Editorial

Assessing the severity and prognosis of chronic obstructive pulmonary disease: is it still sufficient to measure FEV_1 alone?

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Since Fletcher & Peto described the natural history of the decrease in forced expiratory volume in one second (FEV_1) in postal and transport workers in London, progressive and irreversible airway obstruction has been the characteristic that defines chronic obstructive pulmonary disease (COPD).[1] The FEV_1 is the basis of the current classification of disease severity. Increased FEV_1 values and a lower rate of decrease in FEV_1 are the outcome measures most commonly used in clinical research to evaluate the response to treatment and the prevention of COPD progression.[2] However, for the patient with COPD, whose complaint does not refer to the alterations in these functional variables, the most important outcome measures are the symptoms, especially the degree of dyspnea and exercise tolerance. Measurement of FEV_1 does not usually provide information that allow the assessment of patient performance in activities of daily living, as well as having a weak correlation with the degree of dyspnea and exercise capacity, and has little application in the assessment of bronchodilator response.[3] All these findings, as well as the current concept that COPD presents significant extrapulmonary changes, suggest the need for new markers of disease severity, progression, and prognosis that make it possible to assess not only the functional repercussions, but also the influence of such repercussions on patient symptoms and limitations. Many studies have been carried out with these objectives, and new data have been obtained. Examples include the information that smoking cessation reduces the progression of the disease and that the decrease in the number of exacerbations, as well as their prevention, can change the rate of FEV_1 decrease and improve patient quality of life.[2] The degree of exercise-related dyspnea – which is one of the basic symptoms in patients with COPD, appearing in the initial phase of the disease and affecting the activities of daily living – correlates more closely with five-year survival rates than does the classification of disease severity by FEV_1 values.[4] The systemic manifestations of COPD, which include changes in quality of life and in body composition, as well as repercussions on exercise tolerance, also correlate with the frequency of exacerbations, with hospitalization rates, and with patient survival.[4] Studies indicate that weight loss, low body mass index (BMI), and low fat-free mass index are negative prognostic factors, regardless of disease severity, and are related to exercise capacity in patients with COPD.[2] The distance covered on the 6-minute walk test (6MWT), which reflects the functional capacity of patients with COPD, was also a better predictor of mortality than were other traditional markers of disease severity.[4] However, the identification of numerous markers associated with the prognosis and the systemic character of the disease indicate the need for studies on the influence of the combination of various parameters on the establishment of disease severity and prognosis. In this sense, an index that assesses the systemic and respiratory manifestations of COPD, and which could better characterize and predict outcomes in such patients, was created. This index was designated the Body mass index, airway Obstruction, Dyspnea, and Exercise capacity (BODE) index. The BODE index is a ten-point scale that combines the measurements of BMI, severity of airway obstruction, degree of dyspnea, and exercise capacity.[4]

An important characteristic of generalized airway obstruction is lung hyperinflation, which is defined as an increase in end-inspiratory volume.[3] This increase occurs at rest and becomes accentuated during exercise (dynamic hyperinflation) due to the increased ventilation and the airflow limitation. A simple method of assessing lung hyperinflation at rest and during exercise is to measure inspiratory capacity (IC), defined as the maximum amount of air that can be inhaled after expiratory rest, which typically corresponds to the functional residual capacity (FRC). This measurement was neglected for many years. However, it has recently been recognized as a reserve that allows an increase in tidal volume during periods of higher ventilatory demand and reflects the variations in end-inspiratory volume and in FRC, as long as total lung capacity (TLC) remains constant. Therefore, IC has been assessed and has proven useful as a predictive factor of exercise capacity in patients with COPD. In this issue of the Brazilian Journal of Pulmonology, Santos et al.[5] analyze how IC, expressed as a percentage of the value predicted for the Brazilian population,[5] correlates not only with other parameters of pulmonary function, but also with the sensation of dyspnea, the use of medications, and other prognostic markers, such as the distance covered on the 6MWT, the BODE index, and the classification of COPD according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria. The authors observed that 59% of the variation in the distance covered on the 6MWT could be explained by the postbronchodilator IC (% of predicted), by the use of long-term oxygen therapy at home, and by the number of drugs used in treatment of the disease. Values of IC ≤ 70% of predicted were more common in patients who were categorized as class 3 or 4 according to the BODE index and whose disease severity was categorized as 3 or 4 according to the GOLD criteria. These data reinforce the hypothesis, which has been tested in previous studies, that lung hyperinflation is present in patients with more severe disease and has an influence on exercise capacity. Other researchers have demonstrated that lung hyperinflation, expressed by the IC/TLC ratio, is an independent predictor of mortality in patients with COPD.[6] The authors evaluated the predictive power of the IC/TLC ratio and found that the cut-off point of 25% resulted in a sensitivity of 0.71, specificity of 0.69, positive predictive value of 0.46, and negative predictive value of 0.87. At this cut-off point, there were significant differences in mortality: 71% in the patients with an IC/TLC ≤ 25% *vs.* 29% in those with an IC/TLC > 25%. One study conducted in Brazil also showed the influence of the postbronchodilator IC/TLC ratio on exercise capacity in patients with COPD.[7] The authors observed that IC/TLC values ≤ 28% were related to severely decreased exercise capacity, and higher values were found in patients with lower impairment of functional capacity. Therefore, these two studies indicate that IC/TLC values can be used as prognostic indicators (≤ 0.25) or as indicators of reduced physical capacity (≤ 0.28). According to Santos et al.,[5] the measurement of TLC can only be performed in a limited number of medical centers across Brazil. Therefore, they propose that postbronchodilator IC values < 70% of predicted for the Brazilian population be used as a cut-off point.

In summary, the current knowledge indicates the need to perform longitudinal studies in order to determine how the various possible markers of COPD severity and prognosis, as well as the cut-off points proposed, reflect the disease progression in a given patient. In the meantime, taking into consideration the infrastructure available in the different health care facilities, we should use the markers that have proven valuable in determining outcomes that are important from a physiological point of view, complemented by those focused on the limitations of the patients. The FEV_1 value and its change over time remain important markers of COPD. However, additional assessments are necessary to more accurately estimate the repercussions of the disease.

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