

A time efficient and contrast free evaluation of Cardiac morphology in patients with congenital and acquired heart diseases.

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OBJECTIVE: This study was design to assess the role of Volume Scan Magnetic Resonance Imaging, also called Isotropic 3D Magnetic Resonance Imaging (MRI), for evaluating the Cardiac morphology in patients with congenital and acquired heart diseases.

BACKGROUND: Recently MRI has been used frequently for the evaluation of various cardiac defects in children, However a conventional Cardiac MRI takes approximately two hours to be completed. With the evolution of MRI it is now possible to evaluate the Cardiac morphology via 3D-Isotropic/ volume scanning MRI technique. This method of MRI is simple, time-efficient, noninvasive, does not require breath-holding and no exposure to contrast agents.

METHODS: Cardiac MRI was performed on 202 patients with congenital and acquired heart diseases between Jan 2011 and Dec 2013. Age range was 2 days to 55 years. Patients varied by sex and diagnoses. These studies were performed on an MRI 1.5T machine manufactured by Phillips. 3D-Isotropic MRI of the heart and surrounding structures was performed after an initial survey. By this technique, ultrafast and overcontiguous images were obtained. This method utilizes ECG trigger and respiratory-gated navigation. After this all patients had conventional MRI sequences with a standard protocol. Each study was reviewed and analyzed at a 3-D work station using Phillips standard and TeraRecon and Vitrea Core software by an MRI trained cardiologist. Following structures were evaluated; Atria, atrial septum, ventricles, ventricular septum, atrio-ventricular and semi lunar valves out-flow tracts, great arteries, branch pulmonary arteries, systemic and pulmonary veins, aortic arch, proximal head vessels, thoracic and abdominal aorta and coronary arteries. Image quality (IQ) 5-level score was used (1=non-diagnostic, 5=excellent)

RESULTS: Total scan time for the 3D-Isotropic/volume scan of the whole heart was 6 minutes, ± 2 minutes and 30 minutes, ± 5 minutes for the reconstruction to evaluate different cardiac structure by the physician. In 196 patients (97%) all the structures of the heart, which were planned prior to the study, were seen well with the IQ score ranging from 4 to 5.

CONCLUSION: This study demonstrates that volume scan MRI technique allows reliable assessment of Cardiac morphology in patients with congenital and acquired heart diseases. This method of MRI is simple, time-efficient, does not require breath-holding and no exposure to contrast agents.