Paradoxical vocal cord motion—A case report

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Abstract

Paradoxical vocal cord motion (PVCM) is an unusual cause of stridor, which is associated with some underlying causes, such as central nervous system lesion, gastroesophageal reflux or psychogenic problem. Once a diagnosis of PVCM is made, acute management with reassurance and sedation instead of aggressive airway intervention is required. Speech therapy, psychotherapy combination with anti-reflux medication is considered to be useful in long-term management. We present a 58 year-old male patient who had suffered from several episodes of acute onset of stridor, short of breath and tachypnea since one year ago. He was initially treated as an asthmatic patient with poor response. Aneurysm of ascending aorta by angiography, and mild gastroesophageal reflux with hiatal hernia by panendoscopy were noted. Then, the paradoxical vocal cord motion during inspiration phase was confirmed by flexible fiberoptic nasopharyngoscope after the consultation with an otolaryngologist. The emergency of his air-hunger was relieved quickly after psychological intervention. Now, he is free of stridor attack under anti-reflux therapy and psychotherapy.

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1. Introduction

Paradoxical vocal cord motion is a rare condition characterized by adduction of the vocal cord during inspiration. The clinical presentation may include shortness of breath, wheezing, respiratory stridor or breathy dysphonia [1–6]. Due to a broad spectrum of presentation, paradoxical vocal cord motion is likely to be misdiagnosed and mistreated as asthma [5–7]. Most cases were found in women within young to middle age and only a few male cases had been reported [1,3,6,8]. Symptoms seem to be self-limited and responsive to supportive treatment. Therefore, a long-term management, including speech therapy, psychological counselling or other modalities, is suggested to avoid re-attack. In a few cases, the obstruction is so severe that emergent tracheotomy may be required [1,2,8–12]. We present a 58 year-old male patient who had suffered from several episodes of stridor since one year ago. He was treated as asthmatic patient with poor response until paradoxical vocal cord motion was diagnosed after the consultation of an otolaryngologist.

2. Case report

A 58 year-old male patient visited our emergency department presenting a sudden onset of stridor, shortness of breath and tachypnea. No antecedent illness was noted actually. He had visited our hospital many times due to repetitive stridor attacks since one year ago. During previous admissions, pulmonary function test revealed a mildly decreased expiratory flow rate with FEV1 of 2.56 L (83.4% of predicted value), an FVC of 2.83 L (71.8% of predicted value), and FEV1/FVC ratio of 97.45% (Fig. 1). The flow–volume relationship showed a fluctuated flattening of the inspiratory limb, which was suggestive of mild restrictive ventilation function impairment. Besides, a small aneurysm of ascending aorta was diagnosed by angiography. This time, he came to our emergency department again. Physical
examination revealed an afebrile patient with a respiratory rate of 37/min, pulse rate of 70/min, blood pressure of 140/70 mmHg. Breathing sound showed stridor, but no wheezing on auscultation. Chest plain film showed mild dilatation of ascending aorta. Neurologic examination revealed no focal neurologic sign. The artery blood gas (ABG) study revealed pH 7.428, pCO2 35.5 mmHg, pO2 93.0 mmHg, HCO3 23.7 mmol/L, oxygen saturation of 97.5% on room air. After consultation an otolaryngologist, paradoxical vocal cord motion during inspiration phase was confirmed by the flexible fiberoptic nasopharyngoscope (Figs. 2 and 3). The emergency of his air-hunger was relieved quickly after explanation of the syndrome and reassurance of no life threatening condition. No admission was needed. Thereafter, panendoscopy study revealed mild gastroesophageal reflux with hiatal hernia. No brainstem compression or other anomaly was noted on computed tomography. Now, he is free of stridor attack under anti-reflux therapy and psychotherapy.

3. Discussion

Paradoxical vocal cord motion (PVCM) is a form of laryngeal dyskinesia characterized by inappropriate adduction of the true vocal cords during inspiration. It is most commonly seen in women aged between 20 and 45. Cases in children and in the recovery room after general anesthesia had also been reported [6,7]. The etiology of paradoxical movement is unknown. The following causes had been recognized with this disorder. Organic causes include brainstem compression, motor neuron injury, movement disorder and gastroesophageal reflux, which usually need image or other neurological manifestations to confirm the diagnosis. Non-organic causes include malingering and conversion disorder [9]. Most articles addressed gastroesophageal reflux and psychological conversion disorder to be the main etiology of PVCM, especially in those who are preceded by psychological stressors or emotional difficulties. However, only a few cases of PVCM had been diagnosed with central lesion. A modern concept of adduction of the vocal cord was proposed by Shiba et al. [13]. They hypothesized that the adductor was also activated during inspiration, and the glottis was narrowed in accordance with inspiratory stridor. This active glottis narrowing is probably induced by an airway reflex. We encountered an old male patient presenting with paradoxical vocal cord motion. It is a rare condition due to his age and sex. No brainstem compression or other anomaly was noted on computed tomography. Although he suffered from heart burn sensation and acid regurgitation subjectively and gastroesophageal reflux with hiatal hernia on panendoscopy examination objectively, we believed that the underlying psychological disorder is the major cause of PVCM on him due to a dramatic relief of his symptoms soon after our psychological intervention.

Patients with PVCM always present symptoms, which mimic asthmatic patients. PVCM is likely to be misdiagnosed and mistreated with anti-asthmatic drug [3–5,7,8,12].
However, it could be associated with asthma. Newman et al. [3] analyzed 95 patients who met the criteria of proved vocal cord dysfunction (VCD). Forty-two (44%) of VCD without asthma, and 53 (56%) had combined asthma and VCD. The patients with VCD but without asthma were predominantly young women. These patients had been misdiagnosed as asthma patient for an average of 4.8 years. Although it is very difficult to distinguish PVCM from asthma attack, many features may lead us to differentiate between them. Features inconsistent with asthma which may enhance suspicion of PVCM include: absence of symptoms during exercise or sleep, poor response to aggressive drug therapy, normal arterial-alveolar oxygen gradient, normal pulmonary function test shortly after a severe attack, negative histamine challenge test; and a flattened flow volume loop on inspiration, normal or depressed on expiration [6]. Gastroesophageal reflux may occur in association with PVCM and stridor, although a direct cause-effect relationship between these two disorders has not been established [9]. Increased laryngeal irritability due to gastroesophageal reflux could be a contributing factor to the multifactorial process of PVCM. Denoyelle et al. [14] diagnosed gastroesophageal reflux in eight of nine infants with PVCM and stridor, but the stridor did not resolve with reflux treatment. Twenty-two patients with PVCD had been studied in the cases series of Powell et al. [15]. A strong association between PVCD and GERD was suggested through the posterior laryngeal anatomic abnormalities, although no pH probe for the definite diagnosis. An empirical anti-reflux pharmacological therapy may be helpful on the basis of these commonly identified changes. However, in our report, the patient did not suffered from symptoms of laryngopharyngeal reflux (LPR) subjectively, although gastroesophageal reflux was diagnosed. Therefore, we might support the positive association between GERD and PVCM. But, we suggest that further study should be focused on the relationship of LPR and PVCM.

The gold standard for diagnosing PVCM is through visualization paradoxical motion of the vocal cord when symptoms are found. It is best diagnosed with the use of videolaryngoscopy to document inappropriate adduction of the vocal cords on inspiration [1,4,8,12,15]. Airway radiographs with fluoroscope had been proposed as a rapid and noninvasive means of diagnosing vocal cord dysfunction. However, patients should still have laryngoscopy performed to rule out the possibility of other laryngeal abnormalities [16]. Spirometry remains good investigation tool to rule out other obstructive and restrictive lung disease. Flow volume loop may be normal when the patient is asymptomatic. However, 23% of VCD patients had abnormal inspiratory flow volume loop when asymptomatic. When a patient is symptomatic, the classic finding on spirometry is the attenuation or flattening of the inspiratory flow volume loop, demonstrating an extrathoracic airway obstruction [3,4,15]. Treatment for paradoxical vocal cord motion is usually multidisciplinary. It includes a clear explanation of the syndrome, cessation of unnecessary medications, combination of anti-reflux medication, psychological counseling and speech therapy. Although non-organic disorder remain the most common causes for PVCM, it is important to explore and correct life threatening organic causes such as brainstem compression, motor neuron injury, and movement disorders. Panting, coughing and breathing against pressure may be a useful maneuver against PVCM. A mixture of helium and oxygen (70:30 or 80:20 mixture) can resolve an acute attack. Because helium is less dense than the nitrogen in the air, helium-oxygen mixture creates less turbulence across the narrowed glottis, thus relieving some of the perceived sense of dyspnea [4]. George et al. [8] believe that intubation is favored if airway intervention is required and unnecessary tracheostomy may be avoid. The cornerstone of successful management is speech therapy. Patients are taught laryngeal relaxation techniques [12]. Psychological or any stress-related disorders need to be simultaneously managed as well. Sullivan et al. reported the outcome of a speech pathology treatment in 20 adolescent female athletes. Nineteen of the twenty participants (95%) were reported the ability to control symptoms of vocal cord dysfunction using the abdominal breathing techniques learned in the intervention session [11]. Altman et al. [1] proposed that the use of visual laryngoscope biofeedback with a skilled speech therapist may be a valuable adjunct. Besides, botulinum toxin injection is effective in some patients with PVCM unless dystonia has been ruled out definitively as an etiology. Worley et al. [17] reported the first use of botulinum toxin injection into a vocalis muscle for relieving inspiratory stridor due to laryngeal dystonia in a child.

Paradoxical vocal cord movement is a rare condition that is likely to be misdiagnosed and mistreated. It is an important cause of laryngeal stridor. Correct diagnosis can only be achieved by an otolaryngologist using the fiberoptic laryngoscope. Once the diagnosis of PVCM is made, life threatening organic causes should be ruled out first. Psychotherapy, speech therapy, and combination with anti-reflux medication are considered to be useful in long-term management.

References


