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Do you really know precise radiologic–pathologic correlation of usual interstitial pneumonia?

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ABSTRACT

Although usual interstitial pneumonia (UIP) is the most common chronic interstitial pneumonia, understanding of pathologic backgrounds of CT findings has still not been enough. Since honeycombing on either scanning microgram or CT is essential for diagnosis of UIP in 2010 ATS-ERS-JRS-ALAT guide line, the role of radiologists has become much more important. We will summarize common and uncommon CT findings with radiologic–pathological correlation.

1. Introduction

Usual interstitial pneumonia (UIP) is the most common type of interstitial pneumonia and corresponds to the clinical diagnosis of idiopathic pulmonary fibrosis (IPF). Its prognosis is poor, with a mean survival of approximately 4 years from the onset [1,2].

Although characteristic CT findings of UIP, including honeycombing, reticular opacities, ground glass attenuation, and both basal and peripheral predominance [1,2], are familiar to radiologists, their precise pathologic backgrounds remain unknown. Pathological UIP pattern is also seen in other diseases such as collagen vascular disease (CVD) and chronic hypersensitive pneumonia (CHP) [3,4]. However, the differential points between secondary UIP versus idiopathic one (IPF) are not established.

The purposes of this pictorial essay are four-folds; (1) to review common and uncommon CT findings, (2) to acknowledge pathological hallmarks, (3) to recognize the essential anatomy for pathologic findings, and (4) to learn precise pathologic backgrounds of CT findings

2. Pathological hall marks

There are three pathological hallmarks of UIP [5,6]

1. A heterogeneous appearance at low magnification, with alternating areas of normal lung, interstitial inflammation, fibrosis, and honeycombing is seen (Fig. 1A). This appearance is so called "spatial heterogeneity" "temporal heterogeneity", or "patchwork pattern".
2. Abnormalities are predominantly distributed in perilobular areas (Fig. 1B). This finding is named as perilobular (periacinar) pattern
3. The end-stage hallmark is honeycombing (Fig. 2). Honeycombing consist of collapsing of multiple fibrotic alveoli and dilation of alveolar duct and lumen.

3. CT findings

Common CT findings consist of intralobular reticular opacities, honeycombing, traction bronchiolectasis or bronchiectasis and subpleural and basal predominance (Figs. 3 and 4) [1,2]. Unfamiliar

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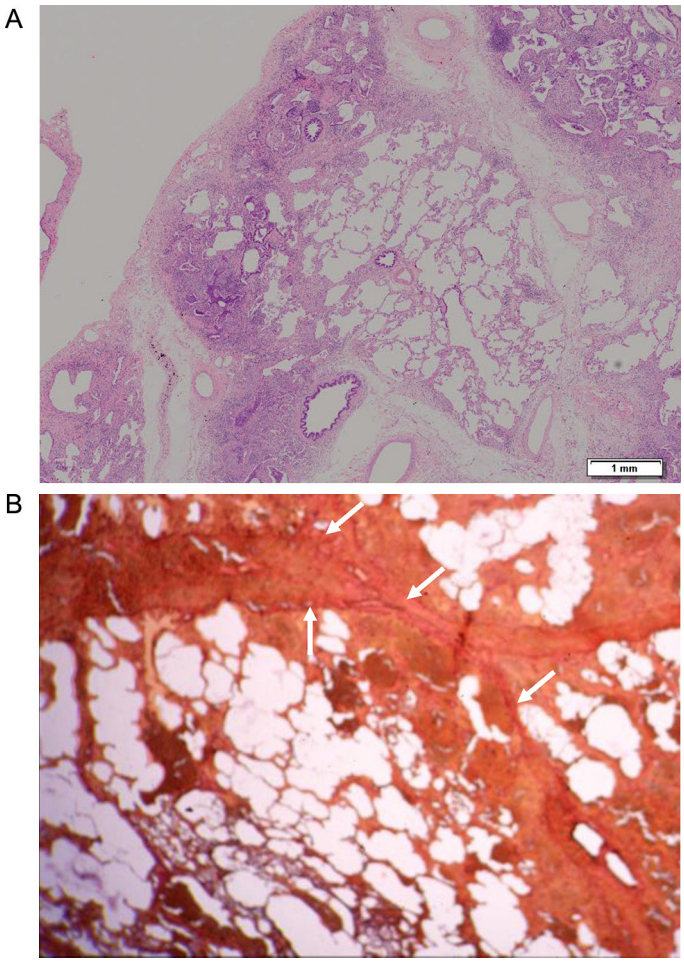

Fig. 1. Pathological hallmarks of UIP. (A) A heterogeneous appearance so called "spatial heterogeneity" "temporal heterogeneity", or "patchwork pattern". Various findings are seen in one lobule altogether (hematoxylin–eosin stain; 8×). (B) Perilobular (periacinar) pattern: Fibrosis is predominantly distributed along perilobular structures. Note there is no thickening of interlobular septa (arrows) (Elastica-vanGieson stain; 3×).

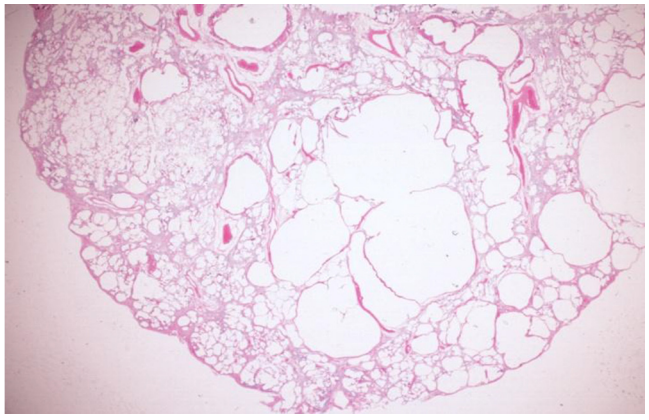

Fig. 2. Honeycombing: Scanning microgram (hematoxylin–eosin stain; 3×) shows honeycombing predominantly in the subpleural lesion. Honeycombing consist of collapsing of multiple fibrotic alveoli and dilation of alveolar duct and lumen.

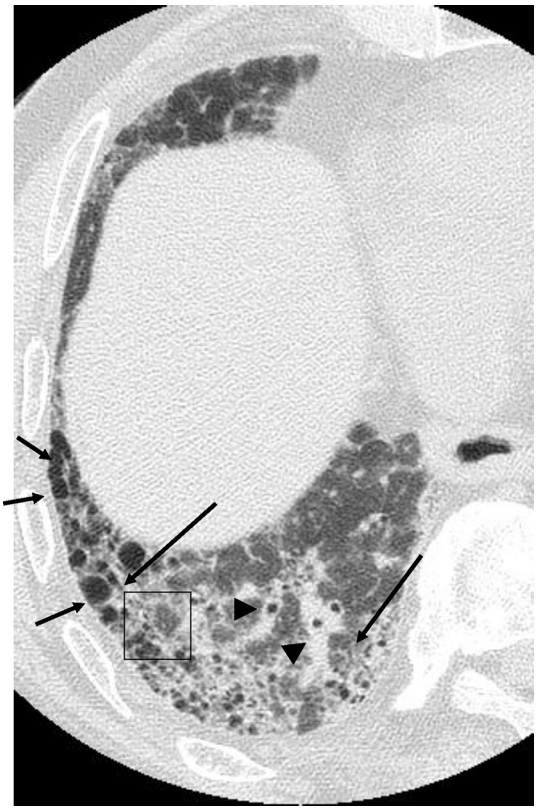

Fig. 3. A 72-year-old man with IPF/UIP. High-resolution CT shows honeycombing (short arrows), traction bronchiolectasis (long arrows) or bronchiectasis and subpleural and basal predominance. Irregular thickening of bronchovascular bundles (arrow heads), are also seen. In a narrow area (square area), there are many findings including from normal to honeycombing. This appearance is lobular heterogeneity so called "spatial heterogeneity" "temporal heterogeneity", or "patchwork pattern".

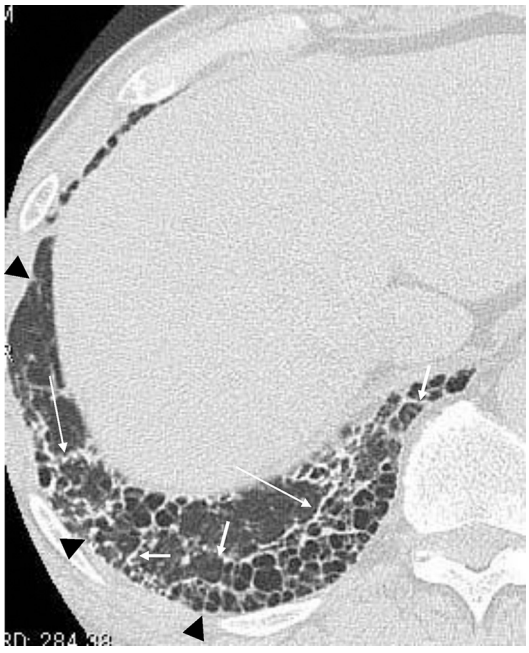

Fig. 4. A 76-year-old man with IPF/UIP. High-resolution CT shows not only honeycombing but also perilobular abnormalities such as irregular thickening of interlobular septa (arrows) and bronchovascular bundles (long arrows) and pleural irregularities (arrow heads).