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RM-11 HRCT evaluation and immunohistochemistry of bronchiectatic airways: is there a relationship?

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Introduction: This study evaluates the relationships between HRCT parameters and collagen IV density in bronchiectatic airways.

Method: 18 bronchiectatic [13 females (65.52 ± 11.45yrs)] subjects underwent thoracic HRCT scan and endobronchial biopsies (EBB). 15 [5 females (57.46 ± 11.99 yrs)] otherwise healthy patients investigated for suspected lung cancer served as controls for EBB. Extent of bronchiectasis, bronchial wall thickening (BWT), global bronchiectasis score and small airway abnormalities on HRCT were qualitatively graded in bronchiectasis subjects. EBBs of all subjects and controls were stained with mouse anti-collagen IV antibodies, amplified using LSAB method. Each section was divided into zone 1 [0-8µm below basement membrane (BM)] and zone 2 [9-16µm below BM]. Positively stained collagen IV density, colour saturation, intensity of staining, and collagen fibril density were obtained for each zone using QWIN image analysis package. Correlation between immunohistochemistry and HRCT findings were evaluated.

Results: Bronchiectatic subjects had significantly higher collagen IV density and fibril density in zones 1 ($p < 0.01$) and 2 ($p < 0.01$) compared with controls. There was no difference between saturation and intensity between the 2 groups. Zone 1 collagen IV density was correlated with BWT score ($r=0.51$, $p=0.03$), and mean collagen IV density (zone 1 & 2) was associated with global bronchiectasis score ($r=0.53$, $p=0.02$).

Conclusion: Collagen density was higher in bronchiectatic airways than in normal airways. There is an association between immunohistochemistry of EBBs and HRCT parameters in bronchiectasis whereby the BWT and global bronchiectasis scores reflected collagen IV deposition, and probably airway remodelling.

RM-12 Functional significance of CT quantified bronchial wall thickening in bronchiectasis

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Introduction: Qualitative evaluation of bronchial wall thickening (BWT) and extent of bronchiectasis have been proven to have significant functional correlation in bronchiectasis. In asthma studies, BWT has also been noted to be involved in airway remodeling. This study quantifies BWT on HRCT to determine its relationship with lung function and to compare its utility with qualitative evaluation.

Method: 18 bronchiectatic [13 females (65.52 ± 11.45yrs)] underwent thoracic HRCT scan and lung function tests. BWT was graded in each lobe ($n=6$) using previously validated scoring system (0-3) based on thickness of bronchial wall relative to the external diameter (EDB) of dilated bronchi perpendicular to the axial plane. Summation of scores from all 6 lobes provided the overall score. Internal bronchial diameter (IBD), EBD and accompanying arterial diameter (AD) were also quantified on a workstation at pre-selected segmental bronchi. The IBD and EBD of the thickest bronchus in each lobe were also measured. Relationships between HRCT and lung function parameters were evaluated.

Results: BWT score correlated with FVC, FEV₁, FEF₂₅₋₇₅ and PEF ($r=-0.65$, -0.76 , -0.55 , -0.75 ; $p < 0.05$). Mean IBD_T/EBD_T of thickest bronchi, and mean IBD_{SB}/AD_{SB} and IBD_{SB}/EBD_{SB} of segmental bronchi were respectively correlated with FEV₁/FVC ($r=0.51$, 0.53 and 0.54 , $p < 0.05$) and FEF₂₅₋₇₅ ($r=0.52$, 0.60 , $p < 0.05$ and $r=0.47$, $p=0.05$). Regression analysis revealed that BWT score was independently related to FVC, FEV₁ and PFR while IBD_{SB}/EBD_{SB} and IBD_T/EBD_T were significant determinants of FEV₁/FVC and FEF₂₅₋₇₅ respectively. IBD_{SB}/EBD_{SB} was therefore a measure of BWT and airflow obstruction in larger airways whilst IBD_T/EBD_T reflected smaller airway obstruction.

Conclusion: These results have confirmed the clinical utility of both qualitative and quantitative HRCT evaluation of BWT in bronchiectasis, which reflect airway remodeling in large and small airways. These HRCT parameters could represent a non-invasive method of monitoring treatment response and disease progression of the bronchial tree.