PVFM: Vocal Cord Function and Dysfunction

Johns Hopkins Voice Center at GBMC
Stroboscopy Grand Rounds
November 11, 2016

Lee M. Akst, MD
Kristine Pietsch, CCC-SLP

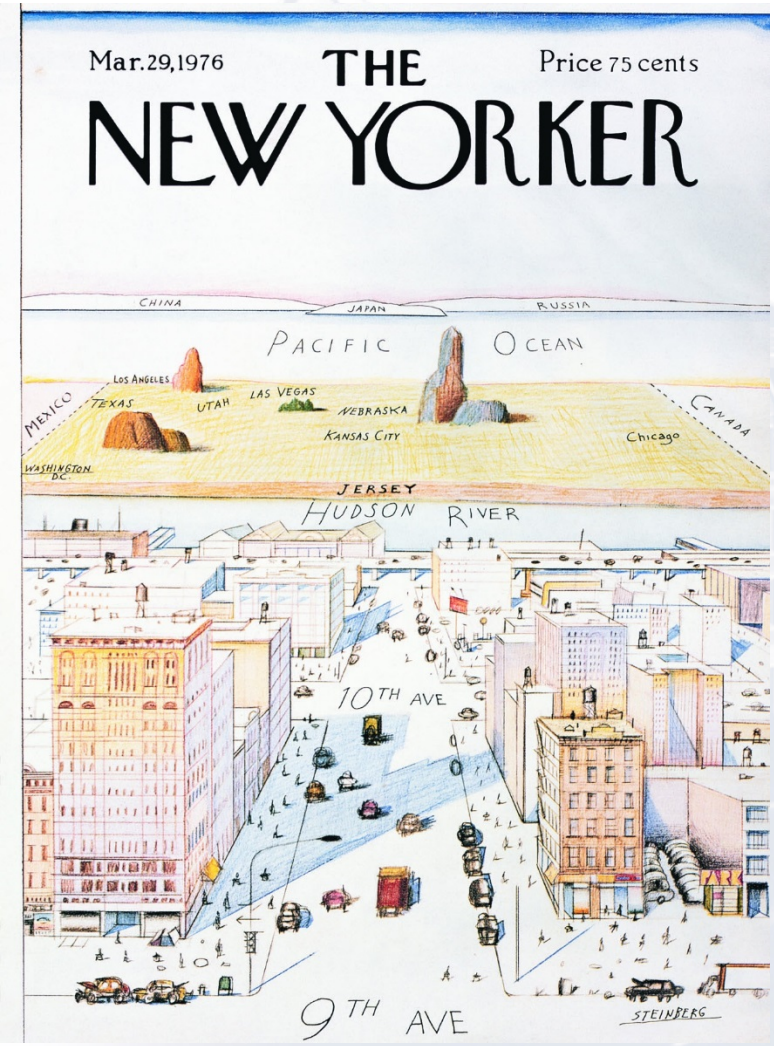
JOHNS HOPKINS MEDICINE

“Vocal Cord Dysfunction” – Defining the terms

- Per AAAAI website: “Vocal Cord Dysfunction (VCD) occurs when the vocal cords (voice box) do not open correctly”
- More correctly, it is when vocal folds *otherwise capable of normal opening* are held in a closed position during inhalation
- Stenosis, bilateral paralysis, even tumor are all reasons for TVC not to open correctly – and these are *not* VCD

"Vocal Cord Dysfunction" – *Refining* the terms

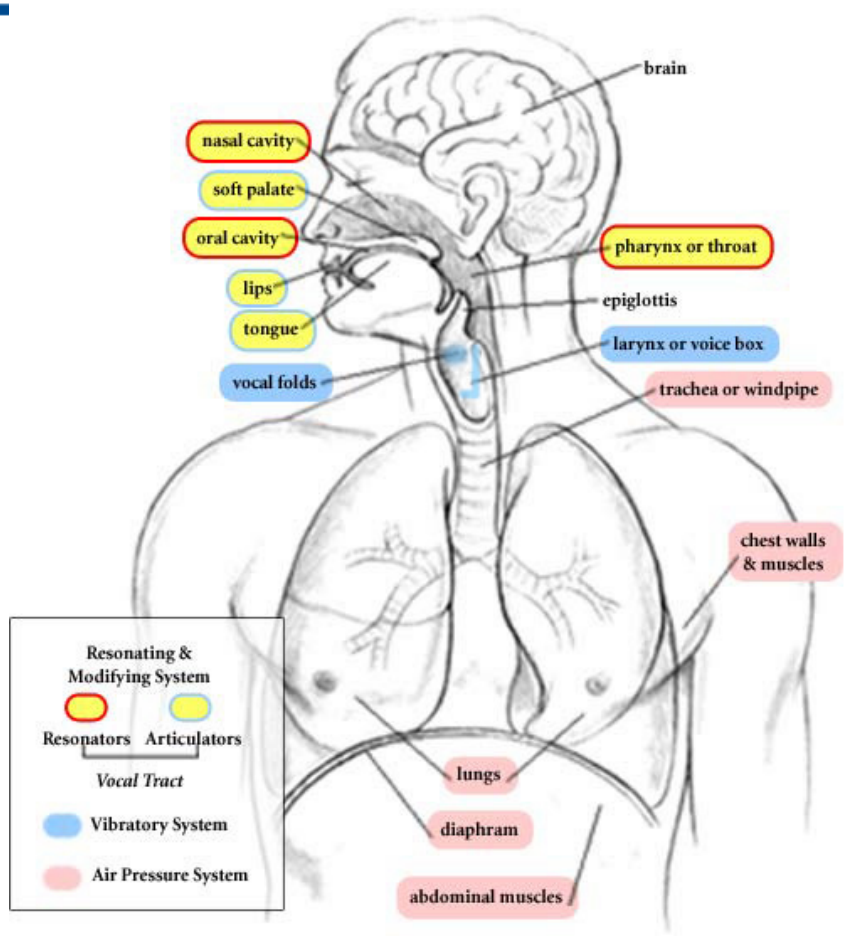
- "Vocal cord dysfunction" is non-specific
  - Cancer, paralysis, polyp…
  - These are all "dysfunction"
- Asthma ≠ "Lung dysfunction"
  - To call it that would ignore lung cancer, pneumonia, TB, etc
- Therefore: *Paradoxical Vocal Fold Motion* (PVFM, PVCM)

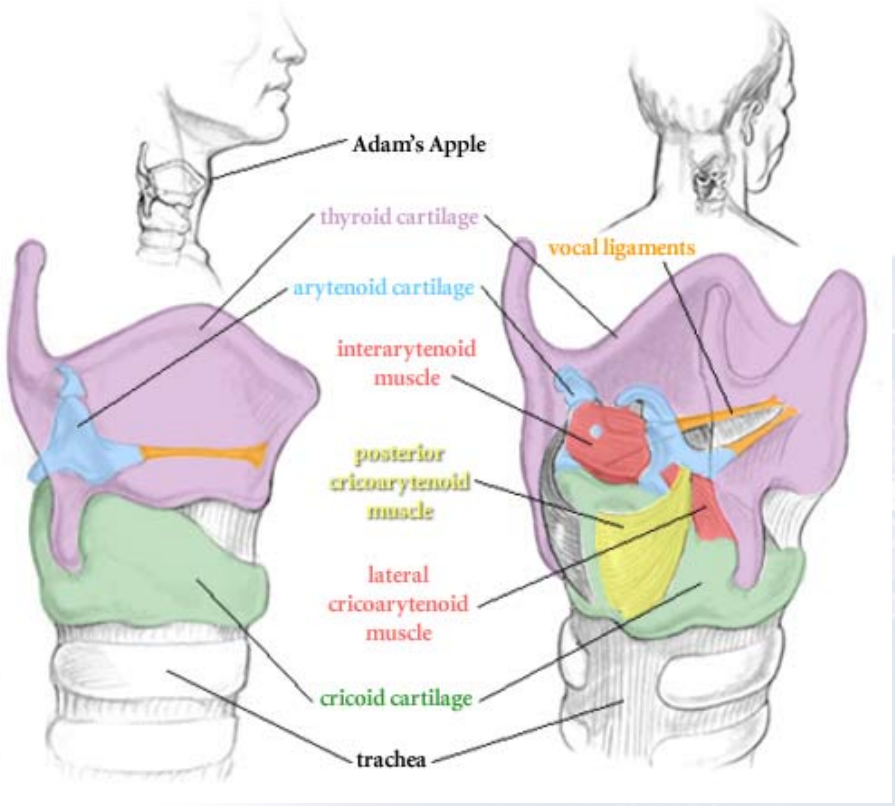


Outline

- Laryngeal Function
- PVFM: Introduction
- Epidemiology
- Diagnosis
- Treatment
- Cases

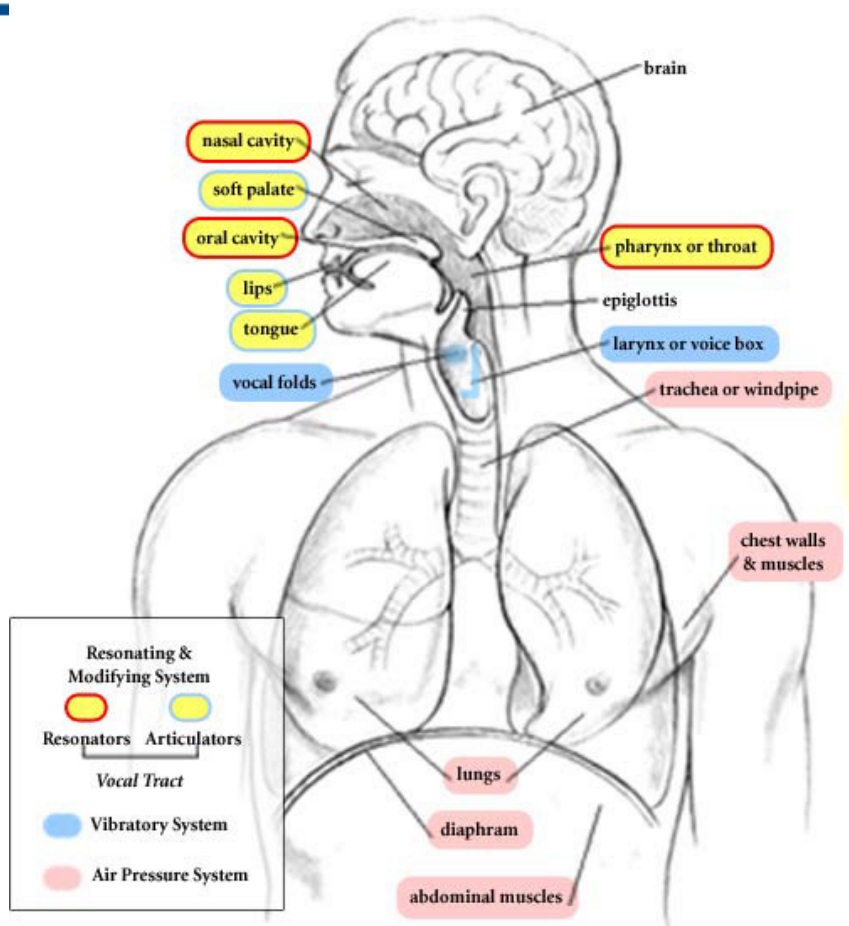
Laryngeal Function

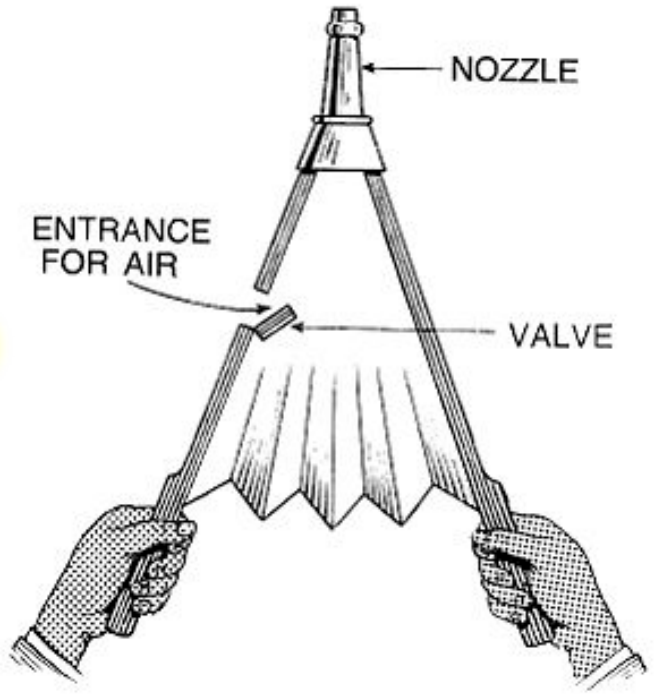




JOHNS HOPKINS MEDICINE

Laryngeal Function



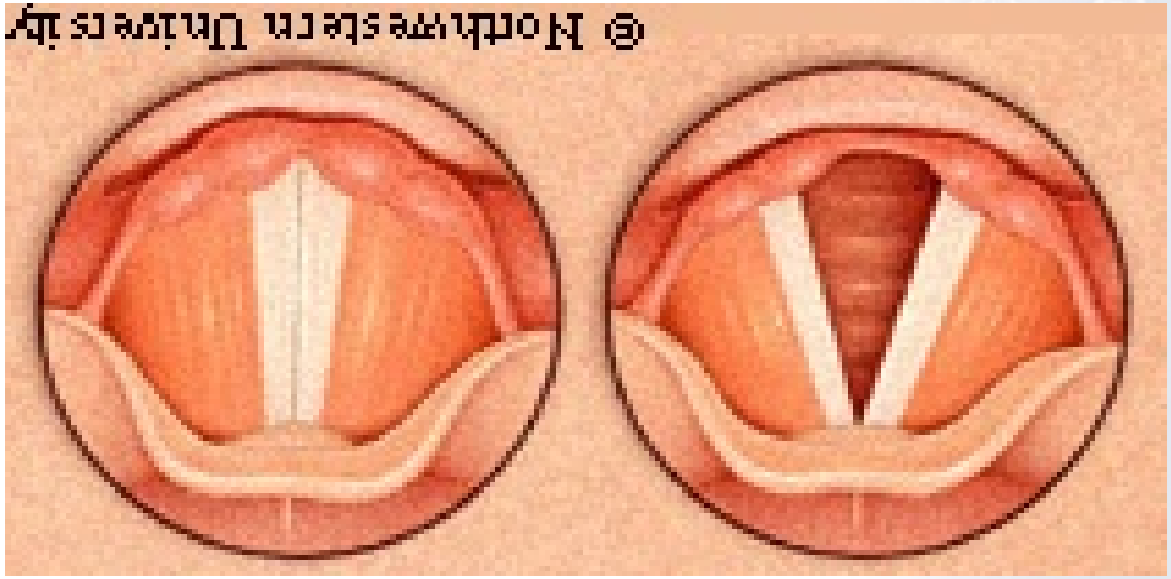


"Bellows", from Webster's Online Dictionary

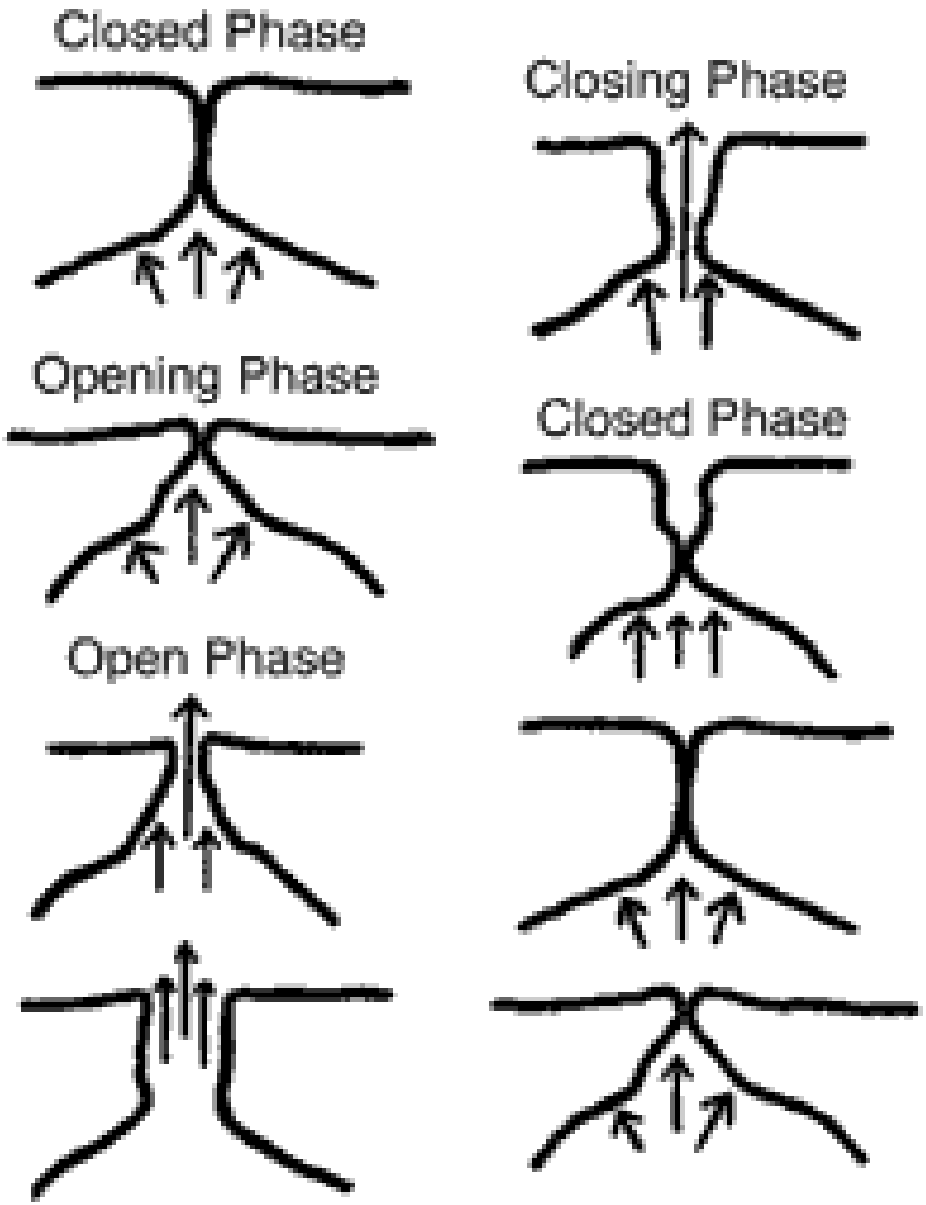
JOHNS HOPKINS MEDICINE

Laryngeal Functions: Breathing, Swallowing, Voice

- Breathing: TVC abducted
- Swallowing, Voice: TVC abducted
  - Swallowing: also other coordinated muscle actions
  - Voice: also depends on vibratory potential



JOHNS HOPKINS MEDICINE



lionsvioceclinic.umn.edu

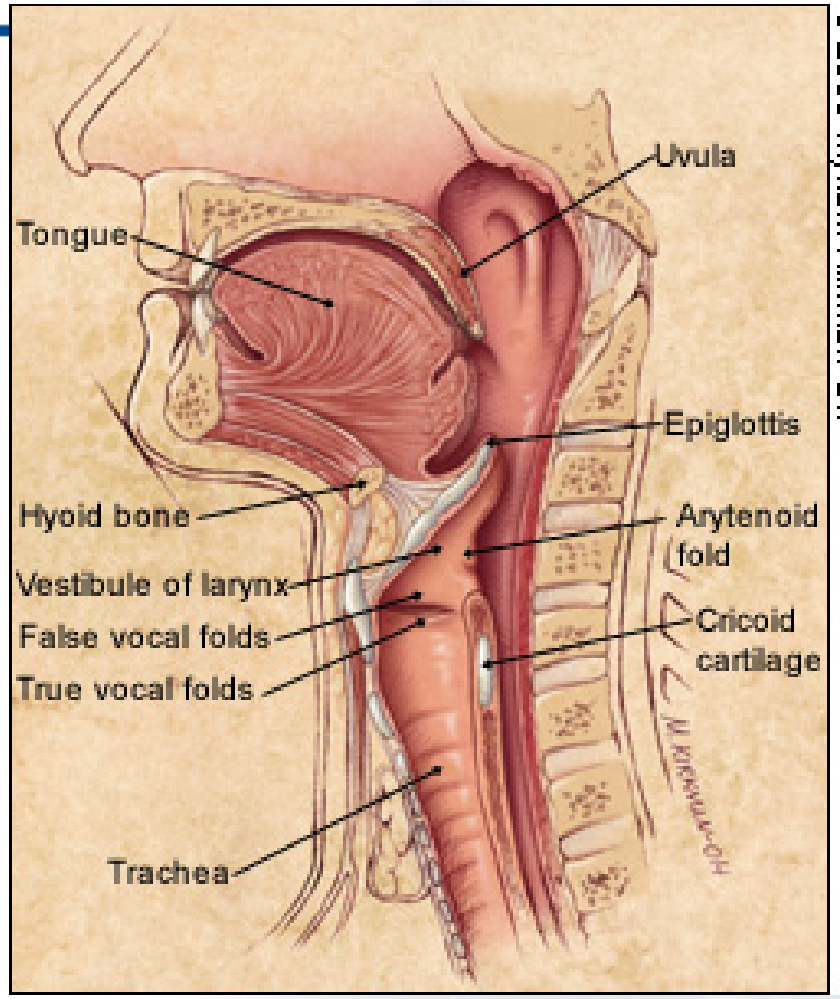
Phonation

- Subglottal pressure builds until the vocal cords open
- Air rushes through
- The air creates negative pressure, which draws the vocal cords closed
- Cycle repeats *hundreds* of times each second

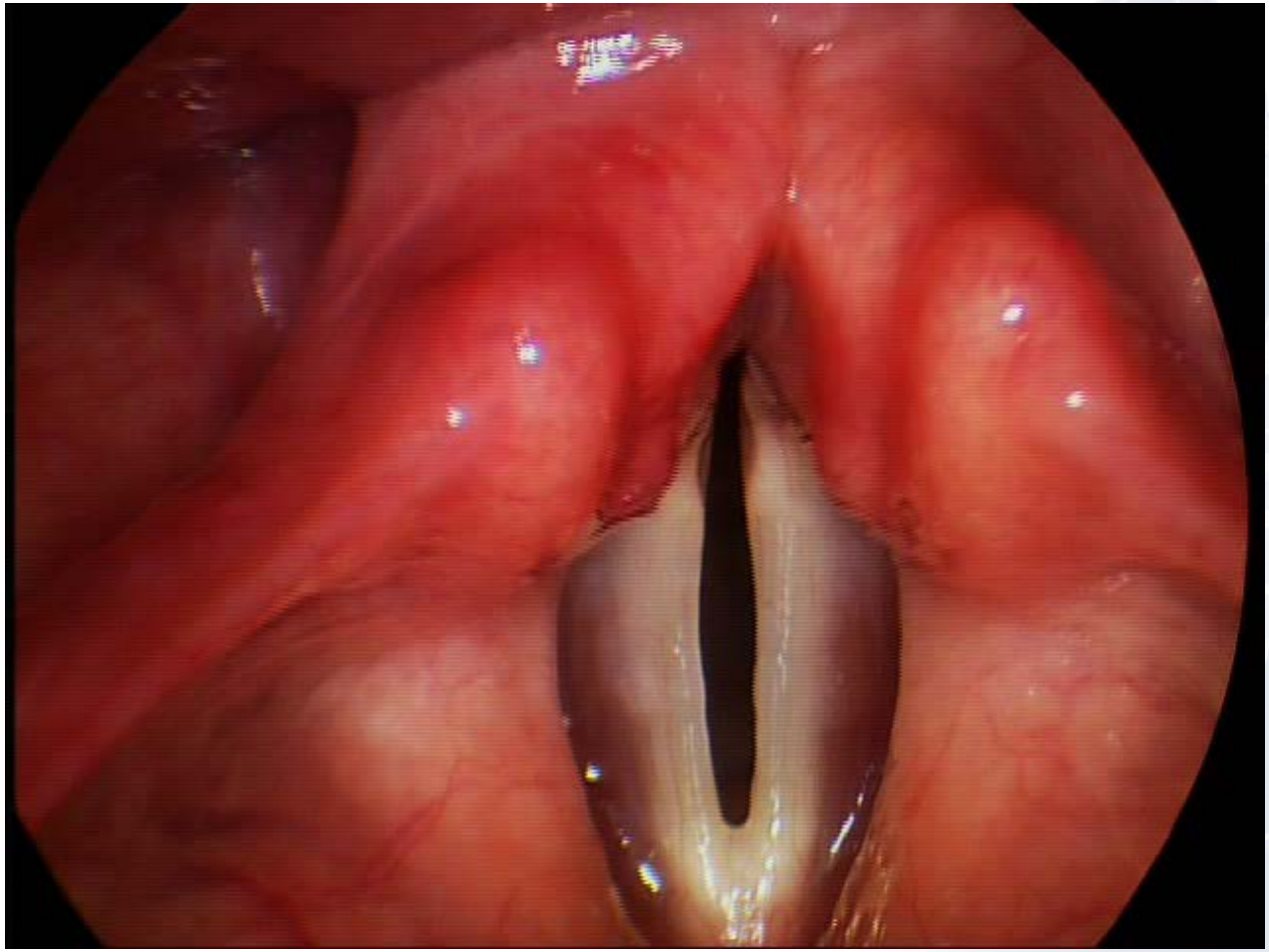
JOHNS HOPKINS MEDICINE

Swallowing

- Oral preparatory phase
- Oropharyngeal phase
  - Base of tongue excursion
- Pharyngeal phase
  - Laryngeal elevation
  - Pharyngeal Squeeze
  - Vocal cord closure
- Esophageal phase
  - Cricopharyngeal relaxation
  - Peristalsis: UES → LES



Laryngeal Function



JOHNS HOPKINS MEDICINE

Paradoxical Vocal Fold Motion

- Inappropriate adduction of TVC during inspiration
  - Functional (not anatomic) airway obstruction
  - Dyspnea
  - Inspiratory Stridor

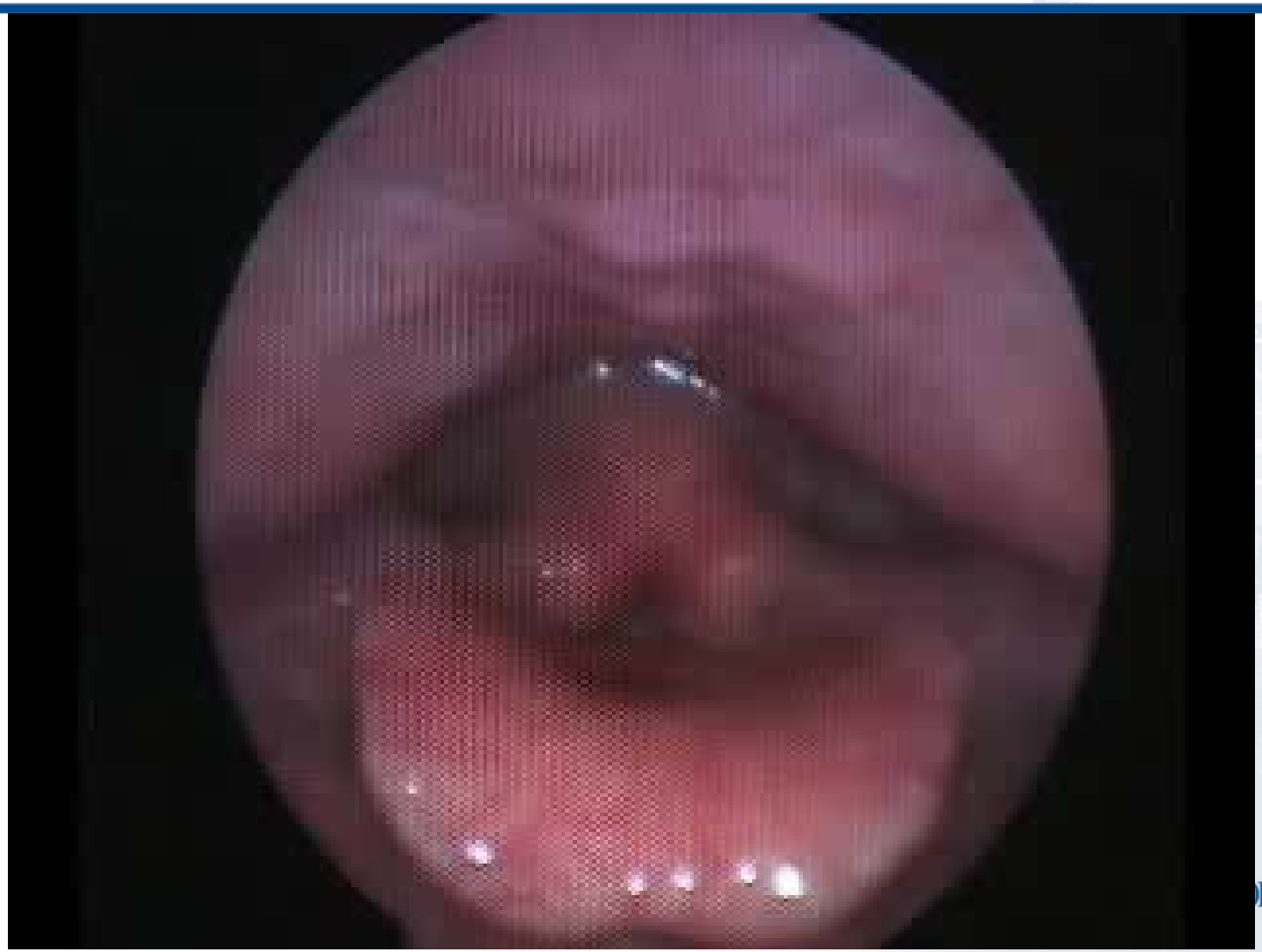
History & Nomenclature

- Dunglison, 1842: “hysteric croup”
- Mackenzie, 1869: mirror exam with PVFM
- Osler, 1902: “spasm of muscles may occur with violent inspiratory efforts and great distress, and may even lead to cyanosis. Extraordinary cries may be produced, either inspiratory or expiratory”

- Munchausen’s stridor, episodic laryngeal dyskinesis, pseudoasthma, spasmodic croup, emotional laryngeal wheezing

What does it look like?

What does it look like?



Who gets it?

- Incidence and prevalence data difficult to obtain due to lack of general understanding and diagnostic criteria in broader medical community

- Younger (mostly teenaged) cohort appears more homogenous
  - Stereotypically: female athletic, high achieving with episodes occurring more frequently in high pressure situations

Who gets it?

- 3.8:1 female-to-male ratio
- More adults than children (71% vs 29%)
- Women in health care professions, elite athletes, active duty military
- Median time to diagnosis – 4.5 years
  - ED visits, unnecessary medications, intubations, tracheostomy

- Comorbidities
  - GERD (64%)
  - Asthma (42%)
  - Allergies, (42%)
  - Psychiatric diagnosis (26%)
  - OSA (21%)

Chiang et al 2012, Patel et al 2004 , Patel et al 2015

Etiology

- Psychologic
  - "Munchhausen's stridor" Patterson et al 1974
  - Meta-analysis, 171 cases Leo at al 1999
    - Conversion disorder 12%
    - Anxiety disorder 11%
    - Histrionic and other personality disorder 6%
    - Depression 4%
  - 47 PVFM patients given psych testing. Forrest et al 2012
    - 70% demonstrated conversion disorder pattern ($p<0.01$), but not anxiety disorder or stress
    - 2 of 47 (4.3%) malingering
- Physiologic: Laryngeal Hypersensitivity
  - Decreased afferent receptor threshold, with increased efferent motor response

JOHNS HOPKINS MEDICINE

Irritable Larynx Syndrome

Morrison et al, *J Voice,* 1999

- "Hyperkinetic laryngeal dysfunction"
  - Muscle tension dysphonia
  - Episodic laryngospasm, PVFM
  - Chronic cough, throat clearing, globus pharyngeus
- Inclusion criteria for ILS
  - Symptoms attributable to laryngeal tension
  - Visible and palpable evidence of tension
  - Presence of a sensory trigger
- Exclusion criteria
  - Organic laryngeal pathology
  - Identified neurologic disease
  - Psychiatric diagnosis

Irritable Larynx Syndrome

Morrison et al 2010

- Neural changes to brainstem laryngeal control networks
- Reflux: >90% of original study cohort
- Viral illness: 43% recall URI near onset
- Overlap with other central sensitivity syndromes:
  - Chronic fatigue, irritable bowel, fibromyalgia, chronic headache, etc

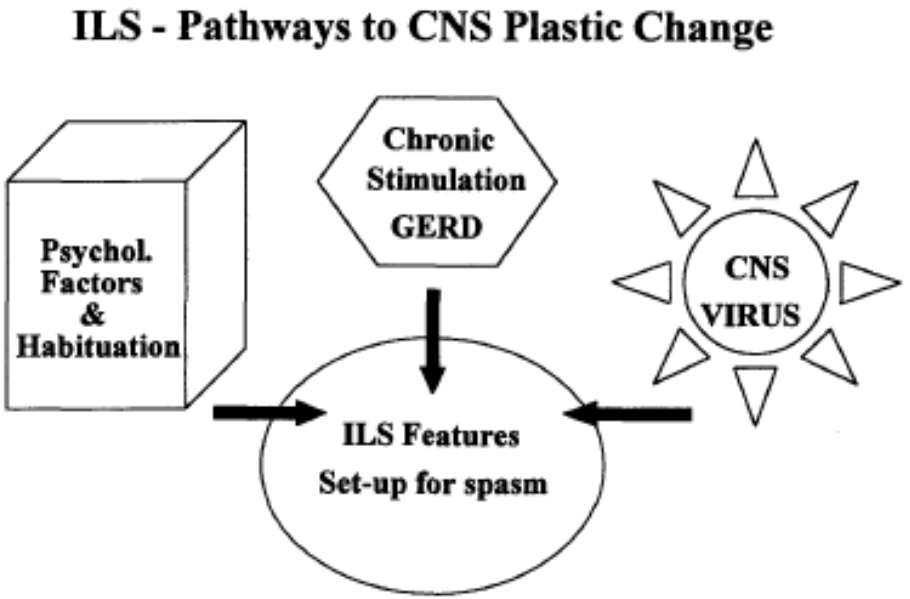


FIG. 2. Creation of a "spasm-ready" state in the CNS laryngeal control network. The oval region represents CNS neurons that may become hyperreactive in response to a number of processes.

JOHNS HOPKINS MEDICINE

Laryngeal Hypersensitivity Syndrome

Vertigan et al 2013

- 103 patients with primary symptoms of MTD, PVFM, Globus, or Chronic Refractory Cough vs. Healthy controls

- "Cross-stimulus response" was high in subjects; primary stimulus elicited sensory response in other domains
  - E.g.: Cough sensitivity testing caused poor voice, voice stress test elicited cough
- Capcaisin cough sensitivity was significantly higher (P<.001) in PVFM and CRC groups

JOHNS HOPKINS MEDICINE

Irritable Larynx/Laryngeal Hypersensitivity Treatment

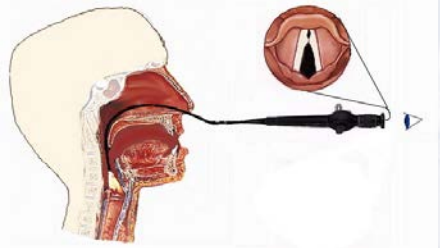
- Minimize exposure to triggers
  - Extrinsic: perfumes, inhaled medications, allergens, etc.
  - Intrinsic: reflux (GERD/LPR), rhinitis and PND, mechanical (cough, exercise)
- Re-program the habituated laryngeal motor response
- Neuromodulators to change threshold for response

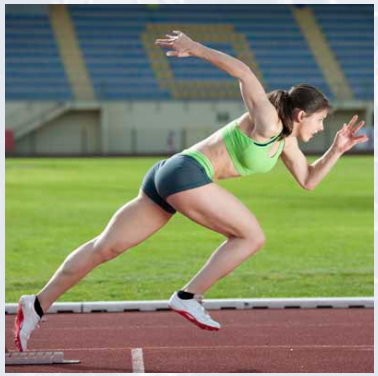
Diagnosis – History

History Questions	Ding ding ding, I think we have a winner….
Episodic vs. Constant	Episodic
Triggers	Exercise, smells/fumes/smoke, change in temperature
Duration	5-20 minutes
Stridor vs. Wheeze	**Stridor**
Tight sensation	Neck
Inspiration vs. expiration	Inspiration more difficult
Resolution	Discontinuing activity, sitting quietly and “calming down”, nebulizer but not rescue inhaler
Voice	Changes, or unable to use
Other Symptoms	Coughing, throat clearing, globus, heartburn

Diagnosis – Exam

- Endoscopic Exam
  - Normal abduction
  - No fixed obstruction
  - *Evidence of Inappropriate adduction*
    - Gold standard
    - At rest, with exertion, or with odors
    - **Not always elicited**





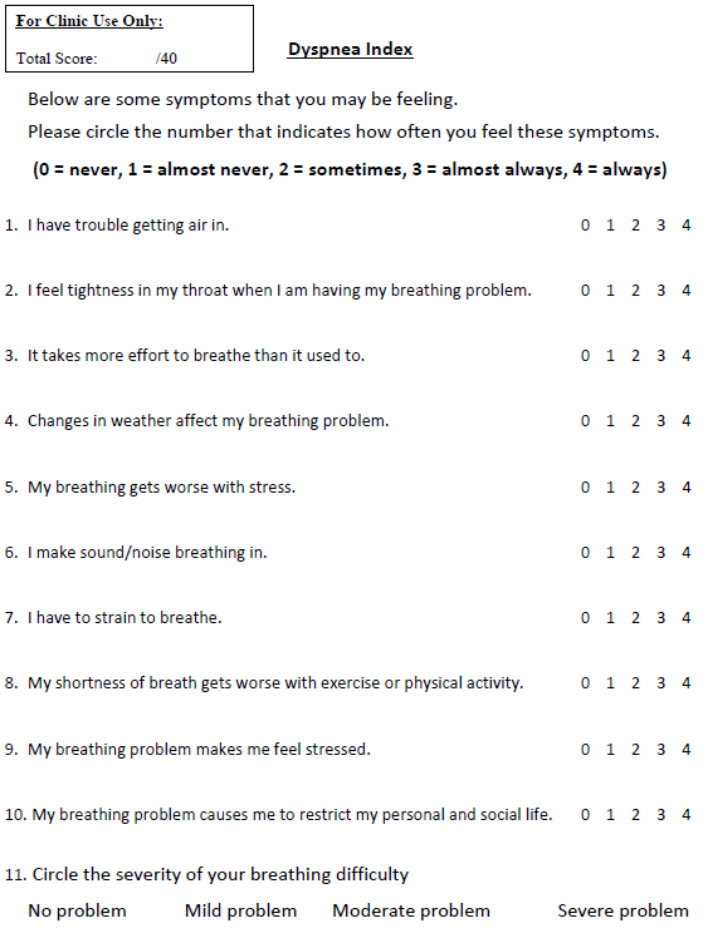
- Classic PVFM is striking in its appearance (recall the earlier video)
  - Ask patient: “are you experiencing an episode right now?”
  - If “yes” but patient is not acutely dyspneic, stridulous, and dysphonic – *it’s probably not PVFM*

JOHNS HOPKINS MEDICINE

Diagnosis – QOL scales

- QoL Scales
  - Dyspnea Index →
    - Validated for PVFM
    - Change of 8 or higher "seems significant"

      Guzman 2014
  - VHI, VRQOL, RSI
    - More for voice or reflux than for dyspnea – though they do contain items on breathing



For Clinic Use Only:

Total Score: /40

Dyspnea Index

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.	0 1 2 3 4
2. I feel tightness in my throat when I am having my breathing problem.	0 1 2 3 4
3. It takes more effort to breathe than it used to.	0 1 2 3 4
4. Changes in weather affect my breathing problem.	0 1 2 3 4
5. My breathing gets worse with stress.	0 1 2 3 4
6. I make sound/noise breathing in.	0 1 2 3 4
7. I have to strain to breathe.	0 1 2 3 4
8. My shortness of breath gets worse with exercise or physical activity.	0 1 2 3 4
9. My breathing problem makes me feel stressed.	0 1 2 3 4
10. My breathing problem causes me to restrict my personal and social life.	0 1 2 3 4

11. Circle the severity of your breathing difficulty

No problem Mild problem Moderate problem Severe problem

JOHNS HOPKINS MEDICINE

Diagnosis – Pittsburgh VCD Index

Traister et al. J Allergy Clin Immunol Pract 2014;2:65-9

- Compared 89 VCD pts to 59 asthma pts
- Scoring system
  - "All or nothing" – not scaled
    - Dysphonia 2
    - "Absence of wheezing" 2
    - Throat tightness 4
    - Odors 3
- Applied to 72 patient sample

TABLE IV. Probability of VCD or asthma at various cutoff points

Cutoff*	Probability of VCD	Probability of asthma
0	0.08	0.92
2	0.34	0.66
3	0.57	0.43
4†	0.77	0.23
5	0.89	0.11
6	0.95	0.05
7	0.98	0.02
8	0.99	0.01
9	0.997	0.003
11	0.9995	0.0005

- "Absence of wheezing" ≠ stridor
- No discussion of length of episode, or temporality of symptoms
- What if it is *neither* asthma nor PVFM?
  - Other "functional dyspnea", muscle tension dysphonia, etc may be false +
  - Stenosis, bilateral paralysis, etc may also be false +

JOHNS HOPKINS MEDICINE

Diagnosis – What if it is *both* asthma and PVFM?

many patients with VCD will have inspiratory stridor at times, which they identify as wheezing and which has traditionally been used in clinical definitions. In our scoring system, we have not tried to determine if the wheeze is originating in the upper or the lower airway, which may also be difficult to determine clinically. Although the absence of wheeze was noted in a large majority of our VCD population (60/89 subjects [67%]), 29 of 89 subjects with VCD (33%) did, in fact, report "wheeze." Conversely, only 12 of 59 subjects with asthma (20%) had an absence of wheeze. These data do not suggest that the presence of wheeze excludes the diagnosis of VCD; it is just more easily distinguished from asthma when that symptom is absent. In fact, with our scoring system, one can be diagnosed with VCD, even with wheezing, as long as either throat tightness or both dysphonia and sensitivity to odors are present. For our scoring system to be used in the diagnosis of VCD, all of the 4 indicated measures must be evaluated; the absence of wheeze is just one of these measures.

- How many asthma patients have throat tightness? Or chest tightness, as they wave generally towards the sternal notch?

- The tool guides history
- It does not replace clinical judgment
- "Gold standard" tests
  - Laryngoscopy
  - Spirometry
  - Bronchoprovocation

JOHNS HOPKINS MEDICINE

Diagnosis – Spirometry

- Inspiratory stridor > expiratory wheeze
  - FIV(0.5)/FIVC ratio changes more than FEV
- Flat inspiratory arm of PFTs predicted PVFM (p=0.034) Forrest et al 2012

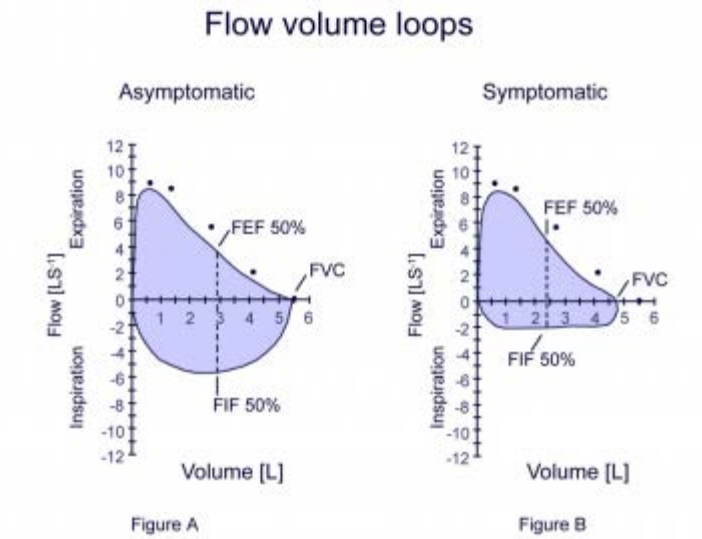
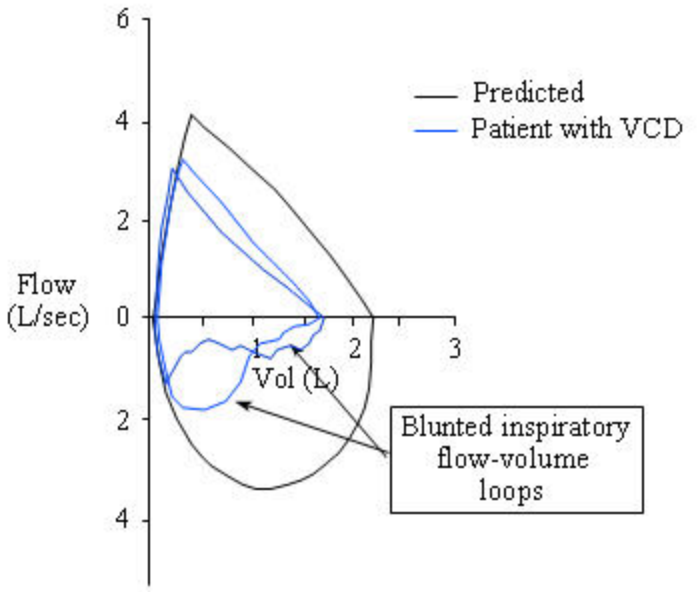


Figure A - Normal inspiratory and expiratory loops
Figure B - Truncated inspiratory loop suggestive of variable extra thoracic large airway obstruction and normal expiratory loop.
This is pathognomnic of paradoxical vocal cord motion.

FVC - Forced vital capacity
FEF 50% - Forced expiratory flow 50%

Medscape - VCD



Medscape – Optimizing Patient Communication in Asthma

JOHNS HOPKINS MEDICINE

Diagnosis – Spirometry

- False negatives
  - Out of 758 PVFM patients confirmed on endoscopy, only 10% had demonstrated flattened inspiratory flow loops Chiang et al 2012
- False positives
  - Is it “variable”?
    - Consider stenosis.
  - How was patient effort?
- *Were they having an episode at time of PFTs?*
- Anecdotally: **most** patients sent to me for variable extrathoracic obstruction with inhalation **don’t** have stridor by history and don’t have PVFM on exam
- *Who wants to study this?*

JOHNS HOPKINS MEDICINE

OSU Protocol

- History,triggers
- Respiration at rest
- Odors (prn)
- Exertion (prn)
- If constriction:
  - Treat (rescue breathing, laryngeal control therapy)
- No constriction:
  - Possibly treat *anyways*

TABLE I.
Paradoxical Vocal Cord Motion Evaluation Protocol.

All PVCM evaluation patients will have check in by a nurse and time out completed.
Baseline vitals will be obtained prior to the exam.
If baseline 0_2 Sat is <92%, the staff physician will be notified.
Nurse will exit the room until the time of the procedure.
The SLP will collect a case history including triggers for dyspnea.
Patients will be informed of the procedure and sign an informed consent form.
The room will be set up for the procedure including a flexible endoscope, gloves, barrier for counter, and surgical lubrication.
Universal precautions and hand hygiene completed by the SLP and nurse.
The patient will be offered topical anesthetic, which will be administered by the state, nurse, or physician.
The flexible scope will then be passed via the nasal cavity to observe respiration at rest.
The patient will be directed to breathe in and out through the nose, in through the nose and out through the mouth, and in and out through the mouth.
The patient will hold his or her breath for 5 seconds then be directed to "let it go."
The patient will be directed to count 1 to 10 on one breath.
The patient will be directed to count for as long as he/she can on one breath.
If constriction is observed during normal respiration, the SLP will direct the patient in various therapeutic breathing techniques to discover what achieves full abduction.
The exam will end at this point if they have shown constriction during normal respiration, and they will be enrolled in laryngeal control therapy.
If constriction is not noted and strong odors are a reported trigger, the nurse will hold a container of various scents in front of the patient.
If a reaction is noted to strong odors, the patient will be directed in breathing therapy techniques and the exam will end.
When a patient does not exhibit constriction with strong odors or during normal respiration, the scope will be removed.
The patient will be directed to participate in activities for exertion until symptomatic (climbing stairs, riding a stationary bike, running, jumping jacks).
The scope will then be re-passed to observe glottal constriction during the presence of symptoms.
Again, if constriction is observed, the patient will be directed in breathing therapy techniques to achieve abduction.
In the off chance that constriction is not observed at this point, the patient will be considered for a trial of laryngeal control therapy based on symptoms, history, and doctor recommendations.
Patients will be continuously monitored with pulse and 0_2 Sat.
The nurse will record pulse and 0_2 Sat every 1, 3, and 5 minutes until the evaluation is completed UNLESS there is a change in vitals.
If 0_2 Sat remains <90%, O_2 2L/NC will be started.
SLP will guide the patient with rescue breathing.
If 0_2 Sat remains <90% for additional 30 seconds, the staff physician will be notified for further direction.

PVCM = paradoxical vocal cord motion; O_2 Sat = oxygen saturation; SLP = speech language pathologist; 2L/NC = 2 liters per nasal cannula.

Cases

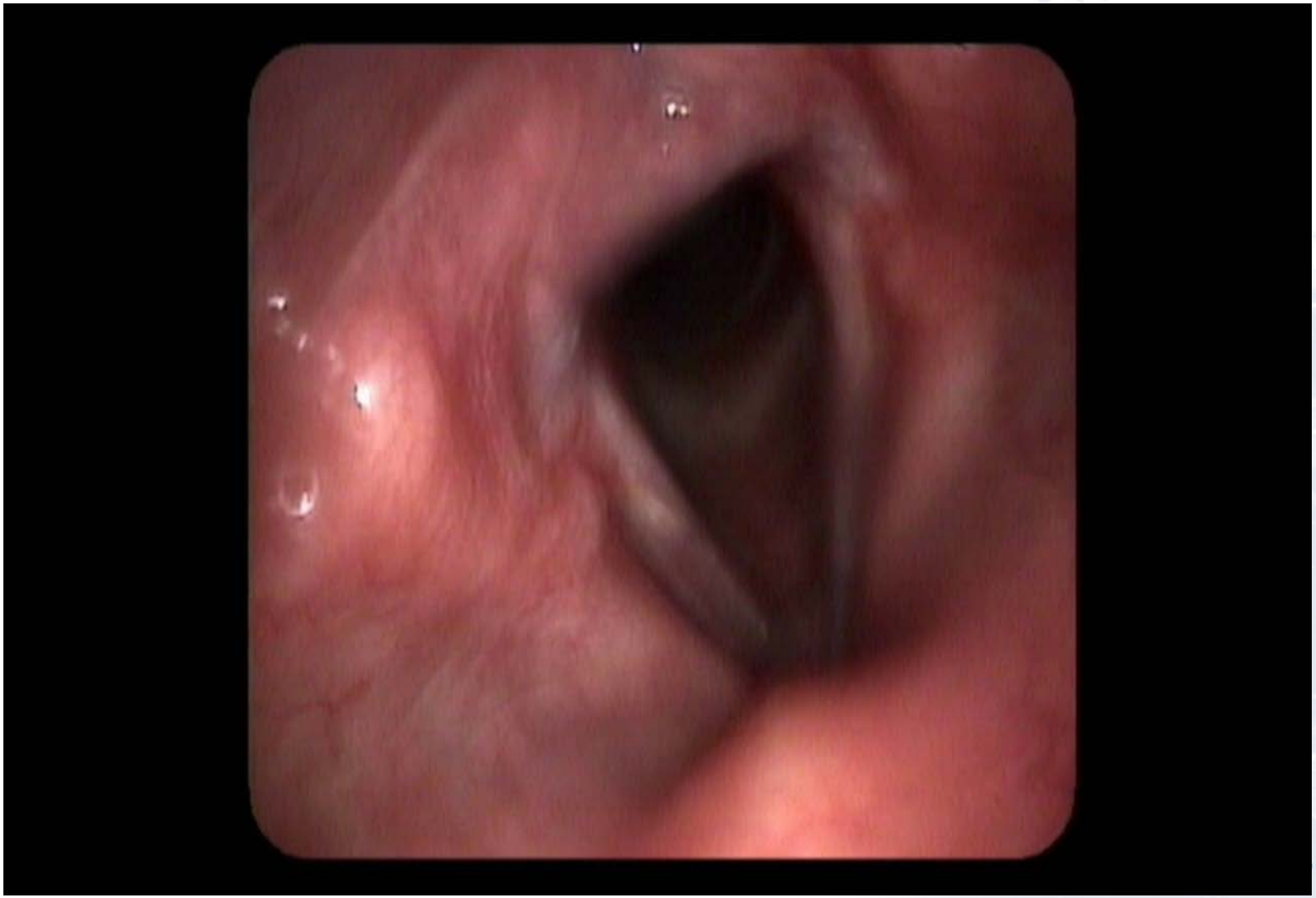
- All patients referred with dyspnea, with consideration of laryngeal involvement
- Clinical history
  - Demographics of the patient
  - Description of symptoms
- Exam findings

Discussion *(it's not always straightforward)*

JOHNS HOPKINS MEDICINE

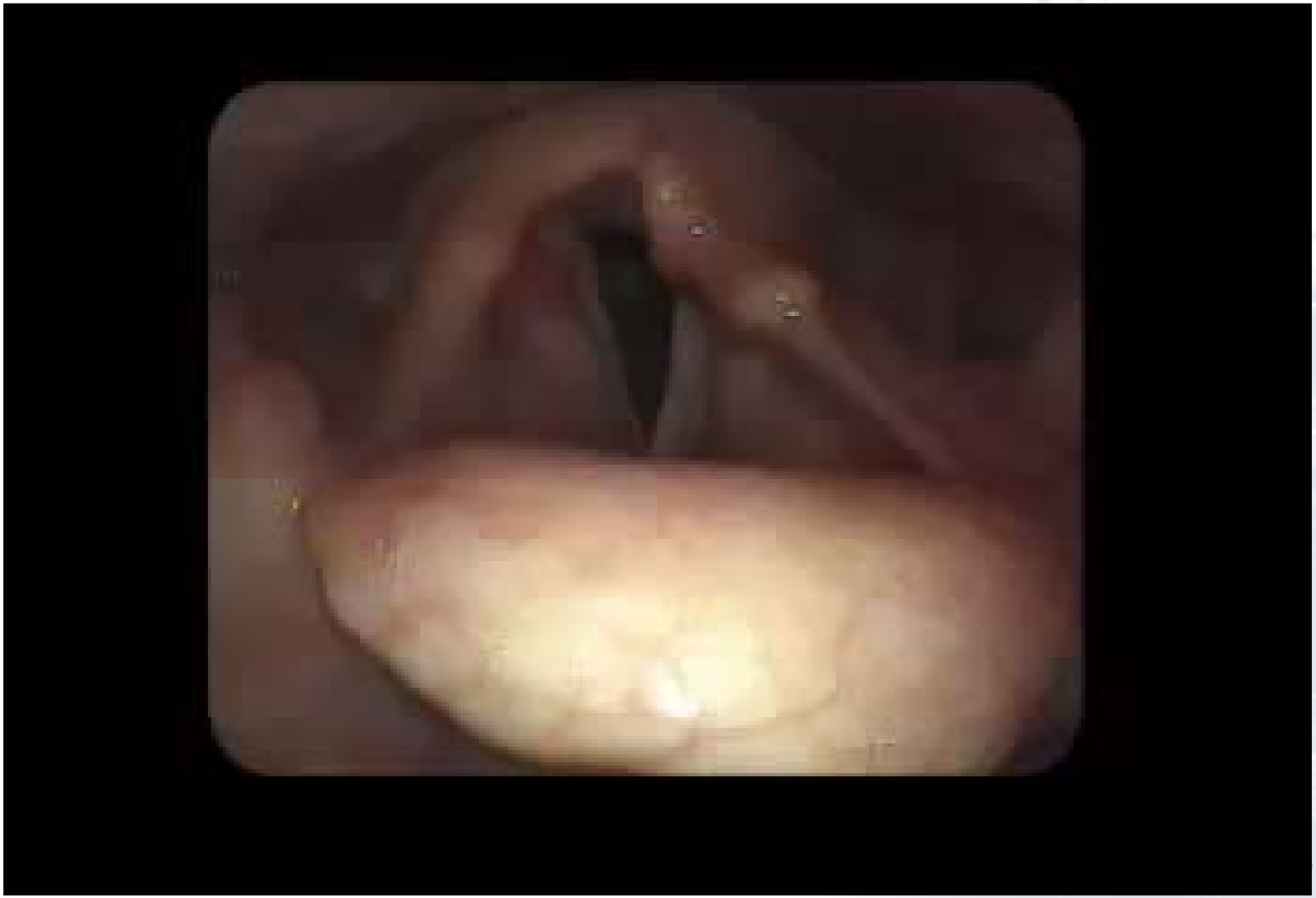
Case Study

- 17 yo male
- “Life long” history of “asthma attacks”
- Twice/day, triggered by cleaning products, dust, exertion
- Throat “locks up”
  - Patient and mother: likely exhalational wheeze; uncertain about inspiratory stridor
- Last 3 minutes, helped by albuterol



Case Study

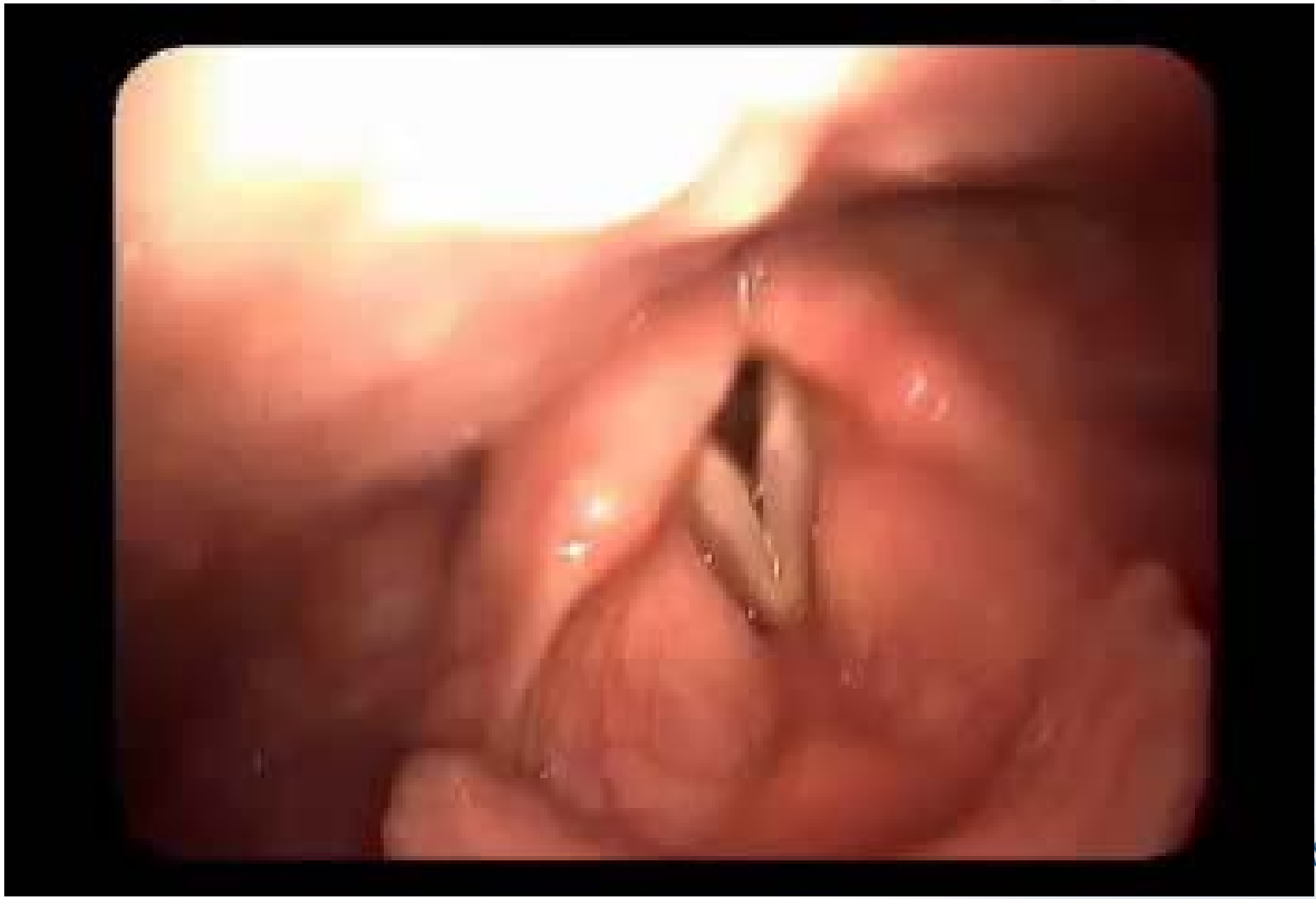
- 81 yo female
- Total thyroidectomy December 2012
- Chief complaint of dyspnea
  - Constant, unrelated to voice use
  - “Can’t take a deep breath” – both throat and chest
  - Uncertain about ‘loud breathing’ – if present, she and husband believe it is rare
- Cardiopulmonary work-up negative



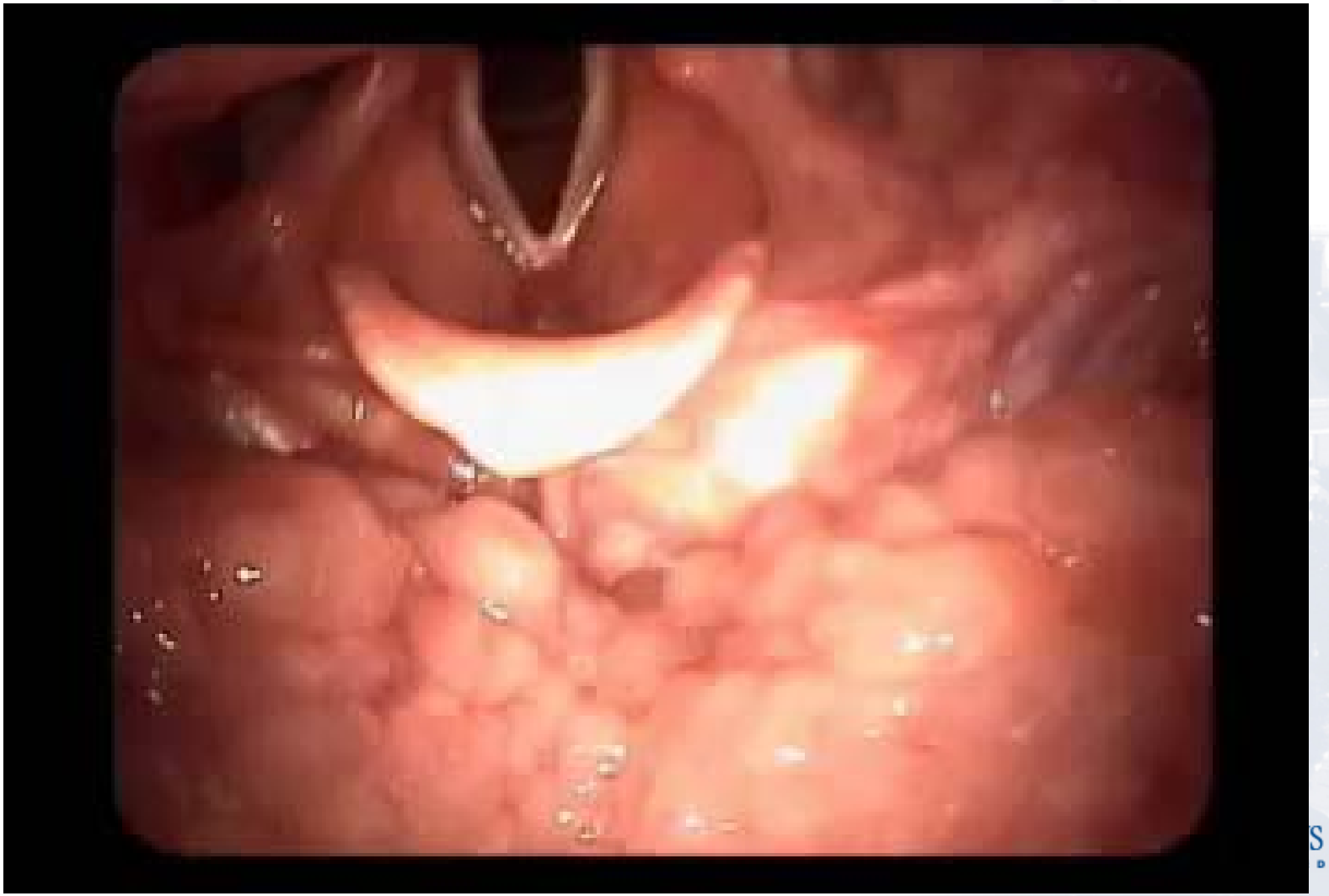
Case Study

- 15 yo female
- Family history of asthma
- Oct 2011: constant sense of “throat clogged”
- Feb 2013: “My throat closes off when I play basketball”
  - Episodic, begins with 10 min of exertion
  - Only basketball, not volleyball
  - “Difficulty catching my breath” – lasts 5 minutes, resolves with cessation of activity
  - “Loud breathing” with inhalation and exhalation, uncertain about stridor
  - Can talk normally during an episode

Baseline exam



Exam after vigorous exertion
"Yes, this is an episode"



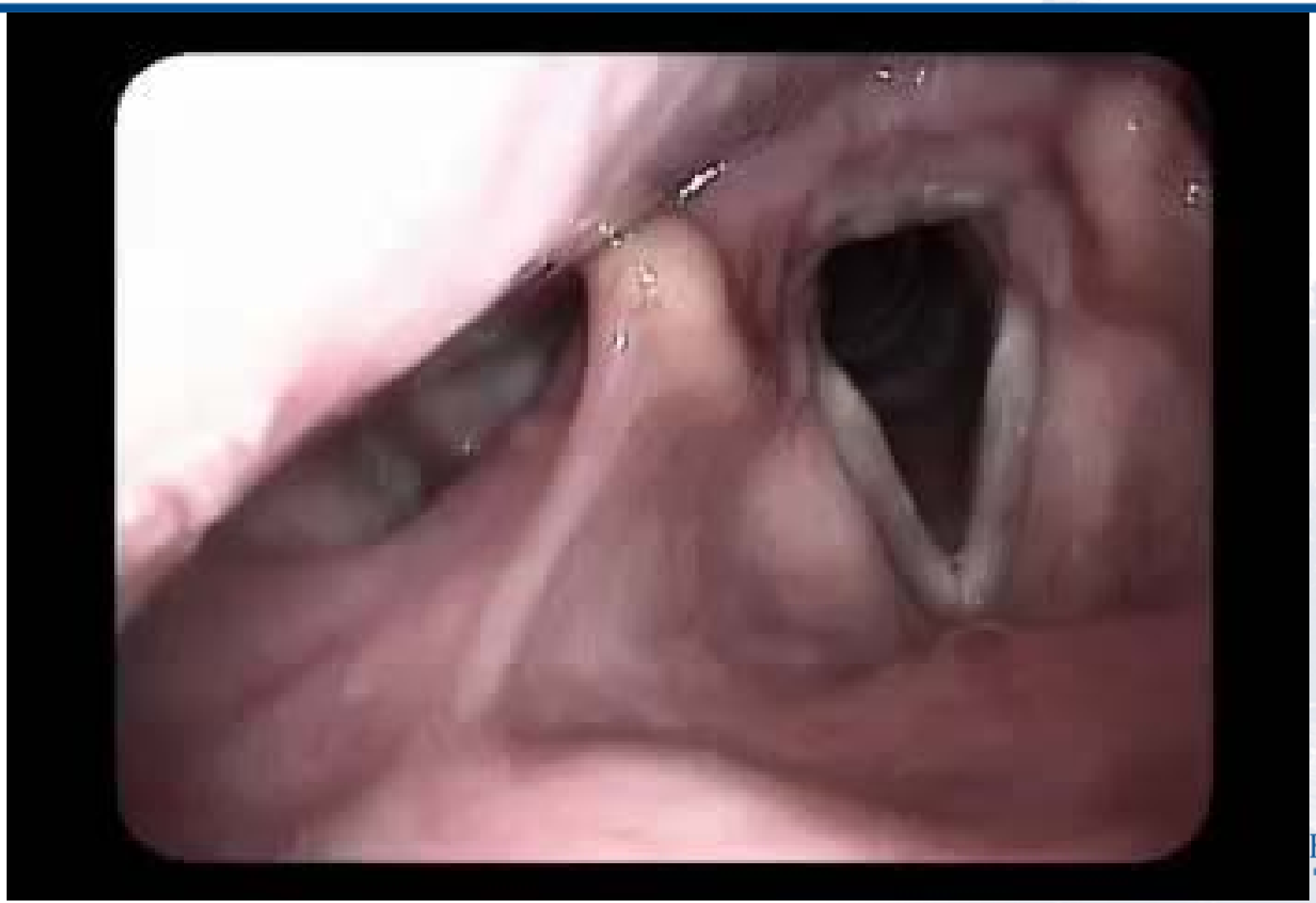
EILO

- There is no true PVFM in this exam
- Hyperfunctional behaviors are seen
  - Cough, pressed voice, “tightness” with laryngeal compression preceeding cough
- Exercise-induced laryngeal obstruction
  - Treated like PVFM: SLP respiratory retraining, reduce irritatant/stressors, nasal breathing
  - Consider supraglottoplasty prn – role is evolving

Hall et al. Brit J Gen Pr. Sep 1 2016 online

Case Study

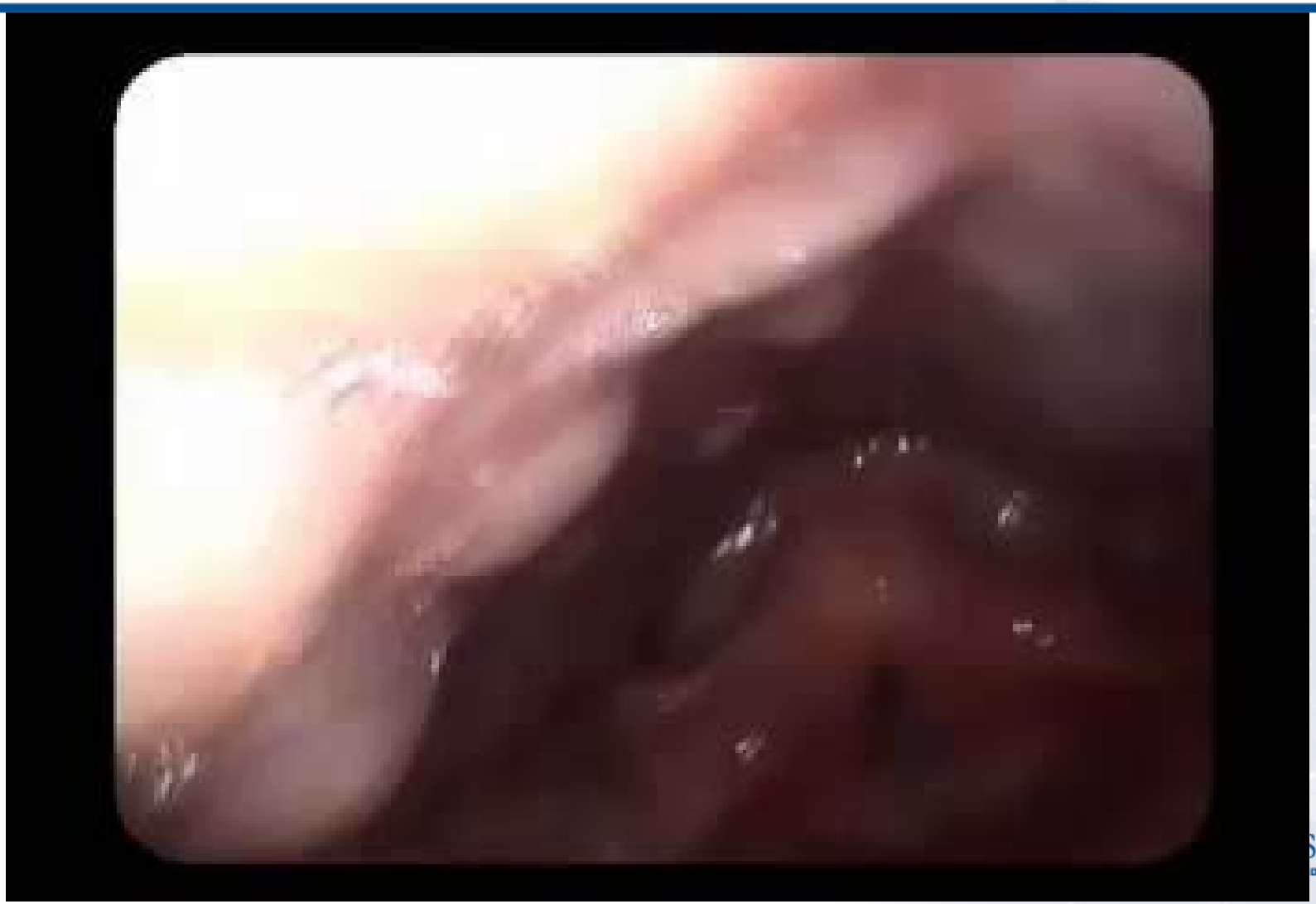
- 60 yo female
- Episodic dyspnea for 20 years
  - 10 hospital admissions in the past year
- Trigger: strong perfume
- Throat tightness → cough, throat clearing, occasional vomiting
- Lasts 1-2 hours
- Sometimes “sensation of someone sitting on my chest” along with “throat tightness”
- Patient is uncertain about stridor
- Son endorses “loud breathing”, but thinks this is ‘on the way out’?
- Most ED visits: steroids, epinephrine, inhalers; no laryngoscopy
- Attempted PFTs – became so dyspneic, 911 was called to take patient to ED; no results available
- Voice ‘rough and strained’ at baseline – worse during an episode



- Pretty classic PVFM
  - Dysphonia, odors, throat tightness
  - “Absence of wheeze?”
    - Still troubles me as a diagnostic criterion, given many patients (and providers) don’t distinguish between wheeze and stridor
- Good demonstration of PVFM as a subset of Irritable Larynx Syndrome
  - Cough, pressed voice, etc may persist even after acute dyspnea has resolved
- Did you see how quickly true laryngospasm resolved with nasal inhalation? “Rescue breathing”

Case Study

- 20 yo female
- Dyspneic episodes since 2003, initially told that she had asthma
- Diagnosed “Vocal cord dysfunction” per her Allergist/Immunologist in 2010 – he scoped her during an episode, told her that there was “very odd vocal cord motion”
  - Hoarse during episodes – he also diagnosed possible spasmodic dysphonia
- Episodes 1x/month, precipitated by “tickle in the throat”, then throat tightness, cough, and “tight breathing”
  - “Tightness” is sometimes in neck, sometimes in chest
  - “Wheezing” is described, both inhalation and exhalation
  - Tight, strained voice during an episode
- Xanax relieves an episode – noisy breathing lasts 30 minutes after taking anxiolytics, ‘tightness’ lasts 1-2 hours
- Possible sexual abuse at age 8
- Symptoms worsened at time of parents’ divorce
- Not on PPI; has occasional heartburn and globus pharyngeus
- Prior SLP evaluation – focused on voice, not breathing

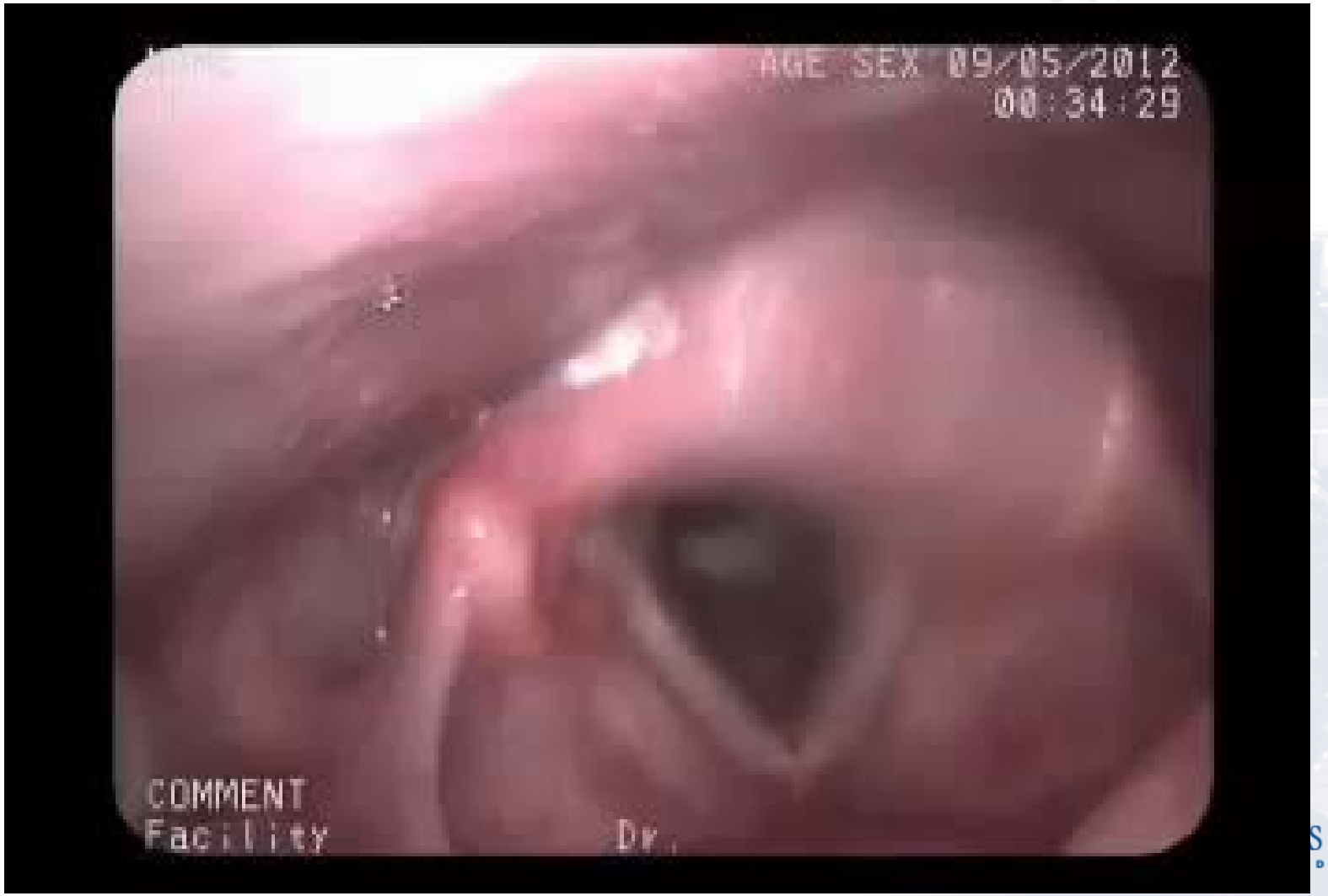


- Talking can be a trigger
- Anxiety can play a role
- Again, rescue breathing works on the acute dyspnea well
- Though anxiety and “tightness” might persist after acute dyspnea has resolved

Case Study

- 54 yo female, exertional dyspnea
- “Something stuck in the throat” – constant, worse with exercise
- When globus is at its worst, she has “throat tightness”
- Twice in the past year, “throat tightness” → inspiratory stridor which lasts until exercise ends; no stridor otherwise
- Pulmonary testing negative per patient; inhaled steroid, bronchodilator did not help exertional dyspnea

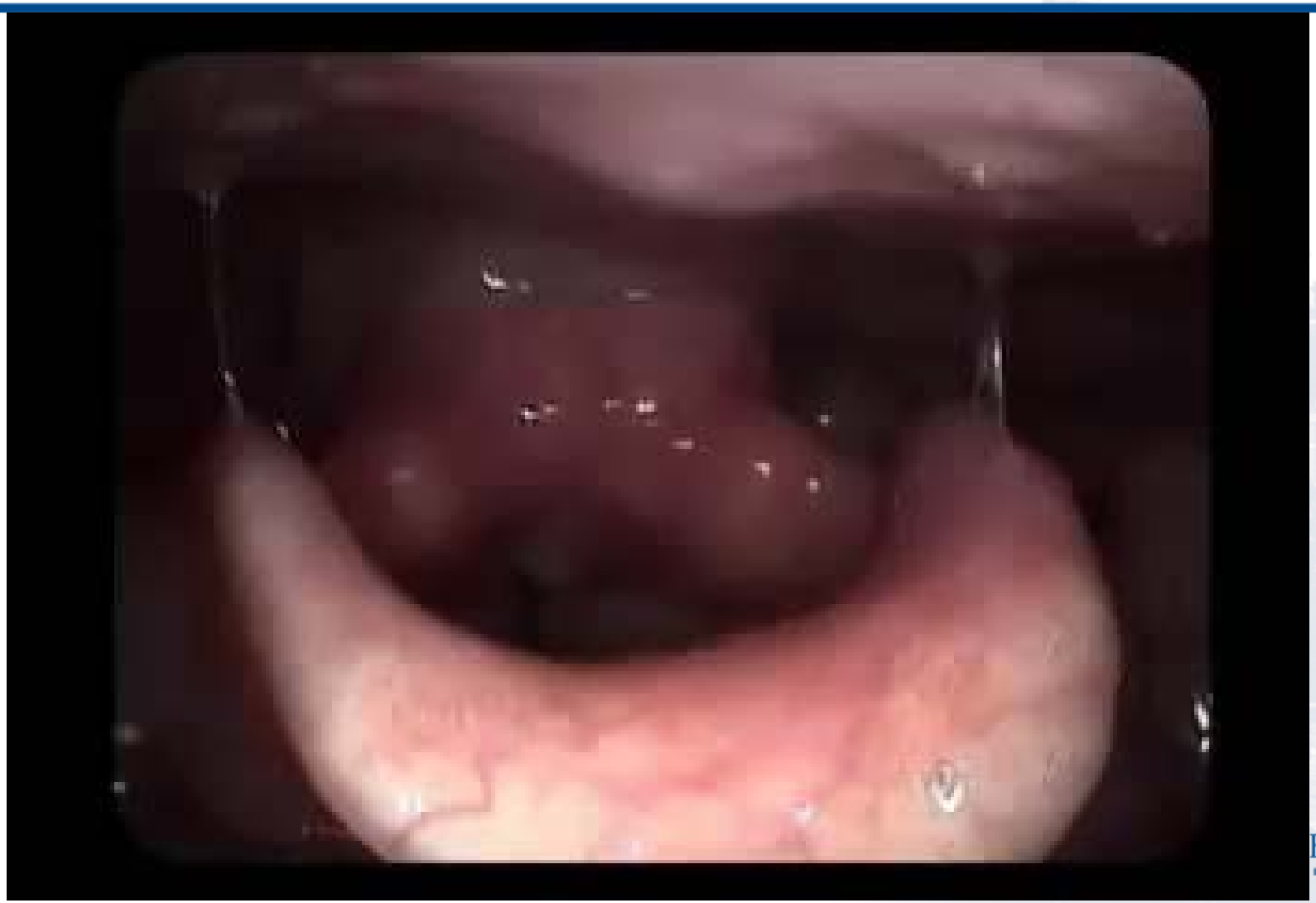
Baseline – normal;
This is after exertion (stairs):



- No PVFM or EILO at all – things are very patent during inhalation
- She does demonstrate FVC compression in between breaths
- Her “throat tightness” seems to be a variant of muscle tension, and her globus pharyngeus relates to the same

Case Study

- 54 yo female
- Same-day, urgent evaluation requested by PCP
- URI with productive cough for 2-3 weeks, diagnosed with bronchitis on day of evaluation
- No dyspnea/stridor prior to day of visit; “very hoarse”
- In PCP office, acute breathing difficulties
  - “Throat tightness” for 30-60 seconds
  - Inspiratory “wheeze” per patient; stridor per PCP
  - Resolved spontaneously
  - 2nd episode, lasting a few seconds, later in the visit



Case Study

- 68 yo male, “severe breathing problem with exertion”
- Vagal nerve stimulator placed for depression, then subsequently removed 2005; started on atypical antidepressants
- Dyspnea gradual in onset ~2007
- Occasionally loud breathing at baseline, described as “grunting and gasping sound”, exhalation > inhalation
- No sense of laryngeal airway restriction
- With walking, breathes more loudly though there is no acute distress
- With running in basketball games, breathing is so loud and so labored that he needs to stop activity
- 2 prior ENTs: left vocal fold paresis, possible PVFM
- 2 subsequent ENTs: left vocal fold paresis, not PVFM
- “Why am I so short of breath, and why is my breathing loud?”

JOHNS HOPKINS
MEDICINE

- His “airway noise” is vocalization, not stridor
- There is left TVC paresis
- But there is also appropriate abduction on inhalation, and adequate airway
- In short – no restriction to inhalation
- ? role of tardive dyskinesia

Stridor

- Inspiratory vs Expiratory
- Differentiate from stertor; vocalization; loud breathing

- If present, it doesn't always mean PVFM
- If absent, doesn't mean that larynx cannot be involved

- Still a good question to ask…

JOHNS HOPKINS MEDICINE

Episodic vs Constant

- This question does not localize to the larynx at all
- However, if laryngeal contribution is present, it distinguishes:

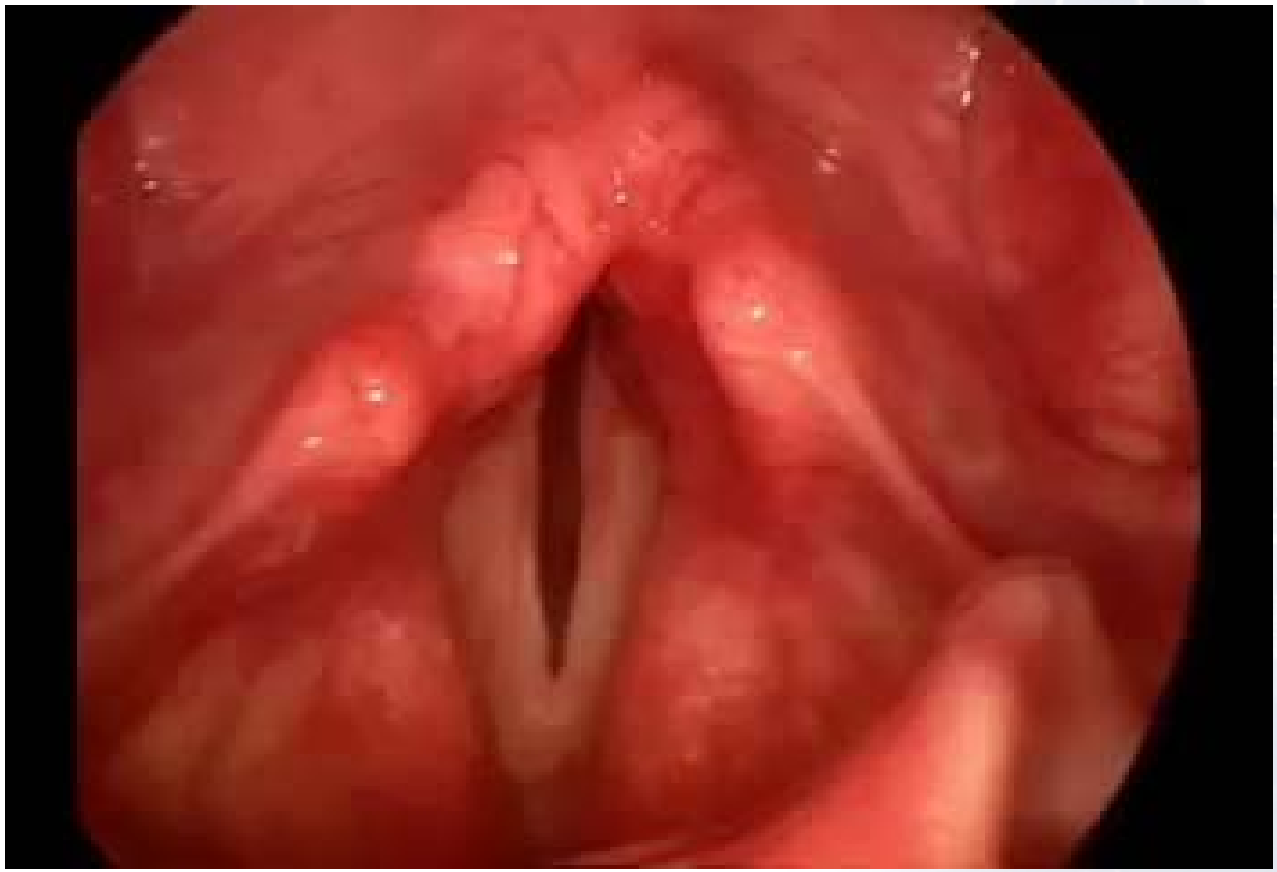
PVFM, irritable larynx syndrome

vs.

Fixed obstruction

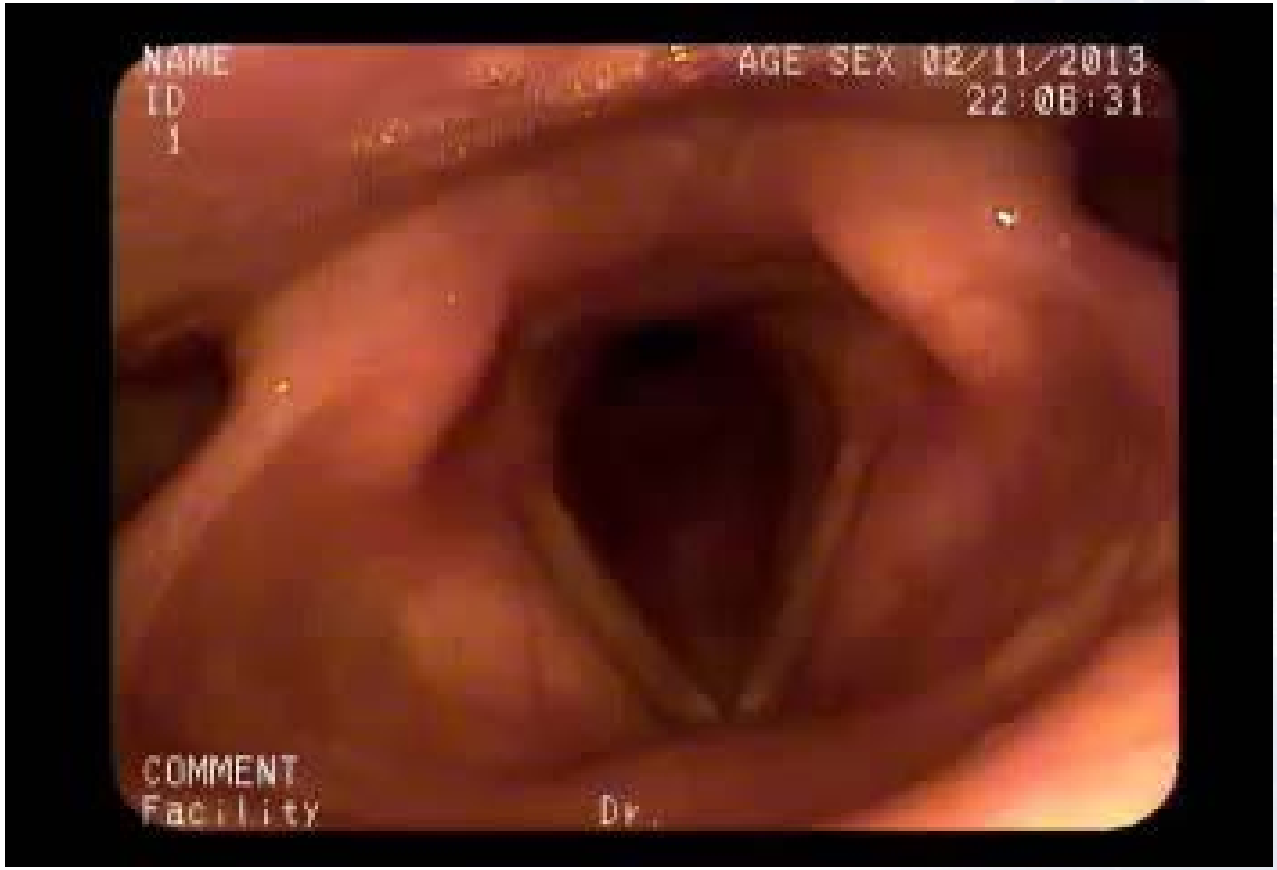
– There are still some red herrings….

Glottic stenosis



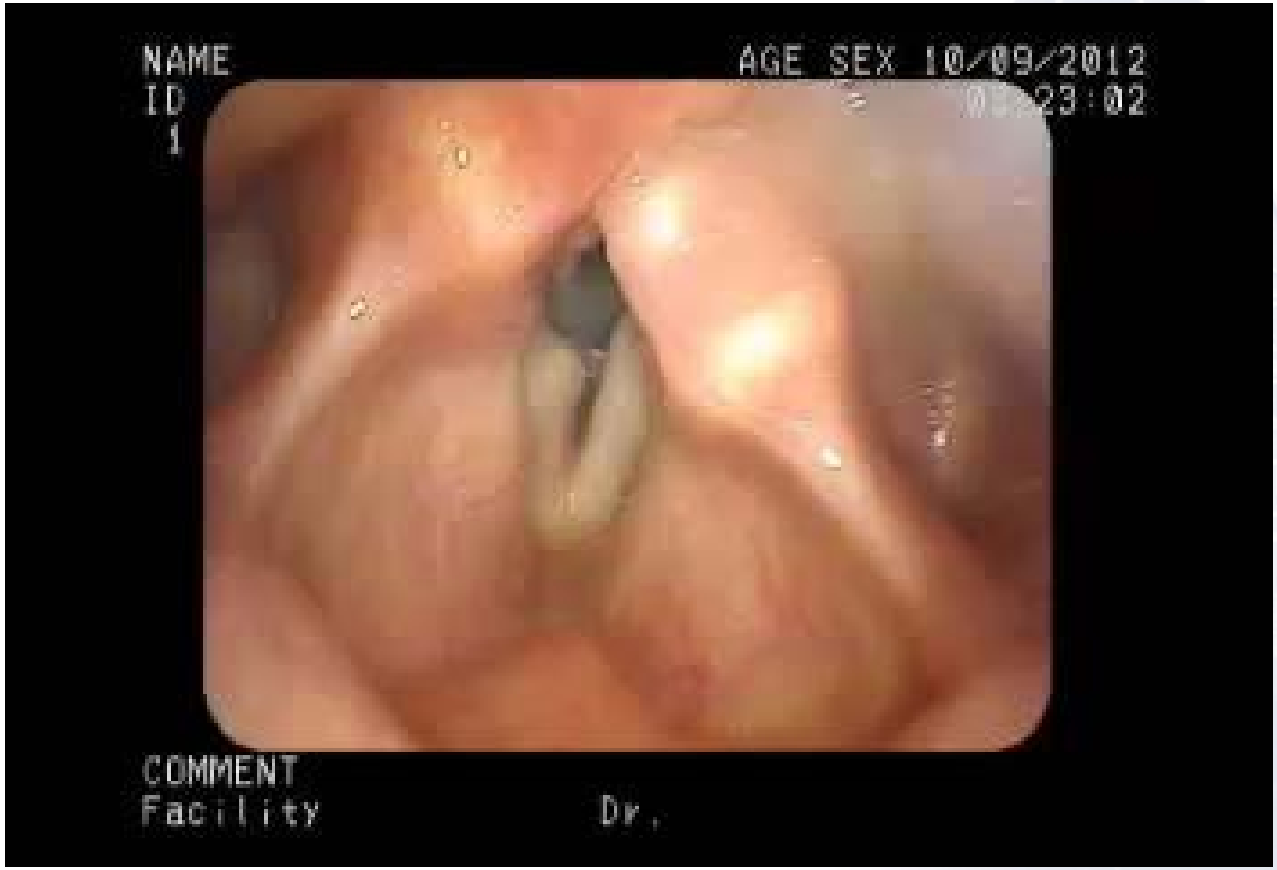
JOHNS HOPKINS MEDICINE

Subglottic stenosis



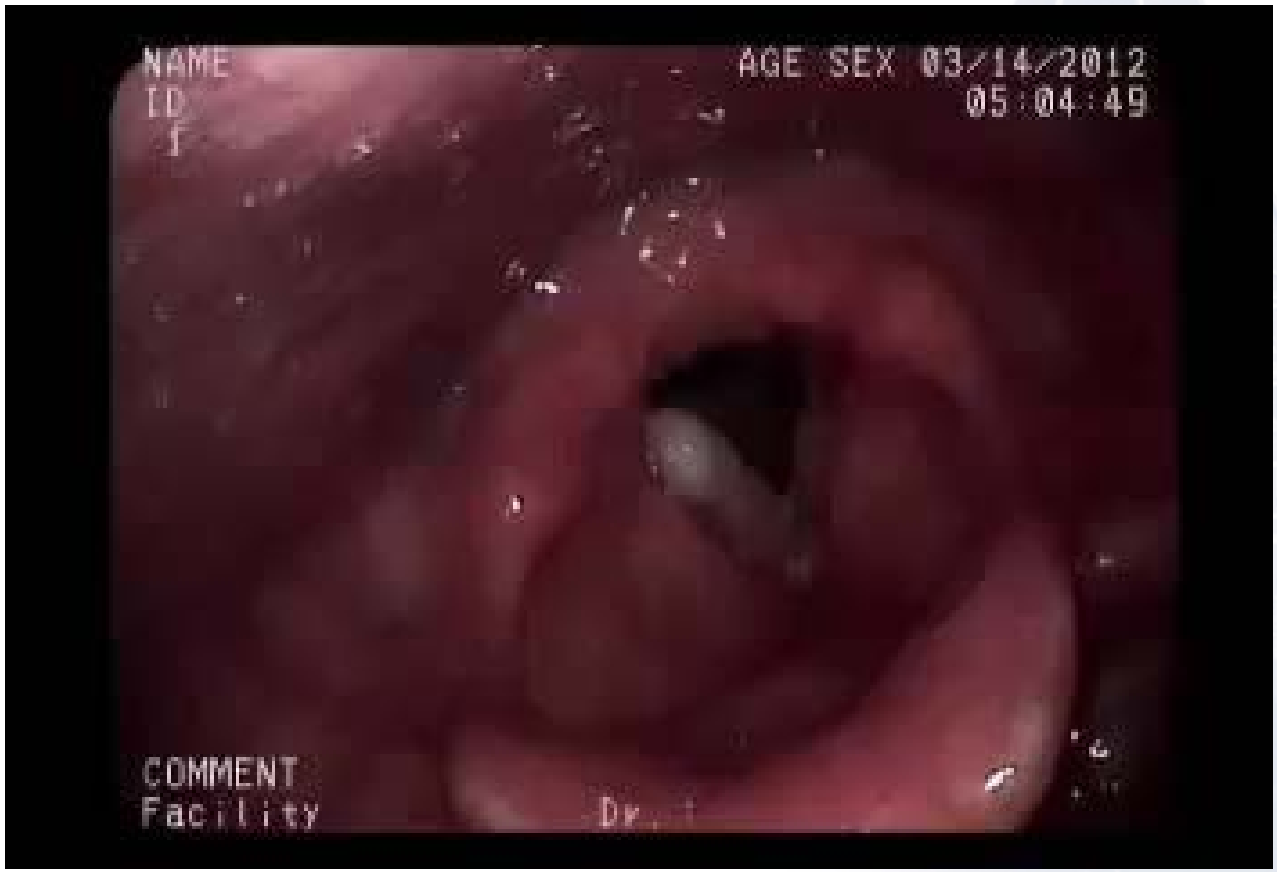
JOHNS HOPKINS MEDICINE

Multi-level stenosis



JOHNS HOPKINS MEDICINE

Polypoid corditis
(Reinke's edema, "smoker's polyps")



JOHNS HOPKINS MEDICINE

Pedunculated cyst

JOHNS HOPKINS MEDICINE

Treatment

- Patel (August 2015 AJSLP) reviewed 65 treatment studies
- 420 individuals with ages ranging from 8 to 87 years, 3.8:1 female-to-male ratio
- Evidence level = poor

Behavioral Treatment methods

- Psychoeducational counseling
  - Understanding of diagnosis and treatment plan
  - Reassurance
  - Build ‘internal locus of control’
  - Identify and manage triggers
- Establish Glottic Airway/ “Rescue” Breathing
  - Basic training gesture: Sniff-Blow
  - Sniff = abduction due to brain stem reflex.
  - Active, Semi occluded exhalation posture : Positive airway pressure helps maintain abducted posture
    - Pursed lips, voiceless fricative “sh” “f” or “s”
    - Helps reduce breathing rate-> reduce hyperventilation/panic-> Allow pCO2 to rise to weaken laryngeal adductor reflex
    - Pursed lips also used for inhale when congested
- Concentration on active exhalation
- Relaxation of oropharyngeal muscles
- Patient education and reassurance that the condition can be brought under voluntary control
- Diaphragmatic breathing
- “Wide-open” throat breathing
- Coordinated thoracic-abdominal breathing
- Visual biofeedback
- Vocal hygiene
- Inspiratory muscle training

JOHNS HOPKINS MEDICINE

Behavioral Treatment methods

- Relaxation of oropharyngeal muscles, upper body tension
- Diaphragmatic breathing/Coordinated thoracic-abdominal breathing
- Vocal hygiene
- Laryngeal control
  - "Open throat" breathing
  - Voice exercises
- Inspiratory muscle training
- Establish awareness of early symptom onset

Figure 1. The Borg Scale

0	Nothing at all
0.5	Very, very slight (just noticeable)
1	Very slight
2	Slight (light)
3	Moderate
4	Somewhat severe
5	Severe (heavy)
6	
7	Very severe
8	
9	
10	Very, very severe (maximal)

JOHNS HOPKINS MEDICINE

Behavioral Treatment methods

- Visual Biofeedback- especially helpful during evaluation
- Exercise Specific Training
  - Establishing normalized breathing patterns within their activity of choice e.g. swimming, basketball, running
  - Train breathing during core strengthening/weight bearing activities
- Desensitization to Triggers
  - Gradual exposure to odors/cold air/smoke with use of PVFM avoidance strategies
- Respiratory Retraining/Laryngeal Control Therapy Typically 1-6 sessions

Conclusions

- Accurate diagnosis is essential
- History is the key; ask about stridor, ask about ‘typical’ episodes
- Observation of breathing, PFTs are helpful
- Exam showing inappropriate adduction is the gold standard; there are tricks that can help precipitate this
- If an exam *performed during patient report of an episode* doesn’t show inappropriate adduction, it’s probably not PVFM

Conclusions

- When in doubt, consider adding respiratory re-training and anti-reflux treatment anyways – if symptoms warrant intervention
- What else can you do?
  - Reassurance – to patient and other physicians
  - Rescue breathing maneuvers
  - Identify triggers and treat those
  - Anxiolytics, benzodiazepines
  - Consider counseling or psychiatric evaluation

  - (Botox of the TA muscles – weaken TVC adduction)
  - (Suture lateralization of a vocal fold)
  - (Tracheotomy)