Letter to the Editor

Magnetic resonance imaging in the evaluation of idiopathic pulmonary fibrosis: a real possibility, or an attractive challenge?

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Submitted Apr 30, 2016. Accepted for publication May 27, 2016.
doi: 10.21037/qims.2016.06.06
View this article at: http://dx.doi.org/10.21037/qims.2016.06.06

The original article by Mirsadraee *et al*. (1) is greatly welcomed for the considerable interest and the clinical relevance of the chosen topic, idiopathic pulmonary fibrosis (IPF), which is currently a dangerously under-diagnosed disease due to the difficulties of interpretation of high resolution CT (HRCT) findings and the insidious clinical onset. To date no cure for this disease is available; however anti-fibrotic drugs have proven effective in slowing the progression and functional decline of this disease. Lung transplantation therefore, to date, remains the only possible cure for IPF. Increasing attention is also due to the publication of international guidelines on diagnosis and treatment of idiopathic interstitial pneumonias (IIPs), in particular of IPF, and for this reason efforts are increased in trying to achieve an early diagnosis (2-5). IPF patients are at high risk for infections, acute exacerbations, lung cancer and for a progressive and sometimes really rapid respiratory failure leading to a functional decline in a short time if the disease is diagnosed with delay. However, it would useful to make some clarification on this interesting paper by Mirsadraee *et al*. (1). According to the authors, HRCT which is considered the gold standard for the evaluation of diffuse infiltrative disorders, and in particular for the IIPs, is characterized by a limited sensitivity in the detection and monitoring of early fibrotic changes. This assertion appears not to be in full accordance with the importance that the HRCT has in diagnostic management. In particular in the early detection and follow-up of interstitial lung disease (ILDs) international guidelines place this radiological technique as the only method being able to demonstrate detailed morphology of subtle lung structures, up to the evaluation of extremely fine interstitial alterations and detection of anatomical structures (secondary lobule) unrecognizable with any other imaging modality. HRCT is a technique that uses a 1/1.25 mm of thickness and for this reason it is able to show an almost total pulmonary anatomical vision similar to a pathological macroscopic low-power view. HRCT is not only able, with high sensitivity, to appreciate the interstitial morphological changes but also to assess follow-up of any morphological changes, allowing radiologists to make a differential diagnosis between cysts and honeycombing (for the correct diagnosis of UIP), and also to quickly assess (a volumetric acquisition can last a few seconds) any new infection, any acceleration of disease, increasing detection of new nodules, assessing overlaps pattern that may be present in patients with ILD with an excellent morphological details. Moreover, in post-processing evaluation, lung volumes can be analyzed with software that provides a quantitative analysis and therefore improve and provide an accurate final diagnosis (6). A multitude of scientific papers have shown a correlation between lung functional parameters and HRCT quantitative analysis derived from computerized software (7,8). Magnetic resonance imaging (MRI) is recommended in multiple clinical conditions because is an attractive diagnostic no radiation alternative technique and therefore particularly useful in children, young people and pregnant woman, and may be considered first choice of modality in pulmonary embolism and cystic fibrosis in these patients. However, it is important to consider that MRI of the lung has obvious limitations for a number of reasons, such as low-proton density, fast signal decay due to artefacts and air tissue interfaces. Furthermore, MR, which is outstanding for the evaluation of soft tissue, presents

additional artifacts when applied to the lung examination due to the execution time of the exam is considerably long (9,10). This important limitation, in patients with dyspnoea, and who are unable to remain still and collaborative for a prolonged time can reduce significantly diagnostic accuracy with deterioration in the quality of the exam and then the final diagnosis. Moreover, as reported in the description of the paper, the thickness of 8 mm chosen by the authors for MRI in the study of interstitial changes in a limited number of patients seems thicker than necessary in achieving an adequate anatomical evaluation of interstitial changes as recommended by guidelines and numerous studies of the literature. A thicker layer may lead to the failure in detecting the presence of minimal and early signs of thickening of interlobular septa which are the first element in the reticular pattern which is an important indication of a new onset of pulmonary fibrosis. As reported by the authors, T1 mapping differences in a small number of IPF patients may not reflect the behaviour of a large portion of patients with IPF, because the disease may show different phenotypes (possible UIP, atypical UIP and also inconsistent UIP pattern can be UIP from the pathological point of view and then IPF from the clinical point of view) and also has sometimes different clinical behaviours. But there is an interesting novelty that the authors describe in their paper, i.e., the difference in behaviour that is observed after administration of gadolinium in areas from early fibrotic changes compared to controls. Certainly the use of the latest generation of MR scanners, together with protocols tailored to the lung structures with breath-hold acquisition techniques, will be able to provide further information that HRCT is not able to provide such as disease activity, leading to a better differentiation between fibrotic tissue and tissues which enhance after administration of gadolinium therefore representing a degree of activity (11,12). The ability to differentiate active inflammation areas from well-defined fibrotic changes is a challenge and is surely of clinical importance for the prediction of potential therapy response and clinical outcome in patients affected by ILDs. A growing and rational use of MRI in lung study should also engage further efforts to significantly improve image quality by reducing respiratory and cardiac artifacts. Overcoming these, MRI will become an excellent method for morphological and functional imaging of lung.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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Cite this article as: Rea G. Magnetic resonance imaging in the evaluation of idiopathic pulmonary fibrosis: a real possibility, or an attractive challenge? Quant Imaging Med Surg 2016;6(3):331-333. doi: 10.21037/qims.2016.06.06

