

Acute Myocardial Infarction

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Section: Cardiovascular

Case Type: Clinical Cases

Authors: Kelle S, Nagel E. German Heart Institute Berlin
and cmr-academy 13353 Berlin, Germany

Patient: 64 years, male

Clinical History:

Patient 1 week after acute myocardial infarction and revascularization of the left anterior descending coronary artery

Imaging Findings:

The patient was admitted 7 days ago presenting with an ST-elevation myocardial infarction (STEMI) of the anterior wall with troponine T elevation. The patient was immediately transferred to the catheter laboratory and the left anterior descending coronary artery was revascularized and a stent inserted into the proximal level. The patient was sent to MR imaging to assess infarct size. MR imaging consisted of wall motion at rest and late Gd enhancement 10 minutes after injection of 0.1 mmol Gd-DTPA-BOPTA (Figures 1 - 8 = apical to basal slice). Wall motion showed a resting wall motion abnormality throughout the anterior, anteroseptal and inferoseptal segments. Late Gd enhancement showed transmural scar with pronounced microvascular obstruction in the same segments. Please note the stent artefact in the left anterior descending artery in slice 08 (figure 8).

Discussion:

Late Gd enhancement (or "late enhancement", "delayed enhancement") is now regarded as the reference standard for the assessment of irreversible myocardial damage. Whereas bright tissue represents mainly necrotic tissue with cell membrane disruption (in acute myocardial infarction) or replacement of large myocardial cells by small fibrotic cells (in chronic myocardial infarction or cardiomyopathies), dark areas within the bright segments represent "microvascular obstruction". This phenomenon is due to a complete disruption of myocardial blood flow and, thus, failure to deliver contrast agent to this area. If imaging is performed early after contrast injection (1-3 minutes) microvascular obstruction is usually more pronounced than if imaged late (> 10 minutes). The optimal time point for imaging is still under discussion. The presence of microvascular obstruction has been related to a worse prognosis in comparison to patients without. Possible improvement of function after revascularization (due to "stunning" in acute myocardial infarction and "hibernation" in chronic myocardial infarction) can be predicted from the transmural extent of the enhancement. Patients with transmural necrosis (as in the current case) are highly unlikely to show improvement of wall motion despite successful revascularization.

Differential Diagnosis List: Anteroseptal myocardial infarction with pronounced microvascular obstruction after revascularization.

Final Diagnosis: Anteroseptal myocardial infarction with pronounced microvascular obstruction after revascularization.

References:

- Hendel RC, Patel MR, Kramer CM, Poon M, Carr JC, Gerstad NA, et al. ACCF/ACR/SCCT/SCMR/ASNC/NASCI/SCAI/SIR Appropriateness Criteria for Cardiac Computed Tomography and Cardiac Magnetic Resonance Imaging. J Am Coll Cardiol. 2006 Oct 3;48(7).
- Wagner A, Mahrholdt H, Holly TA, Elliott MD, Regenfus M, Parker M, et al. Contrast-enhanced MRI and routine single photon emission computed tomography (SPECT) perfusion imaging for detection of subendocardial myocardial infarcts: an imaging study. Lancet. 2003 Feb 1;361(9355):374-9. (PMID: [12573373](#))
- Choi KM, Kim RJ, Gubernikoff G, Vargas JD, Parker M, Judd RM. Transmural extent of acute myocardial infarction predicts long-term improvement in contractile function. Circulation. 2001 Sep 4;104(10):1101-7. (PMID: [11535563](#))
- Kim RJ, Wu E, Rafael A, Chen EL, Parker MA, Simonetti O, Klocke FJ, Bonow RO, Judd RM. The use of contrast-enhanced magnetic resonance imaging to identify reversible myocardial dysfunction. N Engl J Med. 2000 Nov 16;343(20):1445-53. (PMID: [11078769](#))