Role of MRI in evaluation of Cardiomyopathy

Protocol of an essay submitted for partial fulfillment

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانكَ لاَ علِمَ لَنَا إلاّ مَا

عَلّمْتَنَا إنَّكَ أنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة آية (32)

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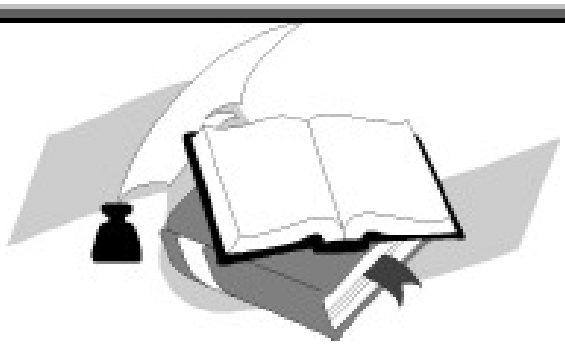
4ch : Four chambers
AO : Ascending aorta
ARVD : Arrhythmogenic right ventricular dysplasia
AV node : Atrioventricular node
b-FFE : Balanced Fast-Field Echo
b-SSFP : Balanced steady state free precession
CE-IR : Contrast enhanced inversion recovery
CMPs : Cardiomyopathies
Ct : Crista terminals
DCM : Dilated cardiomyopathy
EPI : Echo planar imaging
FIESTA : Fast Imaging Employing Steady-state Acquisition
FSE : Fast spin echo
Gd-DTPA : Gadolinium DTPA
GE : Gradient echo
GRE.EPI : Gradient echo-echo planar imaging
HASTE : Half-Fourier Acquired Single-shot Turbo spin Echo
HCM : Hypertrophic cardiomyopathy
HLA : Horizontal long axis
IR : Inversion recovery
LA : Left atrium
LAAP : Left atrial appendage
LAD : Left anterior descending coronary artery
LCC : Left coronal cusps
Lcx : Left Circumflex coronary artery
LMS : Left main stem
LPA : Left pulmonary artery
LV : Left ventricle
LVOT : Left ventricle outflow tract
MRI : Magnetic resonance imaging
NCC : Non-coronal cusps

List of abbreviations

NSSR : Non-surgical septal reduction
PA : Pulmonary artery
PCA : Right coronary artery
PTSMA : Percutaneous transluminal septal myocardial ablation
PRESTO : Precoding inversion recovery
RAAP : Right atrial appendage
RBC : Red blood corpuscles
RCC : Right coronal cusps
RF : Radiofrequency
RPA : Right pulmonary artery
RV : Right ventricle
RVOT : Right ventricle outflow tract
SA : Short axis
SEMRI : Spin-echo MRI
SENSE : Sensitivity encoding
SNR : Signal to noise ratio
Fast SPGR : Spoiled Grass Gradient Recall Acquisition
SR : Saturation recovery
STIR : Short tau inversion
SS-FSE : single shot fast spin echo
SVC : Superior vena cava
TFE : Turbo Field Echo
TI : Time of inversion
TOF : Time of flight
True FISP : True Fast Imaging with Steady-state Precession
TR : Time of recovery
TSR : Turbo spin echo
TurboFLASH: Fast imaging using Low Angle Shot
VCG : Vector cardiography
VLA : Vertical long axis

Introduction and Aim of the Work



Introduction

Cardiomyopathies (CMPs) are myocardial diseases associated with cardiac dysfunction. They are classified as dilated CMP, hypertrophic CMP, restrictive CMP, arrhythmogenic right ventricular (RV) CMP, specific CMP, and nonclassified CMP. (***Richardson et al., 1996).***

Cardiac MRI has become an important imaging technique for the diagnosis and follow-up of CMP. In fact, echocardiography, usually the first step in CMP evaluation, has some pitfalls, mainly its limited acoustic window. On the contrary, cardiac MRI allows a reproducible and accurate evaluation of myocardial morphology, function, perfusion, and tissue damage in a noninvasive and "one-stop shop" way. For these reasons, cardiac MRI has become an important diagnostic tool for CMP and is the new reference standard for the assessment of cardiac function. (***Belloni et al., 2008).***

Examples of the use of cardiac MRI are the pre- and post-therapy evaluation of hypertrophic and dilated CMPs, the differential diagnosis between restrictive CMP and constrictive pericarditis, the assessment of myocardial damage in acute and chronic CMP, and the evaluation of myocardial involvement in

systemic diseases such as amyloidosis and sarcoidosis. (***Papavassiliu et al., 2009), (Assomull et al., 2006), (Kwong and Falk, 2005), (Moon et al., 2004).***

Several MRI sequences have been used including morphologic fast spin-echo black blood sequences with and without fat suppression, cine single-shot free-precession sequences, phase contrast sequences, and late T1-weighted fast-field echo inversion recovery sequences.

Function evaluation is implemented on the cine short-axis images, encompassing the left ventricle and right ventricle from base to apex to obtain a volumetric evaluation using a dedicated workstation. ***(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. Transvalvular flow can be studied by means of phase-contrast sequences. Late-enhancement imaging is performed after the IV administration of gadolinium and is fundamental in the characterization of myocardial tissue abnormalities in CMP. ***(Reichek and Gupta, 2008).***