High Resolution C. T. of Chronic Diffuse Lung Disease

Essay
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In
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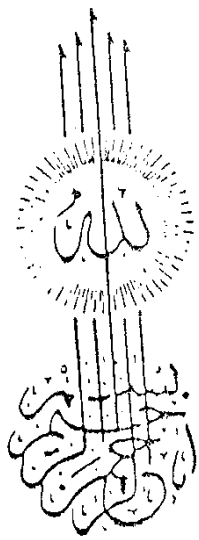

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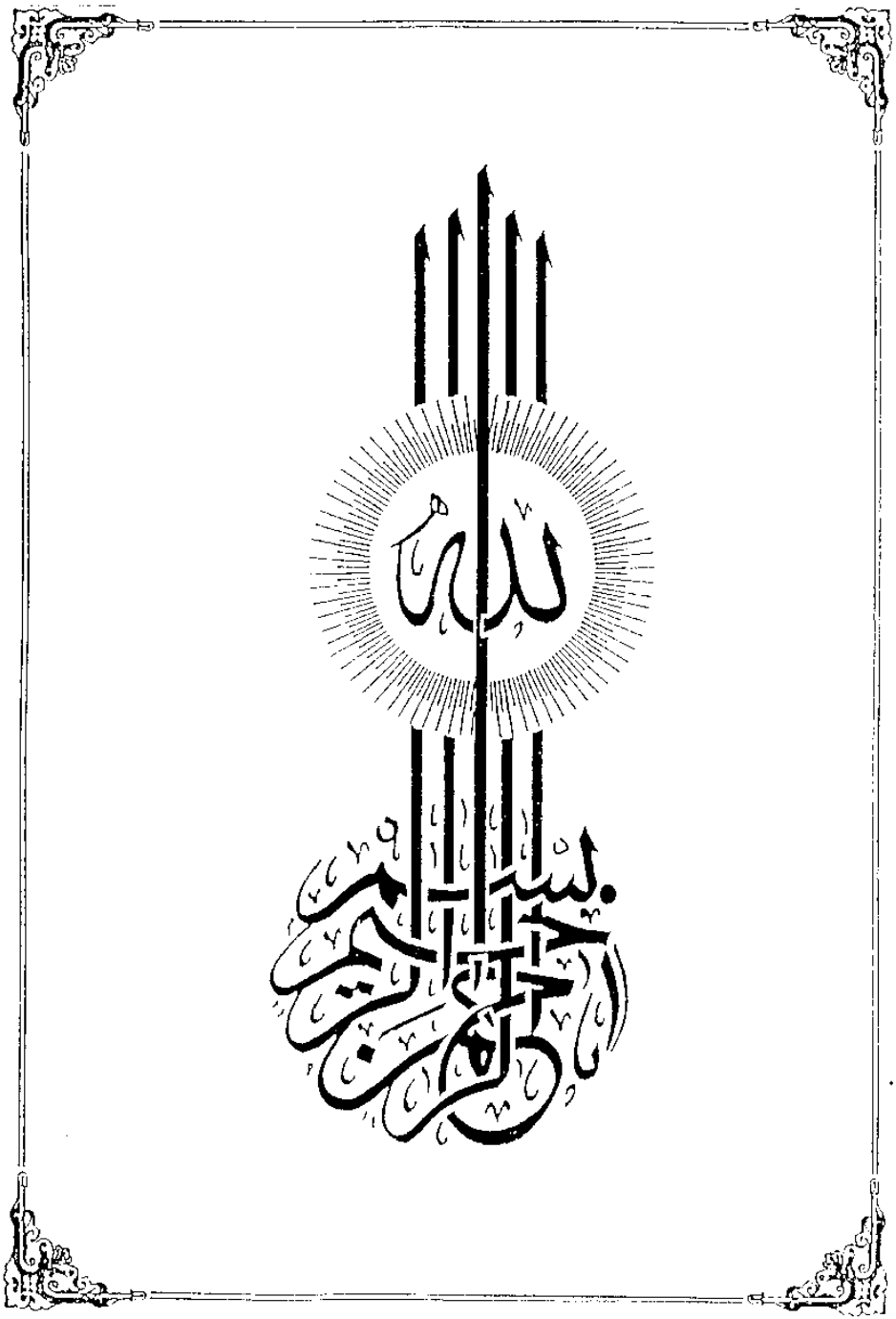

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Contents

INTRODUCTION AND AIM OF WORK

High resolution CT is a technique that optimizes the spatial resolution of conventional scanners .

HRCT show exquisite detail of both normal and diseased lung . The findings seen with HRCT of the lung correlate will with the microscopic and growth pathologic finding .

High resolution CT is superior to conventional CT. in defining details of pulmonary pathology. For example,it can be used for detection of lung fibrosis in patients whose radiographs appear normal . It is also useful to evaluate the lung parenchyma in patients with abnormal pulmonary function tests as well as accurate localization of abnormal areas of the lung for biopsy

In this work we describe the technical features of HRCT and discuss the HRCT findings in various chronic diffuse lung diseases.

Chapter 1

Anatomy

Normal CT anatomy of the lung

The proximal bronchi and pulmonary vessels are will defined by CT . Understanding their normal anatomy helps in identifying bronchial abnormalities and in locating pulmonary lesion by segment.

The following is a description of the CT anatomy of the proximal bronchi and pulmonary vessels.

Right lung :

- Apical segmental bronchus.
- Right upper lobe bronchus.
- Bronchus intermedius.
- Middle lobe bronchus.
- Right lower lobe basal bronchus

Apical segmental bronchus

The apical segmental bronchus (fig 1-1) is seen in cross section lateral to lower trachea or right main bronchus and is usually flanked on its medial side by the apical segmental pulmonary artery and on its lateral side by the posterior tributary of the superior pulmonary vein (Moss et al., 1983)

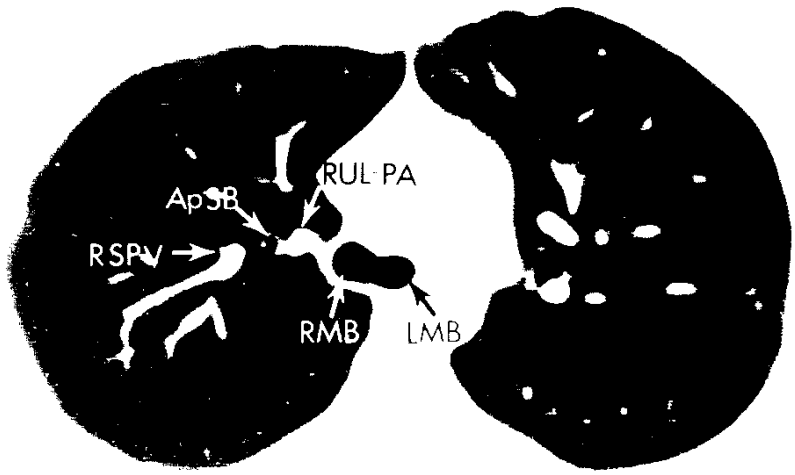


fig 1-1. Level of carina and apical bronchus. Right main bronchus (RMB); Left main bronchus(LMB); Apical segmental bronchus of right upper lobe(ApSB); Right superior pulmonary vein(RSPV);Right upper lobe pulmonary artery(RUL-PA). Quoted from Godwin 1984.

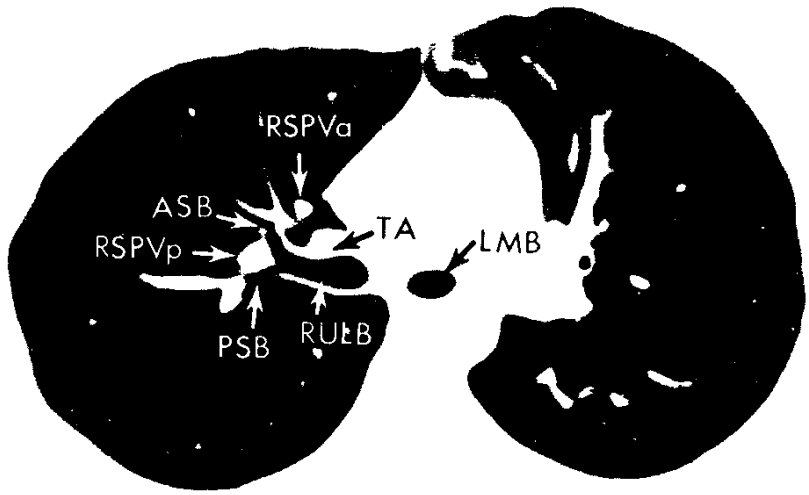


fig 1-2. Level of right upper lobe bronchus (RULB). Anterior segmental bronchus(PSB); Superior pulmonary vein,posterior(RSPVp)and anterior(RSPVa); Truncus anterior(TA)branch of right pulmonary artery;Left main bronchus(LMB) (Godwin 1984)

right upper lobe bronchus :

The right upper lobe bronchus (fig 1-2) originate more cephalic than does the left upper lobe bronchus. The anterior and posterior segmental bronchi of the right upper lobe are usually visible on CT scan because they bifurcate in the axial plane . At the lateral aspect of the bifurcation lies the posterior branch of the superior pulmonary vein. Anterior to the right upper lobe bronchus is the pulmonary artery to the right upper lobe , the truncus anterior (Naidich et al ., 1980).

Bronchus intermedius :

The bronchus intermedius (fig 1-3) is about 3 cm long (Naidich et al ., 1980), extending between the origin of the right upper lobe and right middle lobe bronchi. The posterior wall of the bronchus intermedius is thin, and it is outlined posteriorly by lung . Tumour, inflammation, or adenopathy can increase the apparent wall thickness. The interlobar branch of the right pulmonary artery borders the bronchus intermedius anterolaterally. The right superior pulmonary vein lies at the lateral aspect of the right pulmonary artery.

Middle lobe bronchus :

The middle lobe bronchus (fig 1-4)arise from the

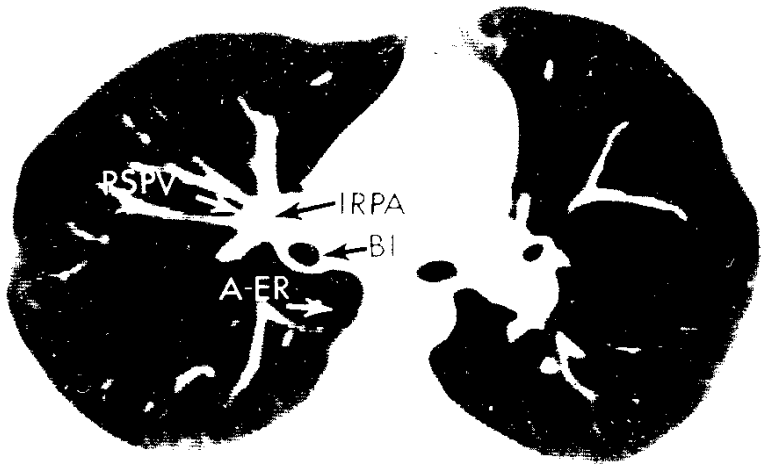


fig1-3. Level of bronchus intermedius(BI). Right superior pulmonary artery (IRPA); azygoeosophageal recess (A-ER) Godwin , 1984)

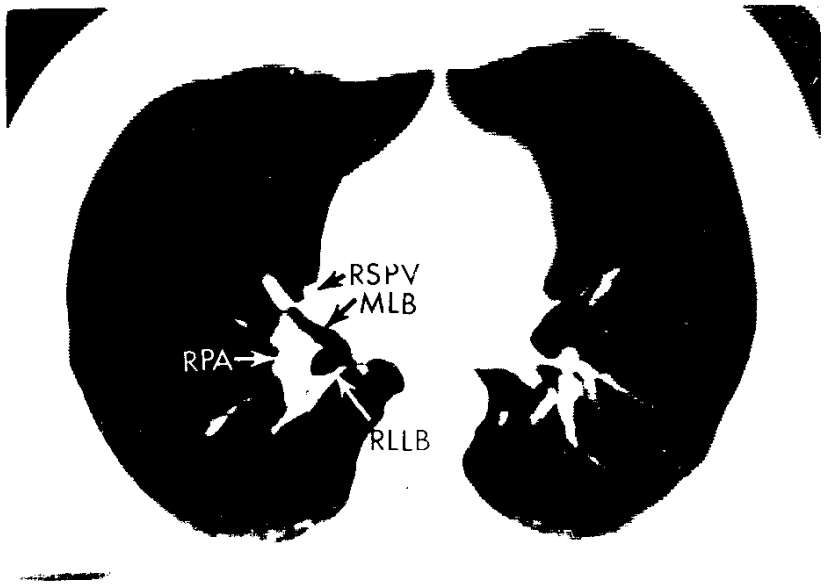


fig. 1-4, Level of right middle lobe bronchus(MLB). Right superior pulmonary vein(RSPV); right pulmonary artery(RPA);right lower lobe bronchus (RLLB). (Godwin, 1984)

anterolateral surface of the intermediate bronchus 4 to 5 cm. below the tracheal carina. It courses anteriorly,laterally and inferiorly for 1 to 3 cm. before dividing into its segmental bronchi (Moss et al., 1983). The middle lobe bronchus is routinely visible at this level, usually on two adjacent images, the medial and lateral segmental bronchi of the middle lobe, however, cannot always be seen on CT scans. The bronchus to the superior segment of the right lower lobe is usually visible at the level of the orifice of the right middle lobe bronchus, or 1 cm.superiorly. It arises from posterolateral right lower lobe bronchus. The interlobar pulmonary artery forms a convex soft tissue density lateral to bronchi between the right middle lobe bronchus anteriorly and the superior segmental bronchus posteriorly. The middle pulmonary vein tributary of the superior pulmonary vein can be seen between the right middle lobe bronchus and the mediastinum approximately 50 % of the time (Moss et al., 1983).

Right lower lobe basal bronchi :

The right lower lobe bronchus divides into its four basal segmental bronchi (medial, posterior , anterior , and lateral) approximately 1 cm bellow the level of the origin of the right middle lobe bronchus (Moss et al., 1983).

CT scan always show one or more basal segmental bronchi, but rarely do they show all four (fig 1-5) CT scan at about the level of origin of the segmental bronchi always shows the right inferior pulmonary vein, which lies medial to the basilar

segmental bronchi as the vein courses horizontally at the left atrium

Left lung :

- Apical posterior segmental bronchus.
- Left upper lobe bronchus.
- Lingual bronchus.
- left lower lobe bronchi.

Apical posterior segmental bronchus :

At the level of the tracheal carina, or one cm cephalic, the apical posterior bronchus is always visible in cross section . Occasionly both the apical and posterior subsegmental bronchi are seen (fig 1-6) . A vein analogous to the right posterior pulmonary vein lies lateral to the bronchus in over half of normal subjects (Moss et al ., 1983).

At slightly caudad level the left apico posterior segmental bronchus is seen as a circular structure separated from the left main bronchus by the left main pulmonary artery. The left main pulmonary artery passes over the left main bronchus before descending behind it (Haaga and Alfidi , 1988).

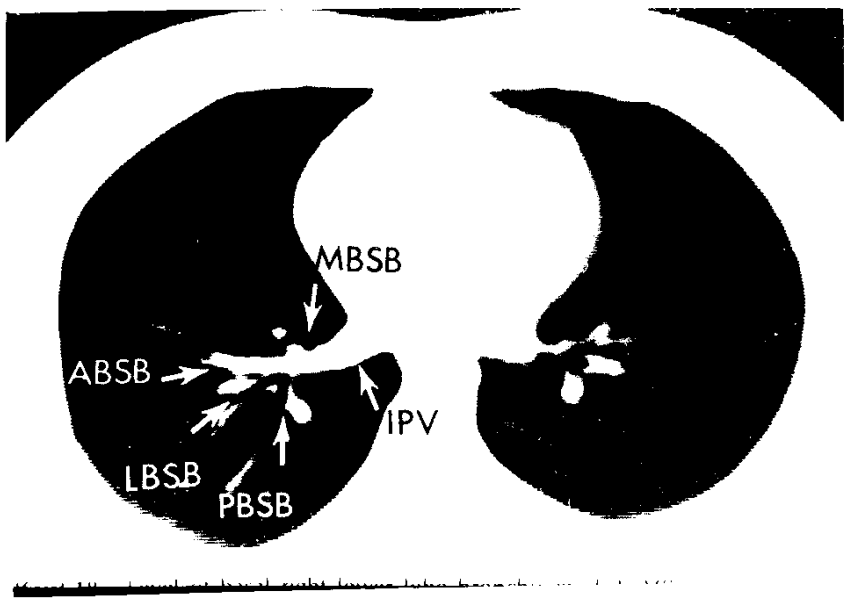
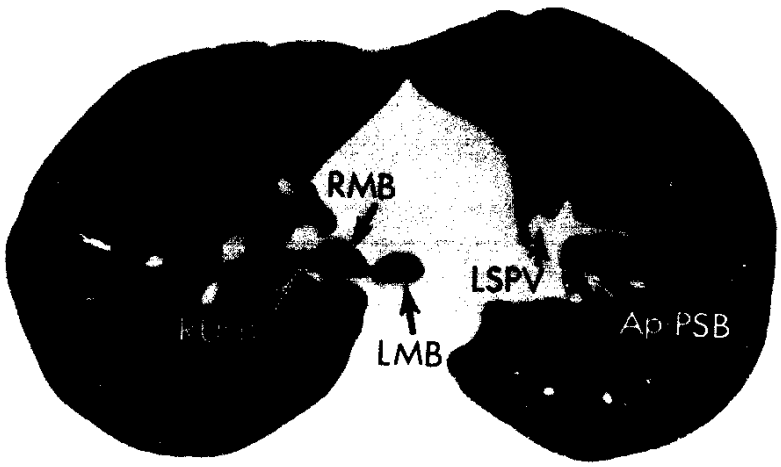


fig 1-5. Level of basal right lower lobe bronchi: medial (MBSB:; lateral(LBSB); anterior(ABSB); Posterior(PBSB); inferior pulmonary vein (IPV). (Godwin, 1984).



3-19. Level of left apical-posterior segmental bronchus (Ap-PSB). Right

fig 1-6 Level of left apical posterior segmental bronchus(AP-PSB).Right upper lobe bronchus (RULB); right main bronchus (RMB); Left main bronchus(LMB);Left superior pulmonary vein(LSPV). (Godwin, 1984)

Left upper lobe bronchus :

The left upper lobe bronchus (fig 1-7) is identified as a tubular structure on the left side 2 to 4 cm bellow the tracheal carina (Moss et al., 1983). The descending portion of the left pulmonary artery lies posterior to it . Though the left superior pulmonary vein has a constant location anterior to the bronchus,the left superior pulmonary artery varies in position, lying either anterior or posterior to the apical posterior bronchus . The anterior segmental bronchus has a variable appearance on CT ,depending on its point of origin.In most patients it originates as a branch of the apical posterior bronchus. Less often the anterior segment arises between the apical posterior segment and the lingular bronchus,creating a trifurcation consisting of the apical posterior bronchus , anterior and lingular bronchus (Naidich et al., 1980).

Lingular bronchus :

The lingular bronchus (fig 1-8) arise from the distal portion of the left upper lobe bronchus and courses caudally and anteriorly .The origin of the left lower lobe bronchus at the posterior aspect of the lingular bronchus is an important anatomical landmark for identifying these two structures . The left inter lobar pulmonary artery courses caudally behind the lingular bronchus . lateral and anterior to the lower lobe bronchus (Naidich et al ., 1980)