

## THE ROLE OF MEDICAL HISTORY TAKING FOR OCCUPATIONAL ASTHMA DIAGNOSIS

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### **Abstract**

To establish the diagnosis of a disease including asthma, physician always taking medical history from patient, physical examination, laboratory tests, imaging or other examination. In occupational asthma, taking appropriate medical history is very important to measure the relationship between exposure and disease. Crucial elements are the occurrence of a symptom-free latency period, an improvement of symptoms when away from work, and to some extent a well-known at-risk occupation. It is essential that the causal relationship between work and symptoms be documented by objective means. However, the clinical history alone is generally not sufficient to make a definitive diagnosis of occupational asthma. The problems are some tests is not so easy to perform, it is time-consuming and costly, and it carries some risk for the patient (and the operator) and should only be done in specialized centers. If only medical history taking performed to establish diagnosis the sensitivity is approximately 70%.

**Keywords:** medical history taking, diagnosis, occupational asthma

### **ASTHMA**

Asthma is an inflammatory disorder of the airways. When an asthma attack occurs, the muscles surrounding the airways become tight and the lining of the air passages swell. This reduces the amount of air that can pass by, and can lead to wheezing sounds. Most people with asthma have wheezing attacks separated by symptom free periods. Other symptoms include shortness of breath, cough and chest tightness. Asthma attacks can last minutes to days and can become dangerous if the airflow becomes severely obstructed.<sup>1</sup>

Asthma ranks second among the most prevalent chronic respiratory diseases worldwide. In 2017, the prevalence of asthma was estimated at 273 million cases (3.6% of the world population) and the incidence of asthma was estimated at 43 million cases. Asthma is the second leading cause of death from a chronic respiratory disease worldwide, with an estimated 500,000 deaths in 2017 and a mortality rate of 6.48/100,000 population.<sup>2</sup>

### **Occupational Asthma (OA)**

Work Related Asthma (WRA) accounts for about 10% to 15% of all adult onset asthma.<sup>1,3</sup> Work-related asthma presents with symptoms of asthma that began or became worse at work, usually in the context of exposure to a new chemical or environmental change. The symptoms may occur during or after work hours. The specific respiratory symptoms in WRA patients are the same as in non-WRA patients, which requires a high level of suspicion and incorporation of work history in the evaluation of all cases of adult-onset asthma. They include cough, wheeze, shortness of breath, and chest tightness, with physiological evidence of

reversible/variable airway obstruction and/or hyperresponsiveness.<sup>3</sup>

More than 200 agents have been reported to cause WRA, based on epidemiological and/or clinical evidence. Many occupations and exposures have been associated with allergic OA. Asthmagens (sensitizing antigens resulting in asthma) are often classified into categories based on their molecular weight, with high molecular weight defined as >5,000 daltons versus low molecular weight as <5,000 daltons. Molecular weights are believed to be important in the mechanisms of action in the development of OA.<sup>3</sup>

Work Related Asthma divided in two groups, Occupational Asthma (OA) and Work-Exacerbated Asthma (WEA). Occupational asthma is defined as new-onset asthma in the workplace and can be caused by exposure to either a workplace sensitizer or an irritant. OA is further classified into OA with latency or OA without latency. Work-exacerbated asthma is defined as “preexisting or concurrent asthma that is worsened by workplace conditions; the activation of preexistent asthma or bronchial hyper-responsiveness may occur due to many factors such as temperature, exercise, dust, or low-level irritants.”<sup>3</sup>

### **Medical History Taking**

Occupational asthma is a “special” form of asthma that often causes diagnostic problems for busy clinicians. Its diagnosis is not always easy. The typical of occupational asthma is that the symptoms are related to work. This may sound simple, but in reality the relationship to work is much more complex than is often assumed. This complexity is the main reason why the diagnosis of occupational asthma is often missed. A major pitfall in the clinical diagnosis of occupational asthma is that the patient with occupational asthma may have few symptoms during work and most symptoms outside the workplace.<sup>4</sup>

In diagnosis of work-related asthma, the most important thing is to take an appropriate history of the patient with asthma. Crucial elements are the occurrence of a symptom-free latency period, an improvement of symptoms when away from work, and to some extent a well-known at-risk occupation. However, the medical history alone is generally not sufficient to make a definitive diagnosis of occupational asthma. It is essential that the causal relationship between work and symptoms be documented by objective means.<sup>4</sup>

According to the European Academy of Allergy and Clinical Immunology, irritant-induced OA is diagnosed in the absence of a history of asthma, being classified as follows: (i) acute (i.e., definite irritant-induced OA) - asthma that develops within a few hours after a single exposure to very high levels of irritants; (ii) subacute (i.e., probable irritant-induced OA) - asthma that develops within a few days or weeks after multiple high-level exposures to irritants; and (iii) chronic (i.e., possible irritant-induced OA) - asthma resulting from chronic exposure to moderate levels of irritants (i.e., with a latency period).<sup>5</sup>

Taking a thorough medical history is the first step when suspecting occupational lung disease. The history should include three components: 1) current and previous respiratory symptoms; 2) an occupational history that includes a detailed exposure history; and 3) focused questions linking the symptoms to the workplace, in space, time, and latency from first exposure. The

ultimate goals of a structured investigation are to assist in determining causation, implementing treatment, and intervening to prevent disease in other exposed workers.<sup>6</sup>

## Symptom

Symptoms of work-related asthma include episodic wheezing, chest tightness, cough, dyspnea, or recurrent attacks of bronchitis with cough and sputum production. The history should include the following questions:<sup>3</sup>

1. What are your symptoms?
  - What are your symptoms of concern? Do you have cough, shortness of breath, or wheezing?
  - When did these symptoms first occur? Was there an event that precipitated the symptoms?
  - When did these symptoms first occur relative to the beginning of your work in that location?
  - How frequently have symptoms occurred?
  - Do they get worse at any particular time of day or night?
  - If yes, indicate below the patterns of the symptoms:
    - Do these symptoms begin hours after starting work?
    - Do these symptoms continue or start while at home?
    - Do they improve when you are away from work such as on weekends, night time (off-shift) or holidays or vacations?
  - Are your symptoms constant or intermittent? What makes them worse or better?
  - Has the pattern of your symptoms changed over time? How?
  - Is there a seasonal pattern to your symptoms? What time of year are they the worst?
  - Are the symptoms associated with any substance or process at work?
  - How frequent and severe are your symptoms? Have your pulmonary symptoms included throat tightness, difficulty with inspiration or expiration, harsh sounds, cough, or sputum production?
  - Did any emergency room or physician visit document lung function?
  - Do you have a history of pre-existing asthma (particularly childhood asthma, which can recur in adults), including prior frequency of symptoms, treatment with asthma medication, and response to medications?
  - Do you have a history of allergy or has anyone mentioned the word atopy to you?

- Do you have symptoms of allergic rhinitis and/or conjunctivitis that are worse with work?
  - Did the symptoms begin after a one-time, high-level workplace inhalation exposure to an irritant gas, fume, smoke, or vapor?
  - How does medication use affect the symptoms? Do you use prescribed medications, over-the-counter medications, and/or complementary/alternative preparations? Do you use pulmonary and non-pulmonary medications? Are you taking an angiotensin-converting enzyme inhibitor or beta-blocker?
  - Do others at work have the same symptoms you have?

2. How did your condition develop?

Past:

- Have you had previous similar episodes before your current job?
- What kind of treatment did you receive for these symptoms in the past?
- Who was your physician?
- Were the treatment effective?

Cause:

- What do you think caused the problem?
- How do you think it is related to work?

Occupation and activities:

- What do you do for work?
- Current occupation and specific work activities including shift, hours, duration, and days worked per week. (Patients working 6 days a week or more may not have enough time away from work to symptomatically improve)
- Any past work history including specific activities, especially if there is a history of similar symptoms?
- What chemicals or substances including gas, fumes, vapors, dusts, or aerosols do you work with? What about at home?
- What is the work area's room size, specific ventilation, other co-worker reports, exhaust hoods, remodeling, and recent change in processes? Are there Material Safety Data Sheets (MSDSs) and industrial hygiene reports available?
- Were there changes in work processes in the period preceding the onset of symptoms? Symptoms of asthma that develop or worsen after a worker starts a new job or after new materials are introduced on a job are suggestive. (A substantial period - from months to years - can elapse between initial exposure and development of symptoms.)

- Was there an unusual work exposure before the onset of initial asthma symptoms?
- 3. What are your expectations regarding your return to work and disability from this health problem?
- 4. What are your concerns about the potential for further injury to your lungs?
- 5. How do you like your job, your supervisor, and co-workers? What is your relationship with your co-workers and supervisor and how do they treat you?
- 6. What do you hope to accomplish during this visit?
- 7. Do you have any protective equipment at work, such as masks or respirators? How often do you use them? Are they required?
- 8. Do you have a second job (moon lighting)? Non-Occupational Activities:
- 9. What is your home environment, including any hobbies, crafts, pets, family Members who work with chemicals, family members who smoke, living near an industrial plant, or living near congested traffic area?
- 10. What are your leisure activities (e.g., wood working, gardening, welding)?
- 11. How do these symptoms limit you?
  - a. Are there any activities that you can no longer perform?
  - b. Do you feel more short of breath during exercise?
  - c. Do you feel more short of breath when doing normal daily activities?
  - d. How long have your activities been limited?
- 12. Do you have other medical problems?
  - e. Do you have headaches, fatigue, malaise, weight loss, appetite changes, fever, physical inabilities, or exercise intolerance?
  - f. Do you have any autoimmune, infectious, or metabolic diseases?
  - g. Do you have any allergies?
  - h. Do you have any other respiratory diseases or conditions?
  - i. Do you smoke? Does someone else in your environment smoke?
  - j. Do you use other drugs, including marijuana?
  - k. Do you have diabetes or HIV?
  - l. Have you ever had cancer?

## **Family History**

A family history of atopic diseases may help identify individuals with greater susceptibility to OA with latency, particularly for OA to high-molecular-weight agents. However, it is important to note that many workers with OA will have no family history of atopy, and conversely, many workers have an atopic history without OA. A history of similar symptoms in other household and family members may also help identify non-occupational causes of asthma, such as home and hobby exposures.<sup>3</sup>

## **Occupational History**

The physician should obtain an accurate and detailed history of current and prior occupations. All possible occupational exposures should be identified, especially those that are known to induce airflow obstruction (e.g., animal and plant proteins, organic dusts, proteolytic enzymes, specific chemicals such as isocyanates and anhydrides, noxious fumes, metals, and drugs). Both routine and episodic tasks are potential exposures and should be evaluated.<sup>3</sup>

The physician should also attempt to quantify the exposure. The intensity (duration and concentration), frequency, duration, and peak concentrations of the exposures are all important to document if possible.<sup>7</sup> A detailed history of current exposure status is important. Lam et al. reported a significant improvement in spirometry results at a mean of 0.8 years after patients with OA were removed from exposure.<sup>8</sup>

## **Environmental History**

Exposures outside the workplace are also important to evaluate and document. Patients should be queried regarding primary place of residence, its age, location, type, remodeling history, heating, ventilation, flooring, and past water damage. Hobbies such as automobile repair, woodworking, photography, ceramics, and gardening may expose individuals to agents that can cause or exacerbate asthma. The majority of the U.S. population is skin-test-positive to at least one environmental allergen.<sup>9</sup> It is difficult to determine the relative contribution of work-related and non-work-related factors to the genesis of symptoms in people with multiple risk factors or exposures.

## **Smoking History**

The greatest threat to personal lung health is from tobacco inhalation.<sup>10</sup> Although it is customary to quantify tobacco use in terms of pack-years, the variation in cigarette type and inhalational habits does not permit more than an approximation for potential lung injury.<sup>11</sup> Cigarette smoking may have an additive effect to airways obstruction from other causes, it may superimpose additional symptoms, or it may lead to misdiagnosis if the condition is apportioned disproportionately to smoking. Cigarette smoking may condition or modify the response to some antigens, but this is not known at this time and cannot be assumed.<sup>12</sup> Regardless of the medical history taking, a physical examination and diagnostic testing should be conducted as indicated.

## Specificity and Sensitivity

Although the probability of WRA from history alone is not high, a typical history consistent with WRA can lead to a pretest probability as high as 70% before diagnostic tests are conducted.<sup>13</sup> Cote et al. reported that a history suggestive of western red cedar asthma had a diagnostic specificity of 45%.<sup>14</sup> In contrast, Malo et al., reported that 76% of referred clinical patients reported improvement in respiratory symptoms while away from work but were subsequently found to have no objective evidence of WRA.<sup>6</sup> Taken together, the clinical history is believed to be more reliable for excluding than confirming the diagnosis of WRA.<sup>12</sup> For OA without latency, frequently resulting from accidents or other non-routine workplace conditions, the history is often the primary source of information to establish that a highly offensive atmosphere was present. In this section, we will use the words inflammatory or irritating interchangeably.

## CONCLUSION

Establish the diagnosis of occupational asthma is difficult due to many factors including time-consuming, costly, and it carries some risk for the patient (and the operator) and should only be done in specialized centres. Taking a thorough medical history is the first step when suspecting occupational asthma. The sensitivity of medical history taking only performed to establish diagnosis occupational asthma is approximately 70%.

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