MRA – MR (Magnetic Resonance) Angiography

What is Magnetic Resonance Angiography (MRA)?

Definition

Magnetic Resonance Angiography (an MRA) creates images of key blood vessels throughout the body – such as those in the brain, neck, heart, lungs, kidneys, abdomen, pelvis, and legs – in order to evaluate their condition and to assist with the diagnosis and treatment of problems. In some ways, an MRA is similar to an x-ray, but it is also different in several important ways. MR Angiography is a less invasive, safer alternative to a traditional catheter angiogram procedure (in which a small cut is made in the skin, a thin plastic tube called a catheter is inserted into an artery to release an x-ray sensitive contrast material, and an x-ray is taken).

How It Works

During an MR Angiography, a contrast material (dye) is injected into the body via an IV (intravenous drip) in the arm. The contrast material contains a magnetic substance. When the MRI (magnetic resonance imaging) equipment is put in motion, the contrast material reacts to the magnets to reveal the details of the arteries and veins, similar to the way x-rays create images of bones. The difference is an MRA 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.

Common Uses

MR Angiograms are commonly used to investigate suspected or potential:

- Aneurysm [an abnormal, blood-filled bulge in a blood vessel – especially an artery – which is caused by the weakening of the wall of the blood vessel and which can cause internal hemorrhage (bleeding) and sudden death if it bursts]
- Arthrosclerosis in the neck, which could lead to a stroke
- Kidney disease
- Problems with the blood vessels or arteries
- Pulmonary embolisms (blood clots that can travel from the legs into the lungs)

Benefits and Risks

Benefits

- MRS's can help identify vascular problems and help the patient make informed decisions about further treatment.
- MRA's can produce much higher quality images of the body's arteries and veins 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.
- MRA is a less invasive procedure than a catheter angiogram.
- The MRA procedure takes less time than a catheter angiogram and does not require a recovery period.
- The patient is not exposed to any x-ray radiation during an MRA procedure.

- The contrast material (dye) used in MRAs is less likely to cause allergic reactions than those used for x-rays and CT scans – and a good quality MR Angiogram can even be produced without the use of any contrast dye, in extreme circumstances.

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 MRA 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 MRA 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 MR Angiogram 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 metal (zippers, buttons, snaps, 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 body before the contrast material is introduced into the body's system (i.e., taking "before" photos).
- 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 body.

- 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 scanning).
- 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 MR Angiogram 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).