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The Detection of Small Airways Disease

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SUMMARY In order to investigate the relationship between pulmonary function and disease of the membranous and respiratory bronchioles, we studied 96 patients who required lobectomy for removal of a solitary pulmonary nodule. A subgroup of patients with forced expiratory volume in one second (FEV₁) greater than 80% predicted were further analyzed to determine if abnormalities in tests designed to detect peripheral airways disease actually correlated with the pathology found in these airways. Analysis of the data shows that inflammation in both respiratory and membranous bronchioles, goblet cell metaplasia of the epithelium in membranous bronchioles, and decreasing muscle in the respiratory bronchioles are the pathologic features that are associated with deterioration of the FEV₁. When the FEV₁ is greater than 80% of the predicted value, inflammation of the respiratory bronchioles and fibrosis of both membranes and respiratory bronchioles increase with decreasing FEV₁. Tests of specialized pulmonary function appear to correlate with epithelial pathologic parameters of membranous bronchioles and inflammation and fibrosis of respiratory bronchioles. When patients with FEV₁ greater than 80% predicted were subdivided according to the number of abnormal tests of small airways function, there was a significant increase in inflammation of the walls of respiratory bronchioles when 2 tests were abnormal and increases in both airway wall and intraluminal inflammatory cells as well as increased wall fibrosis when 3 tests were abnormal. We conclude that when the FEV₁ is greater than 80% predicted, abnormalities in the tests for small airway disease reflect pathological changes in the respiratory bronchioles.

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