

What is Magnetic Resonance Imaging (MRI) of the Heart?

Definition

Magnetic Resonance Imaging (an MRI) of the heart creates images of the tissues and other structures inside the heart in order to evaluate their condition and to assist with the diagnosis and treatment of problems. In some ways, an MRI is similar to an x-ray, but it is also different in several important ways.

How It Works

During an MRI procedure on the heart, a contrast material (dye) may be injected into the body via an IV (intravenous drip). The contrast material contains a magnetic substance. When the MRI equipment is put in motion, the contrast material reacts to the magnets to reveal the details of the structures within and around the heart, similar to the way x-rays create images of bones. The difference is an MRI uses a powerful magnetic field and radiofrequency pulses to create detailed pictures, whereas an x-ray uses radiation. X-rays are usually less effective for creating images of soft organs and tissues in the body because this soft matter shows up as shades of grey, unlike bones which are bright white and can be seen in detail. In most cases, an MRI can also produce more detailed images of organs and tissues than an ultrasound or CT scan.

Common Uses

MRIs of the heart are commonly used to examine the structure and functioning of the heart's parts and surroundings (such as the heart's chambers, the heart valves, the thickness of the heart's wall, any damage to the myocardial muscles, the major blood vessels, any plaque within the major blood vessels, and the pericardial sac around the heart), especially as the shape and working of these parts relates to heart problems, heart attacks, coronary artery disease, or congenital cardiovascular disease in children.

Benefits and Risks

Benefits:

- Magnetic resonance imaging (MRIs) can help identify causes of pain and help the patient make informed decisions about further treatment.
- Magnetic resonance imaging (MRIs) can produce much higher quality images of the body's internal structures than other methods, which can make a crucial difference in a doctor's ability to quickly and accurately evaluate the cause of the patient's discomfort.
- Magnetic resonance imaging is a non-invasive procedure.
- The patient is not exposed to any x-ray radiation during an MRI procedure.
- The contrast material (dye) used in MRIs is less likely to cause allergic reactions than those used for x-rays and CT scans.

Risks:

- There is an extremely small risk of developing an infection (less than 1 in 1,000) at the site where the patient's skin is punctured to establish the intravenous drip (IV), which would require treatment with antibiotics if it were to arise.
- Although rare, few patients may experience side effects from the contrast material. Patients are instructed to notify the technician immediately if any side effects are noted during the procedure.
- Medical devices inside the body may cause problems during any MRI exam because they will be affected by the magnets in the MRI equipment. Therefore, patients are carefully screened to insure it is safe to have an MRI scan.
- In extremely rare cases, patients with compromised kidney function who are injected with high doses of gadolinium contrast material (magnetic dye) during an MRI can develop nephrogenic systemic fibrosis.
- Other potential risks may vary from patient to patient; the patient should speak to his or her doctor before the procedure about any questions or concerns.

How Should I Prepare for My Appointment?

Restrictions on what a patient may eat or drink before an MRI procedure vary, based on the type of procedure to be performed, the specific body parts being examined, and the facility's guidelines. In certain cases, the patient may be asked to fast (to avoid consuming any food or liquids aside from water) for 8-12 hours before the procedure. The patient should check with the facility to see if he/she can eat, drink, and take medication as usual before the procedure. The patient should notify his or her doctor of any drugs or materials to which he/she is allergic and should notify doctor of pregnancy or of any other pertinent details of his or her medical history (prescriptions, recent illnesses or injuries, or serious health problems, etc.).

What Will Happen During the Procedure?

- The patient will be asked to remove any items of clothing, jewelry, or other accessories that might interfere with the procedure.
- A patient gown will be provided unless the patient is wearing clothing that is free of any metal (snaps, zippers, clasps, decorative glitter, etc.).
- Because the scan is loud, hearing protection will be provided.
- The technician may instruct the patient to lie down on the examination table and slide the table inside the cylindrical chamber to take some initial images of the heart before the contrast material is introduced into the body's system (i.e., taking "before" photos).
- During the initial and later scans, the technician may place electrocardiogram (ECG) wires on the surface of the patient's chest to monitor his/her heartbeat and may secure a respiratory gating belt that monitors breathing around the lower chest/upper abdomen.

These measures are important because it allows the technician (and the MRI equipment) to time its capturing of images with different stages in the beating of the heart, so the images are clear and not distorted by the moving of the heart when it beats.

- If contrast has been ordered, the technician will insert a needle into a vein to establish an IV (a harmless saline solution would most likely be dripping from the IV bag until it is time to insert the contrast dye via the IV, after any initial scans).
- The patient will be positioned on the moveable examination table. Then, the examination table will be slid into position inside the cylindrical tube.
- The patient will need to remain very still while the MRI machine takes images of the heart.
- The patient will be alone in the exam room (a parent or friend may be allowed to stay in the room), but the technician will be able to see and speak with the patient through a two-way intercom. The MRI machine will be noisy (it “buzzes” and “hums” while the magnets do the scans).
- After all the necessary images have been collected (sometimes several “runs” are necessary to obtain enough images of the body part or area in question), the exam table will be moved back out of the cylindrical tube and the patient may get up.
- If an IV was inserted, it would be removed after the procedure is complete.

What Should I Expect After the Procedure?

If the patient has been sedated as part of the MRI procedure, a short recovery period may be required; otherwise, the patient may generally go on with his or her normal routine and activities. There is conflicting research about whether or not breastfeeding mothers should continue nursing immediately after being injected with the contrast dye through an IV; the manufacturers of the contrast dye recommend mothers abstain from breastfeeding for 24 to 48 hours after the procedure (using a breast pump to store extra milk ahead of time and expressing and discarding their milk during that 24-48 hour time period).