CT angiography, underuse, overuse, or appropriate use?

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Recently, cardiologists have started serious debates over expensive medical technologies, questioning the conclusions that high-resolution cardiac CT images are almost as effective as conventional angiograms. This debate reveals a deep gap among cardiologists over the use of multi-slice CT angiography. A number of physicians have immediately embraced CT technology and installed expensive CT scanners in their hospitals in order to detect early signs of coronary artery disease. Other doctors, however, argue that these high-tech devices drive up healthcare costs and offer no proven benefits. In a recent study in the *New England Journal of Medicine* (2008;35:2324-36), investigators identified 291 patients with symptoms of coronary artery disease who were studied with a 64-slice CT scanner. The CT angiograms accurately identified 85% of the patients who had significant stenoses and 90% of the patients without coronary artery disease. The authors stated that noninvasive CT angiography was almost as accurate as conventional angiography. Nevertheless, it was also concluded that CT angiography is not able to replace conventional coronary angiography at present. More outspoken was the ACCURACY trial (*JACC* 2008;52:1724-32) which showed in 230 patients a 99% negative predictive value for CT angiography, establishing this method as an effective noninvasive alternative to conventional angiography to rule out obstructive coronary artery stenosis.

On the more relative side of the spectrum, CT angiography may be overused, according to a study published in the *JACC* (2008;52:2135-44). Researchers from the Erasmus MC (Meijboom, de Feyter et al.) enrolled 360 patients with chest pain who were planning to have invasive angiograms. In more than 50% of patients CT angiography showed coronary artery stenoses that did not really exist. In a smaller sub-category, CT imaging had a false-positive rate of 81%. In an accompanying editorial, Steve Nissen (Cleveland Clinic, USA) called for restricted use of CT angiography until adequate clinical evidence becomes available showing the cost-effectiveness and safety of this approach.

There are inherent questions about safety of cardiac CT scans. The median exposure of CT angiography is roughly equivalent to 600 chest X-rays (12 milliSievert). Traditional angiography exposes patients to roughly half the dose of CT angiography. However, the radiation exposure of almost 2000 people having 64-slice cardiac CT images at 50 medical centres in different countries may vary more than six-fold (*JAMA* 2009;301:500-7). Effective strategies to reduce radiation dose (such as prospective gating) are available but these strategies are not frequently used. In view of this, heart imaging tests should be used cautiously to minimise patient exposure to ionising radiation, which has been linked to cancer, according to a new American Heart Association science advisory released in the 2009 February 2 issue of *Circulation*. This advisory suggested that cardiac imaging studies exposing patients to ionising radiation should be ordered only after thoughtful consideration of the potential benefits to the patient, thereby keeping in line with the established so-called 'appropriateness' criteria. In recent years, for all imaging modalities appropriateness criteria have been established with the primary aim to adhere to the primary indications. For example, at the ACC 2009 meeting in Orlando it was reported by Bob Hendel (Illinois, USA) that 12% of the nuclear SPECT studies were still inappropriate. As to CT angiography, researchers from the Cleveland Clinic (*J Cardiovasc Comput Tomogr* 2009; 3:16-21) recently showed that the number of appropriate CT examinations increased from 69.5 to 78.5% during the period from 2006 to 2007, whereas the number of inappropriate examinations decreased from 11.5 to 4.6%. Interestingly, cardiologists were more likely than non-cardiologists to order CT examinations that were appropriate during the study period. Needless to say that strict adherence to the appropriateness criteria is of paramount importance in clinical practice. This policy will have a significant impact on physician decision making and performance, patient care, reimbursement policy, and might help in guiding future research. Only then, CT angiography can appropriately be used. ■

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