THE ROLE OF MRI IN ASSESSMENT OF MYOCARDIAL VIABILITY

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Presented by

Yasser Mohammed Ali Ismail

M.B.B.CH

Under supervision of

Prof. Dr. Maha Hussein Anwar Abd ElSalam

Professor of Radiodiagnosis
Faculty of medicine
Ain Shams University

Dr. Hazem Fawzy Abou Elhamayed

Assistant Professor of Radiodiagnosis
Faculty of medicine
Ain Shams University

Faculty of medicine
Ain shams university
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الدّكتور/حازم فوزى أبوالحمايّد

أستاذ مساعد الأشعة التشخيصيةِ
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INTRODUCTION

Ischemic heart disease (IHD) is the most common symptomatic manifestation of cardiovascular disease and by far the leading cause of mortality. Atherosclerotic vascular disease is very common and most adults have some degree of atherosclerosis. The presence of risk factors such as hypertension, smoking, hypercholesterolemia, diabetes and obesity identifies a large proportion of patients who are at increased risk for developing symptomatic IHD ***(Grainger et al, 2008).***

Cardiac magnetic resonance imaging (CMRI) is a rapidly developing new modality with applications in clinical cardiology for detection and assessment of myocardial ischemia and viability ***(Wagner et al, 2003).***

CMRI has recently been applied successfully to the assessment of myocardial perfusion. CMRI has also been shown to assess accurately the extent of injury after a myocardial infarction and the presence of myocardial viability ***(Theodoros et al, 2001).***

CMRI perfusion imaging has matured to a point where it can be routinely applied to assess patients with coronary artery disease and ischemic cardiomyopathy. The method has been compared to invasive, catheter-based as well as other noninvasive imaging modalities (echocardiography, single-photon emission computed tomography [SPECT], and positron emission tomography [PET]) for the evaluation of patients with coronary artery disease. Besides qualitative evaluation of MR perfusion images, an absolute quantification of global, regional and transmural myocardial perfusion is possible. A relative or absolute myocardial perfusion reserve has been determined noninvasively with MR perfusion imaging, and can provide good agreement with the invasive assessment (***Muhling et al,2003***).

The use of magnetic resonance (MR) imaging for cardiac diagnosis is Expand ing, aided by the administration of paramagnetic contrast agents for a growing number of clinical applications ***(Edelman et al, 2004).***

Cardiac MRI allows an accurate evaluation of myocardial morphology, function, perfusion, and tissue damage in a noninvasive way **(*Belloni et al, 2008).***

Cine imaging is important in the evaluation of cardiac volumes and kinesis and is now considered the reference standard for the assessment of cardiac function and characterization of myocardial tissue abnormalities. ***(Reichek et al, 2008).***

Coronary arteries diseases can be obtained by computed tomography angiography (CTA), this requires significant radiation and iodinated intravascular contrast medium. CMR for these applications does not usually require contrast agent, and even when required, the risk is much less than that associated with iodinated contrast media. Direct comparison of the best MDCTA and coronary MRA shows that these techniques have essentially equivalent accuracy however MDCTA is a quicker study and is easier to use, and used in patient where MRI is absolutely contraindicated (such as prosthetic valve , pacemaker and stents***(Grainger et al, 2008).***

For these reasons, cardiac MRI has become an important diagnostic tool for IHD and is the new reference standard for the assessment of cardiac perfusion ***(Belloni et al, 2008).***

LIST OF ABBREVIATIONS

AA Ascending Aorta
AMI Acute Myocardial Infarction
AO Aorta
APM Anterior Papillary Muscle
ATP Adenosine triphosphate
AV Aortic Valve
AZV Azygos Vein
B-SSFP Balanced Steady State Free Precession
C Carina
CAD Coronary Artery disease
CE-IR MRI Contrast Enhanced Inversion Recovery MRI
CI Cardiac index
CMRI Cardiac Magnetic Resonance Imaging
CNR Contrast to Noise Ratio
CO Cardiac Output
CS Coronary sinus
CTA Computed Tomography Angiography
DAo Descending Aorta
DSMRI Dobutamine Stress MRI
ECF Extracellular Fluid
ECG Electrocardiogram
EDV End Diastolic Volume
Es Esophagus
ESV End Systolic Volume
ETL Echo Train Length
FAME Fast Acquisition with Multiple Excitation
FE Field Echo
FFE Fast Field Echo
FID Free Induction Decay
FIESTA Fast Imaging Employing Steady-state Acquisition
FISP Fast Imaging with Steady Precession

Gd-DTPA Gadolinium Diethyl Triaminic Pentaacetic Acid
GE Gradient Echo
HR Heart Rate
IAS Inter-Atrial Septum
IHD Ischemic Heart Disease
IR Inversion Recovery
IVC Inferior Vena Cava
IVS Inter-Ventricular Septum
LA Left Atrium
LAA Left Atrial Appendage
LAD Left Anterior Descending
LCA Left Coronary Artery
LCC Left Coronary Sinus
LCCA Left Common Carotid Artery
LCX Left Circumflex
LI Left Inferior
LL Left Lung
LMB L Left Main Bronchus
LMB Left Main stem Bronchus
LPA Left Pulmonary Artery
LSA Left Subclavian Artery
LV Left Ventricle
LVOT Left Ventricular Outflow Tract
MB Moderator Band
MDCT Multi-Detectors Computed Tomography
MDCTA Multi-Detectors Computed Tomograph Angiography
MI Myocardial Infarction
MPRi Myocardial Perfusion Reserve index
MRA Magnetic Resonance Angiography
MRI Magnetic Resonance Imaging
MV Mitral Valve
PA Pulmonary Artery
PDA Posterior Descending Artery
PET Positron Emission Tomography
PLB Posterior Left Branch

PPM	Posterior Papillary Muscle
PV	Pulmonary Veins
RA	Right Atrium
RAA	Right Atrial Appendage
RARE	Rapid Acquisition with Relaxation Enhancement
RCA	Right Coronary Artery
RCC	Right Coronary Sinus
RCCA	Right Common Carotid Artery
RFP	Radio Frequency Pulse
RI	Right Inferior
RMB	Right Main stem Bronchus
RPA	Right Pulmonary Artery
RS	Right Superior
RSA	Right Subclavian Artery
RV	Right Ventricle
RVOT	Right Ventricular Outflow Tract
SDC	Sudden Cardiac Death
SE	Spin Echo
SENSE	Sensitivity Encoding
SNR	Signal to Noise Ratio
SPECT	Single Photon Emission Computed Tomography
SPGR	Spoiled Gradient-Recalled Echo
SSFP	Steady State Free Precession
SV	Stroke Volume
SV C	Superior Vena Cava
T	Tesla
T2wSTIR	T2Weighted Short-tau Inversion Recovery
TF	Turbo Factor
TR	Time of Repetition
TSE	Turbo Spin Echo
TV	Tricuspid Valve
WMA	Wall Movement Abnormality
2D	Two Dimentional
3D	Three Dimentional

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