

# Standard Diagnostic Tests

## Arthroscopy

Arthroscopy is a diagnostic and surgical technique in which the provider manipulates a small, lighted camera called an arthroscope that has been inserted into the joint through a small incision in the joint. Images of the inside of the joint are projected onto a monitor.

## Arthrogram

An arthrogram provides a diagnostic record that can be seen on an X-ray after the injection of a contrast fluid into the joint to outline structures of the joint. If disease or an injury is present, this contrast fluid may either leak into an area where it does not belong, indicating a tear or opening, or be blocked from entering an area where there normally is an opening.

## Bone Scan

Two different kinds of tests may be called bone scans. One type tests the density of the bone and is used to diagnose osteoporosis. This type of bone scan uses narrow X-ray beams or ultrasound to see how solid the bone is. The second type of bone scan is used to identify areas where there is unusually active bone formation. It is frequently used to pinpoint stress fracture sites or the presence of arthritis, infection, or cancer. The patient is given a dose of a mildly radioactive substance through an intravenous line (IV). A special nuclear camera takes a picture of the entire body. Areas of abnormal bone formation activity will appear brighter than the rest of the skeleton.

## Computed Tomography (CT Scan)

A CT scan (computed tomography) combines X-rays with computer technology to produce a more detailed, cross-sectional image of the body. It may be ordered if the doctor suspects a tumor or a fracture that doesn't appear on X-rays (such as in your collarbone or pelvis) or if the patient had severe trauma to the chest, abdomen, pelvis or spinal cord. An X-ray tube slowly rotates around the patient, taking pictures from all directions. A computer combines the images to produce a clear, two-dimensional view.

## Discography

Discography is a test used to determine whether the discs, the cushioning pads that separate the bones of the spine, are the source of back pain. It may be performed before surgery to positively identify the painful disc(s). During the procedure, the doctor inserts a needle into one or more discs and injects a contrast dye. A CT scan will then show any changes in the disc size or shape.

## Doppler Ultrasound

If a blockage in the blood vessels of the legs or arms is suspected, the doctor may prescribe an ultrasound test. An ultrasound uses high-frequency sound waves that echo off the body. This creates a picture of the blood vessels. The Doppler audio system transmits the "swishing" sound of the blood flow. The technician uses a sensor that looks like a microphone. The sensor is placed against the skin and moved up and down across the area being tested. The technician will apply pressure every few inches to see if the blood vessels change their shape.

## Echocardiogram

Often referred to as a cardiac ECHO, an echocardiogram is a sonogram of the heart. It uses standard ultrasound techniques to image two-dimensional slices of the heart. The latest ultrasound systems now employ 3D real-time imaging.

## Electrocardiogram (ECG or EKG)

An ECG or EKG is a non-invasive test that records the electrical activity of the heart. It is used to measure the rate and regularity of heartbeats, as well as the size and position of the chambers, the presence of any damage to the heart, and the effects of drugs or devices used to regulate the heart, such as a pacemaker. Sensors are applied to the torso and extremities, and readings of the heart's electrical activity are taken.

## Electromyography

An electromyography (EMG) records and analyzes the electrical activity in your muscles. It is used to learn more about the functioning of nerves in the arms and legs. During an EMG, small, thin needles are placed in the muscle to record the electrical activity.

## Contrast Enhanced CT Scan

This test uses contrast dye to better visualize the spinal canal and nerve roots in the spine. It may be used to help diagnose back problems such as spinal stenosis, particularly in patients with pacemakers or others who cannot have an MRI. The doctor uses X-ray guidance to inject a very low dose of contrast fluid (dye) into the spinal fluid. The CT scan is then administered.

## Magnetic Resonance Imaging (MRI)

An MRI (magnetic resonance image) uses magnetic fields and a sophisticated computer to take high-resolution pictures of bones and soft tissues, resulting in a cross-sectional image of the body. It can be used to help diagnose torn muscles, ligaments and cartilage, herniated disks, hip or pelvic problems and other conditions. As with a CT scan, the patient lies on a table that slides into the tube-shaped MRI scanner. The MRI creates a magnetic field around the patient, then pulses radio waves to the areas of the body to be pictured. The radio waves cause tissues to resonate. A computer records the rate at which the body's various parts (tendons, ligaments, nerves) give off these vibrations, and translates the data into a detailed, two-dimensional picture.

## Nerve Conduction Study (NCS)

Nerve conduction studies are often done along with an electromyogram to determine if a nerve is functioning normally. The doctor will tape wires (electrodes) to the skin in various places along the nerve pathway. Then the doctor stimulates the nerve with an electric current. As the current travels down the nerve pathway, the electrodes placed along the way capture the signal and measure its speed. In healthy nerves, electrical signals can travel at speeds of up to 120 miles per hour. If the nerve is damaged, however, the signal will be slower and weaker. By stimulating the nerve at various places, the doctor can determine the specific site of the injury.

## Quantitative Computed Tomography

Quantitative computed tomography (QCT) is used to measure bone mineral density (BMD) for osteoporosis. It is similar to a normal CT scan, but uses a computer software package that determines bone density in the hip or spine. This technique provides for true three-dimensional imaging and reports BMD as true volume density measurements.

## Radiographs (X-rays)

X-rays (radiographs) are the most common and widely available diagnostic imaging technique. X-rays are always used for fractures and joint dislocations, and may also be recommended if the doctor suspects damage to a bone or joint from other conditions such as arthritis.

## Stress Tests

A treadmill stress test measures the effectiveness of the cardiovascular system (heart, lungs and blood vessels).

## Venography

Venography is used to determine the presence of a blood clot in the leg, a condition called deep vein thrombosis. In this test, a contrast solution (or dye) is slowly injected into the leg. X-rays are taken to identify the location of the clot.

# Neurological and Orthopedic Office Tests

## Adson's Test

The patient is asked to take and hold a deep breath, the neck is extended, then the patient is asked to turn his head from one side to the other side. Downward pressure on the patient's arm will cause an obliteration of the pulse, in which case the test is positive, and indicates a thoracic outlet syndrome.

## Anterior Drawer

With the knee flexed approximately 90 degrees, the proximal tibia is pulled forward. If excessive movement is found, the test is an indication of a tear of the anterior cruciate ligament.

## Apley Test

The patient is placed prone on the examining table and the knee is flexed 90 degrees. While compressing the knee, the lower leg is rotated in both directions. If this maneuver elicits pain, it is probable that a meniscal tear is present.

## Axial Compression

The patient is either sitting or lying and the examiner presses down upon the top of the patient's head. Narrowing of the neural foramen, pressure on the facet joints, or muscle spasm can cause increased pain and the test may indicate pressure upon a nerve and the neurologic level of existing pathology.

## Babinski's Test

Normally, when the lateral aspect of the sole of the relaxed foot is stroked, the great toe is flexed. If the toe extends instead of flexes and the other toes spread out, the test is positive and would indicate upper motor (brain or spinal cord) involvement.

## Impingement Test

The shoulder is forcefully abducted or adducted and internally rotated causing the greater tuberosity to press against the undersurface of the acromion. A positive test indicates an impingement syndrome.

## Lachman Test

With the knee flexed approximately 20 degrees, the proximal tibia is pulled forward. Excessive motion of the tibia anteriorly is indicative of a tear of the anterior cruciate ligament. Considered the most accurate clinical test for tear of the anterior cruciate ligament.

## Lasegue's Test (a.k.a. Bragard's Test)

Flexion of the affected limb's hip is not painful, but extension of the knee while the hip is flexed is painful. Such pain would indicate sciatica and spinal cord nerve root compression.

## McMurray's Test

As the patient lies supine with knee fully flexed, the examiner rotates the patient's foot fully outward and the knee is slowly extended; a painful "click" indicates a tear of the medial meniscus of the knee joint. Inward rotation of the foot with pain indicates a tear in the lateral meniscus.

## Phalen's Sign

Flexion of the wrist reproduces the paraesthesias and pain of median nerve compression at the wrist (carpal tunnel syndrome). The reverse Phalen maneuver involves hyperextension of the wrist with the resultant median nerve paraesthesias.

## Quadriceps Inhibition Test

Pressure is placed over the superior aspect of the patella and the patient is asked to perform a straight leg raising maneuver. Pain and grinding with this maneuver is indicative of chondromalacia of the patella.

## Slocum Test

With the knee flexed approximately 90 degrees, the foot is placed in both internal and external rotation for separate tests. The proximal tibia is then pulled forward. Excessive anterior motion of the tibia indicates rotatory instability of the knee, either anteromedial or anterolateral, depending upon the direction of rotation of the foot.

## Straight Leg Raising

With the knee extended and the patient supine or seated, the hip is flexed (with the leg straight). A positive test results in pain in the sciatic nerve distribution and suggests a disc herniation.

## Supraspinatus Isolation

Strength of abduction of the shoulder is tested by abducting and forward flexing the arm with the forearms in internal rotation. This isolates the supraspinatus muscle, the most common area of weakness in a rotator cuff tear. If weakness is demonstrated, this test is very suggestive for a rotator cuff tear.

## Tinel's Sign

A tingling sensation in the distal end of a limb when percussion is made over the site of a divided nerve. It indicates a partial lesion or the beginning of regeneration of the nerve.

## Waddell Test

The patient is tested for appropriateness of response to tenderness, axial loading, rotation, straight leg raising in the seated position, regional disturbances and overreaction. Inappropriate responses in three of the five areas is very suggestive of functional overlay in patients with back problems.

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