NATIONAL COVERAGE DETERMINATION (NCD) FOR MAGNETIC RESONANCE IMAGING:

Item/Service Description
A. General
1. Method of Operation
Magnetic Resonance Imaging (MRI), formerly called nuclear magnetic resonance (NMR), is a non-invasive method of graphically representing the distribution of water and other hydrogen-rich molecules in the human body. In contrast to conventional radiographs or computed tomography (CT) scans, in which the image is produced by x-ray beam attenuation by an object, MRI is capable of producing images by several techniques. In fact, various combinations of MRI image production methods may be employed to emphasize particular characteristics of the tissue or body part being examined. The basic elements by which MRI produces an image are the density of hydrogen nuclei in the object being examined, their motion, and the relaxation times, and the period of time required for the nuclei to return to their original states in the main, static magnetic field after being subjected to a brief additional magnetic field. These relaxation times reflect the physical-chemical properties of tissue and the molecular environment of its hydrogen nuclei. Only hydrogen atoms are present in human tissues in sufficient concentration for current use in clinical MRI.

2. General Clinical Utility
Overall, MRI is a useful diagnostic imaging modality that is capable of demonstrating a wide variety of soft-tissue lesions with contrast resolution equal or superior to CT scanning in various parts of the body. Among the advantages of MRI are the absence of ionizing radiation and the ability to achieve high levels of tissue contrast resolution without injected iodinated radiological contrast agents. Recent advances in technology have resulted in development and Food and Drug Administration (FDA) approval of new paramagnetic contrast agents for MRI which allow even better visualization in some instances. Multi-slice imaging and the ability to image in multiple planes, especially sagittal and coronal, have provided flexibility not easily available with other modalities. Because cortical (outer layer) bone and metallic prostheses do not cause distortion of MR images, it has been possible to visualize certain lesions and
body regions with greater certainty than has been possible with CT. The use of MRI on certain soft tissue structures for the purpose of detecting disruptive, neoplastic, degenerative, or inflammatory lesions has now become established in medical practice.

**Indications and Limitations of Coverage**

**B. Nationally Covered MRI Indications**

1. **MRI**

   Although several uses of MRI are still considered investigational and some uses are clearly contraindicated (see subsection C), MRI is considered medically efficacious for a number of uses. Use the following descriptions as general guidelines or examples of what may be considered covered rather than as a restrictive list of specific covered indications. Coverage is limited to MRI units that have received FDA premarket approval, and such units must be operated within the parameters specified by the approval. In addition, the services must be reasonable and necessary for the diagnosis or treatment of the specific patient involved.

   a) Effective November 22, 1985:
      
      a. MRI is useful in examining the head, central nervous system, and spine.
      b. Multiple sclerosis can be diagnosed with MRI and the contents of the posterior fossa are visible.
      c. The inherent tissue contrast resolution of MRI makes it an appropriate standard diagnostic modality for general neuroradiology.

   b) Effective November 22, 1985:
      
      a. MRI can assist in the differential diagnosis of mediastinal and retroperitoneal masses, including abnormalities of the large vessels such as aneurysms and dissection.
      b. When a clinical need exists to visualize the parenchyma of solid organs to detect anatomic disruption or neoplasia, this can be accomplished in the liver, urogenital system, adrenals, and pelvic organs without the use of radiological contrast materials. When MRI is considered reasonable and necessary, the use of paramagnetic contrast materials may be covered as part of the study.
      c. MRI may also be used to detect and stage pelvic and retroperitoneal neoplasms and
d. to evaluate disorders of cancellous bone and soft tissues.
      e. It may also be used in the detection of pericardial thickening.
      f. Primary and secondary bone neoplasm and aseptic necrosis can be detected at an early stage and monitored with MRI.
      g. Patients with metallic prostheses, especially of the hip, can be imaged in order to detect the early stages of infection of the bone to which the prosthesis is attached.

   c) Effective March 22, 1994:
      
      a. MRI may also be covered to diagnose disc disease without regard to whether radiological imaging has been tried first to diagnose the problem.

   d) Effective March 4, 1991:
      
      a. MRI with gating devices and surface coils, and gating devices that eliminate distorted images caused by cardiac and respiratory movement cycles are now considered state of the art techniques and may be covered. Surface and other
specialty coils may also be covered, as they are used routinely for high resolution imaging where small limited regions of the body are studied. They produce high signal-to-noise ratios resulting in images of enhanced anatomic detail.

C. Contraindications and Nationally Non-Covered Indications
   1. Contraindications
      The MRI is not covered when the following patient-specific contraindications are present:
      MRI is not covered for patients with cardiac pacemakers or with metallic clips on vascular aneurysms unless the Medicare beneficiary meets the provisions of the following exceptions:
      Effective July 7, 2011, the contraindications will not apply to pacemakers when used according to the FDA-approved labeling in an MRI environment

   2. Nationally Non-Covered Indications
      CMS has determined that MRI of cortical bone and calcifications, and procedures involving spatial resolution of bone and calcifications, are not considered reasonable and necessary indications within the meaning of section 1862(a)(1)(A) of the Act, and are therefore non-covered.

D. Other
   Effective June 3, 2010, all other uses of MRI or MRA for which CMS has not specifically indicated coverage or non-coverage continue to be eligible for coverage through individual local MAC discretion.
NIA CLINICAL GUIDELINE FOR HEART MRI:

INTRODUCTION:

Cardiac magnetic resonance imaging (MRI) is an imaging modality utilized in the assessment and monitoring of cardiovascular disease. It has a role in the diagnosis and evaluation of both acquired and congenital cardiac disease. MRI is a noninvasive technique using no ionizing radiation resulting in high quality images of the body in any plane, unlimited anatomic visualization and potential for tissue characterization.

ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2010 APPROPRIATE USE CRITERIA for Heart MRI:

The crosswalk provides the relative appropriate use score between the two equivalent elements when there are other ACCF reviewed imaging modalities.

<table>
<thead>
<tr>
<th>Heart MRI (Appropriate ACCF et al. Criteria # with Use Score)</th>
<th>INDICATIONS (*Refer to Additional Information section)</th>
<th>Other imaging modality crosswalk Stress Echo (SE), Chest CTA, and CCTA (Appropriate ACCF et al. Criteria # with Use Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection of CAD: Symptomatic</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Evaluation of Chest Pain Syndrome (Use of Vasodilator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perfusion CMR or Dobutamine Stress Function CMR)</td>
<td></td>
</tr>
<tr>
<td>2 U(4)</td>
<td>• Intermediate pre-test probability of CAD*</td>
<td>SE 116 A(7)</td>
</tr>
<tr>
<td></td>
<td>• ECG interpretable AND able to exercise</td>
<td></td>
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<tr>
<td>3 A(7)</td>
<td>• Intermediate pre-test probability of CAD*</td>
<td>SE 117 A(9)</td>
</tr>
<tr>
<td></td>
<td>• ECG uninterpretable OR unable to exercise</td>
<td></td>
</tr>
<tr>
<td>4 U(5)</td>
<td>• High pre-test probability of CAD*</td>
<td>SE 118 A(7)</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td>Evaluation of Intra-Cardiac Structures (Use of MR Coronary</td>
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<tr>
<td>Angiography)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 A(8)</td>
<td>• Evaluation of suspected coronary anomalies</td>
<td>CCTA 46 A(9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acute Chest Pain (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 U(6)</td>
<td>• Intermediate pre-test probability of CAD</td>
<td>CCTA 6 A(7)</td>
</tr>
<tr>
<td></td>
<td>• No ECG changes and serial cardiac</td>
<td></td>
</tr>
</tbody>
</table>
| **Heart MRI**  
(Appropriate ACCF et al. Criteria # with Use Score)  
A= Appropriate (7-9)  
U=Uncertain (4-6) | **INDICATIONS**  
(*Refer to Additional Information section) | **Other imaging modality crosswalk**  
Stress Echo (SE), Chest CTA, and CCTA (Appropriate ACCF et al. Criteria # with Use Score) |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>enzymes negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk Assessment With Prior Test Results (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 12 **U(6)** | • Intermediate CHD risk (Framingham)  
• Equivocal stress test (exercise, stress SPECT, or stress echo) | SE 153 **A(8)** |
| 13 **A(7)** | • Coronary angiography (catheterization or CT)  
• Stenosis of unclear significance | SE 141 **A(8)** |
| **Risk Assessment: Preoperative Evaluation for Non-Cardiac Surgery – Intermediate or High Risk Surgery (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR)** | | |
| 15 **U(6)** | • Intermediate perioperative risk predictor | |
| **Structure and Function**  
Evaluation of Ventricular and Valvular Function | | |
| Procedures may include LV/RV mass and volumes, MR angiography, quantification of valvular disease, and delayed contrast enhancement | | |
| 18 **A(9)** | • Assessment of complex congenital heart disease including anomalies of coronary circulation, great vessels, and cardiac chambers and valves  
• Procedures may include LV/RV mass and volumes, MR angiography, quantification of valvular disease, and contrast enhancement | CCTA 47 **A(8)** |
| 19 **U(6)** | • Evaluation of LV function following myocardial infarction OR in heart failure patients | |
| 20 **A(8)** | • Evaluation of LV function following myocardial infarction OR in heart failure patients  
• Patients with technically limited images from echocardiogram | |
<table>
<thead>
<tr>
<th>Heart MRI (Appropriate ACCF et al. Criteria # with Use Score)</th>
<th>INDICATIONS</th>
<th>Other imaging modality crosswalk Stress Echo (SE), Chest CTA, and CCTA (Appropriate ACCF et al. Criteria # with Use Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A= Appropriate (7-9) U=Uncertain (4-6)</td>
<td>(*Refer to Additional Information section)</td>
<td></td>
</tr>
</tbody>
</table>
| 21 A(8) | • Quantification of LV function  
• Discordant information that is clinically significant from prior tests | |
| 22 A(8) | • Evaluation of specific cardiomyopathies (infiltrative [amyloid, sarcoid], HCM, or due to cardiotoxic therapies)  
• Use of delayed enhancement | |
| 23 A(8) | • Characterization of native and prosthetic cardiac valves—including planimetry of stenotic disease and quantification of regurgitant disease  
• Patients with technically limited images from echocardiogram or TEE | |
| 24 A(9) | • Evaluation for arrhythmogenic right ventricular cardiomyopathy (ARVC)  
• Patients presenting with syncope or ventricular arrhythmia | |
| 25 A(8) | • Evaluation of myocarditis or myocardial infarction with normal coronary arteries  
• Positive cardiac enzymes without obstructive atherosclerosis on angiography | |
| 26 A(9) | • Evaluation of cardiac mass (suspected tumor or thrombus)  
• Use of contrast for perfusion and enhancement | |
<p>| 27 A(8) | • Evaluation of pericardial conditions (pericardial mass, constrictive pericarditis) | |
| 28 A(8) | • Evaluation for aortic dissection | |
| 29 A(8) | • Evaluation of pulmonary veins prior to radiofrequency ablation for atrial fibrillation | Chest CTA 38 A(8) |</p>
<table>
<thead>
<tr>
<th>INDICATIONS</th>
<th>Other imaging modality crosswalk Stress Echo (SE), Chest CTA, and CCTA (Appropriate ACCF et al. Criteria # with Use Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Left atrial and pulmonary venous anatomy including dimensions of veins for mapping purposes</td>
<td></td>
</tr>
<tr>
<td>Detection of Myocardial Scar and Viability</td>
<td></td>
</tr>
<tr>
<td>Evaluation of Myocardial Scar (Use of Late Gadolinium Enhancement)</td>
<td></td>
</tr>
</tbody>
</table>
| 30 **A** (**7**) | • To determine the location, and extent of myocardial necrosis including 'no reflow' regions  
• Post acute myocardial infarction |
| 31 **U** (**4**) | • To detect post PCI myocardial necrosis |
| 32 **A** (**9**) | • To determine viability prior to revascularization  
• Establish likelihood of recovery of function with revascularization (PCI or CABG) or medical therapy |
| 33 **A** (**9**) | • To determine viability prior to revascularization  
• Viability assessment by SPECT or dobutamine echo has provided "equivocal or indeterminate" results |

**INDICATIONS FOR HEART MRI:**

- Where Stress Echocardiography (SE) is noted as an appropriate substitute for a Cardiac MRI indication (#s 2, 3, 4, 12, and 13) then at least one of the following contraindications to SE must be demonstrated:
  - Stress echocardiography is not indicated; OR
  - Stress echocardiography has been performed however findings were inadequate, there were technical difficulties with interpretation, or results were discordant with previous clinical data; OR
  - Heart MRI is preferential to stress echocardiography including but not limited to following conditions:
    - Ventricular paced rhythm
    - Evidence of ventricular tachycardia
    - Severe aortic valve dysfunction
    - Severe Chronic Obstructive Pulmonary Disease, (COPD) as defined as FEV1 < 30% predicted or FEV1 < 50% predicted plus respiratory failure or clinical signs
of right heart failure. (GOLD classification of COPD access http://www.pulmonaryreviews.com/jul01/pr_jul01_copd.html

- Congestive Heart Failure (CHF) with current Ejection Fraction (EF), 40%
- Inability to get an echo window for imaging
- Prior thoracotomy, (CABG, other surgery)
- Obesity BMI>40
- Poorly controlled hypertension [generally above 180 mm Hg systolic (both physical stress and dobutamine stress may exacerbate hypertension during stress echo)]
- Poorly controlled atrial fibrillation (Resting heart rate > 100 bpm on medication)
- Inability to exercise requiring pharmacological stress test
- Segmental wall motion abnormalities at rest (e.g. due to cardiomyopathy, recent MI, or pulmonary hypertension)

OR

- Arrhythmias with Stress Echocardiography • any patient on a type 1C anti-arrhythmic drug (i.e. Flecaainide or Propafenone) or considered for treatment with a type 1C anti-arrhythmic drug.

For all other requests, the patient must meet ACCF/ASNC Appropriateness criteria for indications (score 4-9) above.

INDICATIONS IN ACC GUIDELINES WITH “INAPPROPRIATE” DESIGNATION:

Patient meets ACCF/ASNC Appropriateness criteria for indications (score 1-3) noted below OR meets any one of the following:
- For any combination imaging study
- For same imaging tests less than six weeks part unless specific guideline criteria states otherwise.
- For different imaging tests, such as CTA and MRA, of same anatomical structure less than six weeks apart without high level review to evaluate for medical necessity.
- For re-imaging of repeat or poor quality study

ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2006 APPROPRIATE USE CRITERIA for Heart MRI:

<table>
<thead>
<tr>
<th>Heart MRI (Appropriate ACCF et al. Criteria # with Use Score)</th>
<th>INDICATIONS (*Refer to Additional Information section)</th>
<th>APPROPRIATE USE SCORE (1-3); I= Inappropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection of CAD: Symptomatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation of Chest Pain Syndrome (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>• Low pre-test probability of CAD</td>
<td>I(2)</td>
</tr>
<tr>
<td></td>
<td>• ECG interpretable AND able to exercise</td>
<td></td>
</tr>
<tr>
<td>Heart MRI (Appropriate ACCF et al. Criteria # with Use Score)</td>
<td>INDICATIONS (*Refer to Additional Information section)</td>
<td>APPROPRIATE USE SCORE (1-3); I= Inappropriate</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| Evaluation of Chest Pain Syndrome (Use of MR Coronary Angiography) | • Intermediate pre-test probability of CAD  
• ECG interpretable AND able to exercise | I(2) |
| 5 | | |
| 6 | • Intermediate pre-test probability of CAD  
• ECG uninterpretable OR unable to exercise | I(2) |
| 7 | • High pre-test probability of CAD | I(1) |
| Acute Chest Pain (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR) | • High pre-test probability of CAD  
• ECG - ST segment elevation and/or positive cardiac enzymes | I(1) |
| 10 | | |
| Risk Assessment With Prior Test Results (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR) | • Normal prior stress test (exercise, nuclear, echo, MRI)  
• High CHD risk (Framingham)  
• Within 1 year of prior stress test | I(2) |
| 11 | | |
| Risk Assessment: Preoperative Evaluation for Non-Cardiac Surgery – Low Risk Surgery (Use of Vasodilator Perfusion CMR or Dobutamine Stress Function CMR) | • Intermediate perioperative risk predictor | I(2) |
| 14 | | |
| Detection of CAD: Post-Revascularization (PCI or CABG) | Evaluation of Chest Pain Syndrome (Use of MR Coronary Angiography) | Evaluation of bypass grafts | I(2) |
| 16 | | |
| 17 | • History of percutaneous revascularization with stents | I(1) |

ADDITIONAL INFORMATION RELATED TO HEART MRI:

**Abbreviations**

ACS = acute coronary syndrome  
CABG = coronary artery bypass grafting surgery  
CAD = coronary artery disease  
CCTA = coronary CT angiography  
CHD = coronary heart disease  
CHF = congestive heart failure  
CT = computed tomography  
CTA = computed tomographic angiography  
ECG = electrocardiogram  
ERNA = equilibrium radionuclide angiography
FP = First Pass
HF = heart failure
LBBB = left bundle-branch block
LV = left ventricular
MET = estimated metabolic equivalent of exercise
MI = myocardial infarction
MPI = myocardial perfusion imaging
MRI = magnetic resonance imaging
PCI = percutaneous coronary intervention
PET = positron emission tomography
RNA = radionuclide angiography
SE = stress echocardiography
SPECT = single positron emission CT (see MPI)

ECG–Uninterpretable
Refers to ECGs with resting ST-segment depression (≥0.10 mV), complete LBBB, preexcitation (Wolff-Parkinson-White Syndrome), or paced rhythm.

*Pretest Probability of CAD for Symptomatic (Ischemic Equivalent) Patients:

Typical Angina (Definite): Defined as 1) substernal chest pain or discomfort that is 2) provoked by exertion or emotional stress and 3) relieved by rest and/or nitroglycerin.
Atypical Angina (Probable): Chest pain or discomfort that lacks 1 of the characteristics of definite or typical angina.
Nonanginal Chest Pain: Chest pain or discomfort that meets 1 or none of the typical angina characteristics.

Once the presence of symptoms (Typical Angina/Atypical Angina/Non angina chest pain/Asymptomatic) is determined, the probabilities of CAD can be calculated from the risk algorithms as follows:

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Gender</th>
<th>Typical / Definite Angina Pectoris</th>
<th>Atypical / Probable Angina Pectoris</th>
<th>Nonanginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;39</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>40–49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>50–59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td></td>
</tr>
<tr>
<td>&gt;60</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

Very low: Less than 5% pretest probability of CAD
Low: Less than 10% pretest probability of CAD
Intermediate: Between 10% and 90% pretest probability of CAD
High: Greater than 90% pretest probability of CAD
**Coronary Heart Disease (CHD) Risk**

- **CHD Risk—Low**
  - Defined by the age-specific risk level that is below average. In general, low risk will correlate with a 10-year absolute CHD risk less than 10%.

- **CHD Risk—Moderate**
  - Defined by the age-specific risk level that is average or above average. In general, moderate risk will correlate with a 10-year absolute CHD risk between 10% and 20%.

- **CHD Risk—High**
  - Defined as the presence of diabetes mellitus or the 10-year absolute CHD risk of greater than 20%.

***Perioperative Risk Predictors (As defined by the ACC/AHA Guideline Update for Perioperative Cardiovascular Evaluation of Non-Cardiac Surgery)***

- **Major risk predictors**
  - Unstable coronary syndromes, decompensated heart failure (HF), significant arrhythmias, and severe valve disease.

- **Intermediate risk predictors**
  - Mild angina, prior myocardial infarction (MI), compensated or prior HF, diabetes, or renal insufficiency.

- **Minor risk predictors**
  - Advanced age, abnormal electrocardiogram (ECG), rhythm other than sinus, low functional capacity, history of cerebrovascular accident, and uncontrolled hypertension.

**Surgical Risk Categories (As defined by the ACC/AHA Guideline Update for Perioperative Cardiovascular Evaluation of Non-Cardiac Surgery)**

- **High-Risk Surgery—cardiac death or MI greater than 5%**
  - Emergent major operations (particularly in the elderly), aortic and peripheral vascular surgery, prolonged surgical procedures associated with large fluid shifts and/or blood loss.

- **Intermediate-Risk Surgery—cardiac death or MI = 1% to 5%**
  - Carotid endarterectomy, head and neck surgery, surgery of the chest or abdomen, orthopedic surgery, prostate surgery.

- **Low-Risk Surgery—cardiac death or MI less than 1%**
  - Endoscopic procedures, superficial procedures, cataract surgery, breast surgery.

**Request for a follow-up study** - A follow-up study may be needed to help evaluate a patient’s progress after treatment, procedure, intervention or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.

**Metal devices or foreign body fragments** within the body, such as indwelling pacemakers and intracranial aneurysm surgical clips that are not compatible with the use of MRI, may be contraindicated. Other implanted metal devices in the patient as well as external devices such as portable O2 tanks may also be contraindicated.
Cardiomyopathy – Cardiac MRI is used to diagnose and differentiate cardiomyopathies in the same study. Very small morphological and functional changes in different types of cardiomyopathy may be detected and may be used to evaluate the chance of functional recovery after surgical revascularization.

Cardiac Tumors – MRI is the modality of choice to evaluate cardiac tumors due to its high contrast resolution and multiplanar capability which allows for optimal evaluation of myocardial infiltration, pericardial involvement and extracardiac vascular structures within and beyond the thorax. It is also useful in the differentiation of benign and malignant cardiac tumors and in differentiating thrombi from cardiac tumors.

Pericardial abnormalities – Complicated pericardial diseases may cause significant morbidity and mortality without therapeutic interventions. MRI imaging has an important role in the evaluation of pericardial abnormalities; the pericardium is well visualized on MRI due to its superb contrast resolution and multiplanar capability.
REFERENCES


