Abundant data now link composition of the vascular wall, rather than the degree of luminal narrowing, with the risk for acute ischemic syndromes in the coronary, central nervous system, and peripheral arterial beds. Over the past few years, magnetic resonance angiography has evolved as a well-established method to determine the location and severity of advanced, lumen-encroaching atherosclerotic lesions. In addition, more recent studies have shown that high spatial resolution, multisequence MRI is also a promising tool for noninvasive, serial imaging of the aortic and carotid vessel wall, which potentially can be applied in the clinical setting. Because of the limited spatial resolution of current MRI techniques, characterization of coronary vessel wall atherosclerosis, however, is not yet possible and remains the holy grail of plaque imaging. Recent technical developments in MRI technology such as dedicated surface coils, the introduction of 3.0-T high-field systems and parallel imaging, as well as developments in the field of molecular imaging such as contrast agents targeted to specific plaque constituents, are likely to lead to the necessary improvements in signal to noise ratio, imaging speed, and specificity. These improvements will ultimately lead to more widespread application of this technology in clinical practice. In the present review, the current status and future role of MRI for plaque detection and characterization are summarized.
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