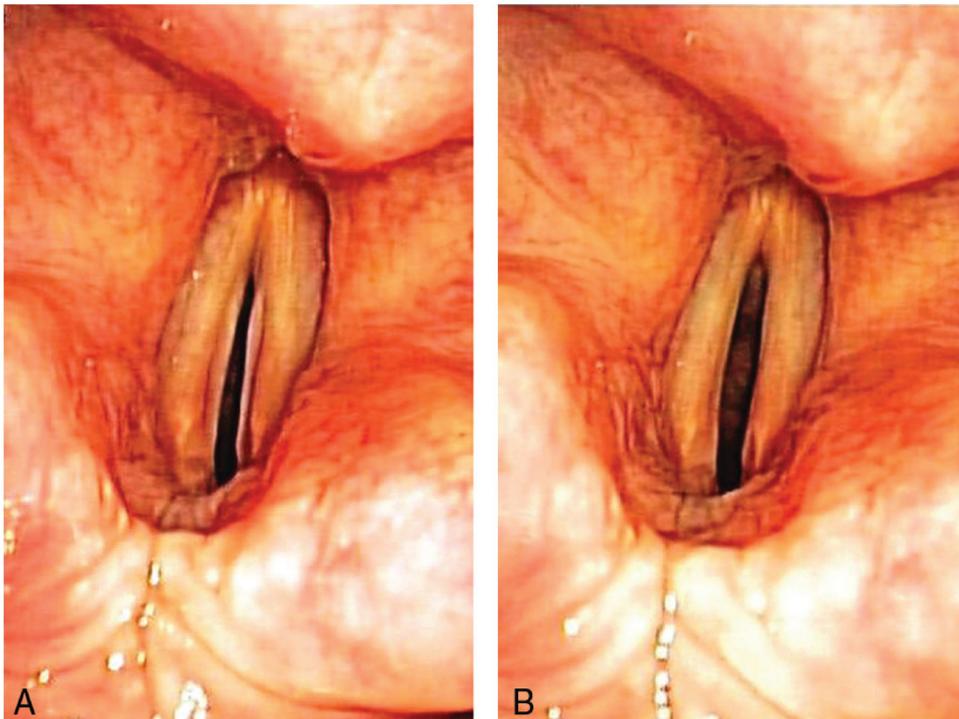
Chest imaging may be helpful in ruling out an alternative diagnosis [5].

Figure 3



Normal spirometry.

Figure 4



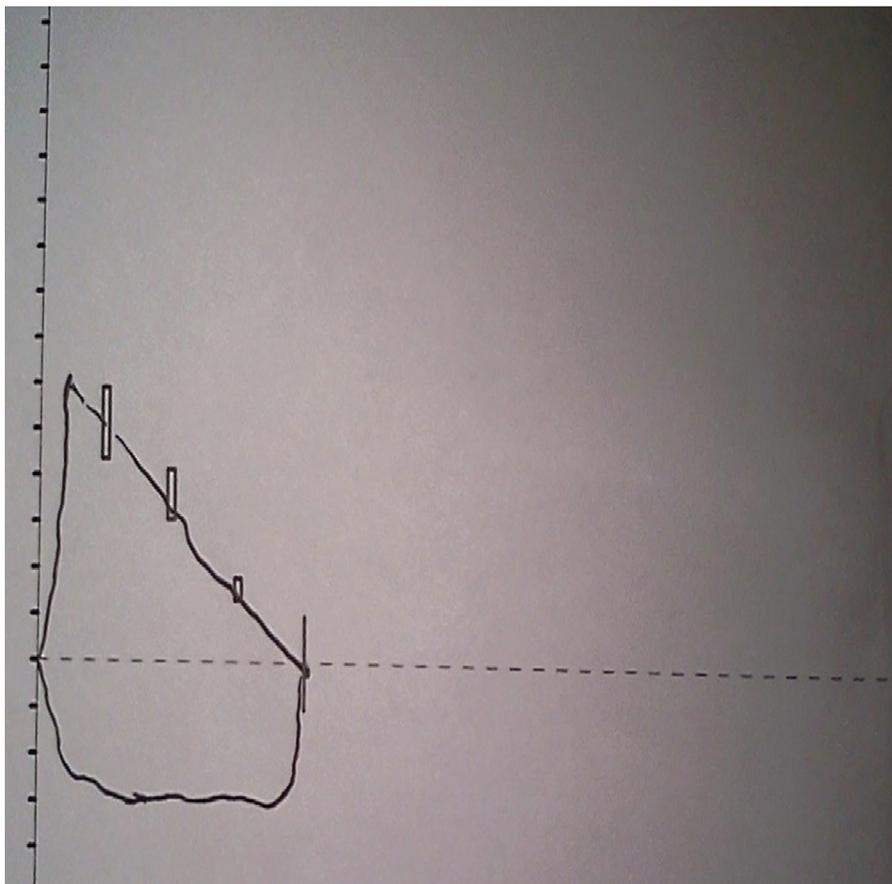
(a, b) Vocal cords at end expiration of a normal patient.

During an acute episode, the patient may be advised to pant, which activates the posterior cricoarytenoid muscle causing abduction of the vocal cord and providing relief. Noninvasive as well as mechanical ventilation may have to be instituted as a life-saving measure.

### Discussion

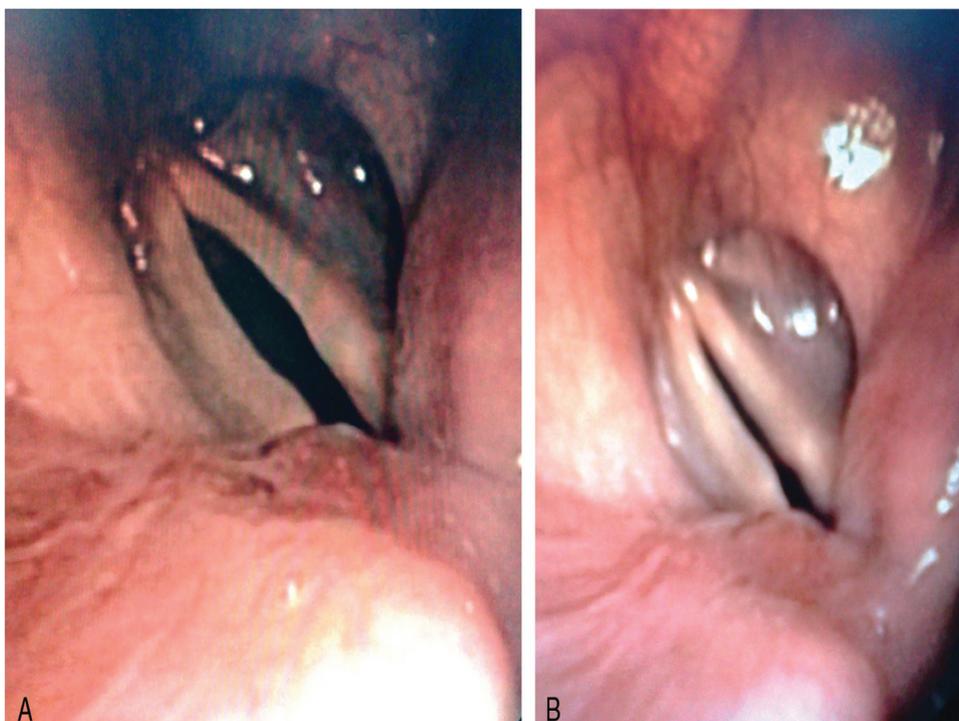
VCD is a known asthma mimic and should be considered as a differential diagnosis in cases of difficult-to-treat asthma. Thus, patients who require increasing doses of medication should be referred for assessment of vocal cord function to rule out a

Figure 5



Spirometry showing variable extrathoracic obstruction.

Figure 6



(a) Vocal cords at mid of expiration. (b) Vocal cords at mid of inspiration showing paradoxical adduction of vocal cords with a chink-like space posteriorly.

**Table 1 Causes of injury to recurrent laryngeal nerve leading to bilateral vocal cord palsy [2]**

Anterior displacement of thyroid cartilage relative to cricoid during intubation
Hyperextension of the neck during intubation stretching the vagus nerve
Excessive cuff pressure of the endotracheal tube compressing the recurrent laryngeal nerve as it enters the larynx

functional disorder [1]. Diagnosing a vocal cord disorder not only requires a high index of suspicion but also facilities of videolaryngoscopy testing for proper documentation. However, it is interesting to note that several false-negative results may also be documented owing to the paroxysmal nature of the VCD. The requirement of doing videolaryngoscopy during an acute episode to establish the diagnosis adds to the difficulty of diagnosing the entity.

BVFP is an uncommon disorder affecting the vocal cords where there are restricted movement of the vocal folds resulting in obstruction to airflow. It occurs as a result of reduced or absent function of the vagus nerve or its distal branch, the recurrent laryngeal nerve [1]. Common presenting symptoms are recent-onset change in voice, breathing difficulty with or without stridor and coughing precipitated on swallowing fluids [6]. As the symptoms developed after extubation, the possible causes of damage to recurrent laryngeal nerve and resultant BVFP are mentioned in Table 1. Proper positioning of the patient during intubation is of paramount importance with avoidance of hyperextension of neck as well as inserting the endotracheal tube gently through the vocal cord under direct vision, thereby avoiding trauma to the nerves. Common causes of BVFI include surgical trauma (44%), malignancies (17%), endotracheal intubation (15%), neurologic disease (12%), and idiopathic causes (12%) [2].

Treatment is largely surgical, including posterior cordotomy (unilateral or bilateral), arytenoidectomy (endoscopic or external, partial or complete) and cordopexy or lateralization of the vocal cord [7]. In severe cases not responding to the aforementioned modalities, tracheostomy may be required.

VCD or PVCMM refers to the episodic unintentional adduction of the vocal cord during inspiration resulting in a constellation of symptoms as such episodic shortness of breath, wheezing, chest tightness, stridor, and dysphonia [8]. Laryngoscopic or bronchoscopic visualization of the vocal cord during an acute episode is the gold standard test, which reveals abnormal vocal cord adduction either during inspiration, during both inspiration/expiration, or rarely during expiration alone [9]. A diamond-

shaped area posterior in the glottis is usually spared. Modalities like spirometry may be helpful, revealing flattening of the inspiratory loop suggestive of a variable extrathoracic obstruction.

The ratio of forced expiratory flow to forced inspiratory flow at 50% of the vital capacity may be more than 1.

There is a paucity of studies that assess the effect of corrective procedures on the quality of life and symptom control after procedure. Thus, although the role of vocal cord disorders as an asthma mimic [3,9] and its coexistence in patients with asthma [9] is well known, the effect of early identification and management need further study.

The common differential diagnosis of BVFI and PVCMM includes laryngospasm, laryngeal angioedema, laryngomalacia, mass in the upper respiratory tract and asthma [5,10].

## Conclusion

Vocal cord disorders namely BVFP and PVCMM are uncommon causes of respiratory symptoms which pulmonologists should be aware of. High index of suspicion coupled with good history taking and early laryngoscopic examination aids in early diagnosis.

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## Conflicts of interest

There are no conflicts of interest.

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