

**Welcome to this  
SpeechPathology.com  
Live Expert e-Seminar!**

**Using Spirometry to Diagnose and Treat  
Vocal Cord Dysfunction**

Presented By:  
**Bridget Russell, Ph.D., CCC-SLP**

Moderated By:  
**Amy Hansen, M.A., CCC-SLP, Managing Editor, SpeechPathology.com**

Please call technical support if you require assistance  
1-800-242-5183

---

---

---

---

---

---

---

---

**Live Expert eSeminar**

**ATTENTION! SOUND CHECK!**  
**Unable to hear anything at this time?**  
Please contact Speech Pathology for technical support at  
**800 242 5183**

**TECHNICAL SUPPORT**  
**Need technical support during event?**  
Please contact Speech Pathology for technical support at  
**800 242 5183**  
Submit a question using the Chat Pod - please include your  
phone number.

---

---

---

---

---

---

---

---

**Earning CEUs**

**EARNING CEUS**

- Must be logged in for full time requirement
- Must pass short multiple-choice exam

**Post-event email within 24 hours regarding the CEU exam (ceus@speechpathology.com)**

- Click on the "Start e-Learning Here!" button on the SP home page and login.

**•The test for the Live Event will be available after attendance records have been processed, approximately 3 hours after the event ends!**

- Must pass exam within 7 days of today
- Two opportunities to pass the exam

---

---

---

---

---

---

---

---

## Peer Review Process

Interested in Becoming a Peer Reviewer?

**APPLY TODAY!**

•3+ years SLP Clinical experience  
Required

• Contact: Amy Natho at  
[anatho@speechpathology.com](mailto:anatho@speechpathology.com)



---

---

---

---

---

---

---

---

## Sending Questions



Type question or comment  
and click the send button

---

---

---

---

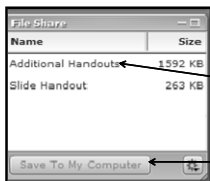
---

---

---

---

## Download Handouts



Click to highlight handout

Click Save to My Computer

---

---

---

---

---


---

---

---

**USING SPIROMETRY TO DIAGNOSE AND TREAT  
VOCAL CORD DYSFUNCTION**

Bridget A. Russell, Ph.D., CCC-SLP  
Associate Professor  
Department of Communication Disorders & Sciences  
State University of New York at Fredonia



---

---

---

---

---

---

---

---

**VOCAL CORD DYSFUNCTION- OTHER NAMES**

- o Paradoxical Vocal Fold Motion
- o Paradoxical vocal cord motion
- o Episodic paroxysmal laryngospasm
- o Factitious asthma
- o Munchausen's stridor
- o Psychogenic stridor
- o Episodic laryngeal dyskinesia
- o Adductor laryngeal breathing dystonia

---

---

---

---

---

---

---

---

**VOCAL CORD DYSFUNCTION- DEFINED**

- o Inappropriate adduction or closure of the true vocal folds during inspiration and/or expiration.
- o May result in upper airway obstruction and laryngeal stridor.
- o Often misdiagnosed as asthma

---

---

---

---

---

---

---

---

DIFFERENTIAL DIAGNOSIS- SYMPTOMS

Asthma

- Multiple triggers
- Chest tightness
- Wheezing with expiration
- Response to bronchodilators
- Nocturnal awakening common
- Unlikely to return after resuming activity

VCD

- Typically one trigger
- Throat tightness
- Stridor with inhalation
- No response to bronchodilators
- Rare nocturnal events
  - *Pediatric exceptions*
- Likely to return after resuming activity

---

---

---

---

---

---

---

---

SYMPTOMS

- Hyperfunctional laryngeal behaviors
- Acute upper airway obstruction
- Dysphonia/aphonia
- Dyspnea
- Dysphagia
- Cough
- Laryngeal stridor
- Laryngeal muscle tension patterns

---

---

---

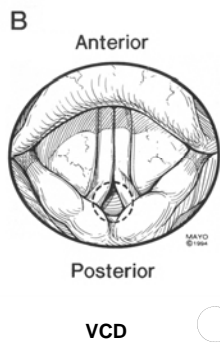
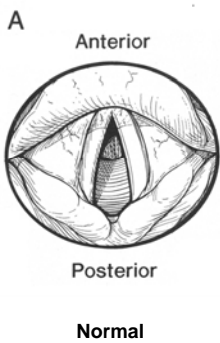
---

---

---

---

---



---

---

---

---

---

---

---

---

### VIDEOLARYNGOSTROSCOPIC EVALUATION

o VCD case example



### Posterior Glottal Chink



(Sandage, 2004)

Courtesy of Brian Sano, MD, Buffalo, NY  
Otolaryngological Group, Buffalo, NY

---

---

---

---

---

---

---

---

### DEMOGRAPHICS

- o Documented in males and females of all ages
- o More frequently female
- o Most patients fall between 10-40 years of age
- o Documented in infants as young as four months
- o Affects athletes
  - 5% prevalence of inspiratory stridor in elite Olympic athletes (Rundell & Spiering, 2003)
- o Average of 4 years from onset to point of accurate diagnosis



---

---

---

---

---

---

---

---

### PRIMARY ETIOLOGIES

1. Upper airway sensitivity to laryngeal irritants
  - GERD/LPR
  - Allergens/inhaled irritants
    - Excitation of chemoreceptors in the olfactory passages and pharynx due to irritation (Morrison et al, 1999)
  - Post nasal drip
2. Psychological conditions
  - Conversion disorders (Martin, Blager, Gay & Wood, 1987 as cited by Goldman & Muers, 1991; Andrianopoulos, Gallivan & Gallivan, 2000)
3. Laryngeal dystonia
  - Neurological basis (Morrison et al, 1999; Treole, Trudeau & Forrest, 1999)
4. Viral infection (Andrianopoulos et al, 2000; Altman, Mirza, Ruiz & Sataloff, 2000)



---

---

---

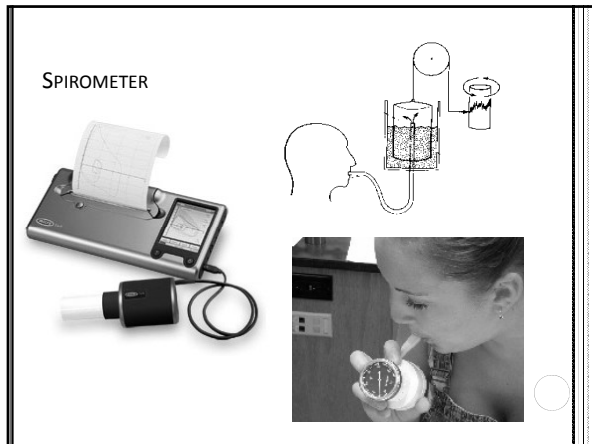
---

---

---

---

---




---

---

---

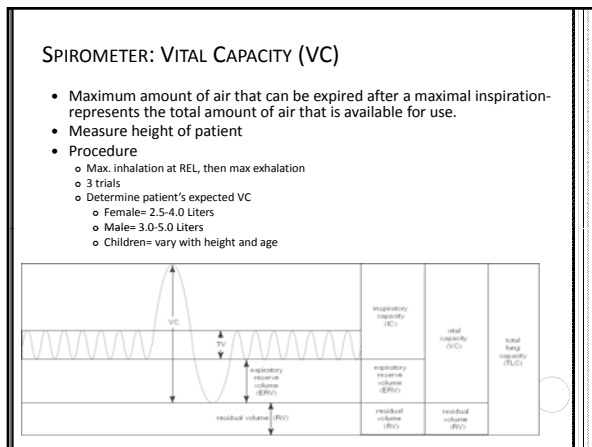
---

---

---

---

---




---

---

---

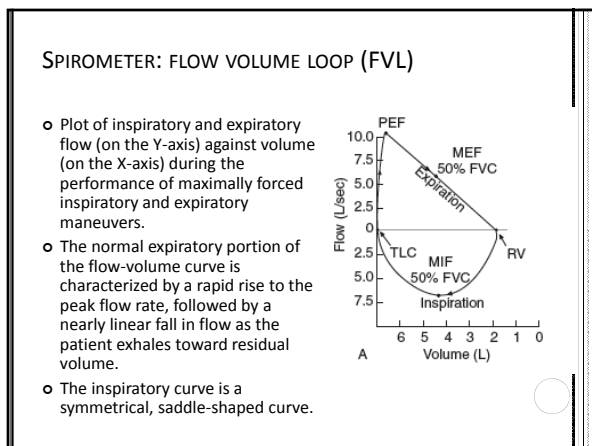
---

---

---

---

---




---

---

---

---

---

---

---

---

SPIROMETER: CASE EXAMPLE

Vital Capacity

Flow Volume Loop



---

---

---

---

---

---

---

---

---

---

VITAL CAPACITY



---

---

---

---

---

---

---

---

---

---

FLOW VOLUME LOOP



---

---

---

---

---

---

---

---

---

---

WHY USE FLOW VOLUME LOOPS?

- Examining shape of the loop, helps understand the way air is moving into and out of the lungs.
- Helps identify specific diseases that are hard to diagnose.
- Results of testing tell us what is happening throughout the lung.
  - obstructive lung /airway disorders (upper/lower)
  - degree of the disease
  - emphysema, asthma and chronic bronchitis




---

---

---

---

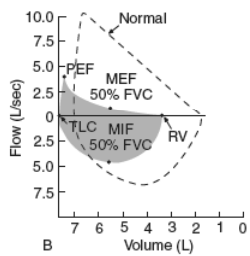
---

---

---

---

FLOW VOLUME LOOP: OBSTRUCTIVE DISEASE



Emphysema & Asthma:

- All flow rates diminished
- Expiratory prolongation predominates
- MEF < MIF
- Lower airway obstruction

---

---

---

---

---

---

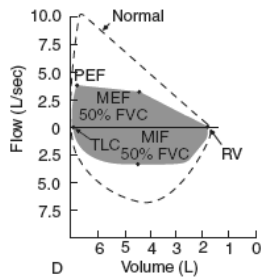
---

---

FLOW VOLUME LOOP: FIXED OBSTRUCTION OF THE AIRWAY

Tracheal Stenosis:

- Top and bottom flattened
- Limits Insp and Exp equally
- MEF = MIF




---

---

---

---

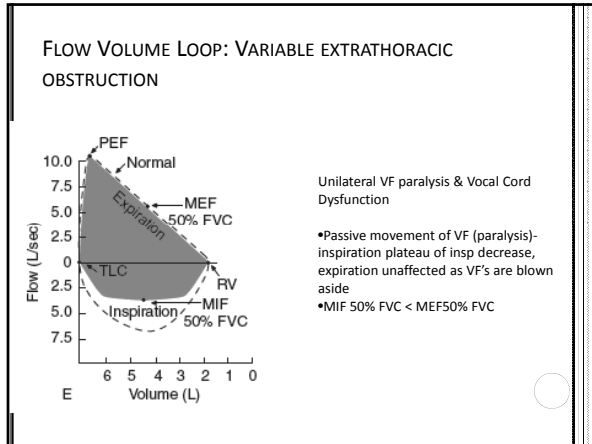
---

---

---

---





---

---

---

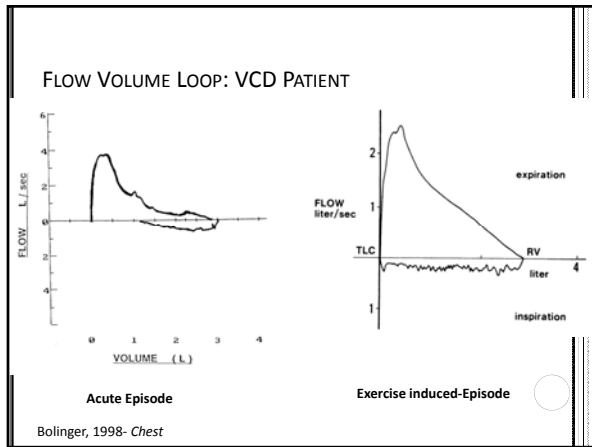
---

---

---

---

---



---

---

---

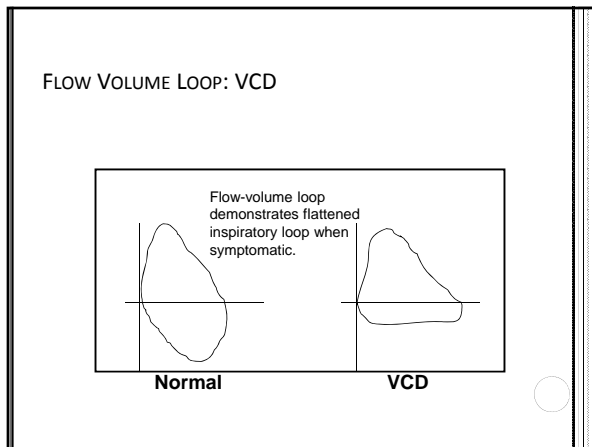
---

---

---

---

---



---

---

---

---

---

---

---

---

FLOW VOLUME LOOP: RESULTS

- Truncated inspiratory loop suggesting extrathoracic obstruction
- Cannot differentiate between behavioral laryngeal obstruction and laryngeal mass/anomaly
- Failure with empiric treatment for asthma



---

---

---

---

---

---

---

---

TREATMENT: CHANGE CURRENT RESPONSE

o **Teach /Trigger/Apply**

o **Rescue Strategies**

- Release and control techniques that provide behavioral techniques that generate a mechanical response
  - o Nasal Inspiration with pursed lip expiration
  - o Panting
  - o Lip Trills – steady tone, glides



---

---

---

---

---

---

---

---

TREATMENT: CHANGE CURRENT RESPONSE



o **Rescue Strategies**

- Lingual extension/stretches
  - o To release tension
  - o Forward carriage facilitates airflow over the base of tongue
- Say "Duh" to drop jaw and tongue
- Monitor Posture/Tension
  - o Jaw/Tongue/Neck/Shoulders/Arms/Base of Support



---

---

---

---

---

---

---

---

TREATMENT: CHANGE CURRENT RESPONSE

o Trigger the symptoms

- Stationary bike

o Apply the strategies

- Will need to cue to apply and continue to use rescue strategies as needed
- Maneuver patient through tasks/strategies based on symptoms noted during the triggering of the VCD




---

---

---

---

---

---

---

---

Triggering VCD Episode




---

---

---

---

---

---

---

---

TREATMENT: TRIGGERING



Equipment array (Vista Mini-CPX System - Vacumetrics Inc./Vacu-Med Division, model number 13670; Speech, Harn Rad-31b mouth/nasal breathing facemask, model number KM101; elastic head-strap; patient positioning during baseline and treatment sessions.

- o **Protocol:**
  - Facemask fitted over subject's mouth and nose
  - Subject instructed to pedal on stationary bicycle at regulated rate while ventilatory measures were collected
- o **Respiratory Retraining Protocol:**
  - Regulated closed mouth/nasal inspiration
  - Regulated pursed lip expiration
  - Continued retraining until resolution of VCD episode




---

---

---

---

---

---

---

---

TREATMENT: ENVIRONMENTAL CONSIDERATIONS

- o Need space to tax the patient
- o Helpful to have access to exercise equipment, treadmill, arm bike, bike
- o Used pool for swimmers, exposure to "smells" also helpful for those who trigger because of odors
- o Appropriate tools and space to simulate/re-create as best as possible



---

---

---

---

---

---

---

---

TREATMENT: RELAXATION

- o Laryngeal Massage (Aronson, 1990)
  - o Hyoid Release (Roy, 1993)
  - o Lingual Stretch/Massage
  - o Attention to Oral Posture
- Use these techniques prior to activity during the "red flag moments" and/or when triggered*



---

---

---

---

---

---

---

---

Laryngeal Massage



---

---

---

---

---

---


---

---

TREATMENT: RESPIRATORY CONTROL

o **Respiratory Techniques:**

- Exhalation then inhalation
- Cyclical breathing
- Timing, pacing, rhythm
- Ability to change rhythm with activity  
(ie. Walk vs. jog vs. sprint)
- General awareness of abdominal support, helpful to work supine



---

---

---

---

---


---

---

---

TREATMENT: RESPIRATORY CONTROL

- o Increase level of difficulty incrementally
- o Provide distraction training
- o Provide home exercise program
- o Use of gait belt or abdominal binder helpful to feel exhalation
- o Identify breath holding
- o Teach cyclical breathing
- o Increase awareness of airflow over base of tongue ("h" words may help)
- o Amount of direct instruction is case dependent: age, self-awareness, level of athletic ability, willingness



---

---

---

---

---


---

---

---

TREATMENT: INCREASE TASK INTENSITY WITH USE OF STRATEGIES

- o Increase:
  - Rate of activity
  - Length of activity
  - Complexity of activity
- o Vary the time of day
- o Simulate suboptimal conditions
  - Heat, cold, fatigue, odors



---

---

---

---

---

---

---

---

### SPIROMETER USE IN TREATMENT

- o During triggering activities (i.e. bike): Pre measures
- o During treatment techniques (i.e. nasal sniff): Post measures



---

---

---

---

---

---

---

---

### PROTOCOL

- o **Baseline:** Take FVL's before, during & after episode
- o **Treatment:** trigger episode, FVL, start intervention, FVL
- o **Treatment:** identify trigger prior to episode, employ control strategies, FVL



---

---

---

---

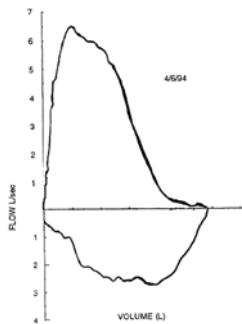
---

---

---

---

### RESOLVED VCD EPISODE: POST THERAPY



---

---

---

---

---

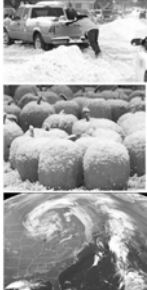
---

---

---

THANK YOU SPEECH PATHOLOGY.COM!

- o Back to Western New York!



Say it ain't so Pete, not 8 more weeks of winter?



---

---

---

---

---

---

---

---