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EDITORIAL

Imaging and COPD

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COPD involves destruction of alveolar septa in the lungs, associated with small airway dilation that is partially irreversible.[(1)] The first process leads to loss of surface area for gas exchange (restrictive component), whereas the second process is detrimental to an adequate respiratory cycle (obstructive component). COPD is an entity that has remarkable relevance in public health practice, because of its high prevalence and because it is associated with the occurrence of lung cancer and reduced life expectancy and quality of life.[(2)]

A diagnosis of COPD is based on a combination of clinical findings and changes in pulmonary function tests, especially spirometry. A Tiffeneau index (FEV_1/FVC ratio) lower than 70% after a bronchodilator test is considered a diagnostic criterion for the disease.[(1-4)] In addition, the classification of the Global Initiative for Chronic Obstructive Lung Disease groups patients into severity classes, in order to systematize the therapeutic approaches.[(3)] However, the relationship between FEV_1 and symptoms has proven to be limited,[(4)] there being dissociation between Global Initiative for Chronic Obstructive Lung Disease classes and symptom severity in many patients.[(4,5)]

Currently, the attempt to divide COPD patients into several groups has been extensively explored in the literature. The term phenotype in COPD is defined as "a unique combination of disease or attributes that describes differences between individuals with COPD and how they are related to clinically meaningful outcomes". Among all phenotypes described in the literature, three are associated with prognosis and particularly with variable response to currently available therapies. They are as follows: the exacerbator phenotype; the COPD/asthma overlap phenotype; and the emphysema/hyperinflation overlap phenotype. The expectation is that the identification of the particularities of the different COPD phenotypes will help us offer a more tailored treatment, so that patient characteristics and disease severity can be the key to choosing the best treatment option.[(5)]

In this context, imaging is essential for the characterization of emphysema. In the opinion of various authors, the quantification of emphysema with conventional radiological imaging is flawed.[(3-7)] For this reason, CT has gained great importance in the imaging assessment of pulmonary emphysema. Various studies have been devoted to CT detection of emphysema, to investigating the correlation between CT and pathologic examination findings of emphysema, and to CT quantification of emphysema.[(8)] One of the major advantages of CT is that it allows the pathologic classification of pulmonary emphysema. The current pathologic classification of emphysema was proposed by Reid,[(8)] being based on the acinar distribution of emphysema, and it is divided into four major groups: centroacinar; paraseptal or periacinar; panacinar; and irregular. However, the distribution of these findings in the lung parenchyma and their relationship with the diagnosis, severity, treatment, and prognosis of COPD are still poorly understood.

Quantification of emphysema by visual scores usually uses scales ranging from 1 to 4 or from 1 to 5; the disease being graded according to the proportion of lung involvement (0%, 25%, 50%, 75%, or 100% of the lungs). The relationship between this technique and pathologic examination findings has a correlation coefficient of r = 0.91 in vitro (cadaver lung specimens). However, it should be taken into account that there are natural limitations when quantification of emphysema is analyzed subjectively, whether by radiological imaging or by macroscopic or microscopic pathologic examination.[(1-5)]

Predictably, comparisons between methods for quantification of emphysema by visual scores with those by automatic quantification using computer graphics have shown a significant difference in favor of automation. The density mask introduced by Müller et al.[(9)] was one of the most important techniques for the automated assessment of emphysema, being cited in virtually all other such studies. That was the first large-scale study that aimed at diagnosing emphysema on the basis of computer-aided CT assessment. The correlation between density mask findings and pathologic examination findings reaches r = 0.89. However, visual assessment is still used, because of its simplicity, which facilitates its use in clinical practice.

The study published in the current issue of the JBP by Bastos et al.[(10)] assesses a cohort of patients with emphysema and demonstrates that lower lung predominant pulmonary emphysema is associated with more severe disease than is upper lung predominant pulmonary emphysema. In addition, the authors report that patients with homogeneous emphysema tend to have greater hyperinflation. These findings are important in building a body of knowledge about the influence of the different morphostructural changes of the COPD phenotypes, so that we can arrive at a tailored and more efficient treatment.

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