A TEAM COLLABORATION APPROACH TO THE EFFECTIVE ASSESSMENT AND TREATMENT OF THE ATHLETE WITH VOCAL CORD DYSFUNCTION (VCD)

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Diagnosis of Vocal Cord Dysfunction

• This is a laryngeal disorder that affects breathing.
• When there is inappropriate closure of the true vocal folds during inhalation and respiratory obstruction occurs.

Respiration-Breathing VCD

Symptoms

• Shortness of breath (Dyspnea)/airway obstruction
• Stridor on inhalation
• Cough/Throat clearing
• Panic/Anxiety disorder
• Throat tightness
• Chest tightness
• Refluxing – LPR-GERD
• Asthma can co-exist
• Hoarseness can co-exist

TRIGGERS

• URI
• Stress
• Exercise - Children and Adults who are high achievers and usually participate in competitive sports
• Extreme temperatures
• Irritants: environmental pollutants, dust, smoke, chemicals, paints, perfume-cologne, mist, mold, and fumes

TEAM APPROACH FOR THE ATHLETE

• ROLES AND RESPONSIBILITIES
  • ENT
  • SLP
  • ATHLETIC TRAINER

• 3-5% of athletes
ENT PATIENT PLAN

VCD
- Inappropriate Adduction of true vocal cords
- More common diagnosis today......why?

COMMON characteristics of athlete with VCD
- YOUNG WOMEN
- HIGH ACHIEVERS
- ANXIETY / STRESS PERCEPTION
- INTENSE PHYSICAL ACTIVITY

LESS COMMON characteristics
- Allergy/asthma coexisting
- Sinonasal pathology (CRS, polyps, septal deviation)
- LPR
- Tobacco, irritants
- Glottis lesion
- Psychosocial disorder (PTSD, etc)

OTHER VCD causes - (not discussing today)
- Brainstem/CNS pathology
- Movement disorders (dystonia, etc)
- Factitious / Malingering

SYMPTOMS
- INSPIRATION NOISES (vs asthma)
- SYMPTOMS SIMILAR TO EIA (EXERCISE INDUCED ASTHMA)
  - DYSPNEA
  - CHEST TIGHTNESS
  - DYSPHONIA
  - COUGH
  - CHOKING
- LACK OF RELIEF FROM BRONCHODILATORS
- LUMP SENSATION
- LIGHTHEADED, SYNCOPE RARE
**DIAGNOSIS**

- History most important
- Physical Examination/Flexible laryngoscopy to rule in and rule out other dx - GOLD STANDARD
  - Ideally when symptoms are present with or without exercise
  - Greater than 50% adduction – quiet breathing
  - Count to ten and/or count until end volume and watch for incomplete ABDuction
  - Ask to mimic episode

**VIDEO**

**spirometry when symptoms, flat inspiratory flow volume loop**

American Family Physician, Vol. 81, No. 2, January 15, 2010

**Empiric Heliox**

(upper airway obstruction treatment, decrease turbulence, dyspnea resolves)

**RULE OUT other upper airway obstruction dx**

- Bilateral TVC paralysis
- Supraglottic/Glottic/SG lesion
- Suglottic stenosis
- Cricoarytenoid arthritis
- Angioedema
- Infection
- Psychological
- Laryngomalacia
- Foreign body
- Trauma
- Neuropathies
- Myasthenia gravis

**OTHER DYSPNEA CONSIDERATIONS: Not upper airway obstructive**

- Pulmonary/ lower airway (COPD, asthma)
- Cardiac
WARNING
if your are a hammer everything
looks like a nail

TREATMENT
• REASSURE
• TONGUE TO TEETH, NASAL SNIFFS
• SLP – Laryngeal Support Therapy (LST) –
Laryngeal Control Therapy (LCT) * This is most
important
• RX LPR- PPI AND GERD INSTRUCTIONS
• RX ASTHMA (bronchodilator inhalers, steroids)
• Psychotherapy
• Hypnosis
• Biofeedback to decrease sympathetics
• Rx Nasal disease (meds or surgery)
• Botox Thyroarytenoid muscle
• Heliox (30:70 Oxygen: Helium)

TEAM APPROACH
• Otolaryngologist
• Pulmonologist
• Team physician
• SLP
• Trainer/ Coaches
• Sports Psychologist

SLP PATIENT PLAN

VOCAL CORD DYSFUNCTION
FACT SHEET - DESCRIPTION
Vocal Cord Dysfunction (VCD) can present with
some voicing complaints but more commonly
presents with upper airway obstructive complaints.
It is commonly referred to as paradoxical vocal
cord movement or paradoxical vocal fold dysfunction.
VCD involves intermittent attacks of breathing
difficulties whereby the vocal cords close
prematurely during inhalation. This partial upper
airway obstruction can be mild to severe, sometimes
even rarely, resulting in a hospital visit. VCD may
coop-exist with asthma and is frequently misdiagnosed
as asthma. VCD will not improve with typical asthma
medications.

CAUSES
There is not one specific cause for VCD. However,
some causes or triggers may include any one or
combination of the following: exercise, acid reflux,
nasal congestion, postnasal drainage, coughing,
anxiety, stress, extreme temperatures, respiratory
illness, environmental irritants or pollutants, or
inhaled chemicals, such as paints, fumes or
perfumes. Symptoms usually consist of tightness in
throat or upper chest, stridor or noisy breathing,
shortness of breath, lump in the throat, feeling of
inability to get air into the lungs, and/or hoarseness.
**DIAGNOSIS**

The gold standard to diagnose vocal fold dysfunction is made by flexible laryngoscopy. Vocal fold partial closure during inhalation is the key finding. There may also be signs of inflammation caused by laryngopharyngeal reflux. It can be suspected with symptoms of tightness in the chest or upper throat, noisy breathing (especially during inhalation), lump in the throat sensation, hoarseness, or even passing out.

**TREATMENT**

The treatment of VCD usually is multi-factorial. This commonly will require an otolaryngologist to perform flexible laryngoscopy to confirm the diagnosis. Medical therapy by the physician may include acid reflux medications; possibly even anxiety medications. The speech-language pathologist is important for laryngeal control therapy. A psychiatrist or psychologist may be needed to help manage anxiety, as well. In most cases, this comprehensive approach leads to complete resolution of the behavior in a short period of time.

**Evaluation with VCD Case History**

- Breathing
- Respiration Testing (IMST-EMST)
- GERD – RSI
- Stress-emotional factors
- Triggers
- Dyspnea Index
- Laryngeal Visualization
- Swallowing – Eat -10 (if needed)
- Voice testing (if needed)

**IMST/EMST**

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<th>Maximum Expiratory Pressure</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Average</th>
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**Treatment**

- Body Awareness–Physiological Awareness
- Reassurance (not life-threatening)
- Nancy Swigert – VCD Fact Sheet
- Training of Breathing Exercises
  - Relaxed Breathing
  - Three Step Breathing
- PowerBreathe
- LPR-GERD
- Consultation and Follow-up with AT
- Stress Management
- Collaborative Team Approach with other Health Professionals: Pulmonologist, Allergist, Psychology, etc.

**Breathing Techniques**

- **PowerBreathe**
  - Sniff and Swallow
  - Silent Cough
  - Soft Throat Clear
  - Hydration – sip throughout the day
  - Hard Swallow

**MANAGING LARYNGEAL REFLUX - (LPR)**

- Drink Water
- Avoid eating for at least 2-3 hours before going to bed or Eat Friendly Refluxing foods
- Reduce/Eliminate stress/tension.
- Elevate the head of the bed 6-10 inches. Place cinder blocks, bricks, wood under the legs at the head of the bed.
- Reflux Friendly Foods
- Reflux Unfriendly Foods
- Medication
- We recommend that you consult with your physician regarding the above suggestions.

**Weekly Home Practice Log**

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**ATHLETIC TRAINER COLLABORATION**
**Relaxing Breath**

Adapted from Andrew Wall, M.D. • Right Weeks to Optimum Health

1. Start by putting the tip of your tongue on the alveolar ridge (the ridge of tissue just behind your upper front teeth). Keep it there for the whole exercise.
2. Now exhale completely through the mouth, making an audible sound (a whoosh).
3. Then close your mouth and inhale quietly through your nose to a (silent) count of four.
4. Then hold your breath for a count of seven.
5. Finally, exhale audibly through the mouth to a count of eight.

This constitutes one breath cycle. Repeat for a total of four cycles, then breathe normally.

**Three-Step Breathing**

1. Breathe out through your mouth
2. Breathe in through your nose
3. Breathe out through your mouth

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**VCD treatment**

- Breathing through various diameters of straws
- Blowing, sniffing, panting, pursed-lip inhalation, nasal inhalation, relaxed tongue posturing, holding breath, counting on one breath, sibilant and vowel prolongations (maximum phonation time), sustaining /s/, sustaining sounds through pursed lips, gliding or stair-stepping up and down scales, lip trills, humming, chanting, counting aloud, reading aloud, singing, spontaneous speech
- Exercise bands
- Calm Card

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**Inspiratory Muscle Training in Exercise Induced VCD** Mathers-Schmidt and Brilla

*Journal of Voice* 2005

- Does inspiratory muscle training (IMT) result in increased inspiratory muscle strength, reduced perception of exertional dyspnea, and improved measures of maximal exercise effort in an athlete with exercise-induced VCD?
- At end of the study, the participant reported experiencing no VCD symptoms when playing soccer.
- The findings suggest that IMT may be a promising treatment approach for athletes with exercise-induced VCD.
- The participant was a nonsmoking 18-year-old woman with a 2-year history of acute dyspnea triggered by high intensity exertion during soccer workouts and games. She had been treated for exercise-induced asthma, with a bronchodilator inhaler, with no improvement.
- The participant trained 5 days per week for 5 weeks, with a custom-made inspiratory muscle strengthening device.

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**Inspiratory Muscle Strength Training with Behavioral therapy in a case of exercise-induced VCD** International Bari Hoffman Ruddy, et. al. *Journal of Otorhinolaryngology* 2004

- VCD with high effort exercise can result in disruptions to ventilation, dyspnea, inspiratory stridor, elevated heart rate, and syncope. This single subject study experimentally tested an inspiratory muscle strength training (IMST) program with behavioral therapy on a 15-year-old male crew member.
- Following 5 weeks of IMST, MIP increased by 95% from baseline function while dyspnea ratings substantially decreased. Outcome included successful competition with his high school crew team, a task he was previously unable to complete.
- Discussion focuses on IMST combined with traditional approaches of voice therapy for treating PVFD.
- As per the subject's anecdotal report, this combined treatment, in his opinion, was most effective.

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**Role of the Athletic Trainer (ATC) in the Team Collaboration Approach to Treatment of the Athlete with VCD**

- Athletic Trainers (ATs) are health care professionals who collaborate with physicians to optimize patient and client activity and participation in athletics, work and life. The services provided by ATs comprise prevention, emergency care, clinical diagnosis, therapeutic intervention and rehabilitation of injuries and medical conditions.
What is the Educational Background of the Athletic Trainer?

NATA Educational Competencies Content Areas:
- Evidence-Based Practice
- Prevention & Health Promotion
- Clinical Examination & Diagnosis
- Acute Care of Injury & Illness
- Therapeutic Interventions
- Psychosocial Strategies & Referral
- Healthcare Administration
- Professional Development & Responsibility

Where do Athletic Trainers work?

- High Schools, Colleges, Professional Sports
- Sports Medicine Clinics
- Industrial Settings
- Physician Extenders
- Military
- Performing Arts
- NASCAR & Indy Car Racing
- Rodeo

Who does the AT work / interact with?

- Athletes and other physically active individuals
- Coach
- Team Physician and medical specialists
- In some situations, parents of the athlete
- Sports Nutritionist
- Sports Psychologist
- Speech-Language Pathologist
- Sports Performance Specialist

When does the Athletic Trainer interact with the athlete?

- Typically every day before, during and after activity.
- Pre-season Participation Examination
- Pre-season Strength & Conditioning Sessions
- Practices
- Competitions
- Post-season Strength & Conditioning Sessions
- Rehabilitation Sessions

Why is this important?

- The Athletic Trainer...
  - Sees the athlete in a variety of situations
  - Sees how often and in what situations the athlete has respiratory distress,
  - Sees how often and in what manner the athlete uses a rescue inhaler.
What is the role of the AT in a team collaborative approach to the effective assessment and treatment of the athlete with VCD? How do they contribute?

- Knowledge of VCD
- Recognition of S/S which might indicate VCD
- Referral to appropriate ENT / SLP
- Oversee administration of daily plan of care
- Encourage / require follow-up
- AT attends voice therapy session(s)
- SLP and AT attend athlete’s practice/events

CASE SCENARIO – ATHLETE

- 21 year-old female, was referred to ENT/speech-language pathology by athletic training at Purdue.
- The patient reported that breathing episodes began when she was 12 years old and happened 2-4 times per year, but over the past summer breathing episode frequency increased to daily occurrences during vigorous exercise. During this time period, stress levels increased with increased class load, increased expectations, perfectionism, and interpersonal/emotional conflict, which the patient reported likely contributed to breathing episodes.
- The patient saw a Pulmonologist for recurrent episodes of shortness of breath during exercise characterized by feeling cold in the hands, experiencing weakness, feeling exhausted, and breathlessness.

- Spirometry testing revealed normal expiratory effort.
- Impressions included vocal cord dysfunction.
- The patient saw Dr. Hillsamer for evaluation of vocal cord dysfunction. The examination revealed that the patient’s dyspnea is not associated with any respiratory illnesses, viral symptoms, fever, drainage, head congestion, pharyngeal or other ENT symptoms.
- The patient reported a history of heartburn with increased frequency over the last year.
- Flexible laryngoscopy revealed mild inflammation in the interarytenoid area consistent with laryngeal reflux, vocal cords appeared normal and had good mobility, but were characterized by intermittent quiver and partial adduction during inhalation. The patient exhibited vocal cord dysfunction with paradoxical adduction and laryngopharyngeal reflux.

- Dr. Hillsamer prescribed Prilosec for reflux management, gave precautionary GERD guidelines, and referred her for speech language pathology for laryngeal supportive therapy.
- The patient reported that sitting down and resting helps to relieve symptoms, but going back to exercising immediately results in another episode.
- The patient identified exercise and stress as triggers for breathing episodes.

- The Reflux Symptom Index (RSI) is a 9-item survey that evaluates the severity of laryngopharyngeal reflux (LPR). Normative data suggests that a RSI of greater than or equal to 10 is clinically significant and may be indicative of a significant refluxing disease. A score of >13 is abnormal. The patient scored 20. The patient presents with a mild respiratory problem consistent with vocal cord dysfunction and characterized by dyspnea and was also diagnosed with laryngopharyngeal reflux (LPR).
- Speech therapy was recommended.
RESPIRATION GOALS
• The patient will identify triggers that produce VCD symptoms.
• The patient will increase awareness of sensations in the throat, shoulders, chest, and laryngeal areas 80% of the time.
• To improve laryngeal support (decrease frequency and severity of breathing episodes), the patient will use relaxing breath and 3 step breathing exercises daily with minimal cues from coach/friends.
• To assess the patient’s Maximum Inspiratory Pressure, to gather baseline information, and to determine benefits of a PowerBreathe inspiratory muscle training device, the patient’s respiratory support was tested using the Micro Medical (Micro RPM) inspiratory and expiratory device.
• The patient will use the PowerBreathe device 5 times daily for 5 sets (25 total trials) with minimal prompting.
• The VCD fact sheet will be reviewed.

STRESS MANAGEMENT GOALS
• The patient will pursue strategies for stress management.
• The patient will create a calm card for stress management.

LPR GOALS
• The GERD/LPR management sheet will be reviewed.
• The patient will understand the behaviors that contribute to GERD/LPR.
• The patient will understand behavioral strategies to reduce GERD/LPR.

FUTURE OF VCD TREATMENT
• COLLABORATION
• FOLLOW-THROUGH
• SLP TRAINING IN VCD
• ENT TRAINING IN VCD
• ATHLETIC TRAINER TRAINING IN VCD
• ELEMENTARY-H.S.-UNIVERSITY-COLLEGE
  • PE TRAINING IN VCD
  • AD TRAINING IN VCD
  • COACH TRAINING IN VCD
  • TEAM MD TRAINING IN VCD

Resources
• VCD Case History
• Dyapnea Questionnaire
• Nancy Swigert - The Source for Children’s Voice Disorders – VCD Fact Sheet
• www.bluetreepublishing.com
Resources/References
• Marcinow, Thompson, Chiang, Forest, and deSilva. Paradoxical Vocal Fold Motion Disorder in the Elite Athlete: Experience at a Large Division I University. The Laryngoscope 2013;
• Chiang, Marcinow, deSilva, Ence, Lindsey, and Forrest. Exercise-induced paradoxical vocal fold motion: diagnosis and management. The Laryngoscope 2013; (3) 727-731.

Dyspnea Index - University of Utah Health Care Patient's self-assessment of breathing difficulty
Below are some symptoms that you may be feeling. Please circle the number that indicates how often you feel these symptoms. (0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, 4 = always)
1. I have trouble getting air in.
2. I feel tightness in my throat when I am having my breathing problem.
3. It takes more effort to breathe than it used to.
5. My breathing gets worse with stress.
6. I make sound/noise breathing in.
7. I have to strain to breathe.
8. My shortness of breath gets worse with exercise or physical activity.
9. My breathing problem makes me feel stressed.
10. My breathing problem causes me to restrict my personal and social life.

Case History Information for Vocal Cord Dysfunction (VCD)/Chronic Cough
• Breathing
• Reflux
• Emotional

DISCUSSION