Cardiac MRI in Acute Myocardial Infarction and Detection of Myocardial Viability

Essay

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Master (M.Sc) in Radiodiagnosis

By

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Abstract

MRI is a valuable tool for evaluation of the patient with ischemic heart disease. MRI is also a rapidly evolving field which provides high contrast and 3D images of the heart, coronary vessels and the great vessels without subjecting the patient to ionizing radiation .By contributing to an accurate early diagnosis, magnetic resonance imaging (MRI) is an excellent diagnostic imaging tool for the evaluation of soft tissue and functional assessment of the heart. Cardiac MRI is considered a "one-stop-shop", providing a comprehensive assessment of the heart.

Key Words: Magnetic resonance imaging, myocardial viability

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List of Abbreviations

AHA:	American Heart Association.
AM:	Acute marginal.
Ao:	Aorta.
b-TFE	Balanced turbo field echo.
CAD:	Coronary artery disease.
CE:	Contrast enhanced.
CMR:	Cardiac magnetic resonance.
CMR-HE:	Cardiac magnetic resonance-hyperenhancement.
CS:	Coronary sinus.
Ct:	Crista terminalis.
CV MRI:	Cardiovascular magnetic resonance imaging.
D:	Diagonal artery.
DCM:	Dilated cardiomyopathy.
DE:	Delayed enhancement.
DE-CMR:	Delayed enhancement cardiac magnetic resonance imaging.
DICOM:	Digital imaging and communication.
DOTA:	Tetraazacyclododecanetetraacetic acid.
DTPA:	Diethylene triamine pentaacetic acid.
ECF:	Extracellular fluid.
ECG:	Eelectrocardiogram.
EDV:	End diastolic volume.
EF:	Ejection fraction.
ESV:	End systolic volume.
F:	Female.
FID:	Free induction decay.
Fo:	Fossa ovalis.
FOV:	Field of view.
Gd:	Gadolinium.
GRE:	Gradient echo.
IR:	Inversion recovery.
IVC:	Inferior vena cava.
LA:	Left atrium.
Laap:	Left atrial appendage.
LAD:	Left anterior descending artery.
LCA:	Left coronary artery.
LCX:	Left circumflex artery.
LL:	Left lung.

LM: Left main coronary artery.
LV: Left ventricle.
M: Male.
MHz: Mega Hertz.
MI: Myocardial infarction.
MRI: Magnetic resonance imaging.
Ms: Milliseconds.
NSA: Number of signal averages.
OM: Obtuse marginal.
PDA: Posterior descending artery.
PEAR: Phase encoding artifact reduction.
PL: Posterolateral artery.
Pv: Pulmonary vein.
RA: Right atrium.
Raap: Right atrial appendage.
RCA: Right coronary artery.
RL: Right lung.
ROPE: Respiratory ordered phase encoding.
RV: Right ventricle.
***S*:** Septal branch.
S: Segment.
SD: Standard deviation.
SE : Subendocardial.
SENSE: Sensitivity encoding.
SSFP: Steady state free precession.
SVC: Superior vena cava.
TE: Echo time.
TFE: Turbo field echo.
TSE: Turbo spin echo.
TI: Time of inversion.
TM: Transmural.
TR: Repetition time.
VCG: Vector ECG.
WHO: World Health Organization.

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Introduction and Aim of the Work

Introduction

Heart disease continues to be a major source of morbidity and mortality in the world. Ischemic coronary diseases and heart failure as well as a range of other cardiac conditions, often require advanced imaging modalities to provide effective diagnosis and patient management ***(Rosamond et al., 2008)***.

Cardiovascular magnetic resonance (CMR), a relatively new imaging technique, has already proven its efficacy in the assessment of myocardial function, inflammation, tissue characterization, and viability. Currently, the applications of CMR in coronary artery disease are being extended, making it a powerful diagnostic tool in the evaluation of myocardial perfusion and viability ***(Sophie Mavrogeni et al., 2011).***

It has evolved from an effective research tool into a clinically proven, safe and comprehensive imaging modality providing anatomic and functional information in acquired and congenital heart diseases ***(Constantin et al., 2008).***

Cardiovascular magnetic resonance (CMR) has recently emerged as a new non-invasive imaging modality capable of providing high resolution images in any desired plane ***(Mahrholdt et al., 2010).***

This improvement has led to the recognition of CV MRI as the reference standard for the assessment of regional and global systolic function, the detection of myocardial infarction and viability as well as the evaluation of pericardial diseases and cardiac masses ***(Gizzard et al., 2008).***

The clinical role of cardiovascular magnetic resonance (CMR) continues to expand, supported by ongoing technological advances that have shortened acquisition times while maintaining and often improving image quality. Cardiac MRI is currently considered a clinically accepted modality for assessment of cardiac structure and function, ventricular mass and volume, myocardial perfusion and to determine the size of infarction (***Pennell et al., 2004)***.

Aim of the Work

To review the role of CMR in the assessment of acute myocardial infarction and detection of myocardial viability.