MRI of the Prostate

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What is MRI of the Prostate?

Magnetic resonance imaging (MRI) is a noninvasive way of viewing organs, soft tissues, bone and other internal body structures without the use of x-rays. MRI uses a magnetic field and radio waves together with a computer to create cross-sectional pictures of various parts of the body. Detailed MR images allow physicians to better evaluate parts of the body that may not be visible with other imaging methods such as x-ray, ultrasound or computed tomography (also called CT or CAT scan). MRI has proven valuable in diagnosing a broad range of conditions, including cancer, heart and vascular disease, stroke, and joint and musculoskeletal disorders.

The prostate is a walnut-size gland that is part of the male reproductive system. It is located below the bladder, where urine is stored, and surrounds the urethra, the tube that carries urine and other fluids out of the body. The prostate helps make the milky fluid called semen that carries sperm out of the body when a man ejaculates. Ultrasound and MRI are the most commonly used techniques to image the prostate gland.

What are some common uses of the MRI of the Prostate procedure?

The three most common prostate problems are:

- Infection (prostatitis)
- Enlarged prostate, called benign prostatic hyperplasia (BPH)
- Prostate cancer

The prostate tends to grow bigger with age due to the development of BPH. A tumor or infection can also enlarge the prostate. All of these conditions may squeeze the urethra, causing urinary problems.

Diagnosing a prostate problem may require a series of tests including an MRI exam, which can help identify abnormalities. If a biopsy has confirmed cancer, a doctor may use MRI or other imaging techniques to determine if the cancer is confined to the prostate, or if it has spread outside the walls of the prostate gland and elsewhere in the body.

How should I prepare for my MRI of the Prostate procedure?

Your MRI exam may involve the use of an endorectal coil, a thin wire covered with a balloon, placed inside the rectum. This coil helps focus on the prostate and surrounding structures; it also enables your radiologist to perform magnetic resonance (MR) spectroscopy, which provides additional information on the chemicals present in the body's cells.

To prepare for an MRI with the endorectal coil, you should eat light meals on the day prior to and on the day of your exam. This will help make it easier to insert the coil. You may also be asked to use an enema preparation prior to your exam. An enema involves injecting liquid into your large intestine through your rectum to help clear the bowel.

Prior to your exam, you may continue to take your usual medications, unless you are told otherwise. You may be given a hospital gown to wear during the exam, or you may be allowed to wear your own clothing if it is loose-fitting and has no metal fasteners.

Jewelry and other accessories should be left at home if possible, or removed prior to the MRI exam. Metal and electronic objects can interfere with the MRI's magnetic field and are not allowed in the exam room. 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 MR images
- Removable dental work
- Pens, pocketknives, keys, coins and eyeglasses

In most cases, an MRI exam is safe for patients with metal implants, except for a few types. Tell the technologist if you have medical or electronic devices in your body, such as:

- Artificial heart valves
- Implanted drug infusion ports
- Implanted electronic devices, including a pacemaker
- Artificial limbs or metallic joint prostheses
- Implanted nerve stimulators
- Metal pins, screws, plates or surgical staples

In general, metal objects used in orthopedic surgery pose no risk during MRI. However, a recently placed artificial joint may require the use of another imaging procedure. If there is any question, an x-ray may be taken to detect the presence of any metal objects. Sheet metal workers and others who might have metal objects such as shrapnel in their bodies may also require an x-ray prior to an MRI. Dyes used in tattoos may contain iron and could heat up during MRI, but this is rarely a problem.

People with the following implants cannot be scanned and should not enter the MRI area:

- Cardiac pacemakers
- Defibrillators
- Cochlear (ear) implants
- Clips used on brain aneurysms

Some MRI procedures use oral or injected contrast material to help obtain clearer images. For this reason, the radiologist or technologist will ask if you have an allergy of any kind such as hay fever, hives, allergic asthma, or allergy to food or drugs. However, the contrast material used for an MRI exam, called gadolinium, does not contain iodine and is less likely to cause an allergic reaction.

The radiologist should also know if you have any serious health problems. Some conditions, such as kidney disease and sickle cell anemia, may prevent you from having an MRI with contrast material.

How does the MRI of the Prostate procedure work?

Unlike conventional x-ray examinations and computed tomography (CT) scans, MRI does not depend on ionizing radiation. Instead, radio waves are directed at protons, the nuclei of hydrogen atoms, in a strong magnetic field.

The strong magnetic field is produced by passing an electric current through wire coils in the MRI unit. Other coils send and receive radio waves. As you lie in the MRI machine, radio waves are directed at the protons in your body. In the magnetic field, protons change their position, producing signals that

are detected by coils within the MRI unit or placed around the body part being examined.

A computer processes these signals and generates a three-dimensional representation of your body. The radiologist can then view any two-dimensional plane (slice) from any direction on a video monitor for evaluation.

Because protons are most abundant in water molecules (the "H" in H20), MR images show differences in water content between various body tissues. As a result, MRI is especially suited to detecting disorders that increase fluid in the body, such as tumors, infection and inflammation.

How is the MRI of the Prostate performed?

If an endorectal coil is to be used in your MRI exam, a nurse or physician will insert the wire coil, which is enclosed within a small, flexible plastic tube, into your rectum. Once inserted, a balloon is inflated to hold the coil in place during the exam. When your exam in complete, the balloon is deflated and the coil is removed.

You will lie on your back on a narrow table that can be moved into and out of the MRI tunnel. Cushions are used to maintain the proper position of your body and to make you as comfortable as possible.

The radiologist and technologist will leave the room while the MRI examination is performed. An MRI exam generally takes 15 to 45 minutes, although only a fraction of that time is needed for the actual imaging. Imaging will be done in sequences, each lasting between a few seconds and a few minutes. During imaging, you will be instructed not to move. You will know when images are being recorded because you will hear tapping or thumping sounds when the coils that create the magnetic field are turned on. In between sequences, you will be able to relax.

If a contrast material is used to enhance the visibility of certain tissues or blood vessels, it may be injected into your arm through an intravenous (IV) line.

MR spectroscopy, which provides additional information on the chemicals present in the body's cells, may also be performed during the MRI exam and will add approximately 15 minutes to the exam time.

When your exam is completed, you will wait a short time on the table while the images are examined to ensure no additional images are needed.

What will I experience during my MRI of the Prostate?

MRI of the prostate is a pain-free procedure. During the exam, your prostate may feel slightly warm, but this is normal and harmless. If contrast material is injected, you may feel coolness for a minute or two.

If an endorectal coil is used, you will feel pressure in your rectum similar to that experienced during a digital rectal exam.

It is important to remain perfectly still when images are being recorded. Some patients can find it uncomfortable to remain still during MR imaging. People who tend to be nervous when in a confined space (claustrophobic) may become uncomfortable when examined in an enclosed MRI unit. Fewer than one in twenty patients will need a sedative to relieve their anxiety and help them lie still. Another option is to use an open MRI unit, if available, which is less confining than a conventional unit.

MRI scanners are air-conditioned and well-lit. During your exam, you will be able to talk to the radiologist and technologist, who will observe you from an adjacent room throughout the exam. You may request earplugs to reduce the thumping and humming noises of the MRI scanner. Some scanners have music or a built-in television to help pass the time. Many MRI centers allow a relative or friend to stay close by during your exam.

If you have not been sedated, no recovery period will be necessary. You may resume your usual activities and normal diet immediately after the exam.

What are the benefits vs. risks of MRI of the Prostate ?

Benefits

- MRI is a totally noninvasive imaging technique that does not require exposure to ionizing radiation.
- MRI provides more clear and detailed images of the soft-tissue structures of the body than other imaging methods. The detail makes MRI an invaluable tool in early diagnosis and evaluation of tumors.
- MR images can help physicians evaluate the function as well as the structure of many organs.

- MRI contrast material is less likely to produce an allergic reaction than the iodine-based materials used for conventional x-rays and CT scanning.

Risks

- The MRI examination poses no risk to the average patient when appropriate safety guidelines are followed.

- An undetected metal implant may be affected by the strong magnetic field.

- There is a very slight risk of an allergic reaction if contrast material is injected. Such reactions usually are mild and easily controlled by medication. There also is a very small risk of skin infection at the site of injection.

- If sedation is used, there are risks of excessive sedation. The technologist monitors the patient's vital signs to minimize this risk.

What are the limitations of MRI of the Prostate?

Patients who are claustrophobic may have to be sedated during an MRI exam or examined in one of the newer open MRI units. A person who is very obese may not fit into the opening of a conventional MRI machine.

The presence of an implant or other metallic object often makes it difficult to obtain clear images, and patient movement can have the same effect. A patient with severe pain may not be able to lie still during imaging.

MRI may not always distinguish between tumor tissue and edema fluid. It cannot detect calcium present in a tumor.

The MRI findings by themselves do not establish an absolute diagnosis, but in most situations the findings will suggest the correct diagnosis. The images must be interpreted along with the patient's history, physical findings, and information from other tests.

MRI may be more costly than other imaging methods including CT scanning.