

## Section D – Abstract 4 – 3:30 PM

### Evaluation of Coronary Arteries by Magnetic Resonance Imaging in Patients with Congenital and Acquired Heart Diseases

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**Objective:** This study was design to assess volume scan Magnetic Resonance Imaging (MRI) as a gold standard noninvasive diagnostic tool for evaluating the coronary artery anatomy in patient's with congenital and acquired heart diseases.

**Background:** Cardiac catheterization and Computed Tomography have been used to evaluate the coronaries. However, both expose patients to unnecessary radiation and contrast agents. Echocardiogram has been used for many years for evaluating the proximal coronary arteries. However, secondary to its limitations it is not possible to visualize the coronaries in many patients. With the evolution of cardiac MRI it is now possible to evaluate the proximal *and* distal coronaries via volume scanning/3D-Isotropic MRI technique. This method of MRI is time-efficient, noninvasive, does not require breath-holding and no exposure to radiation or contrast agents.

**Methods:** MRI was performed on 146 patients with congenital and acquired heart diseases between October 2008 and March 2011. Age range was 11 days to 55 years. Patients varied by sex and diagnoses. These studies were performed on an MRI 1.5T machine manufactured by Phillips. Each patient underwent a complete physical examination prior to the MRI. Initially a survey was obtained followed by black-blood axial sequences. After these two steps, a volume scan of the whole heart was performed. By this technique, ultrafast and overcontiguous images were obtained. This method utilizes ECG trigger and respiratory-gated navigation. After this all patients received a complete cardiac MRI evaluation with a standard protocol. Each study was reviewed and analyzed at a 3-D work station using Phillips standard and TeraRecon software by an MRI trained cardiologist. Initially the origin of the Right Coronary Artery (RCA) and Left Coronary Artery (LCA) from their respective aortic sinuses were delineated. Once this was established the RCA was seen beyond the Acute Marginal Branch with the target being the Posterior Descending Artery. The Left Main Coronary Artery was seen through the bifurcation. The Left Anterior Descending and Circumflex were visualized beyond the Diagonal, Septal, and Obtuse Marginal Branches.

**Results:** In this study 146 patients with congenital and acquired heart diseases who underwent volume scan cardiac MRI were evaluated for coronary artery anatomy. The proximal and distal coronary arteries were well seen in 94% of these patients (138 out of 146 patients). The coronaries in 8 (6%) patients in our study were difficult to visualize. Five of these 8 patients were less than six months of age, two patients had metal coils in the chest which produced artifact, and one patient was out of the age range for sedation and was unable to cooperate.

**Conclusion:** This study demonstrates that cardiac MRI, using the real-time, free-breathing navigator technique is an effective and safe modality for visualizing both the proximal and distal coronary arteries in patients with congenital and acquired heart diseases. This method of MRI is time-efficient, noninvasive, does not require breath-holding and no exposure to radiation or contrast agents. We highly recommend that Cardiac MRI be employed frequently in patients with congenital and acquired heart diseases.