

Bone X-ray (Radiography)

This procedure is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is Bone X-ray (Radiography)?

An x-ray (radiograph) is a painless medical test that helps physicians diagnose and treat medical conditions. Radiography involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

A bone x-ray makes images of any bone in the body, including the hand, wrist, arm, foot, ankle, knee, leg or spine.

What are some common uses of the procedure?

A bone x-ray is used to:

- determine whether a bone has been fractured or if a joint is dislocated.
- ensure that a fracture has been properly aligned and stabilized for healing following treatment.
- determine whether there is a build up of fluid in the joint or around a bone.
- guide orthopedic surgery, such as spinal repair, joint replacement and fracture reductions.
- evaluate injury or damage from conditions such as infection, arthritis, abnormal bone growths or other bone diseases, such as osteoporosis.
- assist in the detection and diagnosis of cancer.
- locate foreign objects.
- evaluate changes in bones.

How should I prepare?

Most bone x-rays require no special preparation.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

What does the equipment look like?

The equipment typically used for bone x-rays consists of an x-ray tube suspended over a table on which the patient lies. A drawer under the table holds the x-ray film or image recording plate.

A portable x-ray machine is a compact apparatus that can be taken to the patient in a hospital bed or the emergency room. The x-ray tube is connected to a flexible arm that is extended over the patient while an x-ray film holder or recording plate is placed underneath.

How does the procedure work?

X-rays are a form of radiation, like light or radio waves that can be focused into a beam. X-rays pass through most objects, including the body. Once it is carefully aimed at the part of the body being examined, an x-ray machine produces a small burst of radiation that passes through the body, recording an image on photographic film or a special image recording plate.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue, such as muscle, fat and organs, allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue shows up in shades of gray and air appears black.

X-ray images are maintained as hard film copy (much like a photographic negative) or, more likely, as a digital image that is stored electronically. These stored images are easily accessible and are sometimes compared to current x-ray images for diagnosis and disease management.

How is it performed?

The technologist, an individual specially trained to perform radiology examinations, positions the patient on the x-ray table and places the x-ray film holder or digital recording plate under the table in the area of the body being imaged. When necessary, sandbags or pillows will be used to help the patient hold the proper position. A lead apron may be placed over the patient's pelvic area to protect it from radiation.

The patient may be asked to keep from breathing for a few seconds and must hold very still while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.

The patient may be repositioned for another view and the process is repeated. At least two images (from different angles) will be taken and often three images are needed if the problem is around a joint (knee, elbow or wrist).

An x-ray may also be taken of the unaffected limb, or of a child's growth plate (where new bone is forming), for comparison purposes.

When the examination is complete, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

A bone x-ray examination is usually completed within 5 to 10 minutes.

What will I experience during and after the procedure?

A bone x-ray examination itself is a painless procedure.

You may experience discomfort from the cool temperature in the examination room. You may also find holding still in a particular position and lying on the hard examination table uncomfortable, especially if you are injured. The technologist will assist you in finding the

most comfortable position possible that still ensures x-ray image quality.

Who interprets the results and how will I get them?

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and 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

- Bone x-rays are the fastest and easiest way for a physician to view and assess broken bones and joint and spine injuries.
- X-ray equipment is relatively inexpensive and widely available in physician offices, ambulatory care centers, nursing homes and other locations, making it convenient for both patients and physicians.
- Because x-ray imaging is fast and easy, it is particularly useful in emergency diagnosis and treatment.
- No radiation remains in a patient's body after an x-ray examination.
- X-rays usually have no side effects.

Risks

- There is always a slight chance of damage to cells or tissue from radiation. However, the radiation risk is very low compared with the potential benefits.
- During a single x-ray exposure, a patient is exposed to approximately 20 milliroentgens of radiation. We are all exposed to approximately 100 milliroentgens of radiation each year from sources like the ultraviolet rays of the sun and small traces of radioactive isotopes, such as uranium, in the soil.
- Women should always inform their doctor or x-ray technologist if there is any possibility that they are pregnant.

A Word About Minimizing Radiation Exposure

Special care is taken during x-ray examinations to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection councils continually review and update the technique standards used by radiology professionals.

State-of-the-art x-ray systems have tightly controlled x-ray beams with significant filtration and dose control methods to minimize stray or scatter radiation. This ensures those parts of a patient's body not being imaged receive minimal radiation exposure.

What are the limitations of Bone Radiography?

While x-ray images are among the clearest, most detailed views of bone, they provide little information about the adjacent soft tissues.

An MRI may be more useful in identifying ligament tears and joint effusions in knee or shoulder injuries and in imaging the spine, because both the bones and the spinal cord can be evaluated. MRI can also detect a bone bruise when no crack is visible on x-ray images.

Ultrasound imaging, which uses sound waves instead of ionizing radiation, has also been useful for injuries around joints and in evaluating the hips of children with congenital problems.



Ankle x-ray (front view).



X-ray showing frontal view of both hands.

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