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Vocal Cord Dysfunction (VCD): Evidence-Based Treatment

Bridget A. Russell, PhD, CCC-SLP

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator, SpeechPathology.com

Need assistance or technical support?

- Call 800-242-5183
- Email customerservice@SpeechPathology.com
- Use the Q&A pod

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How to earn CEUs

- Must be logged in for full time requirement
- Log in to your account and go to Pending Courses
- Must pass 10-question multiple-choice exam with a score of **80%** or higher
  - Within **7 days** for live webinar; within **30 days** of registration for recorded/text/podcast formats
- Two opportunities to pass the exam

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Interested in Volunteering to be a Peer Reviewer?

- APPLY TODAY!
- 3+ years SLP Professional Experience Required
- Contact Amy Natho at anatho@SpeechPathology.com

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Vocal Cord Dysfunction (VCD): Evidenced-Based Treatment

Bridget A. Russell, PhD, CCC-SLP
Associate Professor
State University of New York Fredonia

SUNY FREDONIA

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Learning Objectives

After this course, participants will be able to

- Define the population most often diagnosed with VCD.
- Identify symptoms and etiologic factors of VCD
- Describe effective strategies used to treat VCD.

8

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Vocal Cord Dysfunction- Other Names

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

9

CONTINUED

Vocal Cord Dysfunction- Defined

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

Video: Videostroboscopy of VCD Episode

- https://vimeo.com/84887182

10

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Differential Diagnosis- Symptoms

Asthma	VCD
• Multiple triggers • Chest tightness • Wheezing with expiration • Response to bronchodilators • Nocturnal awakening common • Unlikely to return after resuming to activity	• Typically one trigger • Throat tightness • Stridor with inhalation • No response to bronchodilators • Rare nocturnal events • *Pediatric exceptions* • Likely to return after resuming activity

11

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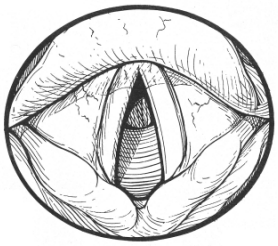
Video with permission from Dr. Christopher Chang

www.FauquierENT.net https://youtu.be/gmNwpJf1zUQ

A **Normal**

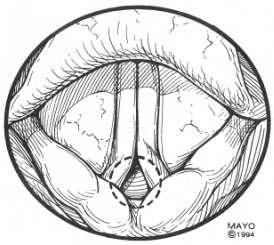
Anterior



Posterior

B **VCD**

Anterior



Posterior

12

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Demographics

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

13

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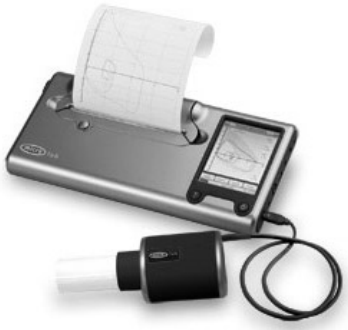
Spirometry use in Treatment

- https://youtu.be/K7bFxiHCwxM
- https://youtu.be/CLj_SZF8xnw



14

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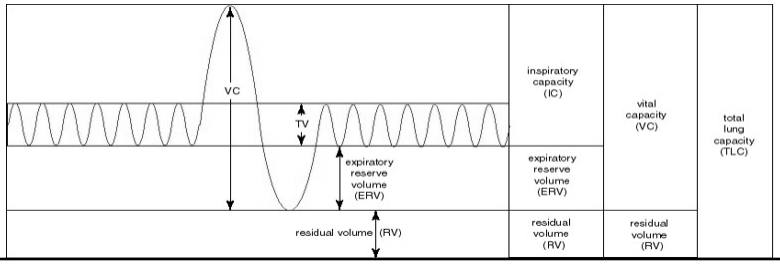
Spirometer: Vital Capacity (VC)

- Maximum amount of air that can be expired after a maximal inspiration- represents the total amount of air that is available for use.
- **Not** used for treatment (only baseline and post treatment)
- Procedure
  - Max. inhalation at REL, then max exhalation
  - 3 trials
  - Determine patient's expected VC
    - Female= 2.5-4.0 Liters
    - Male= 3.0-5.0 Liters
    - Children= vary with height and age



15

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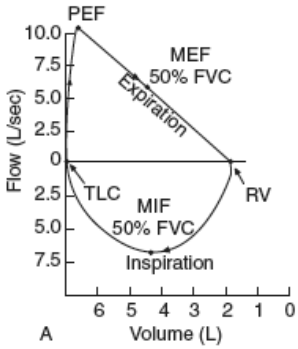
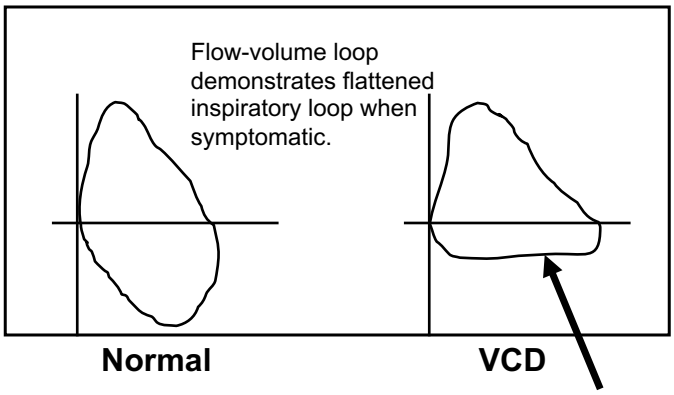
Spirometer: flow volume loop (FVL)

- Plot of inspiratory and expiratory flow (on the Y-axis) against volume (on the X-axis) during maximally forced inspiratory and expiratory maneuvers.
- Used for baseline measures, but also to determine if treatment methods are relieving VCD symptoms.



16

Flow Volume Loop: VCD



- Trunkated inspiratory loop suggesting extrathoracic obstruction

17

What do you see? Symptoms

- Change in vocal quality
- Wheezing
- Stridor
- Dyspnea, or shortness of breath, on exertion
- Coughing
- Choking sensation
- Throat tightness
- Chest tightness
- Respiratory distress
- Clavicular breathing pattern
- Fast breathing rate
- Visible tension in:
  - Face
  - Neck
  - Chest
- Videos:
- https://youtu.be/JoAYCEyGelA
- https://youtu.be/zI7SfC61wFw
- https://youtu.be/Qpz8ftfyQCY

Video permission from: Speech and Voice Therapy Center, LLC, 40 Mechanic St, Suite 301, Foxboro, MA 02035

18

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Precipitating Factors

- Exercise-
- Medication Use-
  - Neuroleptic drugs, specifically phenothiazines
- Irritants-
  - ammonia, dust, smoke, soldering fumes, and cleaning chemicals
- Psychological Conditions-
  - posttraumatic stress disorder, anxiety, depression, and panic attack
- Rhinosinusitis-
  - Postnasal drip has been linked to airway hyperresponsiveness

19

CONTINUED

Treatment

- Gastroenterology Management
- Otolaryngology (ENT) Management
- Pulmonary Management
- Allergy and Immunology Management
- Psychological Management
- SLP Management

20

CONTINUED

Short Term Treatment:

- Reassure patient during episode
- Immediately instruct patient in breathing behaviors:
  - Panting, diaphragmatic breathing, breathing through nose or straw, pursed-lip breathing, exhaling with a hissing noise
- Possible trial of heliox (mixture of helium and oxygen)

Michael Weir, MD, **Vocal Cord Dysfunction Mimics Asthma and May Respond to Heliox,** *Clinical Pediatrics*, Vol 41, Issue 1, pp. 37 – 41.

21

CONTINUED

Long Term Treatment

- Avoid known triggers such as smoke, airborne irritants, or certain medications
- Treat underlying conditions including anxiety, depression, GER, and rhinosinusitis
- Consider a trial of inhaled ipratropium (Atrovent) in patients with exercise-induced symptoms
- Referral for speech therapy is indicated in patients with unresolved symptoms

22

CONTINUED

Gastroenterology Management

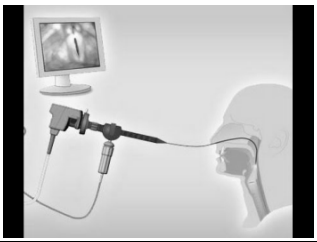
- Significant findings of laryngeal changes consistent with GERD were present in 95% of juveniles with confirmed VCD (Wilson & Wilson)
- Diagnosis and treat underlying GERD which could contribute to laryngeal inflammation

23

CONTINUED

Otolaryngology (ENT) Management

- Gold standard for diagnosis: Visualization of vocal fold adduction during a VCD event
- Challenging to stimulate the physical and/or psychologic stresses of competition or practice in an artificial setting
- Exclude other causes of extrathoracic airway obstruction



24

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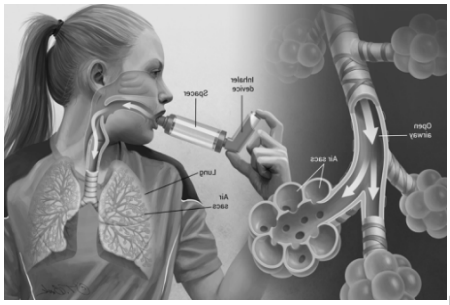
Pulmonary Management

- To rule out or identify existing asthma/EIB
- Pulmonary Function Testing Flow Volume Loop
  - Baseline
  - Treatment progress



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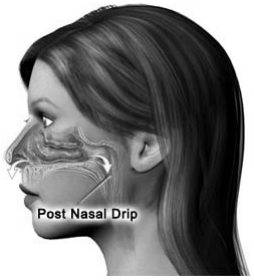
Allergy and Immunology Management

- Untreated allergic rhinitis may result in chronic postnasal drainage that could also act as a laryngeal irritant



26

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Psychological Management

- Sports psychologist-address issue of anxiety and stress related to performance
- Use of biofeedback and hypnosis

27

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Speech Therapy

- SLP management-behavioral therapy by a medical SLP is critical.
- Goal: enable the patient to recognize an impending VCD event
- implement techniques to avert or control an attack

28

CONTINUED

Speech Therapy Protocol

- 6 sessions:
  - Session 1:
    - Assessment and initial education
  - Sessions 2-6:
    - Diaphragmatic breathing
    - Negative practice
    - Tightening/Relaxing exercises
    - Breathing Recovery
    - Biofeedback

29

CONTINUED

Speech Therapy Assessment

Session 1:

- Gather case history Participation in athletics
  - Description of onset
  - Description of symptoms
  - Co-diagnoses including current medications
- Examination:
  - Respiration
  - Observation of muscle tension
  - Overall posture
- Observation during exercise
- Educate patient regarding vocal cord dysfunction
- Introduce diaphragmatic breathing/"tummy" breathing Laying down
  - Sitting
  - Standing in front of mirror
- Home program

30

CONTINUED

Patient Handouts

- Ross, Laurie. Vocal Cord Dysfunction: Something to Talk About. *Allergy & Asthma Today*. 2009. Volume 6, Issue 1.
- You Tube: "3D view of diaphragm"
  - https://youtu.be/hp-gCvW8PRY
- iPhone Apps for download to help practice diaphragmatic breathing & slower breath rate: My Calm Beat-
  - https://youtu.be/YCickT8lLHE
- Belly Bio Interactive Breathing
  - https://youtu.be/0DsviJEx73I

31

CONTINUED

Treatment: Change Current Response

- **Teach ⇨ Trigger ⇨ Apply**
- **Teach: Rescue Strategies**
  - Release and control methods that generate a mechanical response
    - Nasal Inspiration with pursed lip expiration
    - Panting
    - Lip Trills – steady tone, glides

https://youtu.be/p4qy_CXXfKY

32

CONTINUED

Treatment: Change Current Response

- **Teach: Rescue Strategies**
- Recognize: "Just noticeable onset"-This is a period of time when the patient tries to identify the very first respiratory symptoms before the VCD episode begins.
- Strategies:
  - Lingual extension/stretches
    - To release tension
    - Forward carriage facilitates airflow over the base of tongue
  - Say "Duh" to drop jaw and tongue
  - Monitor Posture/Tension
    - Jaw/Tongue/Neck/Shoulders/Arms/Base of Support
- https://youtu.be/oQN7fCIa5Uc

33

CONTINUED

Treatment: Change Current Response

- **Trigger the symptoms**
  - Stationary bike, run track, arm bike
- **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

34

Triggering VCD Episode

- https://youtu.be/w9IVg0bHPCA

35

Treatment: Triggering

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

Equipment array (Vista Mini-CPX System - Vacumetrics Inc./Vacu-Med Division, model number 17670-Speech; Hans Rudolph mouth/nasal breathing facemask, model number KM201; elastic head strap, patient positioning during baseline and treatment sessions.

36

CONTINUED

Treatment: Environmental Considerations

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

37

CONTINUED

Treatment: Relaxation

Use these techniques prior to activity during the “red flag moments” and or when triggered

- Laryngeal Massage (Aronson, 1990)
- Hyoid Release (Roy, 1993)
  - https://youtu.be/zEZ8igCcEGc
- Lingual Stretch/Massage
- Attention to Oral Posture

38

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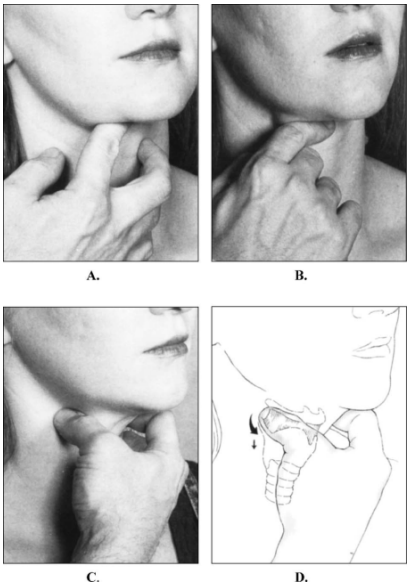
Laryngeal Massage



39

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Treatment: Respiratory Control

- **Respiratory Techniques**:
  - Exhalation than inhalation
  - Cyclical breathing
    - https://youtu.be/qcyY0tsGm6A
  - Timing, pacing, rhythm
  - Ability to change rhythm with activity

    (ie. Walk vs. jog vs. sprint)
  - General awareness of abdominal support, helpful to work supine

40

CONTINUED

Treatment: Respiratory Control

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

41

CONTINUED

Treatment: Increase Task Intensity with use of Strategies

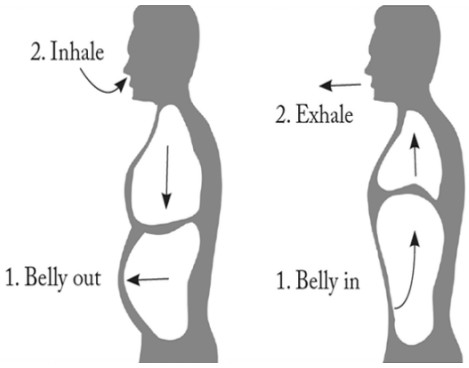
- Increase:
  - Rate of activity
  - Length of activity
  - Complexity of activity
- Vary the time of day
- Simulate suboptimal conditions
  - Heat, cold, fatigue, odors

42

CONTINUED

Diaphragmatic Breathing

- The way babies breathe naturally
- Our breathing pattern changes as we get old certain
- Diaphragm is most efficient muscle of breathing
- Abdominal muscles help move diaphragm
- If diaphragm isn't working effectively, neck and chest muscles must assume an increased share of the work of breathing



43

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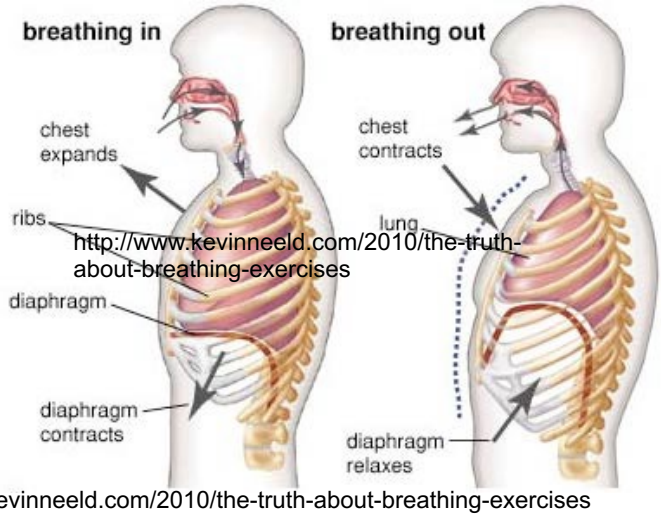
Benefits of Diaphragmatic Breathing

- Strengthen the diaphragm
- Decrease the work of breathing by slowing your breathing rate
- Decrease oxygen demand
- Use less effort and energy to breathe

44



http://www.kevinneeld.com/2010/the-truth-about-breathing-exercises

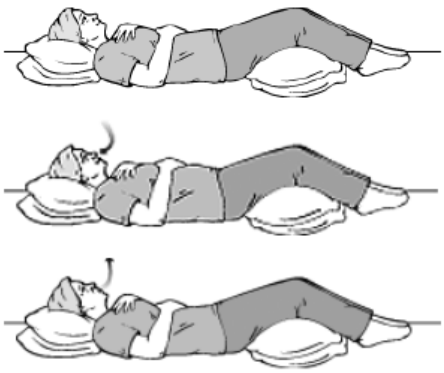
http://www.kevinneeld.com/2010/the-truth-about-breathing-exercises

http://www.kevinneeld.com/2010/the-truth-about-breathing-exercises

45

Diaphragmatic Breathing Practice

- Take in a very deep breath-relax the pressure on your belly wall and let it swell out
- Push in with your hands on your abdomen and blow out air through the mouth. This makes the diaphragm force air up and out of the lungs



46

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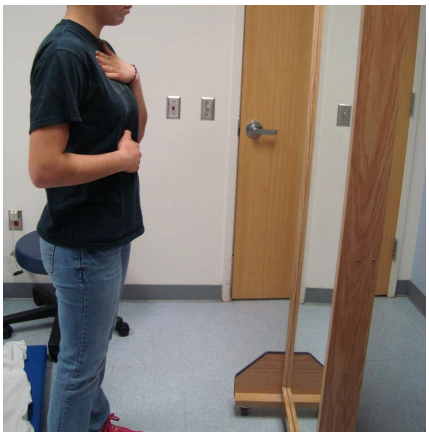
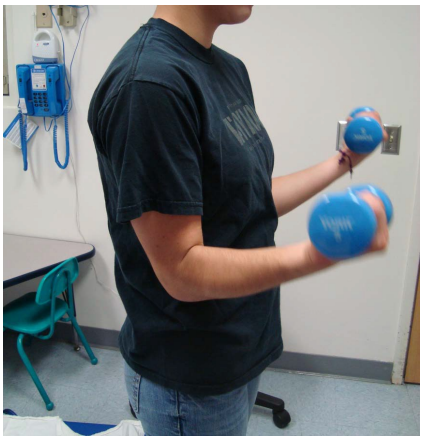
Diaphragmatic Breathing Practice





47

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Breathing Rhythms

- Even Breathing

- Extended Breathing

- 4x4x4x4 Breathing

48

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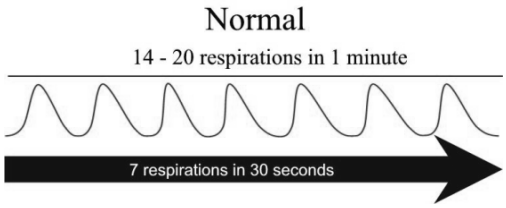
Breathing Rate

- Slow breathing rate
- Breathe out making /s/ sound
- Pursed lips
- Goal: 6.0 bpm at rest
- Use of weights to slow breathing



49

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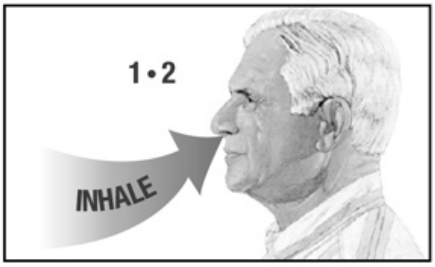
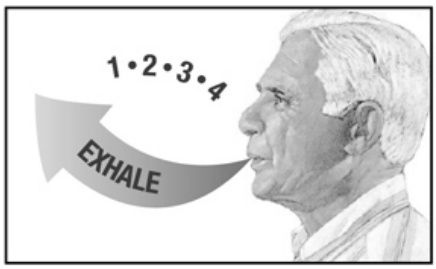
Pursed Lips

- Breathing exercise that helps learn how to master extended exhalation
- Breathe in through your nose with mouth closed…
- Then breathe out through pursed lips like you were going to whistle
- https://vimeo.com/78772085





50

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Negative Practice

- Tightening and Relaxing Muscles
  - To show the patient the difference between tight and loose muscles
- Laying down
- Sitting/Standing while looking in a mirror
  - Watching for clavicular breathing
  - Watching for visible tightening in face, neck, and chest

51

CONTINUED

Relaxation Techniques

- Practice at the end of every session
  - Progressive Muscle Relaxation Technique
  - Quieting the Body and Mind
  - Focusing
  - Meditation

52

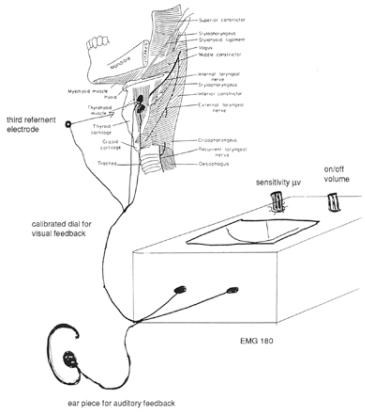
CONTINUED

Types of Biofeedback

- **Respiration: breath rate, rhythm, volume**
- **EMG (electromyography): records muscle activity**

Study by Warnes & Allen: 16 year old with 2 year history of VCD

- EMG electrodes placed along thyrohyoid membrane
- Patient seen for biofeedback 1 time/week for 10 weeks
- Baseline tension levels reduced by 60%
- Reductions in episodes of respiratory distress and chest pain
- Elimination of disorder-related school absences & reduction in interference of daily functioning



53

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Typical Session Layout

1. Review homework, past week, strategies
2. Breathing practice-at rest
3. Walk/Run-practice recovery breath
5. Relaxation/ Discussion

54

CONTINUED

References

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55