Pictorial review: Electron beam computed tomography and multislice spiral computed tomography for cardiac imaging


Electron beam computed tomography (EBCT) revolutionized cardiac imaging by combining a constant high temporal resolution with prospective ECG triggering. For years, EBCT was the primary technique for some non-invasive diagnostic cardiac procedures such as calcium scoring and non-invasive-angiography of the coronary arteries. Multislice spiral computed tomography (MSCT) on the other hand significantly advanced cardiac imaging through high volume coverage, improved spatial resolution and retrospective ECG gating. This pictorial review will illustrate the basic differences between both modalities with special emphasis to their image quality. Several experimental and clinical examples demonstrate the strength and limitations of both imaging modalities in an intraindividual comparison for a broad range of diagnostic applications such as coronary artery calcium scoring, coronary angiography including stent visualization as well as functional assessment of the cardiac ventricles and valves. In general, our examples indicate that EBCT suffers from a number of shortcomings such as limited spatial resolution and low contrast-to-noise ratio. Thus, EBCT should now only be used in selected cases where a constant high temporal resolution is a crucial issue, such as dynamic (cine) imaging. Due to isotropic submillimeter spatial resolution and retrospective data selection MSCT seems to be the non-invasive method of choice for cardiac imaging in general, and for assessment of the coronary arteries in particular. However, technical developments are still needed to further improve the temporal resolution in MSCT and to reduce the substantial radiation exposure.

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