1154-145 Abnormal Left Ventricular Wall Rotation in Patients With Complete Left Bundle Branch Block: Analysis Using Magnetic Resonance Imaging Tagging Images

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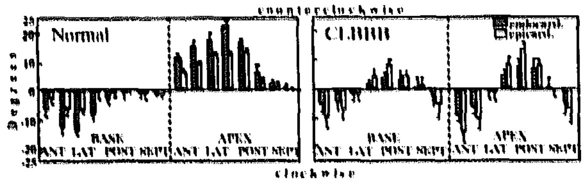
Segmental cardiac wall motion can be assessed by means of magnetic resonance imaging (MRI) tagging images. Using this method, we examined 7 patients with complete left bundle branch block (CLBBB) without any cardiac disease and 5 normal volunteers and assessed the rotation of the left ventricular (LV) wall around the center of gravity in the transverse plane of the heart. The angle of rotation was positive, when it was counterclockwise viewed from the apex. In normal hearts, the rotation gradually changed in the midventricle from clockwise in the basal portion to counterclockwise in the apical portion. The rotation angle was greater at the endocardium than at the epicardium. In all the CLBBB hearts, both the basal and apical portions displayed a clockwise rotation in the anterior wall but a counterclockwise one in the inferoposterior wall. The rotation angle was greater at the epicardium than at the endocardium unlike the normal hearts.



The abnormal LV rotation in the CLBBB hearts may be related to the disorder of myocardial depolarization which spread from the ventricular septum to the lateral epicardial segments through the anterior and inferoposterior walls. We first clarified the abnormal rotation of the LV in CLBBB using tagging MRI. This abnormality may affect the function of LV in CLBBB.

1154-146 Assessment of Coronary Artery Blood Flow Velocity Using Breath-hold Phase Contrast MR Angiography in Patients With Acute Myocardial Infarction

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Background: The purpose of this study was to assess the infarct-related coronary artery blood flow velocity in patients with reperfused acute myocardial infarction and to correlate these results with flow measurements obtained by intracoronary doppler US.

Methods: We measured coronary blood flow velocity after direct or rescue coronary angioplasty in 15 patients with acute myocardial infarction using a 0.014 doppler guidewire. MR exam was also performed in all patients within one week after the coronary angioplasty. Following doppler parameters were measured: average peak velocity (APV), maximum peak velocity (MPV) and average diastolic peak velocity (ADPV). MR imaging was performed on a 1.5T clinical imager with Torso phased array coil. The phase contrast pulse sequence (FASTCARD PC) was employed in breath-hold with 10 to 21 temporal phases with 4 view per segment, flip angle 20 deg., acquisition matrix 256 × 128, and one excitation. Field of view, TE, TR were 44 × 33 cm, 7 ms, 16 ms.

Results: MR and doppler measurements after angioplasty were obtained at the same anatomic levels: 10 proximal and distal LAD segments and 5 proximal and distal RCA segments. Mean APV was 17.8 ± 6.3 cm/sec, mean ADPV was 21.5 ± 7.8 cm/sec and mean MPV was 33.9 ± 10.9 cm/sec. Mean MRI APV was 15.5 ± 10.3 cm/sec, mean MRI ADPV was 24.0 ± 11.3 cm/sec, and mean MRI MPV was 31.1 ± 15.0 cm/sec. Mean MRI APV correlated well to ADPV ($r = 0.50$; $p < 0.05$).

Conclusion: Comparing MR with invasive intracoronary doppler flow measurements, the measured MR values showed good agreement with APV, ADPV and MPV. Thus, phase contrast MR imaging allows to assess the coronary blood flow velocity pattern and the presence of microvascular dysfunction in patient with reperfused acute myocardial infarction.

1154-147 Phase Contrast Magnetic Resonance Imaging of Effective Orifice Area for Restrictive Valve Orifices

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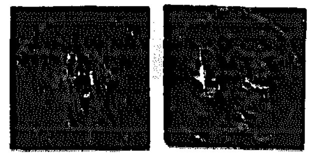
We investigated the applicability of phase contrast magnetic resonance imaging (PC MRI) for direct measurement of effective orifice are (EOA) and explored the effect of flow rates, orifice sizes, and geometry on EAO and contraction coefficient (Cc) (which is the relationship of EOA to actual OA). On PC images, a 1.5T GE SIGNA system was used for imaging steady flows, ranging from 3.6–9.0 l/min., through 4 orifices (2 circular, 1 rectangular and 1 eccentric prolapsing mitral valve orifice) with OA 0.12–0.24 cm² set in a custom designed in vitro model. EOA was determined by computer-assisted processing of the velocity-weighted MR images using 3 mm slices of the narrowest cross-sectional area of the jet derived from multiple referenced imaging planes and views. EOAs correlated and agreed well with EOAs calculated from actual flow rate/CW Doppler velocity ($r = 0.94$, SEE = 0.03 cm²). Cc by MRI was significantly larger ($P < 0.05$) for high flow rates than for low flow rates; it was also larger for the circular orifice than for rectangular orifices.



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The shape of the MRI resolved EO images highly resembled those of the true orifices. PC MRI with high resolution multiple plane referenced image plane selection is capable of imaging flow events and determining EOA to aid the quantitative evaluation of valvular regurgitation and stenosis.

1154-148 Magnetic Resonance Techniques for the non Invasive Determination of Coronary Blood Flow Velocity

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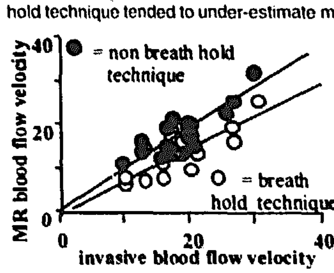
The functional assessment of coronary artery stenoses by invasive intracoronary Doppler flow velocity measurements is well established. Magnetic resonance (MR) tomography allows a non invasive estimation of coronary artery blood flow velocities. The aim of this study was to evaluate two different MR techniques for the assessment of coronary blood flow.

Methods: Coronary blood flow velocities (average peak velocities) were measured invasively in 24 angiographically normal segments (12 patients) with a 0.014" FloWire (FloMap system, Cardiometrics). Non invasive blood flow measurements were performed in identical segments with the 2 MR techniques using a 1.5 Tesla system (Philips Gyroscan NT). A single breath hold technique (duration 16–20 s, spatial resolution 1 × 0.9 × 4 mm, temporal resolution = 140 ms) and a non breath hold technique with prospective navigator correction (duration 150 s, spatial resolution 1 × 1 × 4 mm, temporal resolution = 31 ms) were used. Maximal diastolic flow velocity was measured and corrected for cardiac motion.

Results: Three patients had to be excluded due to insufficient MR image quality. Coronary blood flow velocities determined by both MR techniques correlated closely with the invasive measurements (figure). However, the breath hold technique tended to under-estimate maximal flow velocity.



Conclusions: Both MR techniques allow an estimation of coronary blood flow velocities. The higher temporal resolution of navigator corrected non breath hold techniques may lead to an increased accuracy.

1154-166 Gadolinium-enhanced 3 Dimensional Magnetic Resonance (MR) Angiography for Identifying Coronary Graft Patency

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Background: We investigated prospectively graft patency in patients with inter-

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