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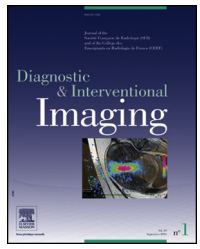

REVIEW / *Thoracic imaging*

Multiple lung parenchymal abnormalities: Don't panic, let's be pragmatic! The 6 question rule — a checklist strategy

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Abstract Analysis of multiple lung parenchymal abnormalities on HRCT is a real diagnostic challenge. These abnormalities may be due to a disease of the pulmonary interstitial tissue, the bronchial tree, the cardiovascular system or to abnormal alveolar filling with fluid, blood, cells or tumor, several of these etiologies possibly being concomitant. Systematic pathophysiological reasoning, in the form of a logical checklist, guides reflection and covers many of the most frequent diagnoses and potentially treatable emergencies that can be identified by the non-specialist radiologist. This approach also provides a basis for deepening knowledge of each area. The use of the mnemonic FIBROVAKIM (fibrosis-bronchi-vascular-cancer-infection-medication) is easy to apply and summarizes this strategy.

Objectives

The endless list of lung diseases that can present as multiple parenchymal abnormalities makes it almost impossible for a radiologist who has not specialized in thoracic imaging to progress from describing the images to making diagnostic hypotheses. We believe that a

Abbreviations: MCM, Multidisciplinary consultative meeting; MIP, Maximum Intensity Projection; MinIP, Minimum Intensity Projection; UIP, Usual Interstitial Pneumonia; NSIP, Non-Specific Interstitial Pneumonia; CHP, Chronic Hypersensitivity Pneumonitis; AIP, Acute Interstitial Pneumonia; OP, Organizing Pneumonia; COP, Cryptogenic Organizing Pneumonia; BOOP, Bronchiolitis Obliterans and Organizing Pneumonia; DILD, Diffuse Interstitial Lung Disease; IDILD, Idiopathic Diffuse Interstitial Lung Disease; RB-ILD, Respiratory Bronchiolitis-associated Interstitial Lung Disease.

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standard systematic checklist method may help to demystify these problems and provide a basis for looking deeper into each subject. Our objective is not to provide an exhaustive list of pattern-based diagnoses, nor to deal exclusively with interstitial pneumonia, but to try and develop a teaching tool to organize thinking around the complex, often multifactorial subject of multiple lung parenchymal abnormalities.

The aim is to:

- recognize urgent, treatable or characteristic situations;
- identify the more complex abnormalities and rare conditions which require a specialist opinion and probably discussion in a multidisciplinary consultative meeting.

As in any review, a certain number of rarer etiologies will not be discussed, but guidance for deepening knowledge and wider references for each subject will be given at the end of each section and in the bibliography.

Essential preliminary work

Below are the essential preliminary work:

- understanding the secondary pulmonary lobule (Fig. 1): this is the structural unit of the lung [1] centered on the lobular bronchiole, prolonged into the terminal then respiratory bronchiole accompanied by the centrilobular pulmonary artery and the lymphatic network (all reaching the alveoli grouped into acini). Its polyhedral shape is limited peripherally by the interlobular septa containing interstitial tissue, veins and lymphatics;
- knowing the descriptive consensus terminology for CT lung abnormalities produced by the Fleischner Society in 2008 (Glossary of Terms [2]). The CT scan signs used for this work refer to the glossary and will not be detailed in order to simplify the text;
- obtaining essential clinical information for each patient, if necessary using a questionnaire that can be filled out before the examination in the waiting room (Appendix 1);
- once the data have been obtained, in addition to axial images, applying simple image processing to the parenchymal and soft tissue windows [3]: coronal reconstruction (distribution of abnormalities), MIP (amplification of nodular images and overall study of the vascular bed) and minIP (increasing contrast of hypoattenuated areas, mosaic patterns and the bronchial tree).

The six question rule

Establishing a reproducible checklist automatically suggests a certain number of possible diagnoses and helps unravel the difficulties encountered when several conditions are associated (i.e., a patient with chronic emphysema developing bronchopulmonary infection and left cardiac failure).

It is based on six questions relating to observation of the images and clinical/radiological reasoning: do the lesions encountered point to:

- diffuse fibrosing (FI) disease;
- bronchial or bronchiolar (BRO) lesion;
- vascular or cardiac (VA) dysfunction;
- carcinomatous (K) process;
- infection (I);
- or medication-induced (M) disease?

The acronym FIBROVAKIM covers a large number of the common etiologies that the non-specialist radiologist can identify, and which can be rapidly treated.

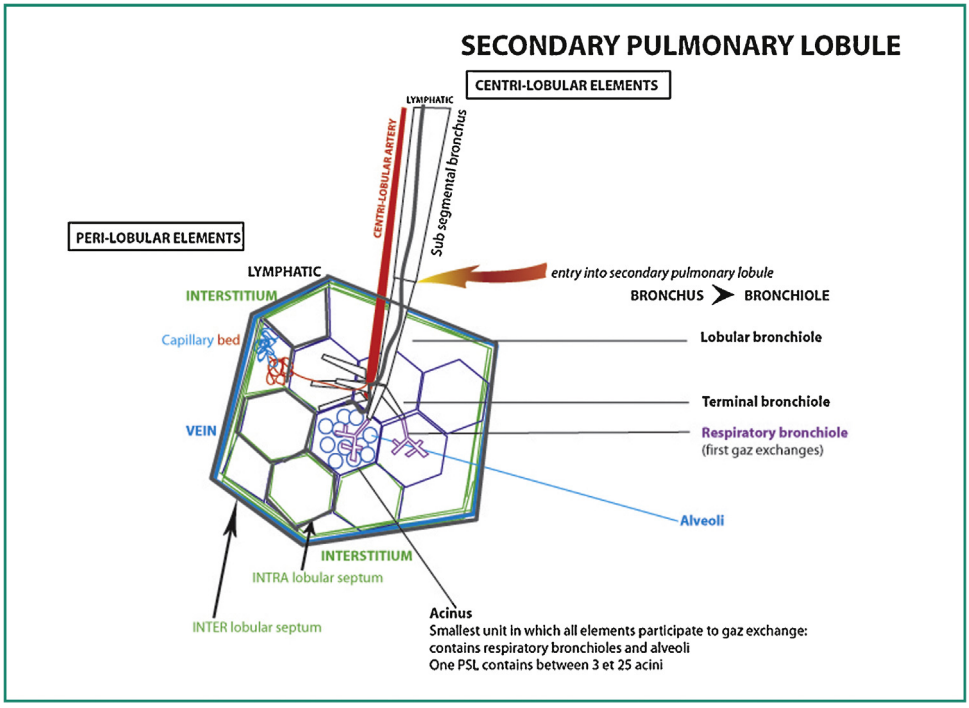

Figure 1. Secondary pulmonary lobule.