Hughston Health Alert

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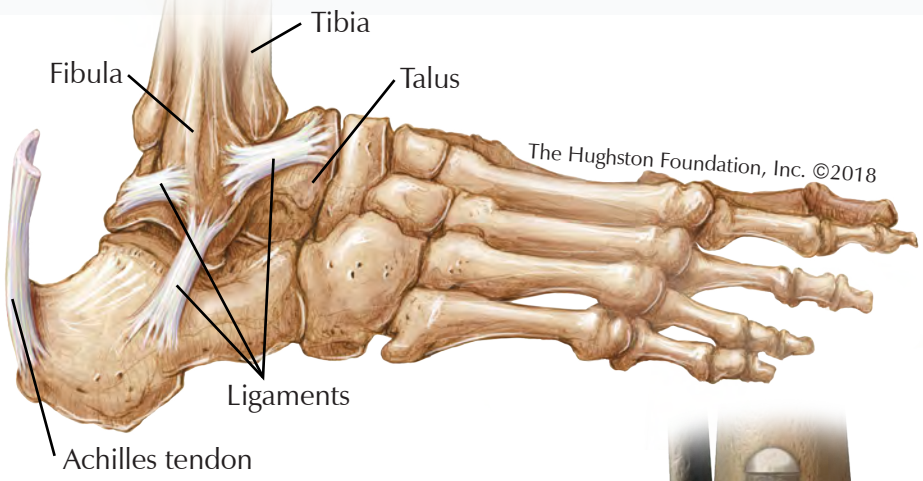
30th Anniversary HUGHSTON HEALTH ALERT

Inside...

Fig. 1. Normal anatomy of the foot and ankle



Total Ankle Arthroplasty

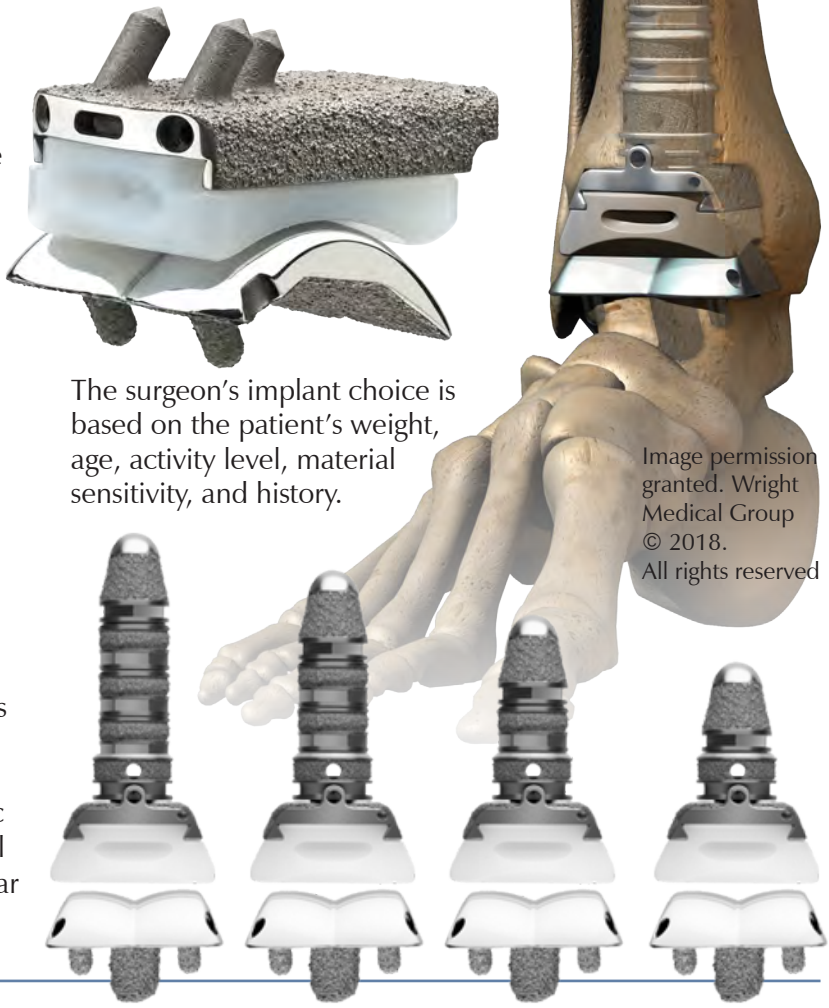
QUESTIONS FOR A SPECIALIST

Total ankle arthroplasty (TAA), also called total ankle replacement, is a surgical procedure that helps to relieve pain and maintain motion in an arthritic or injured joint. The fibula, tibia, and talus bones make up the tibiotalar (ankle) joint (**Fig. 1**). The talus, which is between the leg and foot bones, articulates with the fibula (smaller bone of the lower leg) and tibia (shinbone). TAA is an alternative treatment to ankle fusion, which can relieve pain, but often limits motion of the joint since the procedure permanently fuses the bones together. Depending on your condition, age, weight, and activity level, your doctor may recommend TAA rather than ankle fusion.

Why does my ankle hurt?

Ankle arthritis caused by degeneration of the cartilage, produces a painful, stiff joint that can affect your quality of life. Whereas arthritis in the knee and hip often results from normal wear and tear of the joint due to aging, ankle arthritis most commonly occurs after trauma to the ankle, whether this is from an ankle fracture, chronic ankle instability, or malalignment of the leg. Only a small percentage of ankle arthritis arises from just wear and tear of the joint alone.

Fig. 2. Total ankle replacement hardware options



The surgeon's implant choice is based on the patient's weight, age, activity level, material sensitivity, and history.

What is the treatment for ankle arthritis?

Initially, physicians treat ankle arthritis nonsurgically with anti-inflammatory medications, physical therapy, bracing, and steroid injections. If these conservative measures fail to provide pain relief and the arthritis continues to affect your ability to do everyday activities, surgical options such as an ankle fusion or TAA can help relieve your pain.

Ankle fusion surgery consists of fusing together the bones of the ankle joint. Fusion eliminates motion at the joint and provides pain relief. On the other hand, an ankle fusion can lead to increased stress and wear on the surrounding joints, which can lead to arthritis. This procedure is the gold-standard surgical treatment for ankle arthritis; however, you now have TAA as another option.

What is total ankle arthroplasty (TAA)?

Surgeons perform TAA by removing the arthritic cartilage and part of the bone from the ankle joint and replacing it with metal and plastic components (**Fig. 2**). The goals of TAA are to alleviate pain and regain the range of motion, which will ultimately improve your quality of life. Another benefit of maintaining ankle range of motion is that the surrounding joints in the foot do not take on any additional stress.

Am I a candidate for TAA?

If you have painful arthritis and nonsurgical treatment has failed, you may want to talk to your doctor about TAA. You are a good candidate for ankle replacement if you have maintained ankle range of motion and have minimal to no ankle deformity. Typically, older patients who place less demand and impact on the ankle joint are great candidates; however, younger patients, in their 50s are beginning to have replacements as well.

TAA is not recommended if you have an active or prior deep infection in the ankle joint, inadequate bone to support the implants, or neuromuscular disease that impairs muscles resulting in poor muscle tone and function in the ankle. Additionally, it's not recommended to patients who have Charcot neuropathy (loss of sensation in foot and ankle), severe ankle deformity, prior ankle fusion, or poor musculature quality at the surgical site.

How is the surgery performed?

Orthopaedic surgeons typically perform TAA using general anesthesia with a nerve block around the knee for postoperative pain control. The doctor places a tourniquet around the thigh to help control bleeding and improve visualization during surgery. The surgeon makes an incision in the front or side of the ankle depending on the type of implant used. Guides are then placed on the bones, and their positions are viewed with an x-ray to determine accurate location before any cuts are made. The surgeon cuts the bones, which allows for the placement of metal and plastic components to recreate the ankle joint. Some patients have tight calf muscles or Achilles tendon (connects calf muscle to the heel bone) that needs to be lengthened to help increase the range of motion at the ankle joint. If that is the case, the surgeon does a lengthening procedure as well. Then the surgeon closes the incisions with sutures or staples, and the ankle is placed in a well-padded splint.

Is there a specific technique that is preferred?

I prefer performing ankle replacements through an incision made in the front of the ankle. This approach allows me to visualize both sides of the ankle joint, which can help in cases of mild deformity and ligament (tissues connecting bone to bone) balancing. The prosthesis company that I use offers multiple options of implants depending on the patient's anatomy, age, and activity level. One device provides bone-preserving cuts, which maintain good bone stock whereas another implant provides more fixation in both the tibia and talus, especially in cases of ankle deformity or prior ligament damage.

We can now do virtual surgery before going in the operating room. A technologist takes a computed tomography (CT) scan of the patient's ankle and sends it to the physician. The doctor's office sends the images to the prosthesis company and engineers map out the exact size of the device to match the patient's anatomy as well as implant position. Virtual images of the implant size and position are returned to the surgeon in a document, and we are able to view the surgery before entering the operating room. To match the patient's exact anatomy, patient-specific blocks are also custom made, and are used in surgery to set the cutting guides in the correct position. These guides are very accurate; therefore, we are able to reduce procedural steps, thereby reducing surgical time and increasing efficiency.

What happens after surgery?

After surgery, you will spend 1 to 2 nights in the hospital; however, some surgeons perform TAA as an outpatient procedure either in a hospital or surgery center. After you go home, your physician will give you a strict elevation regimen to follow for several days that helps reduce swelling and improve wound healing. You will be nonweightbearing in a splint or cast for 3 to 4 weeks, and then you can bear weight as tolerated in a walking boot for another 3 to 4 weeks. Typically, after 6 weeks, you can return to a regular shoe and begin physical therapy to work on range of motion and strengthening the ankle.

Patients often ask why they cannot walk on their ankle for a period after surgery. Early range of motion in total hip or knee replacement is encouraged because there are no concerns with wound breakdown during early movement. However, this is not the case in total ankle replacements. The skin around the ankle is very thin, especially in the

front of the ankle where a tendon lies just underneath the incision. Early motion in TAA causes the tendon to glide back and forth beneath the incision, producing friction, which can lead to wound problems. For this reason, surgeons immobilize the ankle for a short period after surgery to encourage healing of the incision before any ankle movement.

What are the potential complications?

In general, problems that can arise from surgery include blood clots in the leg, infection, excessive blood loss, and complications associated with anesthesia. Some complications that can occur specifically with TAA include fracture of the bone on either side of the prosthesis whether this is the tibia, fibula, or talus. Wound healing can be a problem, especially in higher-risk patients who are diabetic or have peripheral vascular disease (poor circulation) and those who continue to smoke. Implant failure can result if the bone fails to heal to the metal components. As in all total joint replacements, the plastic component between the metal device can wear out, which could result in loosening of the implant from the bone. This typically requires revision surgery to replace the implants for bony ingrowth. Lastly, if the TAA fails, then you may have the option of removing the TAA device and converting the ankle to a fusion.

What are the typical outcomes of TAA?

Patients typically return to their regular activities after TAA. Surgeons generally recommend low impact activities after ankle replacement to prolong the life of the implant. Generally, the TAA device will last 10 years or more. Overall, ankle replacement surgery has come a long way over the past 30 years, and the implants are continuing to be improved.

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Why Tape My Ankle?

Ankle taping is commonly used in athletics, but why is it done? Initially, an athletic trainer may tape your ankle to help reduce the swelling that often occurs right after an injury. Later, taping the ankle provides the external stabilization that your stretched ligaments (tissues connecting bone to bone) need while they heal. Additionally, after you have completed rehabilitation and are ready to return to play, the athletic trainer may tape your ankle for extra support to avoid another injury.

The method used to tape your ankle depends on the type of injury you incurred. The most common type of ankle injury is an inversion (turning inward) ankle sprain (stretching or tearing a ligament). This occurs when the athlete's ankle turns "in" or "under," forcing the 5th digit (small toe) towards the ground. When this injury occurs, ligaments are stretched leaving the ankle unstable in the process. Once you have sprained your ankle, it will be more susceptible to sprains in the future because the stretched ligaments are weaker. This is where taping helps.

Taping after an inversion ankle sprain

The athletic trainer will first apply adhesive spray to hold heel and lace pads and a prewrap in place. The pads and prewrap protect the skin by reducing friction, which results in fewer blisters, and makes removing the tape easier and less painful. Next, a base layer of 1 to 3 pieces of tape, called anchor strips, are placed at the base of the calf muscle, half on the prewrap and half on the skin. The anchor strips do just what they imply; they anchor the tape by providing a base for the other tape pieces to stick. Then, the athletic trainer

Fig. 1. Ankle taping steps

Top: Basket weave

Bottom: Figure 8 (red tape)

Top: Heel locks (blue tape)

Bottom: Final wrap with anchor strips

Fig. 2. Resistance band ankle strengthening exercises

4-way ankle exercises

Towel slides

adds a series of alternating stirrup and horseshoe strips, forming a weave (**Fig. 1**). When the stirrup strips are done, they should form a fan shape to cover the malleoli (the bony projections at the ankle). The horseshoe strips provide the basic support needed at the sides of the ankle joint. Next, the trainer applies 2 heel-locks that keep the heel in place, slightly limiting motion and providing support for the ankle. Then the trainer places strips in the shape of a figure 8. Once these strips are in place, the athletic trainer finishes with multiple strips of tape placed in a circular motion similar to the anchor strips, ensuring that the taping application stays and does not unravel.

Be proactive to prevent injury

Once you have an ankle injury, strengthening exercises and balancing drills can help you be proactive in preventing further harm. You should perform several repetitions of each exercise 2 to 3 times a day. The 4-way ankle strengthening exercise is performed by placing a resistance band on the ball of the foot, and then moving the ankle joint in an up and down, and side-to-side "t" pattern. Additionally, perform towel slides by placing a towel flat on a smooth surface, and then placing the foot at the end of the towel. Then use your foot to pull the towel to the left and then right (**Fig. 2**).

Similarly, restoring proper balance is important to reduce risk of injury as well by placing more outside forces on the ankle to help strengthen it. Balancing drills such as single-leg stands with increasing difficulty levels, adding ball tosses and unstable surfaces can help you regain confidence in your ankle and ability to balance (**Fig. 3**). When performing these exercises correctly, they enhance the ankle's overall strength and decrease the likelihood of another injury.

Fig. 3. Balancing drills

Single-leg stand - with ball toss

A stabilizing effect

Ankle sprains are a common injury among athletes of all ages and level of participation. As a result, athletic trainers look for the best ankle stabilizer that will reduce injuries while minimizing the effect it may have on your performance. The ideal ankle taping method should be restrictive and comfortable while functional and protective. It should provide the extra support you need to feel confident in your return to play. Once you have completed all the necessary rehabilitation and regained confidence in your ankle, then taping may cease.

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Traumatic Patellar Dislocation

During a traumatic event, such as a fall, auto accident, or sports injury, the patella (kneecap) can completely or partially dislocate. A patellar dislocation occurs when the patella "jumps" out of the trochlear groove (a groove that holds the patella in line) and usually moves toward the outside of the knee. With patellar dislocations, often the most recognized damage is to the medial patellofemoral ligament (MPFL). A MPFL tear allows the patella to move out of place; and then, when it returns to its normal position, the patella damages the trochlea, causing bone bruising or fractures. Three bones form the knee joint—the tibia (shinbone), the femur (thighbone), and the patella, and these bones are held in place by a group of ligaments (tissues connecting bone to bone) and tendon (connects muscle to bone). These include the patellar ligament, medial and lateral patellotibial ligaments, medial patellofemoral ligament, and quadriceps tendon. As you move your leg, the patella glides up and down on top of the femur inside the trochlea (**Fig.1**).

Symptoms

Patellar dislocations occur most commonly in young athletes and can be a result of a direct blow to the knee or patella. After a kneecap dislocation, a patient often experiences pain, swelling, and hemarthrosis (a collection of blood) in the joint. The kneecap usually is displaced toward the outside, but the appearance of the knee may lead the untrained eye to think the patella moved toward the inside because the shape of the large medial femoral condyle, the bony projection at the end of the femur (**Fig.2**). It may be painful to walk or to bear weight and the range of motion of the knee may be limited. The patella may need to be reduced, or put back in place, or it may spontaneously reduce (return on its own). The doctor can perform the reduction by gently straightening the knee and placing a side-directed force to the patella. After reduction, an immobilizer or hinged knee brace is worn to keep the knee in full extension (straight) to protect it from dislocating again while it heals. This injury can have long-term consequences, such as instability of the patella, pain, recurrent dislocation, and patellofemoral osteoarthritis.

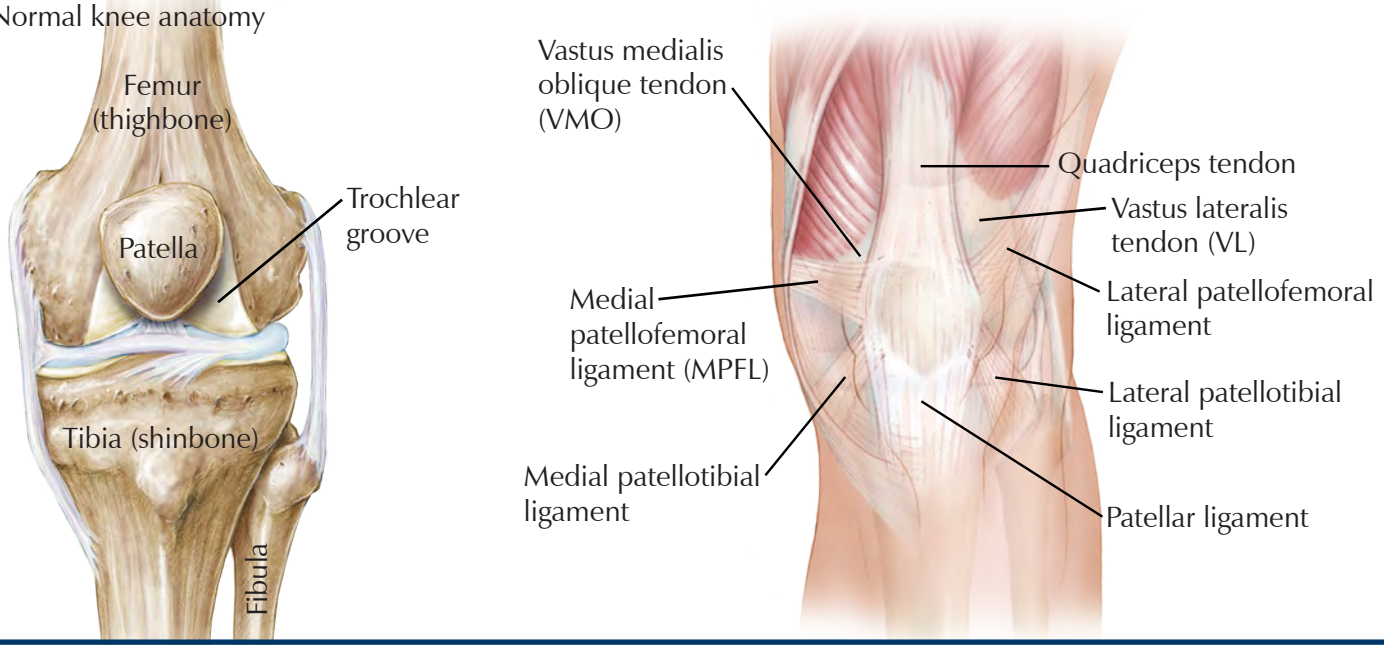
Diagnosing the injury

An orthopaedist should examine your knee after a patellar dislocation. During the doctor's visit, the physician will take a medical history and perform a physical exam, which helps evaluate the nature of your injury. Your physician will order x-rays and may elect to order a magnetic resonance imaging (MRI, a scan that shows the bones, muscles, tendons, and ligaments). Not all first-time patellar dislocations require an MRI, but based on the severity of your injury and the results of your physical exam the test can help determine the extent of other damaged structures within your knee. During the visit, the orthopaedist will likely ask questions to help determine the course of treatment. For example, is this the first time you have injured your knee or have you had other problems with your knee before. The information can help determine if the injury is due to trauma, if it is the result of malalignment of the patella, or if you have a history of patellar instability.

Nonsurgical treatment

Your orthopaedist will decide on a course of treatment based on information ascertained about your knee and the history of your injury. Initially, your physician may elect to have you wear a brace that allows minimal weight-bearing, control pain with medications, and have you transition to a physical therapy program. During physical therapy, range of motion will be the focus for the first 4 weeks. Then, strengthening exercises start around 4 to 6 weeks and

Fig. 1. Normal knee anatomy



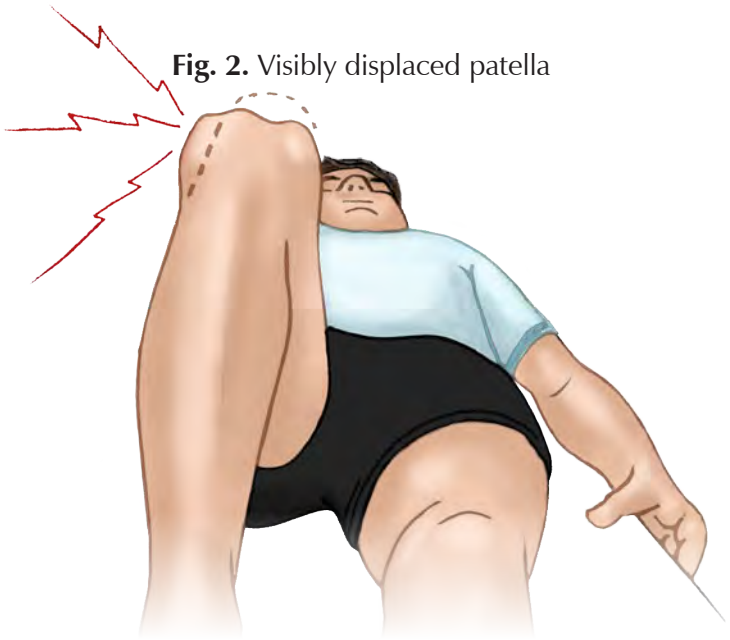


Fig. 2. Visibly displaced patella

sports-specific training between 6 and 10 weeks. Often, you can return to sport at 10 to 12 weeks as long as there are no other dislocations.

Surgical treatment

After a course of therapy, if your patella continues to dislocate or feels unstable your surgeon may offer surgical intervention. Surgery would include knee arthroscopy, to look at the inside of the knee for damage, and an open procedure to stabilize the patella. This can be done with a procedure called proximal extensor mechanism realignment. This procedure takes tissue available in the knee and tightens the stretched-out structures. It also loosens tighter structures to balance the forces of the patella, and the trochlea groove it slides in. After the arthroscopic portion of the procedure, a 3 to 4 cm vertical incision is made over the upper portion of the patella to gain access to the vastus medialis oblique (VMO) and vastus lateralis (VL) tendons. While the knee is bent at 30 degrees the VMO attachment is removed from the upper inside pole of the patella. It is then advanced (pulled) over the superior medial body of the patella, essentially tightening it, and reestablishing stability as this is the loose side. With the knee still bent, the VL is also released in a similar fashion; however, it is reattached to the center of the patellar ligament; thereby loosening the more contracted side. This surgery is usually an outpatient procedure or a short 23-hour hospital stay. Risks include infections, blood clots in legs, problems with anesthesia, stiffness of the knee, and damage to nerves, arteries or veins.

Returning to your sport

After surgery, rehabilitation is similar to early conservative treatments, such as physical therapy that first concentrates on range of motion, then strength training, followed by sports-specific training. Your physician will not recommend returning to your sport until you have reached the strength and agility levels you had before injury. You should not be surprised if it takes you a little more than 3 to 6 months to return to your pre-injury level.

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Can't Catch Your Breath? Could it be Exercise-induced Bronchospasm?

Have you ever had shortness of breath or tightness in the chest during exercise? Has anyone told you that your symptoms were because you are out of shape? Although high-performance athletes appear to be physically fit some of them struggle during or after intense workouts. Coaches and training staff need to be aware of a more serious underlying ailment that can affect performance.

What is exercise-induced bronchospasm?

Exercise-induced bronchospasm (EIB) is an asthma-like condition that causes the airway to temporarily narrow during strenuous activity. This condition is seen in school-aged athletes and older adults who participate in moderate to vigorous exercise.

Certain types of indoor and outdoor environments can be a major factor in an EIB attack. For example, EIB is more commonly seen in people who exercise during the winter months due to the colder temperatures and in those who also participate in aquatic exercise. Because of the decreased amount of moisture it holds, cold air causes the airway to become dehydrated. Breathing in colder temperatures can also cause inflammation in the lungs and trigger a spasm of the bronchial tubes. Additionally, the re-warming of the airways that occurs after exercise can reverse the bronchial reaction and exacerbate the symptoms of EIB.

One trigger for EIB attacks is the high concentration of gas particles found in indoor pool facilities. The chemicals used to maintain the pool and the limited airflow cause irritation and drying of the airways. Another EIB trigger that can occur is when an athlete develops hyperventilation (abnormal fast or deep breathing) during vigorous exercise. Heavy breathing causes the airways to dry out, which leads to a dehydration of the cells lining the airway. The cells' internal chemical balance is disrupted, which causes a chain reaction of chemicals to be released, leading to the spasm of the bronchioles.

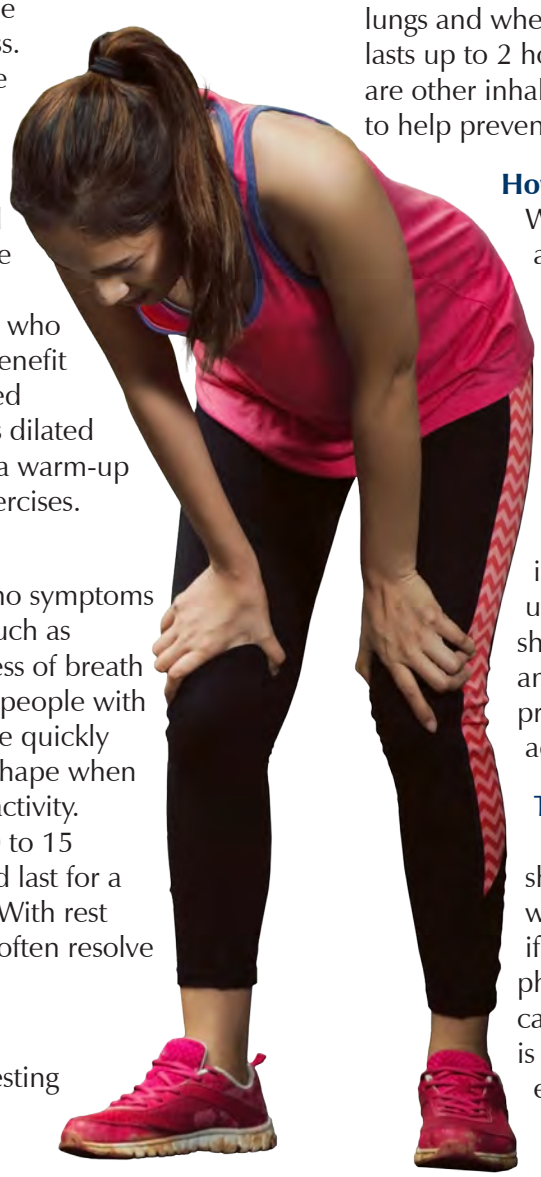
Is EIB different from asthma?

While the term exercised-induced asthma (EIA) is used almost interchangeably with EIB and their symptoms are similar, the 2 conditions are not the same. The main difference is that EIB occurs in people who do not have a history of asthma and the bronchospasms only occur during exercise;

therefore, these patients only receive treatment before exercise. For those who do have asthma, their airways are always inflamed and with EIA specifically, exercise is a trigger that exacerbates their condition. Additionally, for EIA patients, treatment focuses toward reducing symptoms all the time, not just during exercise.

How are EIB and EIA similar?

In both EIB and EIA the airways become restricted, making breathing, and especially exhaling difficult. The symptoms are similar as well, such as wheezing, coughing, shortness of breath, tightness in the chest, fatigue, and lightheadedness. Triggers for each condition include cold dry air, environmental allergens, chlorine, and intense exercise. When an EIB or EIA attack occurs, both can be treated with inhaled steroids or immediate removal from activity with proper hydration. For prevention, people who suffer from either condition can benefit from the use of short-acting inhaled steroids that work to keep airways dilated (opened wider) or by performing a warm-up that consists of a short burst of exercises.



Signs and symptoms of EIB

An EIB attack will present with no symptoms most of the time, although signs such as wheezing, dry cough, and shortness of breath can develop after exertion. Some people with this ailment become fatigued more quickly than others or seem to be out of shape when trying to participate in strenuous activity. Symptoms of EIB usually occur 10 to 15 minutes after intense exercise, and last for a short duration after activity ends. With rest and proper treatment, symptoms often resolve and go away quickly.

Diagnosing EIB

There are 2 common types of testing used to diagnose EIB: exercise challenge tests and bronchial provocation tests. Exercise challenge tests can be completed in either the field or laboratory setting. The test begins with a lung capacity reading prior to the start of exercise, followed by 8 to 10 minutes of intense exercise and then the lung capacity reading is taken again immediately after the exercise. In a laboratory setting, the bronchial provocation test begins with a lung capacity measurement. Then the patient inhales a substance that causes bronchoconstriction (narrowing of the airways) to occur, followed by another lung capacity measurement.

How can an active person treat EIB?

Both nonpharmacological (without drugs) and medication strategies can be used to treat an EIB attack. Nonpharmacological methods include resting immediately after strenuous exercise and drinking room temperature water to avoid further bronchoconstriction. Another nondrug treatment is to inhale and exhale into a paper bag or mask to warm and moisten the airway. A bronchodilator is a common pharmacological treatment that consists of a metered-dose inhaler that contains a drug called albuterol. This bronchodilator is a drug that opens the airway of the lungs and when taken 15 minutes before exercise, it often lasts up to 2 hours. Salmeterol, cromolyn, and nedocromil are other inhaled medications people take prior to activity to help prevent EIB.

How can someone prevent EIB?

While it can be difficult to prevent an EIB attack in some situations, there are steps an active person can take to help decrease the likelihood of an episode occurring. These steps include exercising in a well-ventilated area, with warm, moist air, and avoiding air pollutants. A pre-activity warm-up that includes exercises that increase heart rate, such as short bursts of vigorous wind sprints (intervals), can help induce a symptom-free period that lasts up to 3 hours. Additionally, research has also shown that diets low in sodium and high in antioxidants and fish oils decrease the prevalence of EIB symptoms and frequency in active people.

Take a deep breath and get checked out

If you experience the symptoms—the shortness of breath, fatigue, dry cough, and wheezing—consult with your doctor to see if you are experiencing EIB or EIA. Once your physician makes the diagnosis, your treatment can begin. Keep in mind, however, prevention is key, such as warm-up before you begin exercise, stay hydrated, and exercise in well-ventilated areas. With the proper prevention and treatment plans, the physically active patient who suffers from EIB can exercise and play sports at their full potential.

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