Overcoming the Challenges of Imaging the Heart in Obese Patients

Using CTA to Evaluate Etiology of Chest Pain

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The prevalence of obese patients with known coronary disease continues to rise. Currently in clinical practice, these patients are frequently followed with serial nuclear myocardial perfusion imaging (MPI) studies. These can have radiation doses to the patient that approach 34 mSv* per study with Thallium MPI studies or 9-13 mSv* with TC-99m. In addition, women and obese patients have a higher incidence of false-positive MPI studies due to breast or diaphragmatic attenuation, often obligating that an unnecessary diagnostic invasive coronary catheterization be performed.

The SnapShot™ Pulse low dose coronary CTA technique provides new possibilities for following a patient's disease process due to the lower radiation dose exposure.

BMI is a measure of body fat based on height and weight that applies to both adult men and women. According to the National Institutes of Health, BMI Categories are:

- Underweight = <18.5
- Normal weight = 18.5-24.9
- Overweight = 25-29.9

Obesity = BMI of 30 or greater

Clinical Case

Patient History

A 65-year-old female patient came in for a work up due to complaints of atypical chest pain which radiated to her back. Although she had numerous cardiac risk factors, she had no previous cardiac history. The patient's cardiac risk factors include a history of high cholesterol, positive family history, hypertension and insulin dependent diabetes.

This patient was categorized as obese with a Body Mass Index (BMI) greater than 37.

Her calcium score of 101 is:

Left Main	= 0
Left Anterior Descending	= 85
Left Circumflex	= 0
Right Coronary	= 16
Posterior Descending	= 0
Total Calcium Score	= 101

Age/Sex Matching Score Percentile = 80

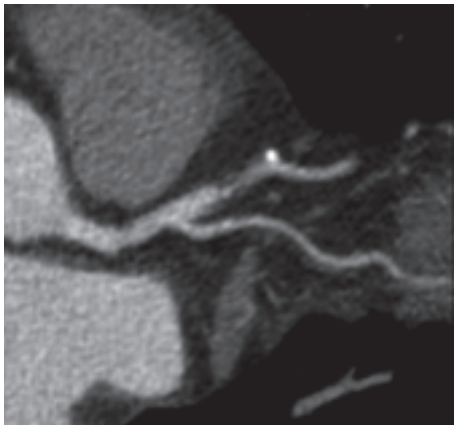

Figure 1

*Obtained by EUR-16262 EN using chest factor of 0.017*DLP

A calcium score of 101 places this 65-year-old female in the 80th percentile for her age and sex, which means 20 percent of asymptomatic women in her age group have a higher calcium score.

Patient Physiological Data:

Average HR	45 bpm
Height:	5' 5"
Weight:	225 lbs.

Acquisition Protocol:

Scanner:	LightSpeed® VCT XT configuration
Scanning Mode:	Cardiac Axial SnapShot Pulse, Prospective ECG-gated
Coverage:	64 x 0.625 mm
mA	750
KVp	120
Gantry Rotation:	0.35 seconds
Total Scan Time:	5 seconds
Radiation Dose:	2.33 mSv*

Contrast Injection Parameters:
Timing dose: 20 cc @ 5.5cc/sec followed by 50 cc saline @ 5.5 cc/sec

Diagnostic dose: 80 cc @ 5.5cc/sec followed by 50 cc saline @ 5.5 cc/sec

Contrast Media: Visipaque™

CT Angiography (CTA) Findings

The left main coronary artery is patent with evidence of mild atherosclerosis (Figure 1).

The left anterior descending (LAD) and diagonals are patent although there is evidence of mild non-obstructing atherosclerosis (Figure 1).

The left circumflex coronary artery (LCx) and marginal branches are patent. Again, there is evidence of mild non-obstructing atherosclerosis.

The right coronary artery (RCA) is a very prominent vessel (Figure 2a and b). It has a maximum diameter of 7.0 mm proximally (2b). This is seen over the proximal several centimeters of the vessel. Several small plaques are identified throughout the non-obstructed vessel.

The posterior descending artery (PDA) arises from the right coronary artery. The vessel is patent without obstruction (Figure 3).

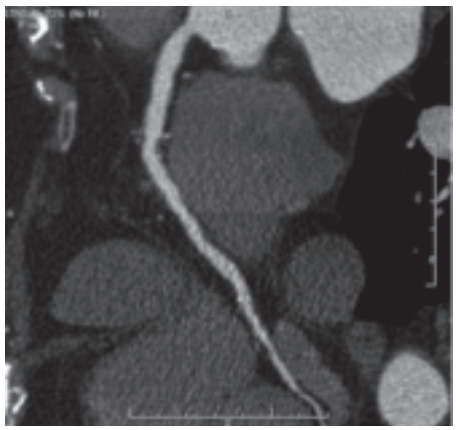

Figure 2a

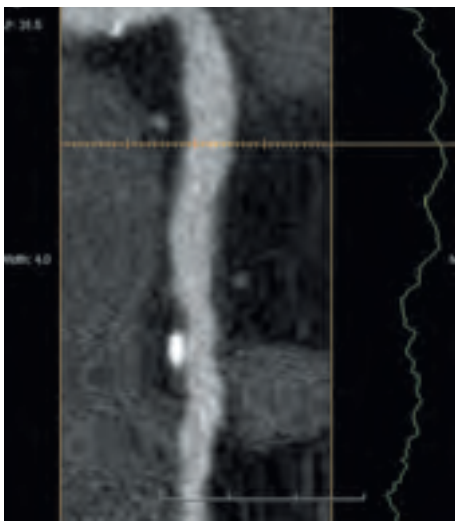

Figure 2b

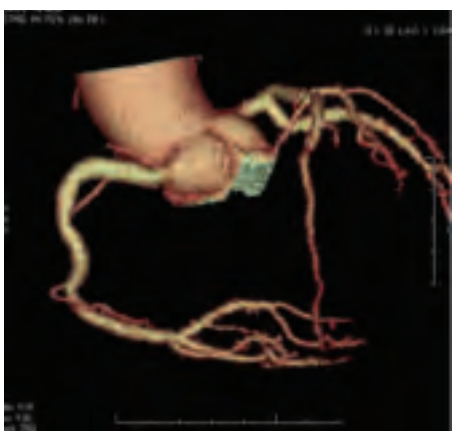

Figure 3

*Obtained by EUR-16262 EN using chest factor of 0.017*DLP

James P. Earls, M.D., is Vice President and Medical Director, and Director of the Cardiac CT Program at Fairfax Radiological Consultants, P.C., Fairfax, VA and Co-Director Cardiac CT Lab at the INOVA Heart and Vascular Institute of Falls Church, VA. Dr. Earls received his medical degree from New York University School of Medicine and completed his residency in diagnostic radiology at Walter Reed Army Medical Center in Washington, DC. He is a founding member of the Society for Cardiac Computed Tomography, and a member of the Radiological Society of North America and Roentgen Ray Society.

Conclusion

Based on the findings, the patient has mild atherosclerosis seen in her LAD, LCx and RCA. She has a very prominent proximal right coronary artery with a widely patent PDA. The atherosclerosis, while being mild in nature, will warrant observation in the coming years for further progression.

The benefits of SnapShot Pulse are demonstrated with this high BMI study. Although a high mA (750) was selected to produce diagnostic quality images with low image noise, the patient's effective dose was kept to a minimum (2.33 mSv*) because of the prospectively triggered SnapShot Pulse technique. We are now able to provide diagnostic quality coronary CT images with substantially-reduced radiation exposure to the patient as compared to helical techniques. ■

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About Fairfax Radiological Consultants, P.C.

Fairfax Radiological Consultants, P.C. (FRC) was established in 1963. It is currently the largest radiology organization in the Washington Metropolitan Area as well as in the Commonwealth of Virginia. FRC provides services to Inova Fairfax Hospital, which is the only Level 1 trauma center in Northern Virginia. FRC also provides services to Inova Loudoun Hospital, Inova Fair Oaks Hospital, as well as fourteen outpatient facilities conveniently located throughout the Northern Virginia area.

FRC currently employs 70 radiologists, all of whom are board certified by the American Board of Radiology and are specialized in the subsection of radiology such as mammography, ultrasound, interventional radiology, neuro-interventional radiology, CT scanning, MRI, nuclear medicine, pediatrics and other radiological services. FRC employs over 400 professionals, registered technologists and support personnel, to provide a full service organization.

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