Magnetna rezonancija srca – klinička primjena i ograničenja

Cardiac magnetic resonance imaging – clinical applications and limitations

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Magnetna rezonancija (MR) sve se više koristi u dijagnostici bolesti srca te omogućuje uvid u morfologiju i funkciju srca, uz mogućnost preciznog mjerenja veličine obje klijetke, ejekcijske frakcije, mase miokarda, kao i procjene stupnja valvularne bolesti. Glavne indikacije za pretragu su bolesti miokarda, ishemijska bolest srca, prirođene srčane greške, tumori srca te bolesti perikarda.¹⁻³ Pretragu je moguće sigurno izvesti i u bolesnika s prostetskim valvulama, suturama sternuma te koronarim stentovima. U bolesnika u kojih je ugrađen MR kompatibilan elektrostimulator ili defibrilator pretragu je moguće učiniti ukoliko se radi o uređaju za kojeg je odobreno snimanje cijelog tijela, no izraženi artefakti najčešće onemogućuju detaljnu analizu srca. Tijekom snimanja bolesniku se obično intravenski injicira gadolinijevo kontrastno sredstvo, što treba izbjegavati u bolesnika s procijenjenom stopom glomerularne filtracije < 30 ml/min i u bolesnika na dijalizi zbog mogućnosti nastanka nefrogene sistemske fibroze. Kasna imbibicija gadolinijem prisutna je unutar ožiljnih zona u miokardu, a temeljem distribucije ožiljaka može se utvrditi etiologija kardiomiopatije, razlikovati ishemijska od neishemijske dilatacijske kardiomiopatije te utvrditi zahvaćenost miokarda u okviru sistemskih bolesti (amiloidoza, sarkoidoza...). Najčešća hitna indikacija za MR srca je sumnja na miokarditis kojeg morfološki karakterizira edem miokarda, te rana i/ili kasna postkontrastna imbibicija subepikardne distribucije. Naprotiv, infarktni ožiljak karakterizira subendokardna do transmuralna kasna imbibicija, dok je reverzibilne ishemijske promjene moguće detektirati stres perfuzijskim snimanjem uz primjenu vazodilatatora, obično adenoza. U praćenju bolesnika s prirodnim srčanim greškama MR pregledom moguće je saznati veličinu i funkciju obje klijetke, masu miokarda, stupanj valvularne greške te kvantificirati shunt mjerenjem protoka kroz plućnu i sistemske cirkulaciju.

Cardiac magnetic resonance imaging (MRI) is frequently used for evaluation of cardiac diseases. It enables depiction of cardiac morphology and function, with precise measurement of biventricular volumes, ejection fraction, myocardial mass, as well as quantitation of valvular disease. The main indications for cardiac MRI are myocardial diseases, ischemic heart disease, congenital heart diseases, cardiac masses and pericardial diseases.¹⁻³ The MRI scan is safe for patients with prosthetic valves, sternal wires and coronary stents. Cardiac MRI examination is also possible in patients with an MR-compatible pacemaker or defibrillator designed and tested for full-body MRI scan, but detailed analysis of the heart is often precluded by artifacts. During MRI scan gadolinium-based contrast agent is usually administered intravenously, but should be avoided in patients with estimated glomerular filtration rate < 30 ml/min and in dialysis patients because of increased risk for nephrogenic systemic fibrosis. Late gadolinium enhancement (LGE) is present in scar regions. Based on LGE pattern etiology of cardiomyopathy can be determined, ischemic dilated cardiomyopathy differentiated from non-ischemic, and myocardial affection with systemic diseases (amiloidosis, sarcoidosis...) can be detected. The most common emergent indication for cardiac MRI is myocarditis that is morphologically characterized by myocardial edema, and subepicardial early or late enhancement. On the contrary, infarct scar presents with subendocardial to transmural LGE, whereas reversible ischemic changes can be depicted using stress perfusion imaging with administration of vasodilator, usually adenosine. In follow-up of patients with congenital heart diseases using MRI it is possible to determine right and left ventricular volumes and function, myocardial mass, grade of valvular disease and significance of shunt by measurement of flow through the pulmonary and systemic circulation.

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