

A New Imaging Approach in Cardiac MRI Reveals Physiologic Abnormality

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The following case study illustrates how our usage of real-time imaging with GE Healthcare's cardiac MR application MR Echo™ (Signa® HD 1.5T) detected a physiologic abnormality that was not evident with standard breath-hold MR imaging.

Clinical Case

A 59-year-old man with a history of a myocardial infarction developed chest pain during a business trip. EKG and echocardiography suggested pericarditis. The patient improved following treatment with steroids. However, not long thereafter, the patient developed increasing shortness of breath and ankle edema which required treatment with diuretics. After a few months of worsening symptoms, cardiac MRI was requested for further evaluation. Standard breath-hold imaging (Figures 1 and 2) shows a small inferior myocardial infarction and abnormally thick pericardium, compatible with the patient's known history of coronary artery disease and pericarditis.

Real-time imaging with MR Echo (Figures 3 and 4) demonstrates the key physiologic abnormality. Images show paradoxical septal wall motion only during inspiration (arrow). This finding is indicative of the ventricular coupling that occurs with pericardial constriction. It cannot be seen during conventional breath-held MRI.



Figure 1
Standard imaging shows inferior infarct

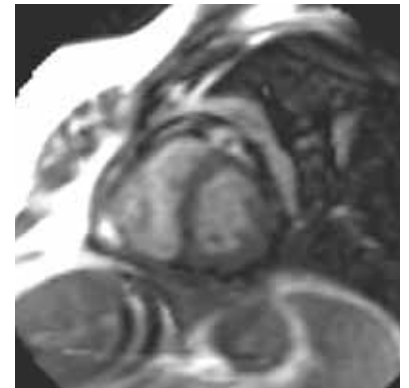


Figure 2
Standard imaging shows thick pericardium



Figure 3
Real-time MR Echo on expiration

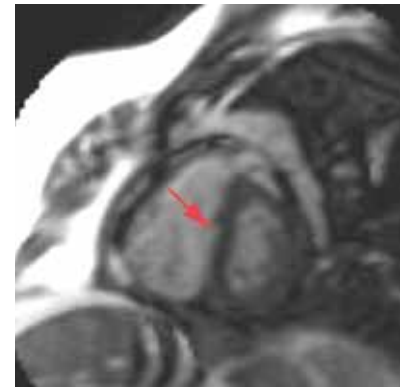
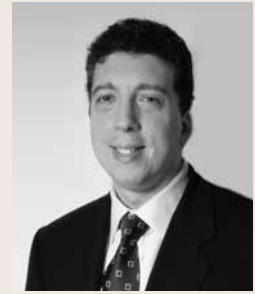


Figure 4
Real-time MR Echo shows paradoxical septal wall motion on inspiration



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Steven D. Wolff, M.D., Ph.D., is the Director of Cardiovascular MRI at the Cardiovascular Research Foundation in New York. He is also the Director of Cardiovascular MRI at Advanced Cardiovascular Imaging, a private practice in Manhattan. His research interests focus on developing new MRI techniques that will have immediate applications to clinical practice.

He is the inventor of several patents in MRI including the original patent on magnetization transfer. Dr. Wolff attended Duke University Medical School for his medical and doctoral studies. His doctoral work was based on research he performed as a Howard Hughes Medical Institute - National Institutes of Health (NIH) Research Scholar. Dr Wolff completed his radiology residency at Johns Hopkins Hospital in 1994.

About CRF

The Cardiovascular Research Foundation (CRF) is a global leader in bringing together three elements that define modern medicine: research, education and patient care. Founded in 1991, CRF has played a key role in the development of nonsurgical and drug-based treatments of heart and vascular disease.

CRF's MRI program, directed by Steven D. Wolff, M.D., Ph.D., was established in May 2000 to perform research and education in cardiovascular MRI. Research and education are closely aligned with the Clinical Cardiovascular MRI program at Advanced Cardiovascular Imaging.

Figure 5
 ReportCARD referring physician report

Once the exam was complete, GE's ReportCARD™ reporting system distilled the entire cardiac MRI exam to a single, easy to understand page (Figure 5) that includes measurements, polar plots, and images – concisely communicating the diagnosis to the referring physician – clearly showing the advantages of the cardiac MRI for comprehensive high-quality cardiac studies.

MR Echo

Presently, patients have to manage multiple breath-holds to allow 'whole heart coverage' for wall-motion and other studies. MR Echo eliminates the need for breath-holds by employing a bright-blood, ultra-fast FIESTA sequence to freeze motion and significantly reduce typical cardiac-exam times. The intuitive MR Echo interface enables the operator to quickly scan the heart in any orientation and to save real-time images to the browser through bookmarks. MR Echo's

Scan & Save mode enables high-resolution heart imaging with Vector Cardiac Gating (VCG); it also allows the prescription of multiple functional images over many slices, with scanning being completed in a single breath-hold. Because the system immediately posts the scan time required for the number of slices prescribed, the operator is able to tailor the scan to the patient's breath-hold capability. To ensure uninterrupted workflow, all images acquired in Scan & Save mode are stored in the browser while the operator continues scanning.

Conclusion

MR Echo provided the capability to detect an abnormality in this patient's physiology that could not be seen with conventional MRI, and the ReportCARD reporting system provided a complete and concise report for the referring physician. ■