

Diagnosis and Management of RADS (Reactive Airways Dysfunction Syndrome)

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Educational Objectives:

1. Review the definition, diagnostic approach and management of RADS
2. Understand the relevant differential diagnosis of RADS among occupational lung diseases, and the importance of concomitant medical diseases and treatments
3. Begin to understand the different approaches to disability and legal evaluations

Scenario 1:

Ms. H is a 45-year-old female with a past medical history of obesity, hypertension, and diabetes mellitus type 2 who worked as a housekeeper in a hotel several months ago. During that time, she reports exposure to cleaning chemicals for a few hours each day that she worked. After a period of time with no exposures, she developed dyspnea on even mild exertion and was hospitalized with a presumptive diagnosis of chemical pneumonitis. She returned to work several weeks later with strict advice to avoid the known chemical exposures but developed similar symptoms a few days after restarting as a housekeeper and was hospitalized again. Following her second hospitalization, she utilized her short-term disability coverage and did not return to work, finding that her symptoms had improved. After a few months out of work, she was able to climb at least two flights of stairs without dyspnea.

Scenario 2:

Ms. B is a 37-year-old female presenting with daily headaches after 20-60 minutes of being at work. She was recently moved to the basement of her employer's building but then moved back to her original office with resolution of her symptoms. Several months later, she moved back to the basement and experienced progressive dyspnea on exertion, sore throat, cough, nasal congestion, and sneezing with return of her headaches. These symptoms progressed over 7 months before she moved back to her original office though these symptoms continued. She transitioned to working from home and only has symptoms when she returns to the office for meetings. She no longer has respiratory symptoms outside of work. Despite her excellent metabolic capacity and regular exercise regimen, she expresses concern about the long term or delayed effects of any exposures on her future health.

Question 1: How would you characterize these exposure histories?

Short-term and transient exposures in the workplace. Symptoms resolve when patients leave the workplace. There is typically no progression of symptoms over a work week.

Question 2: Ms. H and Ms. B each ask you what this might be. What is the differential diagnosis for their work-related symptoms?

- Occupational Asthma
- Pneumoconiosis
 - i. Coal workers' lung
 - ii. Silicosis
 - iii. Hard metal lung disease
 - iv. Berylliosis
 - v. Giant cell interstitial pneumonitis
 - vi. Hypersensitivity pneumonitis
 - vii. Asbestosis
 - viii. Innumerable others (byssinosis, red cedar, etc)
- Cryptogenic organizing pneumonitis
- Non-asthmatic eosinophilic bronchitis
- Fungal and mold exposures
 - i. Aspergillus
 - 1. Allergic bronchopulmonary aspergillosis
 - 2. Aspergillomas
 - ii. Stachybotrys
 - iii. Cladosporium
 - iv. Fusarium
 - v. Penicillium
 - vi. Other (coccidiomycosis, histoplasmosis)
- RADS (Reactive Airways Dysfunction Syndrome)
- Irritant induced asthma
- Irritant vocal cord dysfunction
- Sick building syndrome
- Sporadic, community acquired concurrent illnesses
 - i. Bronchitis, pneumonia, sinusitis
- Exacerbation (or simply detection) of pre-existing diseases
 - i. Asthma/COPD
 - ii. CHF
 - iii. Obesity and/or deconditioning
 - iv. GERD
 - v. Side effects of anti-hypertensive and cardiac medications:
 - vi. ACE inhibitors and beta blockers (remove below)
 - 1. Cough (ACEIs>ARBs)
 - 2. Beta blockers and airway obstruction
 - 3. Beta- and calcium-channel blockers and chronotropic limitation
 - vii. Anxiety and/or depression with somatization

Type	Comments
Occupational asthma (OA)	Adult onset Triggered by immunologic or nonimmunologic stimuli found only at the workplace
Work-exacerbated asthma	Presence of pre-existing or concurrent asthma Subjective worsening at the workplace
Irritant induced asthma	New-onset asthma in adulthood Induced by exposure to an irritant, nonimmunologic stimulus at a high level of intensity Considered a subset of OA if exposure happens at workplace, but physiologically different from immunologic OA
Reactive airways dysfunction syndrome (RADS)	Similar to irritant-induced asthma, except that an acute, single, high-intensity exposure to a nonimmunologic substance triggers symptoms within minutes Episode followed by bronchial hyperresponsiveness and ongoing asthma-like symptoms for a prolonged period of time
Occupational nonasthmatic eosinophilic bronchitis	Adult onset Symptoms mimic asthma Develops at workplace Absence of bronchial hyperresponsiveness but elevated sputum eosinophil count

Figure 1. Types of work-related asthma. Borrowed from ATS Pulmonary Board Review, 2015.

Question 3: Both individuals ask “What is RADS?”

RADS is characterized by:

- Absence of a pre-existing respiratory disease
- Short duration, high intensity exposure to a known respiratory irritant
- Asthma-like symptoms requiring medical care within 24 hours of the exposure

The following should be obtained as part of the diagnostic workup for RADS:

- Chest imaging
- Spirometry – should be normal; if obstructed when actively symptomatic, then occupational (irritant) asthma rather than RADS
- Methacholine challenge is typically positive
 - i. Remember up to 15% of normal (lifelong nonsmokers with no respiratory or atopic history) can have borderline bronchial hyperresponsiveness
 - ii. Prior tobacco use can produce false positive results
- Compatible history is key to making the diagnosis

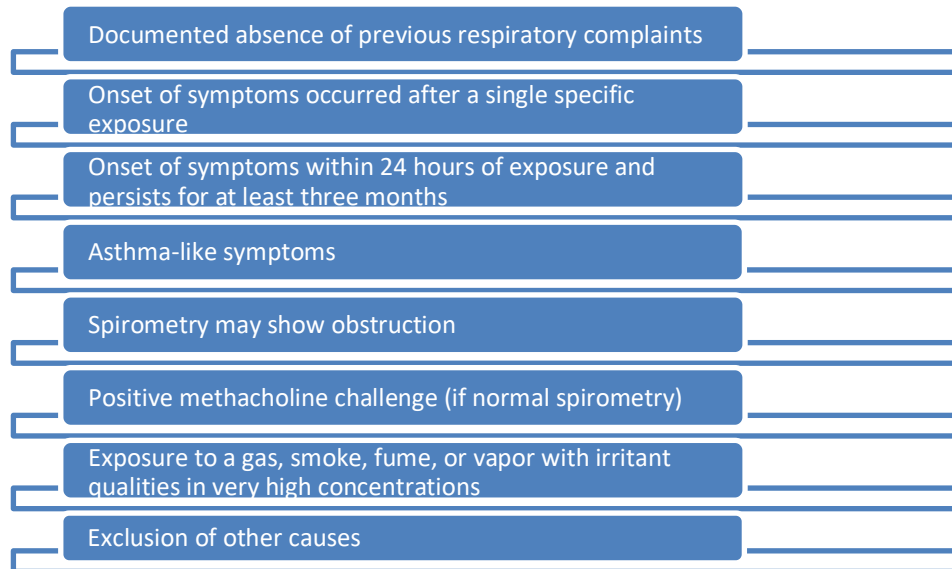


Figure 2. Criteria for diagnosis of reactive airways dysfunction syndrome. Adapted from Brooks SM, et al. CHEST 1985.

Question 4: What is your diagnostic evaluation? What are the typical clinical symptoms?

- Clinical symptoms
 - i. Cough, dyspnea, wheeze etc. with rapid onset, usually with a very clear date/time of onset. Typically, onset is almost always within 24 hrs. Some important questions to ask would include:
 1. Was the onset of symptoms related to one memorable event?
 2. Were others in the vicinity also affected?
 3. Was there any repeat gas, fume, or dust exposure? Is there ongoing exposure?
- Pulmonary function tests
 - i. Peak flow monitoring, with exposure diary
 - ii. Serial spirometry
 - iii. Methacholine challenge testing (typically abnormal)
 - iv. Cardiopulmonary exercise testing if cause of symptoms remains unclear
- Imaging
 - i. Chest radiographs (PA and lateral)- usually normal
 - ii. Chest CT scan- may show mosaicism/air trapping
- Laboratory studies
 - i. Hypersensitivity pneumonitis panel
 - ii. IgE
 - iii. RAST (radioallergosorbent testing)
 - iv. CBC with differential (to assess for eosinophilia)
- Airborne testing: is workplace less or greater than ambient air?
 - i. Mold spore counts
 - ii. Particulates (dust)
 - iii. VOCs (volatile organic compounds)
- Custom testing
 - i. Customized stress tests for specific precipitating circumstances
 - ii. Allergy/hypersensitivity testing

Question 5: What is the treatment for RADS? Will she get better?

Typically, we follow an approach in treatment that mirrors the stepwise approach described in the NAEPP and Global Initiative for Asthma (GINA) guidelines although there have not been any studies formally assessing its efficacy in this population. Recommendations are based on expert opinions, case reports, and case series.

- Tincture of time
 - i. Removal of exposure, symptoms typically abate after 12-18 months
 - Corticosteroids
 - i. Oral: for acute onset of symptoms
- Consider taper rather than short burst given risk of rebound

Inhaled corticosteroid/bronchodilator combination

- Anticholinergics and leukotriene antagonists
 - i. Can be added if patients remain symptomatic despite above therapies

Question 6: Ms. B asks if you will testify on her behalf? Can you be her expert witness? What forms can you expect to see? What ethical conflicts does this pose?

- Independent medical examination (IME)
 - i. At request of employer, insurer, lawyer, other entity
 - ii. Obligation to requestor, NOT TO PATIENT!
 - iii. Cannot divulge/report your opinion to the patient!
 - iv. Patient entitled to learn the IME results through appropriate due process
 - v. Can serve as an expert witness
- Treating physician
 - i. Obligation to patient
 - ii. No obligation to employer or lawyer on either side
 - iii. Can testify as a fact witness
 - iv. Remember your notes are read!
 - v. **MAY** be precluded from also testifying as an expert
- Safety Data Sheets (<https://www.osha.gov/Publications/OSHA3514.html>), formerly (until c.2012) known as MSDS (Material Safety Data Sheets) – available for known exposures (eg, cleaning agents)
- Physician's Affidavit of Recovery
- Return To Work Physical Capabilities Form
- The ethical dilemma – am I treating the patient or their case?
 - i. The incidental finding in an IME (eg, lung cancer or unstable angina)
 - ii. Empiric steroids or a surgical lung biopsy for hypersensitivity pneumonitis?
 - iii. Are they disabled?

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