EFFECTS OF DECREASING TUBE VOLTAGE AND CURRENT ON CORONARY ARTERY CALCIUM SCORING

Poster Contributions
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Background: The coronary artery calcium scan (CACS) age and gender percentile database, acquired at 120 kV, has mandated continued use of 120 kV in clinical practice despite the associated higher radiation dose compared to lower kV. This study was designed to determine the effects of lowering kV, and mAs as well, on the accuracy and risk stratification of CACS compared to standard 120 kV/80 mAs settings.

Methods: A calibrated anthropomorphic phantom with 7 calcium inserts of varying length and density was scanned using a Philips iCT scanner and Agatson Unit (AU) scoring was performed using standard software. Two hundred and ten measurements were obtained at 80, 100 and 120 kV and from 10-100 mAs in 10 mAs increments. All measurements were performed independently by 2 separate observers.

Results: At standard CACS 120 kV/80 mAs settings with standard filtered back projection reconstruction algorithms, the insert AUs of 2.8, 13.9, 41.5, 71.9, 73.9, 161.5 and 313.1 encompassed the range of clinically encountered values. There were no significant differences in mean + 1SD CACS between acquisitions at 120 kV/80 mAs compared to acquisitions at 100 kV/ 40-60 mAs (96.9 + 100.7 AU vs 106.3 + 100.1 AU, p=0.39). There were no changes in assignment to the standard clinical risk classification groups of 0, 1-10, 11-100, 101-400 and >400 AU with the 100kV/50 mAs settings compared to the standard 120 kV/80 mAs. The projected radiation decrease is 57% to <0.5 mSv. The interobserver variability was 0 (Kappa= 1.0).

Conclusions: 1) In a phantom, CT tube current and voltage may be decreased with a projected 57% radiation savings with no significant change in CACS and risk stratification. 2) In this radiation conscious era, confirmation of this finding in patient studies will aid greatly in the broad dissemination of CACS in clinical practice.