ABSTRACT

Spatial resolution is one of the parameters used to determine the image quality of computed tomography (CT). Spatial resolution can be measured accurately and objectively using modulation transfer function (MTF) curves. Three-dimensional (3D) MTF measurement is important, however standard phantoms for 3D-MTF measurement are limited in availability. This study aims to develop an in-house phantom for 3D-MTF measurement based on point objects in the (x, y, and z) axes of CT images. The case of phantom was made from acrylic. The inside of the phantom is filled with water. Dimensions of the phantom were 11 cm in diameter and 20 cm in height. A stainless steel wire with a diameter of 0.3 mm was embedded on three axes to create an intersection at the center of the phantom coordinates. The phantom was scanned using a GE Revolution EVO 128 slice CT scanner. MTF measurements were performed by comparing the effect of tube current, ASIR and slice thickness. MTF in the x and y axes were obtained from axial images. Axial images were reformatted using cubic interpolation to obtain sagittal and coronal images that were used to measure MTF values in the z axes. MTF measurements were performed automatically using IndoQCT software. The results found that the variation of tube current and ASIR level does not have a significant effect on the 10% MTF value in the x, y and z axes. The variation of slice thickness does not affect the 10% MTF value in the x and y axes, but has an effect on the 10% MTF in the z axis. An in-house phantom for 3D-MTF measurement was successfully developed. The phantom can be used easily and practically and it can be used for MTF measurement on x, y and z axis well.

Keywords: *3D-MTF, tube current, ASIR, slice thickness, in-house phantom*