AbstractID: 6773 Title: Geometrical CT image deformation generated on moving targets

Introduction

CT generates high resolution anatomical images. However, scanning moving targets, like lung tumors, may create geometrical deformations in shape, volume and position. The objective of this work was to study the geometrical changes produced on CT images scanning a known moving target.

Material and Methods

A motorized phantom capable of variable oscillatory movement with a platform to attach different radio opaque volumes was constructed (prism, cube, pyramid and sphere). A CT GE Light Speed was used to scan the volume during oscillatory movement. Axial and helical images were acquired with different CT parameters, X-ray tube rotation speed and couch speed. Then, images were acquired with a fixed tube speed and different frequency and amplitude of phantom movement. Analysis of target deformation was done on a Varian Eclipse v.7.3 TPS. Center of mass (CM) displacement, volume deformation and area versus position were compared between static and moving targets.

RESULTS

For fixed oscillation parameter with different X-ray tube speed, the average and maximum CM displacement were 6 and 9mm for axial and 5 and 9mm for helical scans and volume deformation were 6% and 18% for axial and 1% and 31% for helical scans. For fixed X-ray tube speed and variable oscillatory parameter target movement the average and maximum CM displacement were 6mm, 6mm, 3mm and 2mm respectively. Average and maximum deformation for prism, cube, pyramid and sphere were 8.3% - 44%, 0.4% - 10%, 5.8% - 9.8% and 1.6% - 6.6% respectively. A mathematical predictive model can be established for set conditions.

CONCLUSIONS

Displacement and deformity varies independently with X-ray tube rotation speed and oscillatory movement. Movement may produce inaccuracy for PTV definition.

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