Coronary MR Angiography

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Background

Whole-heart CMRA has been introduced as a method that can encompass the entire heart with a single 3D volume, rather than 3D volume targeted CMRA (1). Relatively low spatial resolution and long imaging time are the two major limitations of whole heart CMRA at 1.5T. Contrast-enhanced whole-heart coronary MRA at 3.0-T has emerged as a means of improving the CNR compared with noncontrast-enhanced 1.5-T whole-heart coronary MRA.

Clinical Applications of whole heart CMRA

Non-contrast whole heart CMRA at 1.5T

Single-center study has evaluated the diagnostic accuracy of 1.5T SSFP whole heart coronary MRA for detecting significant coronary artery stenoses(2). These studies indicate that whole heart coronary MR angiography is useful in ruling out significant coronary artery disease in patients suspected of coronary artery disease. Recent multicenter study showed that whole-heart coronary MRA at 1.5T noninvasively detected significant coronary artery stenosis with moderate sensitivity and specificity (3).

Contrast enhanced whole heart CMRA at 3.0T

Our recent study has demonstrated that 3.0T contrast-enhanced whole-heart CMRA has high sensitivity and moderate specificity for the detection of stenoses in patients suspected of coronary artery disease(4). The results compare favorably with the performance of multicenter 64-slice MDCT and this CMRA approach now represents the current state of the art(5). Combined with dedicated 32-channel cardiac coils, along with parallel imaging, allows improvements in imaging speed, study success rate and reduced dose of contrast agent when compared with conventional 12-channel coils. The gaps between 64-slice MDCT and CMRA are quickly closing.

In conclusion, non–contrast-enhanced 1.5-T whole-heart CMRA and SSFP MRA and contrast-enhanced 3.0-T MRA are not competing techniques, they both allow for noninvasive detection of significant coronary artery stenoses. They both have strengths that are complementary to coronary CT angiography's weaknesses in cases where coronary calcification precludes adequate evaluation. Whole-heart CMRA can provide detailed evaluation of the coronary arteries in the large majority of patients.

References

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