Asthma and Vocal Cord Dysfunction

Symposium 6

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Objectives

- Understand common presentations of vocal cord dysfunction and closely related disorders
- Understand keys to diagnosis as well as the pitfalls often encountered from patient history, spirometry, laryngoscopy
- Understand accepted treatment approaches for vocal cord dysfunction
- Appreciate the need for consensus regarding terminology and the need for prospective controlled study of this disorder.
Outline

- Background
- Phenotypes
- Diagnosis
- Treatment
VCD: Early Reports

1974  Downing et al: “Factitious Asthma”

1982  Patterson et al: “Munchhausen’s Stridor”

Other terminology:

- Pseudoasthma
- Nonorganic airway obstruction
- Functional upper airway obstruction
- Spasmodic croup
- Emotional laryngeal wheezing
- Psychogenic upper airway obstruction
- Episodic laryngeal dyskinesia
- Episodic laryngeal obstruction
- Psychogenic stridor
- Episodic paroxysmal laryngospasm
- Irritable larynx syndrome
- Paradoxical vocal fold motion
“POLO”

Periodic Occurrences of Laryngeal Obstruction

Recently proposed name to replace the term VCD

Morris MJ, Christopher KL Chest 2010;138:1213-13
Vocal cord dysfunction presenting as asthma


- 5 patients (4 female).
- None had BHR
- Adduction of glottis with “posterior chink”
- Responsive to speech therapy
Proposed VCD Diagnostic Criteria

- The diagnosis is best established by flexible fiberoptic laryngoscopy
- Paradoxical motion of the vocal cords
  - Anterior adduction with posterior chink
  - More common to see adduction without chink
- Paradoxical motion occurs during inspiration or during both inspiratory and expiratory phases

Rhinolaryngoscopy

- Normal laryngeal anatomy and physiology
Rhinolaryngoscopy

A. Inspiration                  B. Phonation                  C. Sniff
National Heart, Lung, and Blood Institute

National Asthma Education and Prevention Program

Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma

Full Report 2007
Vocal Cord Dysfunction

- VCD can mimic asthma, but it is a distinct disorder
- VCD may coexist with asthma
- Asthma medications typically do little, if anything, to relieve VCD symptoms
- Variable flattening of the inspiratory flow volume loop on spirometry is strongly suggestive of VCD
- Diagnosis of VCD is from indirect or direct vocal cord visualization during an episode, during which abnormal adduction can be documented
- VCD should be considered in patients with difficult-to-treat, atypical asthma and in elite athletes who have exercise related breathlessness unresponsive to asthma medication

Guidelines for the Diagnosis and Management of Asthma
NHLBI NAEPP EPR 3
November, 2007
Outline

- Background
- Phenotypes
- Diagnosis
- Treatment
A word about Clinical Phenotypes

- **Asthma**
  - 4 year old with itchy eyes, runny nose, sneezing and wheezing in late spring during the peak of grass pollen
  - 48 year old without prior atopy who has severe respiratory infection followed by chronic wheezing, dyspnea, and reversible airflow obstruction controlled by the combination of continuous ICS and PRN SABA

- **VCD**
  - 15 year old non-atopic elite soccer player with episodic exercise-induced stridor
  - 45 year old with history of chronic anxiety/depression and recurrent dramatic episodes of dyspnea, stridor and multiple intubations
VCD adult phenotype: National Jewish Adult VCD Series

Newman et al
AJRCCM 152:1382 1995

- All VCD patients from 1984 to 1991 (95)
  - 42 VCD alone
  - 53 VCD + asthma
  - 42 control subjects with severe asthma
### VCD: National Jewish Series
Newman, et al
AJRCCM 152:1382 1995

<table>
<thead>
<tr>
<th></th>
<th>VCD</th>
<th>VCD + Asthma</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of Sx</td>
<td>4.8 +/- 5.2</td>
<td>14.1 +/- 13.9</td>
<td>15.7 +/- 13.8</td>
</tr>
<tr>
<td>Prednisone dose</td>
<td>29.2 +/- 28.7</td>
<td>21.31 +/- 23.6</td>
<td>25.5 +/- 25.3</td>
</tr>
<tr>
<td>Years of prednisone</td>
<td>4.3 +/- 10.9</td>
<td>4.0 +/- 4.1</td>
<td>3.3 +/- 5.4</td>
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<tr>
<td>ER visits in previous yr</td>
<td>9.7 +/- 7.9</td>
<td>5.5 +/- 6.2</td>
<td>4.5 +/- 4.8</td>
</tr>
<tr>
<td>Admits in previous yr</td>
<td>5.9 +/- 6.1</td>
<td>6.7 +/- 11.9</td>
<td>3.1 +/- 4.7</td>
</tr>
<tr>
<td>Intubated</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
Psychiatric Disturbance in 42 VCD patients without asthma

- 73% axis I diagnosis (38% abused)
- 37% axis II diagnosis
- 21% psychiatric Hospitalization

Only psychiatric hospitalizations were significantly different from controls
# Adolescents with VCD Mimicking EIB

<table>
<thead>
<tr>
<th>Age/Sex</th>
<th>Presenting Symptoms</th>
<th>Sport</th>
<th>EIB</th>
<th>Psychiatric Diagnosis</th>
<th>Academic Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/F</td>
<td>Throat tightness, Dyspnea</td>
<td>BB, VB, Tr</td>
<td>No</td>
<td>----</td>
<td>A</td>
</tr>
<tr>
<td>12/F</td>
<td>Throat tightness, Dyspnea</td>
<td>Sw, Ch</td>
<td>Yes</td>
<td>Anxiety</td>
<td>A</td>
</tr>
<tr>
<td>14/F</td>
<td>Throat tightness, Cough</td>
<td>Tae Kwon Do</td>
<td>No</td>
<td>Anxiety &amp; Depression</td>
<td>A</td>
</tr>
<tr>
<td>12/F</td>
<td>Throat/Chest tightness</td>
<td>S, SB</td>
<td>No</td>
<td>----</td>
<td>A</td>
</tr>
<tr>
<td>15/M</td>
<td>Throat/Chest tightness</td>
<td>Tr, FB</td>
<td>No</td>
<td>----</td>
<td>A</td>
</tr>
<tr>
<td>16/F</td>
<td>Voice changes, Wheezing</td>
<td>Sw, Tr</td>
<td>No</td>
<td>Depression</td>
<td>A</td>
</tr>
<tr>
<td>18/F</td>
<td>Throat tightness, Wheezing</td>
<td>VB</td>
<td>No</td>
<td>----</td>
<td>A</td>
</tr>
</tbody>
</table>

Landwehr et al, Pediatrics 1996; 88:971
Normal Larynx

1. Vocal cords
2. False vocal cords
3. Arytenoids
4. Interarytenoid space
5. Epiglottis
VCD “anatomic” Phenotype

Examples

#1

exhalation

inhalation

#2
# Clinical Findings from the VCD Literature

**Morris MJ, Christopher KL** Chest 2010;138:1213-13

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 18 yo</td>
<td>792 (70%)</td>
</tr>
<tr>
<td>&lt;18 yo</td>
<td>339 (30%)</td>
</tr>
<tr>
<td>% female</td>
<td>70%</td>
</tr>
<tr>
<td>Exercise</td>
<td>269 cases</td>
</tr>
<tr>
<td>Psychiatric/emotional factors</td>
<td>270 cases</td>
</tr>
<tr>
<td>GERD</td>
<td>267 cases</td>
</tr>
<tr>
<td>Chemical irritants</td>
<td>103 cases</td>
</tr>
<tr>
<td>URI</td>
<td>98 cases</td>
</tr>
</tbody>
</table>
Irritable Larynx Syndrome: Spectrum of Cough to VCD

Bucca, Rolla, Brussino, Oliva, Bugiani in Allergy, Lancet, JACI
Chronic Laryngopharyngeal Acid Reflux: Indirect Signs*

*not pathognomonic for LPR

Erythema

Interarytenoid edema
VCD: Anxiety and other Psychiatric Issues

- Anxiety – cause or effect?
  - Some patients have conversion disorder
  - Others appear to have PTSD pattern
    - Hx of sexual abuse
  - Associated with health care professionals and family members
  - Diagnosis of asthma, concern about asthma, side effects of asthma medications
  - Others no primary psychopathology (e.g. adolescent)
  - Perfectionist or obsessive/compulsive tendencies

- Controlled studies necessary but near impossible
Outline

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- Phenotypes
- **Diagnosis**
- Treatment
Vocal Cord Dysfunction

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Spirometry and Flow Loop

- FEV1 (88% of predicted), no bronchodilator response

Flattened inspiratory loop
Spirometry and Flow Volume Loops: Variable extra-thoracic obstruction

FEV₁  3.65 (99%)
FVC   3.71 (96%)
FEV₁ / FVC .98
FEF₂₅-₇₅ 6.15 (155%)
FEF₅₀ / FIF₅₀ 4.33
Comparison of spirometry and laryngoscopic findings in 226 patients evaluated for VCD

- Included retrospective flow volume loop interpretation by 3 pulmonologists blinded to laryngoscopy result

Watson et al. Respiratory Care 2009 54(4):467-473
Clinical and Lung Function Variables Associated with VCD

Watson et al. Respiratory Care 2009 54(4):467-473

RESULTS

- 100 confirmed to have VCD via laryngoscopy
- Inspiratory flow volume loop was normal in the Majority of confirmed VCD cases
- Roughly 1/3 of cases without VCD were judged to have truncated inspiratory loop
- Authors’ conclusions:
  - VCD remains difficult to predict with spirometry or flow-volume loops.
  - If VCD is suspected, normal flow-volume loop patterns should not influence the decision to perform laryngoscopy
## Exercise Challenges for Evaluating EIB versus VCD

<table>
<thead>
<tr>
<th></th>
<th>Pro</th>
<th>Con</th>
</tr>
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</table>
| **Bicycle ergometer/treadmill** | • Continuous monitoring  
• Potential for continuous laryngoscopy  
• Standardized EIB protocols available | • Symptoms often not reproduced |
| **Free running**     | • Allows more complex exercise intensity  
• More likely to reproduce symptoms | • Less amenable to continuous cardiac monitoring  
• Less standardized |
Confirming VCD Diagnosis

- Baseline laryngoscopy (poor sensitivity)
- Symptom provocation followed by laryngoscopy
  - Exercise (treadmill, bicycle ergometer, free running)
  - Methacholine challenge
  - Mannitol challenge
  - Irritant (perfume, household cleaners)
Outline

- Background
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VCD: Acute Treatment

- Reassurance
- Panting, sniffing, pursed lip breathing
- Heliox
- Sedation
- Botox (more often used for spastic dystonia)
VCD: Chronic Management

- Patient education
- Speech Therapy
- Discontinue unnecessary medications
- Treat Comorbid diagnoses
  - GERD – high dose PPI x 3-4 months*
  - Post Nasal Drip
  - Psychiatric Dx: consider psychotherapy, pharmacotherapy

* not FDA approved indication
Speech Therapy for VCD

- Pursed lip breathing during exhalation
- Lower jaw thrust during inhalation
- Diaphragmatic breathing
- Relax muscles of neck, shoulders, chest
- Focus on exhalation
- Selected centers able to perform laryngoscopy with video monitor for biofeedback during treatment
Summary

- VCD is a heterogeneous disorder that should probably have a different name.
- There are several ways to evaluate patients suspected of having VCD.
- Spirometry is helpful but is neither a sensitive nor specific way to confirm VCD.
- GERD, post nasal drip, and/or psychiatric illness are common comorbidities that may require treatment.
- Speech therapy is the standard treatment for VCD, though it remains to be validated.