

## Hip MRI

Magnetic resonance imaging (MRI) of the hip uses a powerful magnetic field, radio waves, and a computer to produce detailed pictures of the structures within the hip joint. MRI helps your doctor diagnose or evaluate pain in the joint and direct therapy, including determining whether you need surgery. Hip MRI does not use ionizing radiation.

Tell your doctor about any health problems, recent surgeries, or allergies and whether there's a possibility you are pregnant. The magnetic field is not harmful but may cause some medical devices to malfunction. Most orthopedic implants pose no risk, but you should always tell the technologist if you have any devices or metal within your body. Guidelines about eating and drinking before your exam vary between facilities. Unless your doctor says otherwise, take your regular medications as usual. Leave jewelry at home and wear loose, comfortable clothing.



Most MRI facilities will ask you to change into a hospital gown. You may ask your doctor for a mild sedative before the exam if you have claustrophobia or anxiety. If you take relaxation medication, make sure you have a ride home.

## What is a Hip MRI?

MRI of the hip provides detailed images of structures within the hip joint, including bones, cartilage, tendons, ligaments, muscles, and blood vessels, from all angles. Hip MRI can also provide details of structures near the hip, such as the sacroiliac joints or lower lumbar spine.

Magnetic resonance imaging (MRI) is a noninvasive test doctors use to diagnose medical conditions. MRI uses a powerful magnetic field, radiofrequency pulses, and a computer to produce detailed pictures of internal body structures. It does not use radiation (x-rays). Detailed MR images allow doctors to examine the body and detect disease.

## What are some common uses of the procedure?

Combined with conventional x-rays, MRI is usually the best choice for examining the body's major joints, like the hip. MRI of the hip helps diagnose or evaluate:

- hip pain or stiffness
- degenerative joint disorders such as arthritis
- bone fractures that may not be visible on x-rays and other imaging tests
- abnormal x-ray results
- bursitis/tendonitis, or inflammation of the large bursa, a fluid-filled sac within the joint
- joint abnormalities due to tears to cartilage, ligaments, labrum, or tendons
- tumors (primary tumors and metastases)
- osteonecrosis (<http://www.radiologyinfo.org/osteonecrosis>)
- infections (such as osteomyelitis)

- pain, trauma, or complications following hip surgery

A special form of MRI called magnetic resonance arthrography involves the injection of contrast material into the joint so that the radiologist can better look at structures within the hip joint.

## How should I prepare for the Hip MRI?

Most MRI facilities will ask you to change into a hospital gown. You may want to plan to have someone drive you home after the exam.

Guidelines about eating and drinking before an MRI vary between specific exams and facilities. Take food and medications as usual unless your doctor tells you otherwise.

Some MRI exams use an injection of contrast material. The technologist will ask if you have allergies to contrast materials, drugs, food, or the environment. They also may ask you if you have known kidney disease or risk factors for kidney disease. You may need a blood test to assess your kidney function before having an MRI with contrast.

MRI exams commonly use a contrast material called gadolinium. Gadolinium can be used safely in patients who are allergic to iodine contrast.

Tell the technologist or radiologist if you have any serious health problems or recent surgeries. Some conditions, such as severe kidney disease, may mean you cannot safely receive gadolinium. You may need a blood test to confirm that your kidneys are functioning normally.

You should always tell your doctor and technologist if you are pregnant. Pregnant patients have undergone MRIs since the 1980s with no reports of ill effects. However, the baby will be in a strong magnetic field. Therefore, pregnant patients should not have an MRI in the first trimester unless the benefit of the exam outweighs any potential risks. Pregnant patients should not receive gadolinium contrast unless absolutely necessary. *See the MRI Safety During Pregnancy (<http://www.radiologyinfo.org/safety-mri-pregnancy>) page for more information about pregnancy and MRI.*

If you have claustrophobia (fear of enclosed spaces) or anxiety, ask your doctor to prescribe a mild sedative before your exam date. Do not drive yourself home if you are taking a sedative before undergoing your MRI. Make sure you arrange to have a ride home.

Leave all jewelry and other accessories at home or remove them before the MRI scan. Metal and electronic items are not allowed in the exam room. They can interfere with the magnetic field of the MRI unit and image quality, cause burns, or become harmful projectiles. These items include:

- jewelry, watches, credit cards, and hearing aids, all of which can be damaged
- pins, hairpins, metal zippers, and similar metallic items, which can distort MRI images
- removable dental work
- pens, pocketknives, and eyeglasses
- body piercings
- mobile phones, electronic watches, and tracking devices.

An MRI exam is usually safe for patients with metal implants, except for a few types. People with the following implants may not be scanned and should not enter the MRI scanning area without first being evaluated for safety:

- some cochlear (ear) implants
- some types of clips used for brain aneurysms

- some types of metal coils placed within blood vessels
- some older cardiac defibrillators and pacemakers
- vagal nerve stimulators.

Tell the technologist if you have medical or electronic devices in your body. These devices may interfere with the exam or pose a risk. Many implanted devices will have a pamphlet explaining the MRI risks for that device. If you have the handout, bring it to the attention of the scheduler before the exam. You should also bring it to your exam if the radiologist or technologist has any questions. MRI can only be performed with confirmation and documentation of the type of implant and MRI compatibility.

If there is any question, an x-ray can detect and identify metal objects in your body. Metal objects used in orthopedic surgery generally pose no risk during MRI. However, a recently placed artificial joint may require a different imaging exam.

Tell the technologist or radiologist about shrapnel, bullets, or other metal in your body. Foreign bodies near and/or lodged in the eyes may move or heat up during the scan and cause blindness. Dyes used in tattoos may contain iron and could heat up during an MRI scan. This is rare, but you should let the technologist know if you feel the area is heating during the exam. The magnetic field will usually not affect tooth fillings, braces, eyeshadows or other cosmetics.

The technologist must also screen anyone accompanying you into the exam room for metal objects and implanted devices.

Infants and young children often require sedation or anesthesia to complete an MRI exam without moving. The imaging team will determine whether sedation is needed depending on your child's age, intellectual development, and the type of exam. Sedation is available at many facilities. A pediatric sedation or anesthesia specialist should be available during the exam for your child's safety. You will be told how to prepare your child.

Some facilities may have staff who help children stay still during the exam and avoid the need for sedation or anesthesia. They may help prepare your child by showing them a model of an MRI scanner and exposing them to the noises they'll hear during the exam. Some facilities also provide goggles or headsets so your child can watch a movie during the exam. The staff will also answer your questions and explain the procedure.

## **What does the MRI equipment look like?**

The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a table that slides through the tunnel toward the magnet's center.

Some MRI units, called short-bore systems, are designed so the magnet does not completely surround you. Some newer MRI machines have a larger bore, which can be more comfortable for larger patients or those with claustrophobia. Open MRI units are open on the sides. They accommodate larger patients and people with claustrophobia. Open MRI units can provide high-quality images for many types of exams, but not all. For more information, consult your radiologist.

## **How does the procedure work?**

MRI does not use radiation, unlike x-ray and computed tomography (CT) exams. MRI uses a high-power magnet to temporarily change the position of hydrogen atoms that naturally exist within the body. This does not cause any long-term changes in your body. As the hydrogen atoms return to their usual position, they emit different amounts of energy depending on the type of tissue they are in. The scanner captures this energy, and a computer creates a picture using this information.

Most MRI units produce the magnetic field by passing an electric current through wire coils. Other coils are inside the machine and, in some cases, are placed around the part of the body being imaged. These coils send and receive radio waves, producing signals the machine detects. The electric current does not come into contact with the patient.

MRI can often tell the difference between normal and abnormal tissue better than x-ray, CT, and ultrasound.

## How is the procedure performed?

MRI exams may be done on an outpatient basis.

The technologist will position you on the moveable exam table. They may use straps and bolsters to help you stay still and maintain your position.

Small devices that contain coils that send and receive radiofrequency pulses may be placed around your pelvis and hip to help improve image quality.

If your exam uses contrast material, a doctor, nurse, or technologist will insert an intravenous catheter (IV line) into a vein in your hand or arm. They will use this IV to inject the contrast material.

The technologist will move you inside the magnet of the MRI unit. The technologist will perform the exam while working at a computer outside of the room. You will be able to talk to the technologist via an intercom.

If your exam uses contrast material, the technologist will inject it into the intravenous line (IV) after an initial series of scans. They will take more images during or following the injection.

When the exam is complete, the technologist may ask you to wait while the radiologist checks the images in case more are needed.

After the exam, the technologist will remove your IV line and place a small dressing over the insertion site.

The entire exam takes about 45 minutes.

If your child is having a hip MRI, your physician may ask you to arrive early for the exam. Sedation may add 15 to 30 minutes to the procedure. If your child receives sedation, the imaging team will monitor them until the effects of the medication wear off.

Some patients have hip arthrography before the MRI scan. A hip arthrogram helps evaluate the structure and function of the hip joint and to assess:

- an unstable hip, possibly from a previous dislocation
- suspected cartilage abnormalities
- abnormalities in the socket part of the hip joint

For the arthrogram, the doctor injects contrast material into the hip joint space using X-ray guidance. *See the Conventional Arthrography (<http://www.radiologyinfo.org/arthrog>) page for more information.*

## What will I experience during and after the procedure?

Most MRI exams are painless. However, some patients find it uncomfortable to remain still. Others may feel closed-in (claustrophobic) while in the MRI scanner. The scanner can be noisy. MRI scanners are air-conditioned and well-lit.

It is usual for the area of your body to feel slightly warm during an MRI scan. If it bothers you, notify the radiologist or technologist. You must remain perfectly still while the MRI unit is recording images, which is typically only a few seconds or minutes at a time. You will know when the MRI unit is recording images because you will hear tapping or thumping sounds. The coils that generate radiofrequency pulses make these sounds when activated. The technologist will give you earplugs or headphones to reduce the noise made by the scanner. You may be able to listen to music with the headphones.

Children will be given appropriately sized earplugs or headphones during the exam.

You can relax between imaging sequences but must maintain your position as much as possible.

Patients are typically alone in the exam room during the MRI procedure. However, the technologist can always see, hear and speak with you using a two-way intercom. Many facilities allow a friend or parent to stay in the room with you as long as they are also screened for safety.

If your exam includes contrast material, the doctor may use local anesthesia to numb the skin. You will experience a slight pinprick and burning for a few seconds. It is normal to feel coolness and a flushing sensation for a minute or two following the injection. You may hear gurgling when you move the joint near the injection site. Some patients have a temporary metallic taste in the mouth after the contrast injection. You may experience some bruising or skin irritation at the injection site.

Mild discomfort and swelling at the injection site should only last a few days. If you develop a fever, which may indicate an infection, contact your doctor or get medical attention.

If you received sedation before the procedure, you may need to spend about an hour in recovery to allow the anesthesia to wear off. You should have someone drive you home.

If you do not receive sedation, no recovery period is necessary. You may resume your usual activities and normal diet immediately after the exam. Occasionally, patients experience side effects from the contrast material. These may include nausea, headache, and pain at the injection site. Rarely do patients experience hives, itchy eyes, or other allergic reactions to the contrast material. If you have allergic symptoms, tell the technologist. A radiologist or other doctor will be available for immediate assistance.

## Who interprets the results and how do I get them?

A radiologist, a doctor trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send a signed report to your primary care or referring physician, who will share the results with you.

## What are the benefits vs. risks?

### Benefits

- MRI is a noninvasive imaging technique that does not involve radiation exposure.
- MRI has proven valuable in diagnosing a broad range of conditions, including tendon, ligament, muscle, cartilage, and bone abnormalities that are not as visible on X-rays or CT scans.
- MRI can help determine which patients with hip injuries require surgery.
- MRI may help diagnose a bone fracture when X-rays and other tests are inconclusive.
- MRI can detect abnormalities that might be obscured by bone with other imaging methods.
- MRI provides a noninvasive alternative to x-ray, angiography , and CT for diagnosing problems in the blood vessels.

### Risks

- The MRI exam poses almost no risk to the average patient when appropriate safety guidelines are followed.
- If sedation is used, there is a risk of using too much. However, your vital signs will be monitored to minimize this risk.
- The strong magnetic field is not harmful to you. However, it may cause tissue surrounding metallic implants or foreign bodies to heat up. It may cause implanted medical devices to malfunction or distort the images.
- Nephrogenic systemic fibrosis is a recognized complication related to the injection of gadolinium contrast. This complication is exceptionally rare with the use of newer gadolinium contrast agents. It usually occurs in patients with severe kidney disease. Your doctor will carefully assess your kidney function before considering a contrast injection.
- There is a very slight risk of an allergic reaction if your exam uses contrast material. Such reactions are usually mild and controlled by medication. A doctor will be available for immediate assistance if you have an allergic reaction.
- Although there are no known health effects, evidence has shown that very small amounts of gadolinium can remain in the body, particularly the brain, after multiple MRI exams. This is most likely to occur in patients receiving multiple MRI exams

over their lifetime for monitoring chronic or high-risk health conditions. If you are a patient in this category, consult with your doctor about the possibility of gadolinium retention.

- IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after receiving contrast material. However, the most recent American College of Radiology (ACR) Manual on Contrast Media reports that studies show the amount of contrast absorbed by the infant during breastfeeding is extremely low.

## What are the limitations of a hip MRI?

MRI can produce high-quality images only if you remain perfectly still during the image recording process. If you are anxious, confused, or in severe pain, you may find it difficult to lie still during imaging. Constant coughing and shaking might also interfere with the scan.

A very large person may not fit into the opening of a conventional MRI machine. Implants and other metallic objects can make it difficult to obtain clear images. Patient movement can have the same effect. For patients with metal surgical implants, special metal reduction imaging is performed to improve image quality.

Present data show no convincing evidence that non-contrast MRI harms the fetus of a pregnant patient. However, if the need for the exam is not time-sensitive, your doctor may delay the exam until after delivery. MRI gadolinium contrast material are generally avoided during pregnancy except in specific circumstances. Your doctor will discuss the benefits and risks of any MRI procedure with you.

An MRI exam typically costs more and may take longer than other imaging exams. Talk to your insurance provider if you have concerns about the cost of MRI.

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