PULMONARY LESIONS

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ROLE OF SPIRAL (HELICAL) CT VERSUS CONVENTIONAL CT SCAN

ESSAY

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IN

RADIODIAGNOSIS

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قال الله

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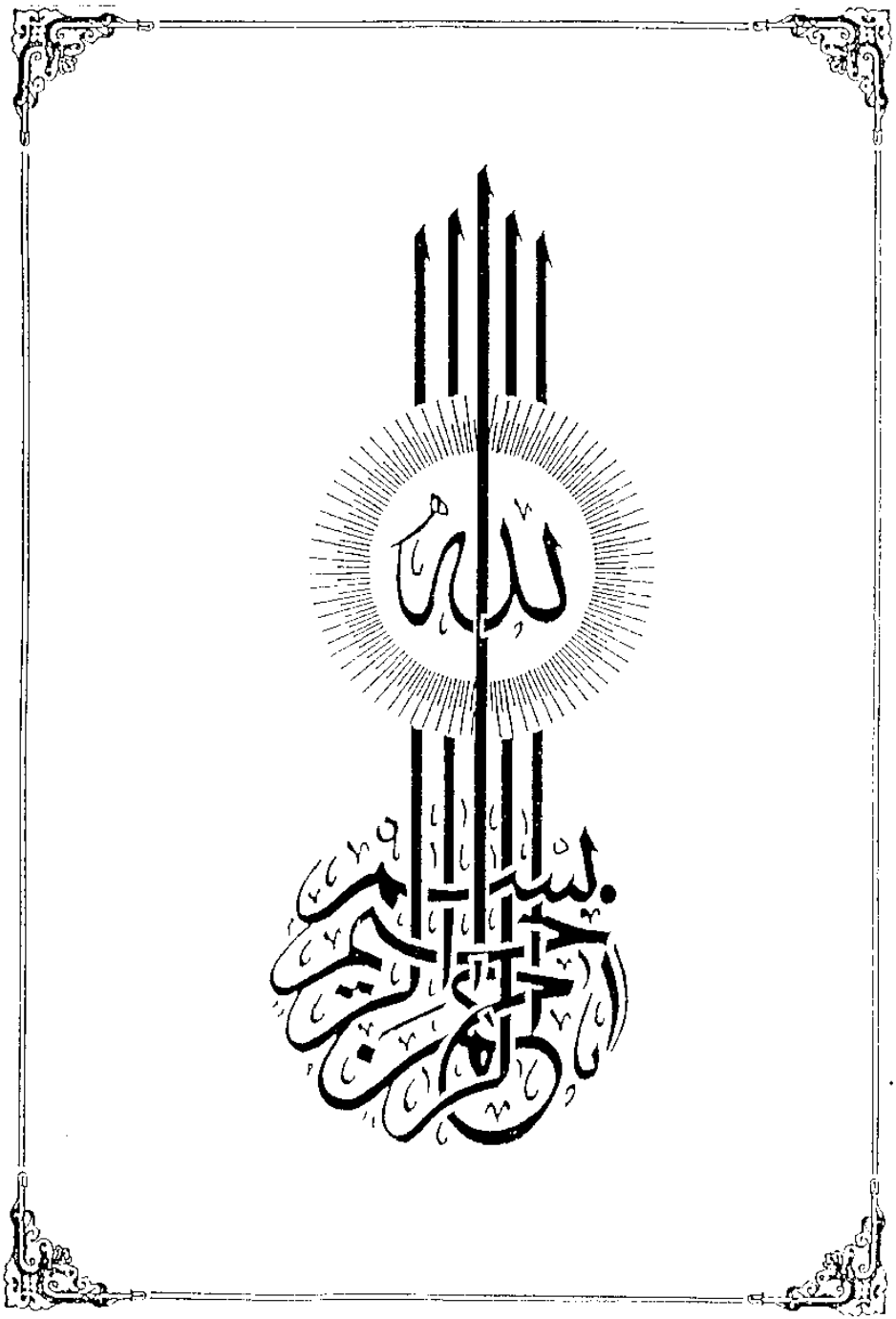

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INTRODUCTION AND AIM OF THE WORK

Introduction And Aim Of The Work

Spiral (Helical) CT represents the latest technologic advance in CT imaging characterized by a shorter scan time. Spiral CT scanning has a number of important advantages including improved lesion detection, optimization of enhancement with intravenous contrast material volume and improved multiplanar reconstruction. ***(HEIKEN et al, 1993).***

The aim of this work is to emphasize the role of Helical CT scan in diagnosis of various pulmonary lesions.

PRINCIPLES OF HELICAL CT

[1] Principles Of Helical CT Scan

Helical CT offers several technical advantages that have revolutionized body CT. Use of Helical technology has improved established CT applications by the minimization of motion artifacts, the elimination of respiratory misregistration artifacts, ***(Kalender et al, 1990 and Grawford, 1990)*** and production of overlapping images without additional x-ray exposure ***(Vock et al, 1990, Costello et al, 1991 and Urban et al, 1993)***.

Helical CT involves simultaneous translatory movement of the patient through the gantry while the x-ray source rotates such that continuous data acquisition is achieved throughout the volume of interest **[Diagram 1]** ***(Kalender et al, 1990)***.

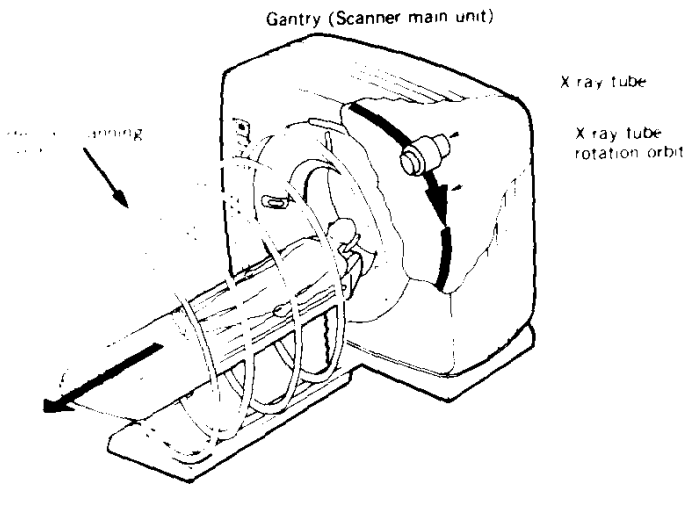

Diagram 1

Principle of Helical Scan.
(Quoted from Tohki, 1993).

Each rotation of the x-ray tube can be thought of as generating data specific to an angled plane of section ***(Heiken et al, 1993)***. To achieve a true transaxial image, data points above and below the desired plane of section must be interpolated to estimate the data value in the transaxial plane **[Diagram 2]**. As a benefit, the interval between reconstructed transaxial images can be chosen arbitrarily and retrospectively.

Interpolation Algorithms :

The early versions of Helical CT employed a 360^0 linear interpolation algorithm such that data at a desired plane of section were generated by interpolating points separated by a full 360^0 rotation of the x-ray tube. This resulted in transaxial images that were nearly identical to those produced with conventional CT. However, longitudinally reformatted images showed rather prominent blurring, compared with images reformatted from conventional scans ***(Brink et al, 1992)***. This prompted investigators to improve longitudinal resolution with algorithms that used data closer to the desired plane of section, with interpolated points separated by about a one half rotation (180^0) of the x-ray tube ***(Polacin et al, 1992)***. One such algorithm performed simple linear interpolation, and another performed higher - order (cubic - spline) interpolation. Longitudinal resolution was improved with these 180^0 interpolation algorithms **[Diagram 3]**.

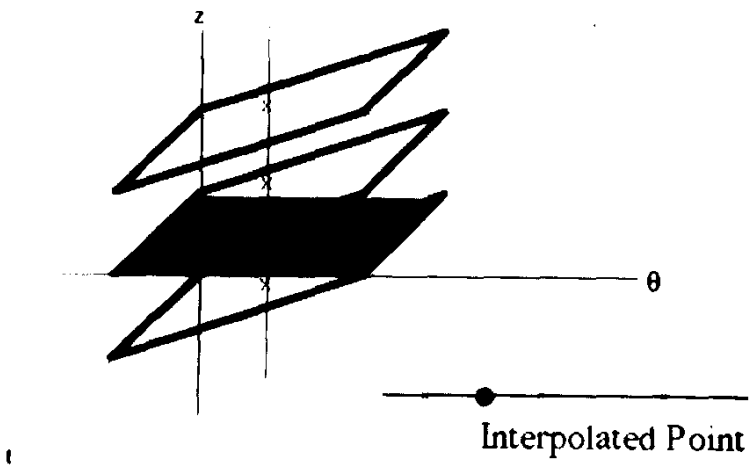

Diagram 2

Illustrates the interpolation rationale for helical CT.
Data from each rotation of the x-ray tube are specific to an angled plane of section.
Data for transaxial sections must be generated by interpolation of data above and below the desired plane of section
t = index to position in the detector array,
z = longitudinal position of patient cross section,
θ = rotation angle with a period of 360^0 .
(Quoted from Bresler and skraba, 1989).