Arthrography

Arthrography is used to evaluate the soft tissue structures within joints, joint surfaces, and occasionally structures that surround the joint (such as the rotator cuff tendon, cartilage, ligaments, and, sometimes, loose bodies). With an arthrogram, dye (and sometimes air) is injected into a joint; then an imaging study is obtained. This may be a plain radiograph (x-ray), although a computed tomography (CT) scan or magnetic resonance imaging (MRI) may be done with injection of material into joint to assess the injured joint. Risks of arthrography include allergic reaction to the dye or other contrast material, infection, or becoming faint.

Bone Scan/SPECT

A bone scan is a highly sensitive tool used to search for bone trauma or increased bone activity (healing or stress to the bone). An injection of a short-acting radioactive tracer (very low dose radiation) is given through the veins. A machine later counts the activity of the bones by the amount of tracer they pick up. This test looks at the activity of the bone, not the anatomy (shape or structure). The problem is that the bone scan is not very specific. Increased uptake or activity in the bone can mean many things (including infection, fracture, stress fracture, arthritis, bone bruise, or just increased stress to an area). Increased activity on the bone scan reflects increased blood flow to the area or increased activity of the cells that make bone. Soft tissue injury (tendon, cartilage, or ligament injuries) may often show indirect evidence on a bone scan. Bone scans are particularly helpful when there is bone or joint pain and x-rays are normal or inconclusive.

Single photon emission computed tomography (SPECT) is a bone scan that looks at different areas of the body in slices (like slicing a loaf of bread). It is like a CT scan of a bone scan, But it allows for more detail of the area.

CT Scan

CT scans look at bone, and to some degree soft tissues, in many planes, as opposed to plain radiographs. It allows evaluation of bone and joints in more than one plane. In other words, without moving the patient or area being studied, the area can be looked at side-to-side, top-to-bottom, or front-to-back. Even more impressive is that one can see structures in segments, like slices of bread. Thus the CT scan allows visualization of each slice. CT scans show soft tissue structures better than x-rays but not as well as MRI. These studies may be performed with the use of dye in the joint.

MRI

MRI is a nonirradiating (that is, is does not use radiation) tool that allows for evaluation of soft tissues, as well as bone. It is essentially a large magnet that looks at cellular structure; it is the most impressive tool available to evaluate the soft tissues, including looking at swelling, inflammation, and injury of the soft tissues (such as cartilage, tendon, and muscle). Another benefit of MRI is that it allows evaluation of the structure being studied in more than one plane. In other words, without moving the patient or area being studied, the area can be looked at side-to-side, top-to-bottom, or front-to-back. Even more impressive is that one can see structures in segments, like slices of bread, and evaluate each slice.

MRIs have the disadvantage of often taking a long time (up to 1 hour) to obtain images of a particular area, and they often have to be done in a closed, confined space. It is particularly difficult for most patients with claustrophobia (fear of enclosed spaces). However, newer technology is currently being developed to overcome this. Open-air MRIs and in-office MRIs are being used with some success; however, often the sharpness of the picture is not as good as with the enclosed models. MRI cannot be performed on people with pacemakers, aneurysm clips in the brain, some artificial eye implants, and some bullet fragments within the body. Orthopedic implants (such as plates, screws, and wires) do not preclude the patient from having an MRI but may affect the quality of the study.

MRI may be done with injection of a dyelike material to help evaluate structures within the joint.

Myelography

In myelography, contrast material or dye is injected around the spinal cord and an imaging study (usually x-ray or CT scan) is used to look for herniated disks, nerve compression, or compression on the spinal cord. Myelography complications include headache, nausea, vomiting, and leg pain.

Radiographs (X-Rays)

Plain radiographs, often known as x-rays, are simple tests that allow evaluation of bone, joints, and occasionally the soft tissues around the bone. They are the first line of supplemental study when evaluating a patient, because they are simple, readily available, and cost effective. The radiographs show shadows of bone, although sometimes the soft tissues of different densities will also appear, particularly when swelling is present in an area, including joints. Usually, however, nonbony structures, including cartilage, muscle, ligaments, tendons, and joint fluid, all appear to have the same density on radiographs, making evaluation of abnormalities of these tissues difficult unless fat or calcification is present. Thus radiographs show bone and calcifications most easily and are best at detecting fractures, dislocations, bone tumors, and infections of bone.

Because these are shadows of bone, usually more than one x-ray must be taken of a particular bone to look at it from different angles.

Tomography

Tomography is a type of plain radiograph that blurs out area above and below the area of interest, essentially like looking at different areas in slices (like slicing a loaf of bread and looking at the area between each slice). Although still of some use, it is has been replaced by CT and MRI.

Ultrasound

Ultrasound is a portable machine that uses radio waves to look at soft tissues, particularly tendon and cysts. It requires no injection or radiation and allows evaluation of tissues while moving. However, this device is difficult to use, and the images are difficult to interpret; thus it is not used as often in sports medicine as in other specialties. Further, the radio waves are reflected by bone and thus are not useful for examining bone or for internal bony structures.

Notes: (Up to 4400 characters only)

Notes and suggestions