

Newer techniques are making cardiac CT safer for children

July 17 2011

Coronary computed tomography angiography (CTA) has excellent image quality and diagnostic confidence for the entire spectrum of pediatric patients, with significant reduction of risk with recent technological advancements, according to a study to be presented at the Sixth Annual Scientific Meeting of the Society of Cardiovascular Computed Tomography (SCCT) in Denver, July 14-17.

"Traditionally, [pediatric patients](#) who require coronary artery imaging have undergone a [cardiac catheterization](#), which is an [invasive procedure](#) with a significant radiation dose, requiring sedation or [anesthesia](#) for all patients," explained B. Kelly Han, MD, a pediatric cardiologist at Minneapolis Heart Institute® at Abbott Northwestern Hospital and the Children's Heart Clinic and Children's Hospitals and Clinics in Minneapolis. "The newer CT scanners deliver far less radiation than both previous generation CT scanners and catheter based angiography. Also, CTA is non-invasive and has different protocols that can be tailored to decrease the risk for each individual patient."

"One barrier to applying coronary CTA in children has been their relatively high heart rates. Using a combination of medication to slow the heart rate and the new scanner technology, we have been able to obtain excellent images of the coronary arteries in patients as young as five months of age" she said.

Han and colleagues conducted a retrospective review of all coronary CTAs performed on patients less than 18 years of age at Minneapolis

Heart Institute® from June 2007 through February 2011. The researchers examined the heart rate control with beta blockade, and the radiation dose with the varied scan modes, with the goal of comparing the image quality and the radiation dose.

Patients were separated by scan mode into three groups:

- Group One: First-generation, dual-source CT scanner with retrospective ECG gating (spiral scan mode);
- Group Two: Second-generation, dual-source CT scanner with prospective ECG gating (sequential scan mode); and
- Group Three: Second-generation, dual-source CT using prospective ECG gating with high pitch (flash-scan mode).

The researchers compared the age, heart rate, body surface area, radiation dose estimates and image quality between the three groups. They performed 76 scans in patients from three days to 18 years of age.

The differences in radiation dose between the three scan groups were statistically significant, according to the authors, and high image quality was maintained between groups despite the decreased radiation exposure, Han and colleagues reported. A high percentage of the patients had coronary artery pathology including anomaly, stenosis, or aneurysm. Overall, 17 patients underwent subsequent surgical intervention and surgical findings correlated with coronary CTA in all cases.

"We found that the newer imaging modes decrease the radiation dose between four-fold and seven-fold, without loss in diagnostic accuracy or [image quality](#)," Han said. "The estimated radiation dose reduction over traditional [angiography](#) is even greater. The aggressive use of beta-blockade to slow the heart rate, in combination with the newer scan modes allows for a very low [radiation dose](#) in this young patient

population."

This technology also will "significantly decrease" the anesthesia and invasive access risk of coronary imaging, according to Han, as the images are acquired without having to access the [heart](#), and all patients age seven or older did not require [sedation](#).

Provided by Minneapolis Heart Institute Foundation

Citation: Newer techniques are making cardiac CT safer for children (2011, July 17) retrieved 26 April 2024 from

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