Assessment and Treatment of VCD: Helping Athletes Work it Out!

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Disclosures
• No financial relationships exist between me and any companies with products which are described in this presentation.

What’s in a Name?
• 1983-Vocal cord dysfunction-VCD
• 1999-Irritable larynx syndrome-ILS
• 2004-Paradoxical vocal fold motion-PVFM
• 2010-Periodic occurrence of laryngeal obstruction-POLO

A respiratory condition characterized by episodic laryngeal closure with chief complaints of noisy breathing and SOB and variable secondary symptoms including cough, throat and chest tightness, and voice changes among others.

VCD Demographics
• Documented in patients from infancy to geriatrics
• Female: Male -2:1 to 3:1
• Early reports of young white female with psych disorders as typical
• 14% severely asthmatic children have VCD
• 15% military personnel with exertional dyspnea
• 3% intercollegiate athletes with EIA
• 5% elite athletes with inspiratory stridor with exertion

Athletes with VCD present unique challenges
• Documented in athletes of all skill levels.
• In 370 elite athletes, 5% had inspiratory stridor suggestive of VCD. (Rundell, 2003)
• Often co-occurs with exercise-induced bronchospasm (EIB).
• Vocal fold narrowing seen in EIB episodes.

Athletes with asthma
• Airway hyper-responsiveness (asthma) is the most common chronic medical condition experienced by both Summer and Winter Olympic athletes.
• High ventilation during exercise and/or environmentally unfavorable conditions may cause injury to the airway epithelium during high-level exercise.
• Repeated injury and repair process of the epithelium could lead to structural and functional changes within the airways and be the underlying cause for the development of asthma. (Kippelen, et.al, 2012)

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Etiological issues in Athletes

- Laryngeal irritants:
  - GERD
  - PND
  - Chemical inhalants
  - Environmental irritants

Etiological Issues in Athletes

- Behavioral /Phonatory
  - Voice use profiles
  - Employment
  - Extra-curricular activity

Etiological Issues in Athletes

- Psychogenic contribution
  - Conversion reaction
  - Coexisting psychological/psychiatric conditions
  - Continued symptoms increase emotional stress during performance
  - Labored breathing is concerning to teammates and coaches

Differential Diagnosis

Must Rule These Out First!

- Structural abnormalities
- Inflammatory process/lesions
- Neurologic impairment
- Deconditioning/poor fitness
- Asthma

Rule Out Asthma

- Pulmonary function test-PFT
  - Negative methacholine challenge in VCD
  - Flattened inspiratory loop in VCD
  - Increased ratio between forced expiratory flow and forced inspiratory flow (FEF/FIF) in VCD
- Laryngoscopy—normal in asthma
- CT scan—hyperinflation and peribronchial thickening in asthma; NL in VCD
- Arterial Blood Gas (ABG)—hypoxemia and hypercapnia in asthma; NL in VCD
- O2 saturation: reduced in asthma; NL in VCD

Flow-Volume Loop

“Truncated” or “saw toothed” inspiratory loop can be indicative of VCD

*Adapted for Nurse Practitioners, Detecting Vocal Cord Dysfunction in Athletes. A 12-year-old girl with labored breathing in a VCD. NAA. 2010. By Melinda F. Miller, NP.*
Rule Out Asthma

- Misdiagnosis of VCD as asthma leads to:
  - Intubation
  - Multiple unnecessary asthma medications
  - Increased utilization of subspecialty care and comparable use of prescriptions, hospitalizations, and urgent care visits for VCD compared to moderate persistent asthma.
  - Increase/prolong athlete’s anxiety
  - Delay or exclude athletic participation


Structural & Inflammatory Lesions: Papilloma & Reinke’s Edema

Subglottic Stenosis/Laryngomalacia

Rule in VCD

Tracheal stenosis or VCD?

Neurological-Bilateral Vocal Fold Paralysis

Exercise induced anaphalaxis

- Rare potentially life threatening syndrome
- Sensitivity reaction involving skin, respiratory tract, cardiovascular and GI systems.
- +/- associated with food
  - Barg, et al 2011

- Clinical history and physical exam
- Acute tx with epinephrine, antihistamines, and systemic corticosteroids.
- Pathophysiology: histamine release
Case History: Patient Reports

Trouble with inhalation > exhalation
Tightness or closing down in throat +/- chest
Specific triggers
Specific contexts
Recent exposure to specific chemicals or URI
Refractory period for exercise
Quick onset, quick resolution
Poor response to inhalers

Typical Case Histories

- Post URI/intubation
- Chronic refractory cough for months
- Frequent episodic attacks causing dyspnea
- Asthma-like symptoms refractory to steroid or bronchodilator
- Worsened with perfume, smoke, strong odor
- Diagnosis of GERD/LPR and on PPI
- Allergy/PND/Sinus issues
- Exercise induced
- Stress/Anxiety/Tension

Endoscopic Evidence of VCD

Approximation of TVF
Approximation of true vocal folds with posterior glottic chink

Approximation of Ventricular Folds
Right arytenoid and left ventricular fold
Contact of tissue overlying the left arytenoid and epiglottis

Acute Therapy

- Reassurance
- Panting
- Heliox
- IPPV and CPAP
- Benzodiazepines
- General anesthetic injection
- Intralaryngeal injection of botulinum toxin type A
- Bronchodilators/oxygen/corticosteroids are ineffective for relief in patients with PVCM

Goals of Treatment: Education

- Review normal/abnormal laryngeal physiology using visual feedback to change aberrant movement patterns.
- Name the disease-claim the disease!
- Reassures that it’s not all in their head!
- Educate all key players.
**Goals of Treatment: Education**

- Reassure that condition is treatable.
- Develop their “bag of tricks”.
- Identify triggers that exacerbate the problem.
- Teach avoidance of panic.
- Motivate patient to follow recs. with quick success.

**Relaxation Techniques**

- Relaxation exercises
  - Relax oropharyngeal muscle groups as well as neck, shoulders, and chest.
  - Teach awareness of tension vs relaxation.
  - Train release of specific tension (ie breath holding, jaw clenching, shoulder raising).
  - Sport specific patterns

**Retraining Breathing**

- Relaxed Throat Breathing Techniques
  - Reduce tension in extrinsic laryngeal musculature and allow intrinsic laryngeal musculature to release from the constricted pattern
  - Concentrate on active exhalation utilizing abdominal muscles and minimize chest/neck tension.
  - Begin in supine/semi-reclined in quiet environment.
  - Use tactile, verbal and visual biofeedback (mirror)
  - Teach distraction

**Then Incorporate... Open Throat Posturing**

- Relaxed Throat Breathing Techniques:
  - Tongue on FOM behind the lower front teeth and inhales with gently closed lips as the abdomen expands. Exhale with a gentle “s” or “th” sound as the abdomen returns to resting state.
  - Make “lots of space” in the back of the throat
  - “Picture the vocal folds being wide open”
  - “Don’t hold your breath”

**Breathing easier during exercise**

- Pursed lip breathing-oral inhale for max. flow
- Positioning- bending forward
- Paced breathing-walking; stair-climbing
- Desensitization-music to distract
- Maneuvers- quick sniff, drop jaw/tongue
- Rescue breathing

**Patient Monitoring of Breathing**

- Increase their awareness of breathing
  - Keep a daily journal of breathing and activities
  - Note any breath holding
  - Generalize to other situations
Respiratory Pattern is Sport Specific

- Swimmers
  - Reactivity to chlorine, carry over in to pool with supervision, pace inhalation with stroke
- Runners
  - Easy due to rhythm of sport, consider nasal allergies, watch breath holding
- Basketball
  - Cognitively demanding, involves bending from waist, start carryover in least demanding situation and advance.

Adapt breathing to specific needs

Exhale on the Action

Cross train in activity with rhythmic breathing patterns

Inspiratory Muscle Strength Training (IMST)

Athletic Trainers address sport specific technique
Sport Psychologist

- Arousal regulation
- Goal setting
- Imagery
- Self talk
- Pre-performance routine

Physical Therapist

- Comprehensive assessment of physical functioning.
  - UE or LE weakness or reduced ROM
  - Pain issues
  - Associated arm, shoulder, and rib cage movements
  - Elevate shoulders (at rest, and/or during running activities)
  - Limited rib cage mobility ("locks rib cage" for stability)
  - Cervical spine issues
  - Cardiovascular conditioning
  - Breathing retraining

Case Examples

- 34 year old female tri-athlete
- 16 year old male cross country runner
- 6 year old female hates PE
- 15 year old female Jr. Olympic tennis player
- 20 year old female collegiate cheerleader
- 17 year old male HS football player
- 48 year old female exercises for fitness/rec.

Case 1: Three Cheers for Cheerleaders

History
- 20 year old female with life long SOB with cheerleading or running.
- Frequent fainting at end of routine
- DX with VCD at 14 with 1 yr of tx without benefit.

Assessment
- ENT:
- Allergy/Asthma:
- Speech Pathology:
- Physical Therapy:

Pre-Post Exercise

Borg Perceived Exertion Scale

- 6 - 20% effort
- 7 - 30% effort - Very, very light
- 8 - 40% effort
- 9 - 50% effort - Very light
- 10 - 55% effort
- 11 - 60% effort - Fairly light
- 12 - 65% effort
- 13 - 70% effort - Somewhat hard
- 14 - 75% effort
- 15 - 80% effort - Hard
- 16 - 85% effort
- 17 - 90% effort - Very hard
- 18 - 95% effort
- 19 - 100% effort - Very, very hard
- 20 - Exhaustion
Case 2: Running on Empty

- Source of referral: Allergist
- 15 year old; Male; “A” student
- Sophomore member of cross country team
- Desires college scholarship in track
- Severe SOB at 2.5 miles with stridor; becomes faint and dizzy
- Pulmonologist: “Exercise Induced Asthma” rx meds: prednisone, flovent, singulair, albuterol, theophylline
- Cardiologist: No abnormality
- Psychologist: Stress issues
- Allergist: Allergies to many FL aeroallergens. PFT → VCD

Evaluation

- Laryngeal Exam: WNL
  - No reduplication of symptoms during SLP exam.
- PT eval with SLP present
  - Stridor on treadmill at 2.5 miles.
  - Excessive use of accessory muscles.
  - Responded to rescue breathing.

Treatment

- Behavioral Techniques
  - Laryngeal relaxation
  - Drop jaw/tongue
- IMST
- Physical Therapy
- School coach and Athletic trainer
- Parents

MIP: Pre- and Post- IMST

Case 3: Lean on Me

History

- 34 year old female PE teacher and Tri-athlete
- Intense competitor
- Trains only with males
- MVA with chest injury

Assessment

- ENT:
- Asthma/Allergy:
- Pulmonology:
- Cardiology:
- Speech Pathology:
- Physical Therapy:

Treatment

- Behavioral Techniques
  - Laryngeal relaxation
  - Listening
- PT eval with SLP present
  - Symptoms on UE cycle at 10 minutes
  - Asymmetric UE/shoulder strength
  - Equipment analysis
- IMST
- Physical Therapy
- Psychologist
  - Abuse counseling
  - Sports psychology
Case 4: Back to School Blues

History:
- 6 year old female with sudden onset SOB/sighing 1 week after school begins.
- Usually occurs at PE/recess.
- Younger sister excels at gymnastics/dance.

Assessment:
- Pediatrician:
- Allergy/Asthma:
- Speech Pathology:
- School counselor:

References


