B5 − 3

Evaluation of image quality factors to the pitch value changes
in the spiral computed tomography

Dae Sung Yoon[1, 2], Moon Chan Kim[2], Hwan Chung[2], Young Kun Kong[1], Soo Il Kwon[1].

Dept. of Medical Physics, Kyonggi University[1]
Dept. of Diagnostic Imaging Radiology, Samsung Medical Center[2]

INTRODUCTION

It has been demonstrated that the image quality of spiral scanning is equivalent to that of conventional slice-by-slice section CT with respect to most parameters when pitch val ue is 1 ; image noise and longitudinal spatial resolution are changed.(pitch is equal to th e table increment per gantry rotation divided by the section thickness)

I measured whether spiral CT with a pitch of greater than 1 can produce acceptable i mage quality.

METHOD

All spiral CT scans were performed with a CT scanner (CT Hi-speed Advantage, Gene ral Electric Medical System, Milwakee, U.S.A.) that used 1, 3, 5, 7, 10 mm collimations with changing pitch value from 1 to 3. The voltage was 120kvp, the tube current was 2 00mA, and the scan time was 1 second. 180 ˚ linear interpolation algorithm was used.

Image noise was measured with a 20 cm diameter cylindrical water phantom. The ROI s was placed center, upper, lower, right, and left regions in the phantom images. Mean v alue and standard deviation of pixels CT number were measured in the ROIs.

Spatial resolution in the longitudinal direction was determined by SSP (section sensitivit y profile. To describe SSP, the full width at half maximum(FWHM) was used.

RESULT

As the pitch value was greater than 1, image noise was increased by 10 to 30 % with the 180 ˚ linear interpolation algorithm compared to conventional scanning.

Spatial resolution was found to be equal in both scanning mode ; holes with diameters of 0.75 were resolved. As the pitch value was greater than 1, with 180 linear interpolati on algorithm, slice thickness(defined as the FWHM of the section sensitivity profile) was increased. Pitch value 1 increased 0.2 ~ 0.5 %, pitch value 2 increased 22 ~ 27 %, and pitch value 3 increased 73 ~ 78%.

DISCUSSION

The technique advantages of spiral CT are to minimize motion artifact and to eliminate

respiratory misregistration and to produce overlapping images without additional radiation exposure. But as pitch value is greater, image noise is increased and spatial resolution i n the longitudinal direction is much inferior to resolution in the x, y direction.

The most appropriate choices of section thickness, table increment value, and interpolati on algorithm need to be determined for the various clinical applications.

CONCLUSION

As pitch value was changed from 1 to 3, with 180 linear interpolation algorithm, imag e noise was increased by 10 to 30 percent, and longitudinal spatial resolution was decrea sed by 0.2 to 78 percent.