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THE IMPACT OF REDUCED 80 KVP TUBE VOLTAGE ON CORONARY CT ANGIOGRAPHY BY CT PLATFORM: RESULTS FROM A PROSPECTIVE, MULTICENTER, MULTIVENDOR RANDOMIZED TRIAL

ACC Poster Contributions

Ernest N. Morial Convention Center, Hall F

Sunday, April 03, 2011, 10:00 a.m.-11:15 a.m.

Session Title: CT Coronary Angiography - Diagnostic Accuracy

Abstract Category: 36. CT Coronary Angiography

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Background: Current methods to lower the radiation dose of coronary CT angiography (CCTA) include reduced 100 kVp imaging. The effect of further reduced 80 kVp voltage on radiation dose and image quality across CCTA platforms is not known.

Methods: We performed a prospective, multicenter, randomized trial of 208 consecutive patients without prior coronary revascularization and normal body mass index (<25 kg/m²) referred for CCTA. Patients were randomized to 80 (n=103) or 100 kVp (n=105) imaging on 4 platforms: GE HDCT (A) or VCT (B), Milwaukee, WI; Toshiba Aquilion One (C), Otawara, Japan; and Siemens Definition Flash (D), Forchheim, Germany. Core lab analysis by 3 blinded readers graded image quality and interpretability. Signal and noise (mean of aortic root, left main, and right coronary arteries), and contrast (mean signal - adipose tissue signal) were compared.

Results: Mean age was 58±12 years; 43% were male. Imaging with 80 vs. 100 kVp was associated with lower median (interquartile) radiation dose [0.9 (0.8-1.7) vs. 1.6 (1.4-3.2) mSv]; increased mean signal [756±157 vs. 592±105 Hounsfield units (HU)], contrast (890±156 vs. 708±108 HU), and noise (55±15 vs. 37±12 HU)(p<0.01 for all). Image quality by platform is provided in the table.

Conclusion: CCTA imaging using 80 vs. 100 kVp was associated with a 47% reduction in radiation dose. Despite a similar or decreased signal/noise ratio and graded image quality, per-artery interpretability was comparable or improved across multiple platforms.

Table.

	80 kV (n=103)	100kV (n=105)	p
Scanner A	n=50	n=46	
Image quality (1-4)	3.9±0.2	3.9±0.3	0.21
Per-artery interpretability	100% (199/200)	95% (175/184)	<0.01
Signal to noise ratio	15±5	17±5	0.08
Contrast to noise ratio	18±6	21±6	0.04
Scanner B	n=22	n=23	
Image quality (1-4)	3.6±0.4	3.9±0.3	0.05
Per-artery interpretability	94% (83/88)	93% (86/92)	0.81
Signal to noise ratio	14±4	18±5	<0.01
Contrast to noise ratio	17±5	22±5	<0.01
Scanner C	n=22	n=27	
Image quality (1-4)	3.4±0.6	3.6±0.5	0.21
Per-artery interpretability	98% (86/88)	96% (104/108)	0.56
Signal to noise ratio	15±4	17±5	0.10
Contrast to noise ratio	17±5	20±6	0.07
Scanner D	n=9	n=9	
Image quality (1-4)	3.7±0.4	4.0±0.1	0.047
Per-artery interpretability	100% (36/36)	100% (36/36)	1.0
Signal to noise ratio	14±8	18±4	0.21
Contrast to noise ratio	15±8	20±4	0.18
Pooled Results	n=103	n=105	
Image quality (1-4)	3.7±0.4	3.8±0.4	0.13
Per-artery interpretability	98% (404/412)	95% (401/420)	0.04
Signal to noise ratio	15±5	17±5	<0.01
Contrast to noise ratio	17±5	21±5	<0.01