Smoking, age, and laryngeal height predicted obstructive airway disease in adults

Straus SE, McAlister FA, Sackett DL, Deeks JJ, for the CARE-COAD1 Group. **The accuracy of patient history, wheezing, and laryngeal measurements in diagnosing obstructive airway disease.** JAMA. 2000 Apr 12;283:1853-7.

QUESTION

How accurate are the clinical examination and patient history in the diagnosis of obstructive airway disease (OAD)?

DESIGN

Blinded comparison of items from the clinical examination and patient history (self-reported OAD, smoking history, wheezing on auscultation, maximum and minimum laryngeal height, and laryngeal descent) with spirometric results (FEV_1 and FEV_1–FVC ratio < 5th percentile).

SETTING

20 investigator groups in primary, secondary, and tertiary care centers in 14 countries.

PATIENTS

332 patients were recruited, and 309 (mean age 56 y, 57% men, 89% white) were included in the analysis. Patients were recruited so that approximately one third had confirmed OAD, one third had suspected OAD, and one third had no evidence of OAD. Exclusion criteria were reversible airway obstruction, terminal illness, age < 18 years, severe respiratory distress, or inability to obtain spirometry.

DESCRIPTION OF TESTS AND DIAGNOSTIC STANDARD

Clinical examination items were derived from previous research and consensus: self-reported history of chronic OAD, smoking history, laryngeal height and descent, and wheezing on auscultation. Spirometry was done within 30 minutes of clinical examination with the better attempt of 2 efforts recorded. OAD was confirmed if FEV_1 and the FEV_1–FVC ratio were < 5th percentile. Spirometrists and clinicians were blinded.

MAIN OUTCOME MEASURES

Positive and negative likelihood ratios (+LRs, –LRs) using multivariate analysis.

MAIN RESULTS

The reduced multivariate analysis indicated 4 items that, when all were present, were highly predictive of OAD in all patients: self-reported chronic OAD, smoking > 40 pack-y, age ≥ 45 y, and maximum laryngeal height ≤ 4 cm. The presence of 3 items predicted OAD in patients with no history of OAD: smoking > 40 pack-y, age ≥ 45 y, and maximum laryngeal height ≤ 4 cm (LRs in the table). Wheezing and laryngeal descent were not predictive of OAD.

CONCLUSION

Obstructive airway disease was highly likely in the presence of smoking > 40 pack-years, age ≥ 45 years, maximum laryngeal height ≤ 4 cm, and self-reported history of OAD.

Multivariate likelihood ratios (LRs) calculated from clinical examination and history for diagnosis of obstructive airway disease (OAD)*

Diagnostic elements	All patients		Patients without known OAD	
	+LR	–LR	+LR	–LR
Self-reported history of OAD	7.3	0.5	Not applicable	Not applicable
Smoking > 40 pack-y	8.3	0.8	11.6	0.9
Age ≥ 45 y	1.3	0.4	1.4	0.5
Maximum laryngeal height ≤ 4 cm	2.8	0.8	3.6	0.7
All factors present	221	0.13	59	0.3

*LRs defined in Glossary.

COMMENTARY

The Clinical Assessment of the Reliability of the Examination (CARE) investigators have used the Internet to recruit consecutive patients with a range of OAD likelihoods. The spirometric criteria for OAD differ from the commonly used Thoracic Societies criteria but are sound. The process and criteria for excluding patients with asthma from the study are uncertain, but they may be important because airways disease includes a spectrum of reversibility. A similar process of excluding patients with asthma in clinical practice is necessary for the reported nomogram to retain external validity. Intraobserver and interobserver variations were not measured, but they may be important because a similar study showed only marginal agreement among observers (l). The study, however, provides important utility data for each of the clinical features tested, 2 of which can now be confidently removed from clinical practice when determining the likelihood of OAD, namely, wheezing on auscultation and laryngeal descent.

The ability to rule out OAD is also important for the use of pulmonary function test resources. Comparison between the nomogram and clinicians' judgment would now be interesting. For example, a patient who is a nonsmoker and < 45 years old and who denies a history of OAD may either have OAD ruled out using clinical judgment or be sent for pulmonary function testing. Patients with an intermediate probability of OAD will benefit most from the nomogram.

Internet use for recruitment of > 300 patients in 1 month, with a very low data error rate, is impressive. Future CARE reports are awaited with interest because they may affect not only the interpretation of diagnostic tests once clinical pretest likelihoods have been determined but also the economical use of diagnostic tests.

Brian J. Smith, MBBS
North West Adelaide Health Services
Woodville, South Australia, Australia

Reference
1. **Holleman DR Jr, Simel DL, Goldberg JS.** J Gen Intern Med. 1993;8:63-8.