

Coronary Computed Tomography Angiography: Overview of Technical Aspects, Current Concepts, and Perspectives

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Abstract

Multidetector-row electrocardiogram (ECG)-gated cardiac computed tomography (CT) will probably be a major noninvasive imaging option in the near future. Recent developments indicate that this new technology is improving rapidly.

This article presents an overview of the current concepts, perspectives, and technical capabilities in coronary CT angiography (CTA). We have reviewed the recent literature on the different applications of this technology; of particular note are the many studies that have demonstrated the high negative predictive value (NPV) of coronary CTA, when performed under optimal conditions, for significant stenoses in native coronary arteries. This new technology's level of performance allows it to be used to evaluate the presence of calcified plaques, coronary bypass graft patency, and the origin and course of congenital coronary anomalies.

Despite a high NPV, the robustness of the technology is limited by arrhythmias, the requirement of low heart rates, and calcium-related artifacts. Some improvements are needed in the imaging of coronary stents, especially the smaller stents, and in the detection and characterization of noncalcified plaques. Further studies are needed to more precisely determine the role of CTA in various symptomatic and asymptomatic patient groups.

Clinical testing of 64-slice scanners has recently begun. As the technology improves, so does the spatial and temporal resolution. To date, this is being achieved through the development of systems with an increased number of detectors and shorter gantry rotation time, as well as the development of systems equipped with 2 X-ray tubes and the eventual development of flat-panel technology. Thus further improvement of image quality is expected.

Abrégé

La tomodescannerie (TDM) cardiaque à multidétecteurs avec synchronisation électrocardiogramme (ECG) sera probablement bientôt une importante option d'imagerie non invasive. Les développements récents indiquent que cette nouvelle technologie s'améliore rapidement.

Cet article présente un aperçu des concepts, perspectives et capacités techniques actuels de la coronarographie (coro-TDM). Nous avons examiné la documentation récente sur les différentes applications de cette technologie, et noté en particulier les nombreuses études qui ont démontré la valeur prédictive négative (VPN) élevée de la coro-TDM, quand elle est exécutée dans les meilleures conditions, pour des sténoses significatives dans les artères coronariennes natives. Le niveau de rendement de cette nouvelle technologie permet de l'utiliser pour évaluer la présence de plaques calcifiées, la perméabilité des greffes de pontage coronarien, et l'origine et l'évolution des anomalies coronariennes congénitales.

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Received April 3, 2006

Revision requested July 10, 2006

Resubmitted September 13, 2006

Accepted October 10, 2006

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Radiologists

Can J Assoc Radiol 2007;58(2):92–108

Key Words: cardiac computed
tomography; coronary
computed tomography
angiography; catheter coronary

Technical Aspects Of Tomography

Puja Mehta

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