

Observed Similarities in Four Adolescents with Paradoxical Vocal Fold Disorder

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Abstract

Four adolescent patients seen in the ENT clinic were referred for psychological assessment and treatment following a diagnosis of paradoxical vocal cord dysfunction. The MMPI-A was administered, and the results were consistent in all four adolescents. All tended to under-report their problems and exhibited similar personality characteristics, particularly a tendency to be competitive in performance activities. They placed an undue amount of stress upon themselves, and their problems were more severe during competition. A questionnaire was sent to each patient at a one-year follow-up. Three of the four returned the questionnaire, and current problems were evaluated and found to show continued similarities.

INTRODUCTION AND LITERATURE REVIEW

Paradoxical vocal cord dysfunction (PVCD) is a disorder of laryngeal respiratory function commonly associated with women. The term paradoxical vocal cord dysfunction describes a respiratory pattern in which the individual constricts the vocal cords during respiration, producing dyspnea. Patients with vocal cord dysfunction exhibit paradoxical adduction of the vocal cords on inspiration or abduction on expiration, or both. On examination, blood gases and chest x-rays are usually normal. Vocal cord dysfunction has been shown to masquerade as asthma, exercise-induced bronchospasm, dyspnea, and stridor (O'Connell et al., 1995), as well as adductor spasmodic dysphonia (Carding & Raz, 2000). The main criteria for evaluation include pulmonary function assessment, patient history and physical, direct laryngoscopy, and psychological evaluation and testing. In a review, Carding & Raz determined that most published cases of paradoxical vocal cord movement report a previous misdiagnosis (2000).

Previous reports in the literature have referred to the disorder by an assortment of various names. These names include Munchausen's stridor (Patterson et al., 1974), pseudoasthma (Dailey, 1976), functional inspiratory stridor (Rogers, 1980), functional upper airway obstruction (Appelblatt & Baker, 1981), factitious asthma (Downing et al., 1982), emotional laryngeal wheezing (Rodenstein et al., 1983), psychogenic stridor (Smith, 1983), spasmodic croup (Collett et al., 1983), laryngeal spasm (Chawla et al., 1984), episodic laryngeal dyskinesia (Ramirez et al., 1986), psychosomatic stridor

(Barnes et al., 1986), functional stridor (Kuppersmith et al., 1993), paradoxical vocal cord movement (PVCM) (Lloyd & Jones, 1995; Carding & Raz, 2000), and paradoxical vocal fold motion (PVFM) (Matthers-Schmidt, 2001). An article appearing in the *New England Journal of Medicine* in 1983 originally referred to the disorder as "Vocal-cord dysfunction presenting as asthma" (Christopher et al.); in recent years, however, authors have shortened this title to "Vocal cord dysfunction" (McQuaid et al., 1997; Poirer et al., 1996; Jensen & Stillwell, 1995). While vocal cord dysfunction occurs more often in women, it does occur in men. In addition, vocal cord dysfunction has been reported in a wide range of ages from a 4-month-old infant to a 68-year-old woman. Kuppersmith et al. (1993) reported that paradoxical vocal cord movement usually occurs in young females who often have a diagnosis of prior psychological disorder. Research suggests that children and adolescents with PVCM tend to be high achievers and often participate in competitive sports (Matthers-Schmidt, 2001).

In the past, a wide variety of treatments have been attempted in order to manage paradoxical vocal fold dysfunction.

McQuaid and colleagues (1997) reported treating a patient with intravenous corticosteroids, oral steroids, inhaled bronchodilators, and other respiratory treatments, all of which were unsuccessful. Administration of botulinum toxin injections has also been attempted to control symptoms (Kuppersmith et al. 1993). Invasive procedures, including intubation and tracheostomy, have even been performed

(Christopher et al., 1983; Martin et al., 1987; Chawla et al., 1984). Most authors have found, however, that speech therapy and psychotherapy emphasizing relaxation techniques and supportive therapy are most effective, while other therapies, such as those mentioned above, are unnecessary. McQuaid's (1997) group proposes that effective and appropriate treatment cannot begin until an accurate diagnosis is made. Once the condition is accurately diagnosed, patient/family education plays an important role in the treatment process. While speech therapy combined with psychotherapy is the most common and effective treatment, long-term follow-up of a large sample size has yet to be undertaken.

The existing literature on vocal cord dysfunction is comprised almost entirely of case reports. Throughout these reports, many psychological factors have been suspected to play a role in vocal cord dysfunction. Early articles suggested that vocal cord dysfunction was a conversion reaction or factitious illness (Downing et al, 1982; Christopher et al. 1983). Kattan and Ben-Zvi (1984) linked vocal cord dysfunction to emotional factors, including difficulty expressing anger. Brown et al. (1988) reported a patient who met DSM-III criteria for depression as well as an MMPI showing hypochondriacal and hysterical traits. Other psychiatric conditions noted include obsessive compulsive disorder, passive dependent personality, adjustment reaction, and somatization disorder (Martin et al., 1987; Maschka et al., 1997). Physical and sexual abuse have also been suggested as important factors in vocal cord dysfunction (Freedman et al., 1991; Smith et al., 1993). In a sample of 20 patients diagnosed with PVCMD, nine presented readily identifiable psychologic triggers for their symptoms (O'Connell et al., 1995). In the pediatric population, family conflict, a history of behavioral problems, and psychosocial stressors have been proposed as contributing factors (Sette et al., 1993 and Poirer et al., 1996). Despite the multiple psychological factors noted to contribute to the illness, authors have reported cases in which no psychological symptoms were present (Collett et al., 1983; Lloyd & Jones, 1995; Heatley & Swift, 1996). While there may be an element of underlying psychological, emotional, or developmental disturbances, psychogenic etiology can not be definitive.

Figure 1

Table 1: Characteristic Features of PVCMD [Adapted from Maschka et al.,1997]

| Feature | History | Associated Signs and Symptoms |
|--|--|--|
| Brainstem compression | Unremarkable | Vagal dysfunction (gastroesophageal reflux) |
| Severe cortical injury | Cerebrovascular accident or static encephalopathy | Excessive salivation, upper airway obstruction, poor neuromuscular control |
| Nuclear or lower motor neuron injury | Medullary infarction, amyotrophic lateral sclerosis, myasthenia gravis | Other neurologic signs related to underlying etiology |
| Movement disorders | May be exacerbated by stress or exertion | Tremors, rigidity, slow movement, decreased reflexes |
| Gastroesophageal reflux | Unremarkable | May occur during crying or without adverse event |
| Factitious symptoms or malingering | Conscious effort to produce signs of disorder | Secondary gain |
| Somatization/conversion disorder; psychological factors affecting physical condition | Unconscious manifestation of stressors | High achievers |

REPORT OF FOUR CASES

Four cases involving adolescents diagnosed with paradoxical vocal fold disorder were studied, and personality and situational similarities were noted. The Minnesota Multiphasic Personality Inventory – Adolescent Version (MMPI-A) (Hathaway and McKinley, 1992) was administered to each of the four adolescents. The series consisted of four high school students, three female and one male. Each presented to a physician with symptoms resembling an asthma attack. Table 1 outlines criteria for evaluation of these patients. Each was involved in competitive athletics in high school. Three of the four were involved in competitive athletics, one was involved in a vocal chorus and played a wind instrument, and one also played a wind instrument in the school orchestra. Medical exam in each case revealed no significant problems with asthma, although each had been treated for asthma at some point in the treatment process because of the presentation of symptoms. After thorough physical examination and visual examination of the vocal cords, in each case it was determined that there was no significant physical damage to the vocal cords. In all cases the respiratory stridor was more pronounced during competition. All the young persons

studied were excellent students and felt pressure either from themselves or from their parents to excel in school and in their respective activities. All appeared congenial, cooperative, and seemed to have adequate social lives and friends. Conflict in the home or in the extended family was noted to varying degrees in all cases.

Results of the MMPI-A indicated a consistent tendency among all four participants to under-report their symptoms. The conversion-V pattern was noted on three of the four MMPI-A's; however, due to the tendency to under-report, none of the clinical scales was significantly elevated. Therefore no conclusions can be drawn with respect to clinical significance. Coincidentally, each of the students was seen once for a clinical interview, once to complete the MMPI-A, and three additional times for treatment. Treatment in each case consisted of relaxation training, stress management, development of communication and negotiation skills, and self-esteem enhancement.

CASE 1

This is a 16-year-old female with two siblings. She was referred by the Department of Otolaryngology after being diagnosed with paradoxical vocal fold disorder. Her parents are divorced, and her mother was soon to be remarried. She was a good student and actively involved in competitive track and orchestra. Her problems began while working out, when she experienced a feeling of tightness and difficulty breathing. The problem eased somewhat when she discontinued exercise; however, she noted that the episodes of breathing difficulty tended to come and go quickly and occurred almost every time she worked out. She was seen by a number of physicians and was initially treated for exercise-induced asthma, with no response to treatment. She indicated that she sometimes worried about breathing when she became stressed, and stress was more likely to influence her breathing difficulty. She reported being very sensitive emotionally and tended to have some emotional low times several days before menstruation. Both the patient and her mother described her as a worrier. She was also described as an excellent student who wanted to excel and do well and was held in high regard by both teachers and friends. She denied smoking, drinking, or drug use and stated that she didn't want these things in her life. She had some difficulty with one member of her track team, and her breathing difficulty was more apparent when she was practicing with that individual. She also noted that her breathing difficulty was much more pronounced during competition. The results of the MMPI-A indicated that all clinical scales were within

the normal range, and the validity scale indicated a tendency to underestimate problems to present a more positive image. On the MMPI-A, Scales 1 and 3 were elevated more than Scale 2; however, all were within the normal range. This person did not complete the follow-up at one year.

CASE 2

This is a white male who was referred by his otolaryngologist at age 16 after being diagnosed with paradoxical vocal fold disorder. He was actively involved in competitive sports. About a year prior to being seen by the otolaryngologist, while swimming, he experienced chest pain and difficulty breathing, which was treated initially as exercise-induced asthma. He was tried on numerous inhalers, and obtained some relief; however, overall improvement was minimal. His performance in competitive athletics deteriorated. He was described as a healthy child who participated in track as well as swimming. He was described as a good student; however, his parents were eager to see him excel, especially academically. He was competitive in sports, and the breathing problems decreased his speed a great deal. He reported that he didn't suffer from significant problems unless he was training competitively or involved in active competition. His mother described him as tough on himself and demanding, and he agreed that he was very competitive. When I spoke with him privately, he indicated that competition would frequently magnify his breathing difficulties. He also indicated that his parents did not allow him as much freedom as his friends were allowed. On the MMPI-A, results indicated a valid profile with the possibility of a tendency to present himself in a favorable manner and to underestimate problems. There were no significant elevations on clinical scales; however, Scales 1 and 3 were elevated over Scale 2 in a manner consistent with Conversion V. On one-year follow-up, SS indicated that when he was first diagnosed, the vocal dysfunction episodes interfered with his lifestyle a great deal. At the time of follow-up, he felt that the vocal cord dysfunction affected his ability to participate in sports "a great deal" but affected his school and social activities only "moderately." He felt it did not influence family relationships or work at all. He indicated that he had experienced about ten episodes per month over the previous six months, and he reported that he did not worry at all about having an episode. The episodes would generally last several minutes. He admitted that he sometimes avoided activities in order to prevent an episode. The activities he avoided were normally sporting activities. At the time of follow-up he was no longer seeing his physician for this condition. He denied having used alcohol

or drugs in the previous six months, and he reported spending his free time with friends playing sports, going to movies, and swimming. In general, he felt his health was good, and compared to the previous year, he felt his health was very good.

CASE 3

This is a white female who was referred by her otolaryngologist at age 17 after being diagnosed with paradoxical vocal fold dysfunction. She has one sibling. According to her mother, she was born of a normal pregnancy and reached developmental milestones in a timely manner. She was described as a healthy child. She swam a great deal when she was young but stopped at about age 12 due to some problems with bronchitis. She played sports and a wind instrument in the band. She also sang in the choir. She had served as class president and maintained a near-4.0 grade point average with only one B. She began to experience some episodes of anxiety at the end of her grade school years. She had many friends but no one particular close girlfriend. She kept a very busy schedule with extracurricular activities and had a relative in her school with whom she had a competitive relationship. Her breathing difficulties began in middle school, when she began to participate in competitive sports. They worsened by high school while she was playing basketball. Her symptoms were much worse when she was in a competitive situation, and she began to have difficulty singing in the choir and playing the flute. Her breathing attacks were initially thought to be asthma. She was given inhalers, to which she did not respond. She cut back on her sporting activities but continued to experience some difficulty in competitive sports. She also had difficulties in performing a solo, either in band or in choir. She reported being fearful of pain and did not sleep well. She reported some irritability, which was worse around the time of her menstrual period. Finances were somewhat difficult within her family at that time, and she was experiencing some significant body image concerns. She also had a difficult relationship with the family member who attends her school, with whom she was competitive. The MMPI-A results indicated a tendency to underestimate symptoms and difficulties, and there were elevations on Scales 1 and 3 over Scale 2, which is indicative of the Conversion V pattern; however, none of the scales were elevated into the clinical range. At one-year follow-up, she reported that her vocal cord dysfunction episodes had influenced her lifestyle “moderately.” At the time of follow-up, her family relationships, social relationships, and work were “not at all affected.” She reported that her schoolwork

activities were “moderately” affected and sporting activities were affected “a great deal.” When asked if she was currently experiencing difficulties with the vocal cord dysfunction, she said no. When asked how her life had changed, she said she could engage in more activities than previously, and she had learned strategies for dealing with the episodes. She experienced infrequent episodes, indicating she had fewer than one per month. She also indicated that she did not worry at all about having another episode. When she did experience the breathing episodes, they normally lasted about ten minutes. She said she no longer avoided activities in order to prevent an episode, and she did not see her otolaryngologist any longer. When asked how she spent her free time, she said she spent it watching TV, going to movies, and bowling, and she mainly spent her free time with friends and family.

CASE 4

This was a 16-year-old white female with three siblings. She maintained a B to B+ average and participated in track, basketball, and numerous extracurricular activities. She disliked many of her high school classes and felt unmotivated in them; however, she enjoyed her sports activities and felt successful in those areas. She also enjoyed social activities with friends. Her difficulties began in about the 8th grade. Symptoms included sweating, occasionally falling down, but not fainting. She reported a sensation of tension in her chest prior to attacks. When they first started, she could rest for about ten minutes and then continue her activities; however, at the time she was seen they had become severe enough that she had to stop her activities altogether. She noted that the attacks were unpredictable. They happened in competition, but they also happened during practice. She used inhalers during sports activities but said that they didn't work. History of smoking or using drugs was negative. She had some family stress due to her parents' frequent fighting. Her vocal cord dysfunction kept her from competing. Her parents reported that she was always an easy child to raise. She was never sick, and though she was shy as a young child, she seemed to have overcome that and had become outgoing. The MMPI-A was administered, and there was a tendency to under-report difficulties. None of the clinical scales were elevated. When asked if the difficulties interfered with her sports or other activities at the time of follow-up, she said yes, and the areas most affected were social relationships, sports, and work, with sports being the most affected. She indicated she continued to have these episodes, and over the previous six months she had experienced about three a week. She reported worrying a

great deal about having another episode. Most of the episodes lasted about 15 minutes, and she sometimes avoided activities in order to prevent an episode. She continued to see her otolaryngologist. When asked how she generally spent her time, she said with friends and participating in sports. When asked if she had experienced any other health problems in the previous six months, she said she had developed a tendency to overeat.

Figure 2

Table 2: Questionnaire Responses One Year Following Discharge

| Question | SS | TZ | ER |
|---|---|---|---|
| Has vocal cord dysfunction interfered with sports or other activities during the last year? | Yes, quite a bit. | Yes, a great deal. | Yes, a great deal. |
| How much has vocal cord dysfunction interfered with your lifestyle during the last year? | Moderately. | Moderately. | A great deal. |
| Do you continue to see your treating physician for this problem? | Yes. | No. | No. |
| Have you experienced other health problems in the past six months? | Yes. | None reported. | Yes. |
| In general, how do you spend your free time? | With friends, boyfriend, and family. | With friends and family. | With friends. |
| Do you participate in sports? | Yes. | Sometimes, but not organized sports. | Not as much as previously. |
| During an episode of breathing difficulty, how do you feel? | Short of breath, dizzy, heart racing, trembling, hot or chilled, tingling | Heart racing, trembling, sweating, sense of choking, tingling, chest pain or pressure, fear of losing control | Short of breath, sweating, sense of choking, chest pain or pressure, fear of losing control |

CONCLUSIONS

In summary, similar characteristics are noted among all four adolescents evaluated and followed. Most importantly, all presented with symptoms which initially appeared somewhat similar to an asthma attack. All were thoroughly evaluated for other medical conditions, and no serious conditions requiring medical assistance were diagnosed. Self-esteem and the pressures of competition are consistent in all four cases, as well as either the self-imposed desire for perfection or the pressure from family to excel. Though the three who responded one year later had not experienced a remission of symptoms, it appeared that they are leading relatively normal lives and engaging in routine activities. Unfortunately, because they discontinued treatment with Psychological Services and, in most cases, with their physicians, additional follow-up is not available. However, it is important to note that there are situational and personality characteristics similar in the four adolescents presenting with vocal fold dysfunction. Therefore, thorough evaluation from a medical and psychological/psychosocial perspective is

suggested for individuals who present with these symptoms in order to determine appropriate management of the disorder.

Vocal cord dysfunction is a common disorder that may present to practitioners in the emergency room or otherwise as asthma, wheezing, dyspnea, stridor, even anaphylaxis. A careful history, physical, and visual examination of the vocal cords, if possible, is necessary for accurate diagnosis and prevention of iatrogenic morbidity. Recognition of the non-organic causes of PVCMD may increase the likelihood of identifying psychological etiology in specific cases and of avoiding inappropriate, costly, and risky medical interventions (Dirulos et al., 1997; Elshami & Tino, 1996). Management of the condition is often individualized and may include reassurance, speech therapy, psychotherapy, behavior therapy, relaxation therapy, and biofeedback.

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