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Title: The ratio of inspiratory Σ Rrs to expiratory Σ Rrs measured by forced oscillation technique correlates with the parameters reflecting narrowing of small airway measured by spirometry in patients with mild to moderate COPD

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Body: Rationale: Chronic Obstructive Pulmonary Disease (COPD) is characterized by airflow limitation caused by narrowing of small airway. Airflow limitation is defined as parameters associated with forced expiratory volume in 1 second (FEV1) by spirometry; however, parameters of respiratory impedance (Zrs) measured by forced oscillation technique (FOT) have also been known to be useful markers for evaluation of airway obstruction. Thus, we evaluated whether the parameters of Zrs by FOT correlated with the parameters reflecting small airway narrowing by spirometry. Method: Patients with mild (n=22) and moderate (n=19) COPD were recruited at our hospital. Respiratory resistance (Rrs) and reactance (Xrs) at 4Hz to 35Hz were measured with FOT device MOSTGRAPH-01 each 0.25 seconds during tidal breathing. Σ Rrs was calculated by summation of Rrs values during a respiratory cycle. Results: Rrs at 4Hz in whole-breath did not correlate with FEV1, the ratio of FEV1 to Forced Vital Capacity, and the parameters reflecting small airway narrowing. However, the ratio of inspiratory (ins) Σ Rrs to expiratory (ex) Σ Rrs at 4Hz weakly correlated with FEV1 (r=0.35, p=0.03), maximal midexpiratory flow (r=0.36, p=0.03), and maximal expiratory flow at 25% of vital capacity (r=0.33, p=0.04). The ratios of ins Σ Rrs to ex Σ Rrs at 20Hz and 35Hz were similar to that at 4Hz. Conclusion: The ratio of ins Σ Rrs to ex Σ Rrs weakly correlates with parameters reflecting small airway narrowing in COPD. Measurement of Zrs with FOT might be useful to detect impairments of small airway in early stage of COPD.