ABSTRACT

This study aims to evaluate the effectiveness of a metal artifact reduction algorithm using MAR, VMI, and MAR+VMI on images with and without titanium implants. This study utilized an in-house phantom made from polyester-resin (PESR) with methyl ethyl ketone peroxide (MEKP) as a catalyst in a ratio of 1:300. The dimension of the phantom was 160 mm in diameter and 50 mm in length with seven insert holes ranging from 10 to 20 mm. The titanium Ti6Al4V representing a metal implant and calcium carbonate representing the bone were inserted into the holes. The phantom was scanned using a GE Revolution Apex CT scanner with dual tube voltages of 80 and 140 kVp, slice thickness of 1.25 mm, and tube current of 200. Images were reconstructed using VMI ranging from 50 to 140 keV with the MAR algorithm. Artifact evaluation was conducted by CT number and noise of the images using IndoQCT. Titanium material increases metal artifact in the in-house phantom. Metal artifact from titanium, both in Non-VMI and VMI usage, decreases CT number around 5% and 3% and increases noise level around 60% and 40%. MAR implementation can reduce metal artifacts, which is indicated by a smaller decreases in the CT number around 0.6% in both Non-VMI and VMI, and increases in noise level around 30% and 45%. The in-house phantom for evaluating MAR algorithm was successfully developed. The presence of titanium increases metal artifacts, which is characterized by a decrease in the CT number and an increase in noise level in the area around the titanium. It is found that the MAR algorithm succeeded in reducing metal artifacts.

Keyword: *CT number, Noise, VMI, MAR.*