Acute Myocardial Infarction: An AHP Guide

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1. Introduction

Acute myocardial infarction (AMI), results from acute obstruction of a coronary artery leading to irreversible myocardial injury. Prompt diagnosis and revascularization are critical to improving outcomes.

From a cardiovascular magnetic resonance (CMR) perspective, AMI presents as regional wall motion abnormalities, myocardial oedema, and late gadolinium enhancement (LGE) with a subendocardial to transmural pattern corresponding to a coronary artery territory.

CMR provides high-resolution tissue characterization that is invaluable for confirming infarction, estimating infarct size, and detecting complications such as microvascular obstruction (MVO) or thrombus. Ensuring accurate cine, T2-weighted, and LGE imaging is essential for diagnosis and treatment planning.

2. CMR Protocol

	Sequence/Technique	**Notes**
1	Anatomy (Localisers)	Scouts to plan cardiac views
2	LV and RV function – Cine SSP	Long and short axis to assess wall motion, LV/RV function and volume
3	Oedema	Identify myocardial oedema in acute infarction zones
4	Early gadolinium enhancement	May detect thrombus or microvascular obstruction
5	Late gadolinium enhancement	Detect infarction myocardium – typically subendocardial or transmural in coronary territory
5	T2 Mapping	For quantitative detection of oedema

3. Reporting Checklist

- LV: EDV, ESV, SV, EF (indexed to BSA)
- RV: EDV, ESV, SV, EF (indexed to BSA)
- Regional wall motion abnormalities
- Presence of oedema – area at risk
- Infarct pattern on LGE – subendocardial or transmural
- Microvascular obstruction – dark core within infarct zone on early or late post-contrast

• Presence of thrombus – especially LV apex in large anterior MI

• Pericardial effusion – common post-infarction or with inflammation

4. Key Diagnostic Criteria

• Wall Motion Abnormality – Hypokinesia or akinesia in coronary artery distribution

• LGE Pattern – Subendocardial to transmural enhancement in territory of occluded vessel

• Oedema – T2 Weighted imaging – may differentiate acute from chronic myocardial infarction

• Microvascular Obstruction (MVO) – Non-enhancing core within hyper-enhanced infarct zone, equates to "angiographic no reflow" appearance, a high risk feature

• Infarct Size – Quantified on LGE; prognostic indicator

• Thrombus or Pericardial Effusion – Identify complications that may impact management

5. Tips & Tricks for Allied Health Professionals

• T2 Imaging – Ensure good fat suppression and minimal motion for accurate oedema detection. Must acquire pre contrast

• MVO – best seen on EGE – use TI > 400ms

• LGE Optimization – Use correct inversion time (TI) to null normal myocardium and highlight infarcted regions

• Compare LGE images with cine images if unsure about differentiation between blood pool and endocardial late enhancement

• Look for Complications – Pay attention to apex (thrombus), pericardium (effusion), and wall thinning

Reference

Herzog, B. A., Greenwood, J. P., Plein, S., Garg, P., Haaf, P., & Onciul, S. (2017). Cardiovascular Magnetic Resonance Pocket Guide. Eur Soc Cardiol.