A Novel Diagnostic Test for the Risk of Aspiration Pneumonia in the Elderly

To the Editor:

Paul E. Marik and Danielle Kaplan (July 2003) have comprehensively summarized the cause and treatment of aspiration pneumonia and dysphagia in the elderly. Owing to the increasing number of the aged population, many pulmonologists and geriatricians recognize that silent aspiration might be very important for the pathogenesis of aspiration pneumonia and nosocomial pneumonia in older patients. Thus, the current review article is very important and useful to understand the diagnosis, assessment, and management of aspiration pneumonia in the elderly. Marik and Kaplan suggest that elderly patients with clinical signs suggestive of dysphagia and/or who have community-acquired pneumonia should be referred for a swallow evaluation. This is very true for assessment of factors that increase the risk of pneumonia in patients who aspirate. However, the conventional clinical assessment of swallowing function is not efficient to detect the risk of aspiration pneumonia.

Because aspiration is a fairly common event for critically ill patients receiving enteral tube feeding, progression to aspiration pneumonia is difficult to predict due to variation in host factors and characteristics of the aspirate material. Aspiration of oropharyngeal secretions is of equal if not greater importance than aspiration of gastric contents. Monitors for aspiration such as glucose oxidase, blue food coloring, and gastric residual volumes are insensitive and unreliable. A number of clinical risk factors cannot be fully identified at the bedside. Although the videofluoroscopic swallowing assessment (VFSS) is the most commonly utilized instrumental assessment tool in the clinical setting to determine the nature and extent of the swallow disorder, this method may be too sensitive for detection of swallowing disorders in the elderly. Because the age-dependent retraction of the larynx, age-dependent muscle weakness, and decreased volume of salivary secretion with age dependently or independently affect the impaired swallowing function, the perfect swallowing function is rarely found by the VFSS in the old persons aged ≥80 years old.

We have reported, however, clinically applicable methods for the assessment of the risk of aspiration pneumonia in the elderly: the swallowing provocation test (SPT) and the simple SPT (S-SPT). These methods are very useful to differentiate the patients with or without stroke who are predisposed to aspiration. Twenty-six stroke patients with aspiration pneumonia (mean age, 72.1 ± 4.1 years [± SD]) and 26 age-matched stroke patients without aspiration pneumonia (mean age, 69.4 ± 3.9 years) were tested. The normal response to SPT was determined by inducing swallowing reflex within 3 s after 0.4 mL or 2 mL of distilled water injection into the supraglottis. In the water swallowing test (WST), subjects drank quantities of 10 mL and 30 mL of water from a cup within 10 s. The subject who drank water without interruption—without evidence of aspiration—was determined to be normal. The sensitivity and specificity of first-step SPT using 0.4 mL of water for the detection of aspiration pneumonia were 100% and 83.5%, respectively. Those of the second-step SPT using 2 mL of water were 76.4% and 100%, respectively. The sensitivity and specificity of first-step WST using 10 mL of water for the detection of aspiration pneumonia were 71.4% and 70.8%, respectively. Those of the second-step WST using 30 mL of water were 72% and 70.3%, respectively. The S-SPT is more useful than the WST in differentiating patients predisposed to aspiration pneumonia, with high sensitivity and specificity. While the cooperation of the patient is needed for the WST and VFSS, the S-SPT does not necessarily require the patient’s cooperation. Furthermore, the test was reproducible by other investigators.

Clinically detectable aspiration is associated with increased morbidity. Since silent aspiration remains a major difficulty, and patients with swallowing disorders are at a risk of aspiration, the SPT and S-SPT are useful and widely applicable methods for the assessment of aspiration pneumonia in the frail elderly.

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Respiratory Findings in Tobacco Industry Workers

To the Editor:

The article entitled “Respiratory Findings in Tobacco Workers” by Mustajbegovich et al in CHEST (May 2003)1 evoked great interest. Because of our extensive experience in this field (> 30 years), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest. Because of our extensive experience in this field (H11022), we hope we are able to add some important facts to the interest.

First, one of our studies,2 which to the best of our knowledge is the largest study of its kind, included 610 tobacco workers from Plovdiv, Bulgaria. One hundred seventy-one subjects (28%; 80 men, 91 women; mean [± SD] age, 41.6 ± 9.4 years) who had respiratory symptoms and/or FEV1 or vital capacity below the lower limits of normal reference values were subjected to comprehensive lung function assessment (ie, body plethysmography, diffusion measurement, slow and fast spirometry, closing volume, and N2 slope and blood-gas analysis) in the referral laboratories of the Pathophysiology Department, Medical University, Plovdiv, Bulgaria. We have to emphasize the fact that the cited article deals with a contingent of subjects who had already undergone a field screening.1

Second, a complete functional assessment of those workers found that women, despite working in an environment with lower levels of pollution, had more frequent respiratory symptoms and lung impairments.3 Our study also showed that smoking can potentiate the effect of tobacco dust. Those workers who had pronounced functional disorders (70.8%) displayed several typical patterns of change, as follows: (1) obstructive ventilatory defects and lung hyperinflation, a pattern suggestive of emphysema (33.1%); (2) a restrictive ventilatory defect with diffusion limitation and dyspnea during exercise testing, a pattern suggestive of diffuse parenchymal lung disease (20.7%); (3) occupational asthma with work-shift changes (5.8%); and (4) in the rest of the studied workers, a mixed pattern or difficulty in defining a pattern.

Third, we subjected tobacco dust to electron microscopy. It was determined that the majority of the particles had an almost isometric form and a size of 0.3 μm (range, 0.05 to 16 μm). In addition, there were some with anisometric forms (eg, triangular and polygonal) ranging in size from 0.1 to 2.0 μm. Keeping in mind the size of the particles of tobacco dust, it is evident that those particles can reach and damage different levels of the respiratory system, including respiratory bronchioles and alveoli.

Fourth, we developed an index for the quantitative assessment of individual risk for the development of lung damage, which was calculated by the following formula:

\[ R_I = \kappa, C, T, \]

where \( R_I \) is the index of risk, \( \kappa \) is the “personal” quotient (including age, smoking history, and medical history), \( C \) is the mean dust concentration for the entire length of service of the worker, and \( T \) is the time of dust exposure (ie, length of service in dust environment). The validation of the index of risk on other contingents and the follow-up of the initial one showed very good discriminative power, and it was incorporated into the lung function surveillance system in the tobacco industry in our country.

Finally, our long experience with respiratory findings in tobacco workers shows that harmless tobacco dust does not exist.

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2 Yanev I. Investigation on respiratory function in tobacco workers. PhD thesis, Plovdiv Medical University, 1987

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