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## Diseases and Conditions

# Avascular necrosis

By Mayo Clinic Staff

Avascular necrosis is the death of bone tissue due to a lack of blood supply. Also called osteonecrosis, avascular necrosis can lead to tiny breaks in the bone and the bone's eventual collapse.

The blood flow to a section of bone can be interrupted if the bone is fractured or the joint becomes dislocated. Avascular necrosis is also associated with long-term use of high-dose steroid medications and excessive alcohol intake.

Anyone can be affected by avascular necrosis. However, it's most common in people between the ages of 30 and 60. Because of this relatively young age range, avascular necrosis can have significant long-term consequences.

Many people have no symptoms in the early stages of avascular necrosis. As the condition worsens, your affected joint may hurt only when you put weight on it. Eventually, the joint may hurt even when you're lying down.

Pain can be mild or severe and usually develops gradually. Pain associated with avascular necrosis of the hip may be focused in the groin, thigh or buttock. In addition to the hip, the areas likely to be affected are the shoulder, knee, hand and foot.

Some people develop avascular necrosis bilaterally — for example, in both hips or in both knees.

## When to see a doctor

See your doctor if you have persistent pain in any joint. Seek immediate medical attention if you believe you have a broken bone or a dislocated joint.

Avascular necrosis occurs when blood flow to a bone is interrupted or reduced. Reduced blood supply can be caused by:

- **Joint or bone trauma.** An injury, such as a dislocated joint, might damage nearby blood vessels. Cancer treatments involving radiation also can weaken bone and harm blood vessels.
- **Fatty deposits in blood vessels.** The fat (lipids) can block small blood vessels, reducing the blood flow that feeds bones.
- **Certain diseases.** Medical conditions, such as sickle cell anemia and Gaucher's disease, also can cause diminished blood flow to bone.

For about 25 percent of people with avascular necrosis, the cause of interrupted blood flow is unknown.

Risk factors for developing avascular necrosis include:

- **Trauma.** Injuries, such as hip dislocation or fracture, can damage nearby blood vessels and reduce blood flow to bones.
- **Steroid use.** High-dose use of corticosteroids, such as prednisone, is the most common cause of avascular necrosis that isn't related to trauma. The exact reason is unknown, but one hypothesis is that corticosteroids can increase lipid levels in your blood, reducing blood flow and leading to avascular necrosis.
- **Excessive alcohol use.** Consuming several alcoholic drinks a day for several years also can cause fatty deposits to form in your blood vessels.
- **Bisphosphonate use.** Long-term use of medications to increase bone density may be a risk factor for developing osteonecrosis of the jaw. This complication has occurred in some people treated with these medications for cancers, such as multiple myeloma and metastatic breast cancer. The risk appears to be lower for women treated with bisphosphonates for osteoporosis.
- **Certain medical treatments.** Radiation therapy for cancer can weaken bone. Organ transplantation, especially kidney transplant, also is associated with avascular necrosis.

Medical conditions associated with avascular necrosis include:

- Pancreatitis
- Diabetes
- Gaucher's disease
- HIV/AIDS
- Systemic lupus erythematosus
- Sickle cell anemia

Untreated, avascular necrosis worsens with time. Eventually the bone may become so weakened that it collapses. Avascular necrosis also causes bone to lose its smooth shape, potentially leading to severe arthritis.

You may be referred to a doctor who specializes in disorders of the joints (rheumatologist) or to an orthopedic surgeon.

## What you can do

- **Write down your symptoms**, including any that may seem unrelated to the reason why you scheduled the appointment.
- **Write down your key medical information**, including other conditions and any history of injury to the painful joint.
- **Write down key personal information**, including any major changes or stressors in your life.
- **Make a list of all your medications**, vitamins or supplements.
- **Ask a relative or friend to accompany you**, to help you remember what the doctor says.
- **Write down questions to ask** your doctor.

## Questions to ask your doctor

- What's the most likely cause of my symptoms?
- What kinds of tests do I need?
- What treatments are available?
- I have other health conditions. How can I best manage them together?

In addition to the questions that you've prepared to ask your doctor, don't hesitate to ask other questions.

## What to expect from your doctor

Your doctor is likely to ask you a number of questions. Being ready to answer them may make time to go over points you want to discuss in-depth. You may be asked:

- Where exactly does it hurt?
- How long have you had this pain?
- Does any particular joint position make the pain better or worse?
- Have you ever taken steroids, such as prednisone?
- How much alcohol do you drink?

During a physical exam your doctor will likely press around your joints, checking for tenderness. Your doctor may also move the joints through a variety of positions to see if your range of motion has been reduced.

### Imaging tests

Many disorders can cause joint pain. Imaging tests can help pinpoint the source of pain. The options include:

- **X-rays.** They can reveal bone changes that occur in the later stages of avascular necrosis. In the condition's early stages, X-rays usually appear normal.
- **MRI and CT scan.** These tests produce detailed images that can show early changes in bone that may indicate avascular necrosis.
- **Bone scan.** A small amount of radioactive material is injected into your vein. This tracer travels to the parts of your bones that are injured or healing and shows up as bright spots on the imaging plate.

The goal is to prevent further bone loss. Specific treatment usually depends on the amount of bone damage you already have.

### Medications and therapy

In the early stages of avascular necrosis, symptoms can be reduced with medication and therapy. Your doctor might recommend:

- **Nonsteroidal anti-inflammatory drugs.** Medications, such as ibuprofen (Advil, Motrin IB, others) or naproxen sodium (Aleve, others) may help relieve the pain and inflammation associated with avascular necrosis.
- **Osteoporosis drugs.** Medications, such as alendronate (Fosamax, Binosto), may slow the progression of avascular necrosis, but the evidence is mixed.
- **Cholesterol-lowering drugs.** Reducing the amount of cholesterol and fat in your blood may help prevent the vessel blockages that can cause avascular necrosis.
- **Blood thinners.** If you have a clotting disorder, blood thinners, such as warfarin (Coumadin, Jantoven), may be recommended to prevent clots in the vessels feeding your bones.
- **Rest.** Reducing the weight and stress on your affected bone can slow the damage. You might need to restrict your physical activity or use crutches to keep weight off your joint for several months.
- **Exercises.** You may be referred to a physical therapist to learn exercises to help maintain or improve the range of motion in your joint.
- **Electrical stimulation.** Electrical currents might encourage your body to grow new bone to replace the area damaged by avascular necrosis. Electrical stimulation can

be used during surgery and applied directly to the damaged area. Or it can be administered through electrodes attached to your skin.

## Surgical and other procedures

Because most people don't start having symptoms until avascular necrosis is fairly advanced, your doctor may recommend surgery. The options include:

- **Core decompression.** The surgeon removes part of the inner layer of your bone. In addition to reducing your pain, the extra space within your bone stimulates the production of healthy bone tissue and new blood vessels.
- **Bone transplant (graft).** This procedure can help strengthen the area of bone affected by avascular necrosis. The graft is a section of healthy bone taken from another part of your body.
- **Bone reshaping (osteotomy).** In this procedure, a wedge of bone is removed above or below a weight-bearing joint, to help shift your weight off the damaged bone. Bone reshaping might allow you to postpone joint replacement.
- **Joint replacement.** If your diseased bone has already collapsed or other treatment options aren't helping, you might need surgery to replace the damaged parts of your joint with plastic or metal parts. An estimated 10 percent of hip replacements in the United States are performed to treat avascular necrosis of the hip.
- **Regenerative medicine treatment.** Bone marrow aspirate and concentration is a novel procedure that in the future might be appropriate for early stage avascular necrosis of the hip. Stem cells are harvested from your bone marrow. During surgery a core of dead hip bone is removed and stem cells inserted in its place, potentially allowing for growth of new bone.

To reduce your risk of avascular necrosis and improve your general health:

- **Limit alcohol.** Heavy drinking is one of the top risk factors for developing avascular necrosis.
- **Keep cholesterol levels low.** Tiny bits of fat are the most common substance blocking blood supply to bones.
- **Monitor steroid use.** Make sure your doctor knows about any past or present use of high-dose steroids. Steroid-related bone damage appears to worsen with repeated courses of high-dose steroids.

## References

1. Ferri FF. Ferri's Clinical Advisor 2015: 5 Books in 1. Philadelphia, Pa.: Mosby Elsevier; 2015. <https://www.clinicalkey.com>. Accessed Jan. 23, 2015.

2. Jones LC, et al. Osteonecrosis (avascular necrosis of bone). <http://www.uptodate.com/home>. Accessed Jan. 19, 2015.
3. Firestein GS, et al. Kelley's Textbook of Rheumatology. 9th ed. Philadelphia, Pa.: Saunders Elsevier; 2013. <http://www.clinicalkey.com>. Accessed Jan. 23, 2015.
4. AskMayoExpert. Who gets avascular necrosis of the hip? Rochester, Minn.: Mayo Foundation for Medical Education and Research; 2015.
5. Questions and answers about osteonecrosis (avascular necrosis). National Institute of Arthritis and Musculoskeletal and Skin Diseases. [http://www.niams.nih.gov/Health\\_Info/Osteonecrosis/default.asp](http://www.niams.nih.gov/Health_Info/Osteonecrosis/default.asp). Accessed Jan. 23, 2015.
6. Chang-Miller A (expert opinion). Mayo Clinic, Phoenix/Scottsdale, Ariz. Jan. 29, 2015.
7. Issa K, et al. Osteonecrosis of the femoral head: The total hip replacement solution. Bone & Joint Journal. 2013;95-B:46.

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