CORRESPONDENCE

Assessment of intraparenchymal lung collateral ventilation

We read with interest the paper of Marshall *et al* entitled 'Direct visualisation of collateral ventilation in COPD with hyperpolarised gas MRI'.[1] Collateral ventilation (CV) is defined as 'the ventilation of alveolar structures through passages that bypass the normal airway'.[2] This happens through the intra-alveolar pores of Kohn, the bronchioloalveolar communications of Lambert and the intrabronchiolar pathways of Martin. These pathways exist in normal lungs, but CV is ineffective since flow resistance is 50 times greater than through the normal airway. In emphysematous lungs, the alveolar wall destruction enlarges the accessory pathways and the presence of airway obstruction increases expiratory resistance; this allows gas to move freely from one lobule to the other (intralobar CV); even interlobar CV is possible although it is obviously related to the absence of interlobar lung fissures (ILF) with consequent anatomical and functional communication between the lobes. Thus, ILF and interlobar CV are anatomically strictly correlated.

Different bronchoscopic procedures have been proposed to treat emphysema (both homogenous and heterogeneous)[3 4]: the airway bypass takes advantage of CV and reduces lung hyperinflation, while bronchoscopic lung volume reduction with one-way valves (BLVR) is not indicated if interlobar CV is present. Thus, CV plays a crucial albeit different role in the selection process for both procedures. In patients undergoing BLVR, there is a correlation between outcome, interlobar CV and presence of ILF assessed at CT: improved results can be anticipated in patients with complete ILF[4] and absence of interlobar CV. Thus, intersegmental CV (always present in COPD) seems less important in treatment planning. We have performed a prospective study to assess the correlation between interlobar CV and fissures, validating it at direct evaluation in a population of patients undergoing pulmonary resection (unpublished preliminary data). Our data showed that: (1) interlobar CV is absent in case of complete ILF; (2) the identification of complete ILF is not accurate at CT scan.

The study reported by Marshall *et al*[1] is extremely interesting and contributes to improve dynamic functional imaging in COPD patients with a novel MRI method during a single breath-hold. However, we believe, in line with the authors, that CV visualised with this technique is referred to as intersegmental gas flow; this variable is clearly not crucial to evaluate patients for BLVR. Furthermore, the single breath-hold method probably is not the most correct technique to assess CV because the important point to quantify the degree of emphysema is to visualise CV and also if and how CV disappears during ventilation. Furthermore, in this study, there is no correlation with the type of emphysema (heterogeneous vs homogeneous) and presence of complete or incomplete ILF. The catheter system certainly allows a more reliable assessment of interlobar CV although CT images should always be available; it has been extensively validated and should be considered the gold standard so far. We believe that the challenge of radiological techniques for the future is to develop new and accurate methods to visualise ILF and measure airflow during the normal breathing activity; once validated, this would contribute to speed and simplify preoperative work-up and treatment planning in COPD patients candidates to BLVR.

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