

DDX of Episodic Dyspnea in the Workplace



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Objective

- To describe DDX to be considered in cases of work-related episodic dyspnea
- 3 brief case summaries
- No relevant disclosures

Case 1

ID: 32- year-old male

CC: Nocturnal cough and fatigue

PI: Multiple episodes of “bronchitis” and “sinusitis” treated on an ambulatory basis over the previous 2 years.
Presenting complaints = productive cough, chest tightness.

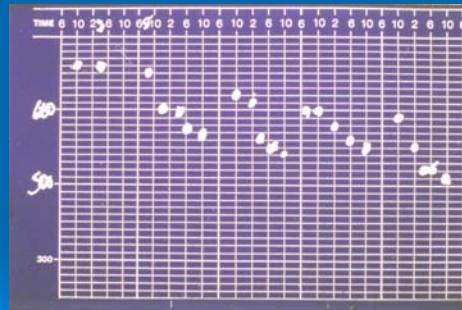


Case 1

- Mechanics
 - FEV₁ 4.52 (115%)
 - FVC 5.45 (118%)
 - Ratio 83%
 - FEF₂₅₋₇₅ 4.62 (108%)
- Lung Volumes
 - TLC 7.41 (112%)
 - RV 1.96 (105%)
- DLco 40.4 (109%)
- Methacholine Challenge
 - S_{RAW} doubled @ 5.1 mg/mL

Case 1

What diagnostic measure is indicated?



Occupational Asthma

Occupational Asthma: Definition

“...variable airflow limitation and/or airway hyperresponsiveness due to causes and conditions attributable to a particular occupational environment and not to stimuli encountered outside the workplace.”

Bernstein D, et al. Definition and classification. In Bernstein IL, et al., eds: *Asthma in the Workplace*. NY: Marcel Dekker, 1993.

Occupational Asthma: Sensitizing Agents

<u>Antigen/product</u>	<u>Occupation(s)</u>
<u>HMW</u>	
Natural rubber latex	Health care workers
Psyllium, Penicillin	Pharmacists, nurses
Animal proteins	Animal handlers, Vets
Alpha-amylase	Bakers
Gum arabic	Printers
Mold spores	Various
<u>LMW</u>	
Abietic acid	Solderers (collophony)
Plicatic acid	Sawyers (W. Red Cedar)
Acid anhydrides	Plastics; ship painters
Diisocyanates	Packing; car painters

Diagnostic Ambiguities

- ✓ W/u for occupational asthma may be “-” or “+/-”
- ✓ Response to Tx may be suboptimal
- ✓ Triggers are often low concentrations of non-sensitizing chemicals (e.g., VOCs or fragrances)
- ✓ Previous exposure history may be ± “benign”
- ✓ Dyspnea may be accompanied by extrathoracic respiratory sx's (e.g., globus, stridor, hoarseness)
- ✓ Dyspnea may be accompanied by non-respiratory sx's (e.g., CNS, autonomic)

Case 2

ID: 30 y.o.m. railroad switchman

CC: "Choking sensation" and upper chest tightness

PI: Seen @ UW 4 mos. s/p exposure to burning rubbish in railroad car. 10-15 min. smoke exposure while moving LPG-containing tank cars to avoid explosion hazard.

C/o acute eye, nose & throat irritation, cough, nausea and anxiety at time of exposure.

Case 2

PI: Seen acutely in ER:

- VS: 124/86; 80; 18; pulse ox = 97%
- "very occasional expiratory wheeze"
- Neg. CXR
- ABGs:
 - COHb = 1%
 - PO₂ = 84 (94% O₂ sat)
 - PCO₂ = 31
 - HCO₃ = 22
 - pH = 7.47
- Rx'd albuterol MDI "for cough"

Case 2

PI: Seen in f/u by pulmonologist:

- NI. PE, including chest exam
- Rx'd beclomethasone & fomoterol MDIs
- Failed RTW
- PFTs and methacholine challenge...

Case 2

> Mechanics

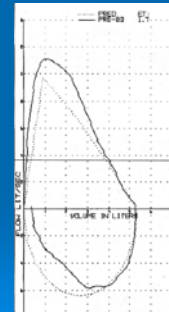
- FEV₁ 5.28 (111%)
- FVC 5.28 (99%)
- Ratio 93%
- FEF₂₅₋₇₅ 7.10 (151%)

> Lung Volumes

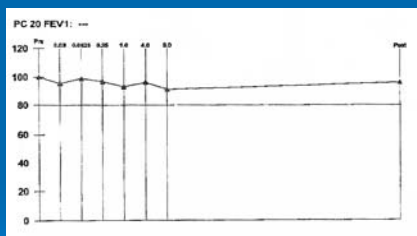
- TLC 6.70 (95%)
- RV 1.79 (108%)

> DLco 32.3 (77%)

> DLco/VA 5.06 (84%)



Case 2



Methacholine Challenge: PD₂₀ >> 8 mg/mL

Case 2

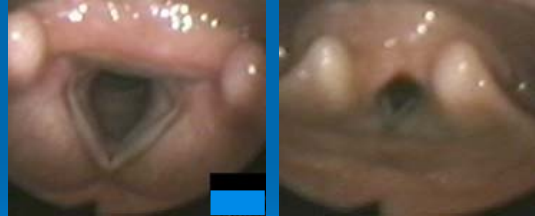
PI: At time of UW consult, experiencing episodic "choking sensation," inspiratory dyspnea, upper chest tightness, & nausea with exposure to diesel exhaust, perfumes & household cleaning products. Off work secondary to above.

PHx: + allergic rhinitis Hx. / - asthma Hx.
No reported reflux symptoms
Smoked 1 ppd x 8 years; quit 8 years prior to incident; currently chewing tobacco.
H/o mild intermit. depression, on bupropion

Case 2

What diagnostic measure is indicated?

Case 2



Expiration

Inspiration

Vocal cord dysfunction (VCD)
(“Paradoxical vocal cord motion”)

Case 2

PI: Patient underwent biofeedback training with speech pathologist and progressed with coping skills to the point that he could tolerate use of bleach solution (sodium hypochlorite) with minimal symptoms.

Awaiting clearance for RTW by employer's Med. Dept.

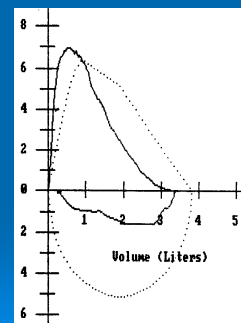
Irritant-associated VCD (IVCD)

Perkner et al. (JOEM 1998)

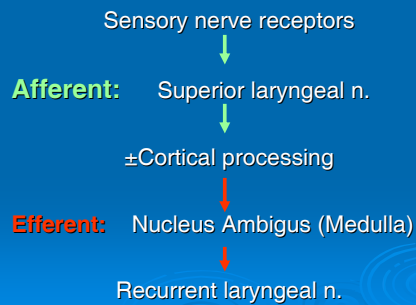
Case Definition

- S/p acute irritant exposure
- Onset Sxs within 24 hours
- No PHx VCD or other laryngeal disease
- Laryngoscopy confirmed

“Characteristic” flow-volume loop in VCD



Laryngeal Adductor Reflex



Management of IVCD

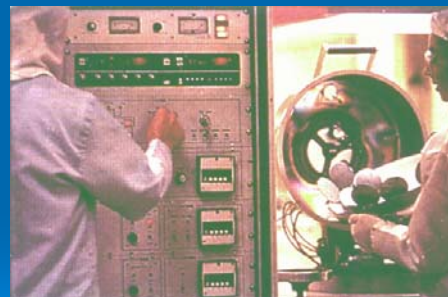
- Education / reassurance
- Vocal hygiene
- Irritant avoidance
- Relaxed throat breathing / panting
- Stop unnecessary medications
- Optimum treatment of underlying diseases (i.e., rhinosinusitis, GERD, asthma)
- Psychological counseling
- Clostridium Botulinum toxin injections (e.g., in spasmodic dysphonia)

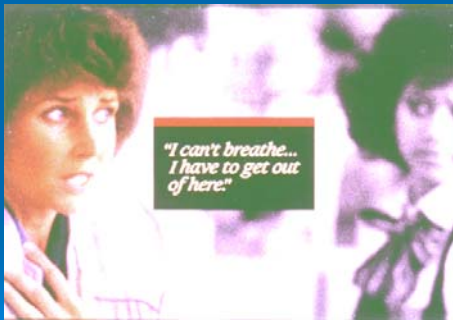
Case 3

ID: 40 y.o.f. electronics worker

CC: Shortness of breath, lightheadedness

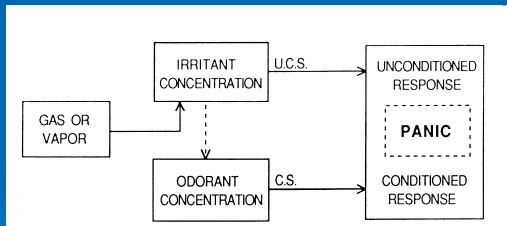
PI: Sxs s/p accidental exposure to phosphine (PH_3) gas in semiconductor mfg...



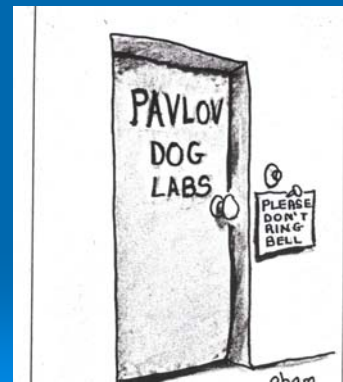


Psychological Injury

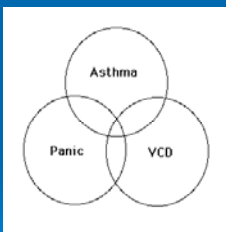
Odor-triggered panic attacks: Conditioning model



Source: Shusterman & Dager, *Occup Med* 1991.



Episodic Dyspnea in the Workplace: DDX



- ✓ Asthma
- ✓ Vocal cord dysfunction (VCD)
- ✓ Panic Disorder

Episodic Dyspnea in the Workplace: Hx Features

- ✓ Characteristics of dyspnea
 - "Do you have trouble getting air in or out?"
- ✓ Associated extrathoracic respiratory sx
 - Globus / stridor / hoarseness
- ✓ Associated non-respiratory sx
 - CNS / neuropsych (lightheadedness / sense of impending doom / depersonalization / loss-of-control...)
 - PNS (paresthesias)
 - Autonomic (palpitations / chest pain / sweating / GI...)

Episodic Dyspnea in the Workplace: Laboratory Workup

- ✓ Asthma
 - Spirometry / cross-shift peak flow meas. / NSBR (methacholine challenge) / specific bronchial challenge
- ✓ VCD
 - Flow-volume loop / laryngoscopy / acoustic voice analysis / others (?)...
- ✓ Panic disorder (odor-trigger panic attacks)
 - Lactate infusion / CO₂ challenge

Episodic Dyspnea in the Workplace: DDX

