Hughston Health Alert

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Inside...

Total Knee Replacement

Most knee pain is caused by osteoarthritis, a condition where the cartilage in the knee breaks down over time (**Fig. 1**). As the cartilage wears away, the bones in the knee can rub against each other, causing pain, stiffness, and swelling. Arthritis can also develop after a serious knee injury, such as a fracture or ligament tear, leading to long-term joint damage and pain. Rheumatoid arthritis and other autoimmune conditions cause the body's immune system to attack the knee joint, leading to inflammation, pain, and eventual joint damage. In all these cases, knee replacement surgery can help relieve pain and restore mobility.

Knee anatomy

The knee is the largest joint in the body, connecting the femur (thighbone) to the tibia (shinbone). At the front of the joint is the patella (kneecap), which protects the knee and facilitates smooth movement. The ends of these bones are coated with smooth articular cartilage, which minimizes friction and enables the bones to slide easily against one another. Inside the knee, 2 C-shaped pieces of cartilage, known as the meniscus, act as cushions and help absorb shock. Ligaments, such as the anterior and posterior cruciate ligaments (ACL/PCL), and medial and lateral collateral ligaments (MCL/LCL) are tough bands of tissue that connect the bones and provide stability. Tendons, like the patellar tendon, attach muscles to the bone and assist in movement. Small fluid-filled sacs, called bursae, reduce friction, allowing the knee joint to move smoothly. Under

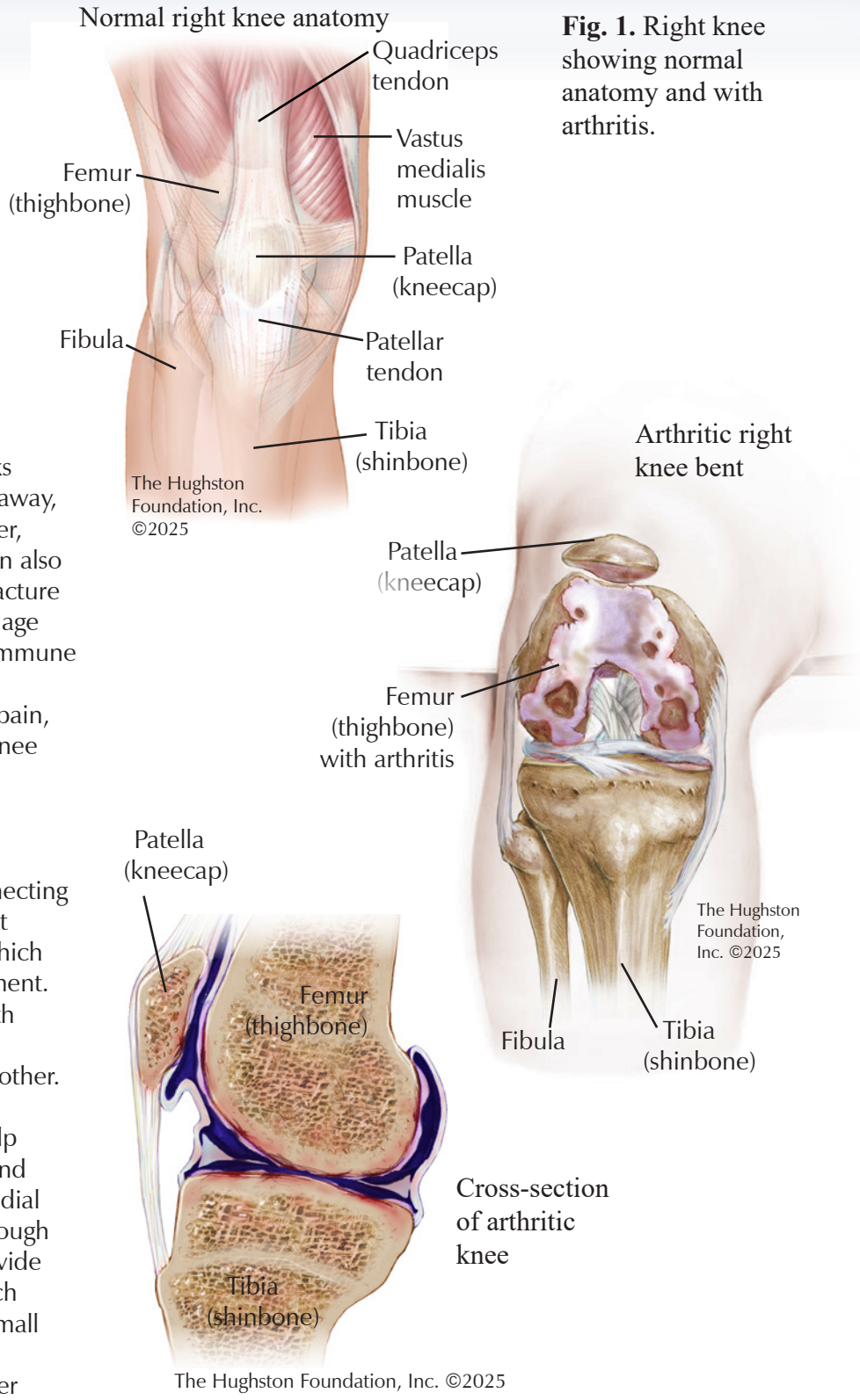

Fig. 1. Right knee showing normal anatomy and with arthritis.

normal circumstances, these components work together seamlessly, but disease or injury can disrupt this balance, causing pain, weakness, and diminished function.

Signs and symptoms

The signs of knee conditions can be similar. Common symptoms include knee pain, which may worsen with activity and stiffness that makes it hard to bend or straighten the knee. Swelling and tenderness around the knee joint are also frequent signs, and in severe cases, the knee may feel unstable or weak leading to buckling. Over time, this can lead to muscle weakness and further symptoms. People with these conditions can have difficulty walking, climbing stairs, or participating in everyday activities.

Nonoperative management

At-home treatment

For those dealing with knee pain, simple treatments at home can help manage symptoms and improve function. One of the most effective ways to reduce pain and strengthen the knee is through quadriceps strengthening exercises. The quadricep muscle, located at the front of the thigh, plays an important role in stabilizing the knee. Exercises like leg raises, squats, and straight-leg raises can strengthen these muscles, taking pressure off the knee joint and reducing pain over time. Low-impact exercises such as swimming, cycling, and walking on soft surfaces are gentle on the knees while boosting strength and mobility. These activities can improve joint mobility and muscle strength without causing additional wear and tear on the knee joint. Weight loss is also essential, as carrying extra weight puts added pressure on the knee, especially for those with osteoarthritis. Even losing a small amount of weight can make a noticeable difference in knee pain and function. Focusing on a balanced diet and engaging in regular low-impact exercise can help achieve and maintain a healthy weight.

Prescribed treatments

In addition to at-home treatments, several nonoperative treatments can be highly effective for managing knee pain. One of the most common is physical therapy. A physical therapist can create a tailored exercise plan to strengthen muscles, improve flexibility, and prevent further damage. Physicians often recommend combining nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, with physical therapy to reduce inflammation and relieve pain. Activity modifications, like avoiding high-impact activities and opting for low-impact exercises, can also reduce stress on the knee. Elevating the leg, using a knee brace, or applying ice can further assist with the swelling and discomfort.

Your doctor can recommend an injection if oral medications and activity modifications do not improve symptoms. Different types of injections exist, but the most common is a cortisone injection, which helps decrease pain through an anti-inflammatory response directly in the knee joint.

Total knee replacement

When nonsurgical treatments no longer provide relief, your physician can recommend total knee arthroplasty (TKA), or knee replacement surgery (**Fig. 2**). The artificial components, which are made of metal and plastic, mimic the body's natural anatomy and movement of the knee joint. After the procedure, patients rest in a recovery area for a short time. Depending on your health, some patients are moved to a hospital room, while others go home the same day. Once you are home, physical therapy, which is an important part of the healing process, begins to help improve flexibility, strengthen the muscles around the

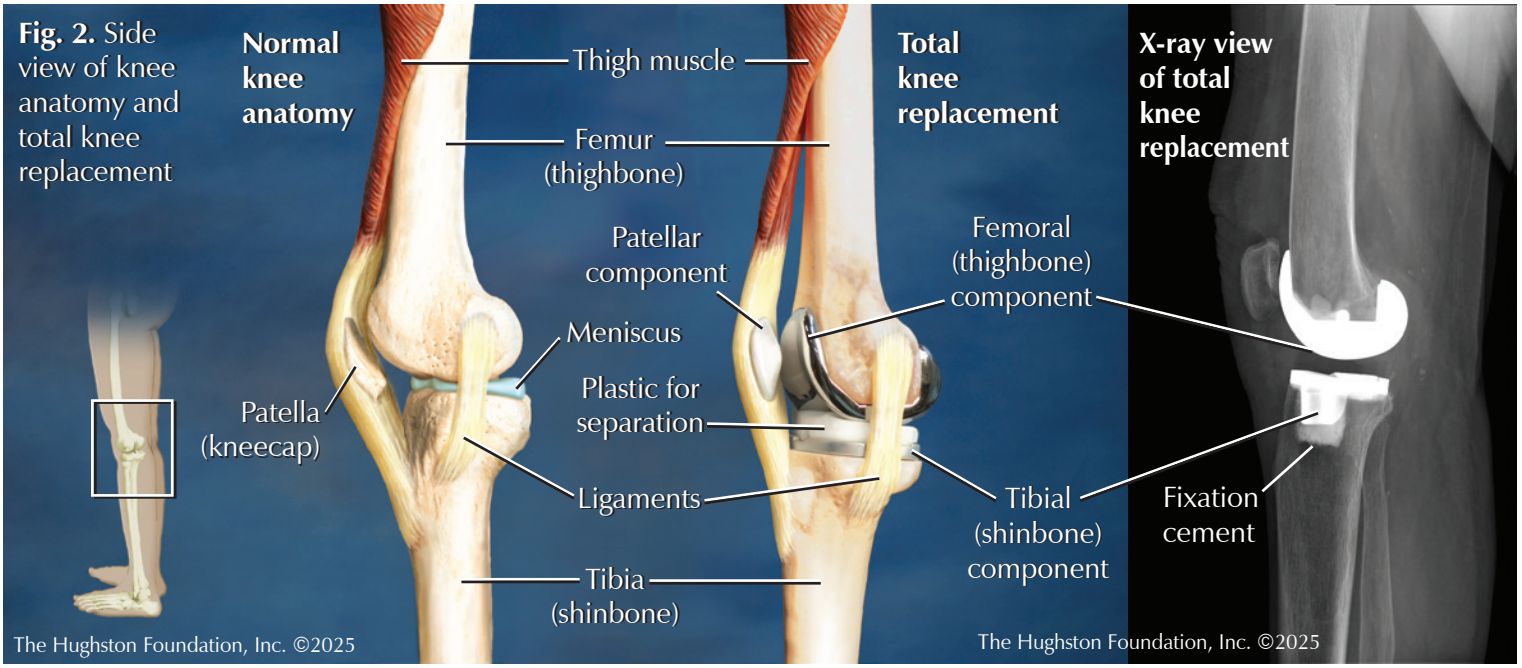

Fig. 2. Side view of knee anatomy and total knee replacement

knee, and decrease postoperative complications.

Total knee implant components

Orthopaedic surgeons use 4 basic components in a total knee replacement: 1) the femoral (thighbone) component, 2) the tibial (shinbone) component, 3) a plastic insert between the femur and tibia, and 4) the patellar (kneecap) component. During total knee arthroplasty, the surgeon cuts away the diseased ends of the femur and the tibia, and sometimes resurfaces the back of the patella. When removing the ends of the bones, the meniscus (crescent-shaped soft tissue between the tibia and femur) and the anterior cruciate ligament are removed. The medial and lateral ligaments remain in place to stabilize the replacement components. The ends of the femur and tibia are replaced with metal parts, and a plastic component replaces the meniscus between them. The surgeon can also substitute a plastic component to replace the joint surface of the patella.

Metallic orthopaedic implants are made metal alloys. An alloy is defined as a substance that has 2 or more metals fused, or dissolved, together. A cobalt-based alloy (cobalt, chromium, molybdenum) is often used in the femoral and tibial components. The cobalt-based alloy is well suited for use in joint replacement surgery because it has good resistance to wear and corrosion and it has biocompatible properties, which means the body is less likely to reject it.

Surgical approach

Over the years, orthopedic surgeons have refined the surgical approaches used in knee arthroplasty. The goal of the surgical approach is to gain enough exposure (allowing access and visualization of the bone) to complete the surgery while minimizing the effects to the surrounding tissues. Improvements in both technique and instruments have allowed surgeons to minimize injury to the muscles and tendons. With a trend towards shorter hospital stays, and even outpatient surgery, we continue to look for new ways to speed recovery after surgery. Each surgical approach has its advantages and disadvantages; but how the surgeon performs your surgery often depends on his or her own preference, as well as your overall health and health history.

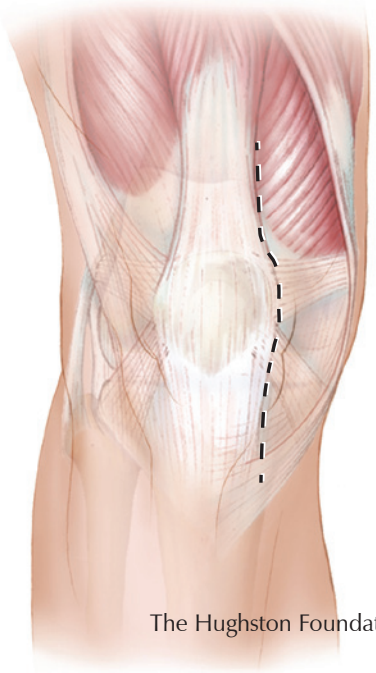

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Fig. 3. Medial parapatellar surgical approach to the knee. Dotted line shows incisions on the right knee.

The medial parapatellar approach has been the standard incision for orthopedic surgeons for many years (**Fig. 3**). The medial parapatellar incision descends down and around the patella, offering the best view of the joint. The disadvantages, however, include cutting into the quadriceps tendon, which then requires repairing. Further, the surgeon flips the patella over during the procedure, which can sometimes stretch its vascular supply.

During surgery, the metal components are securely attached, or fixated, to the bone. The surgeon can achieve fixation with a press-fit design (the textured metal creates a tight fit) or by using polymethylmethacrylate (PMMA) cement. PMMA is like a grout that holds the metal components to the bone. Moreover, the PMMA is radiopaque so the cement is visible on x-rays, and the surgeon can add antibiotics to the cement mixture to help decrease the risk of infection.

Outcomes

The outcomes of a total knee replacement surgery are generally very positive, especially for people who suffer from chronic knee pain due to conditions like arthritis or injury. While the recovery process can take time, many people experience significant pain reduction and improvement in their ability to walk, run, or jump. Most people are back to full activities about 3 months after the operation, but full recovery can take up to a year.

In the long term, total knee replacements can last 25+ years, although it depends on the individual and activity level. Overall, many people are very satisfied with their total knee replacement. It allows them to return to normal activities and enjoy a better quality of life, free from the constant knee pain they experienced before the surgery.

When is the right time?

In most cases, joint replacement surgery is elective, meaning the timing is up to you. The decision largely depends on the level of pain and impact on function. If you're experiencing severe pain in your knee that makes it difficult to move, walk, or climb stairs, it's time to consult with your doctor. If nonoperative treatments do not provide relief, surgery can be a reliable and effective solution to help you return to an active lifestyle with reduced pain.

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Shin Splints

MEDIAL TIBIAL STRESS SYNDROME

Medial tibial stress syndrome (MTSS), commonly referred to as shin splints, affects up to 35% of athletes each year. Shin splints involve pain along the anteromedial (front-inside) of the tibia, or shinbone (larger bone of the lower leg) (**Fig**). The first known mention of shin splints occurred in 1958; however, it suffices to say that people suffered from the condition long before. Of note, a recent archeological team uncovered a 500- to 800-year-old skeleton with features consistent with MTSS.

Symptoms

MTTS often occurs bilaterally, meaning in both legs, and felt at the middle to distal (closer to ankle) portion of the lower leg. Pain often arises during the beginning and at the end of workouts and tends to subside around the mid-point of an activity. The pain often disappears with rest but may persist for a short time, depending on the chronicity of the condition. If MTSS has become chronic, the pain may last longer into exercise, persist even after cooling down, and become almost constant. MTSS is a gradual-progressive condition, often exacerbated as the athlete continues training, leading to worsening symptoms with each activity.

Risk factors

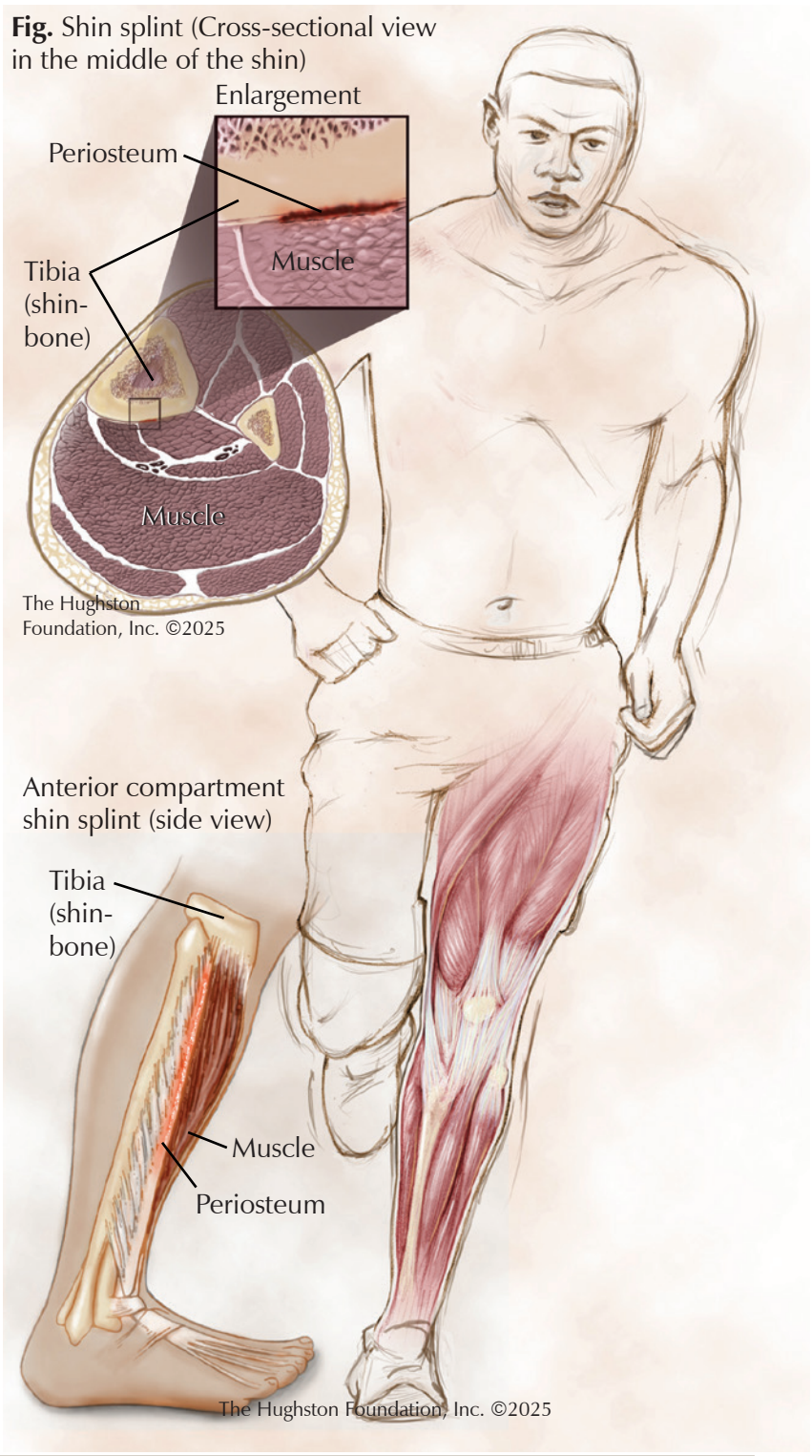
MTSS tends to occur in athletes exerting forceful energy against the ground, which explains why it often affects runners, jumpers, and new military recruits. However, it also results from overuse of the lower extremities. The true culprit comes from a sudden change in volume or intensity of training, which particularly appears in runners increasing their activity and new military recruits who suddenly begin long runs or daily marches. A classic case can happen when a patient who runs 1 to 2 miles a day decides to start training for a marathon, running 9 to 10 miles per day, and develops anteromedial lower leg pain. Other common causes include footwear with minimal cushion, running on uneven or hard surfaces, improper warmup, and foot abnormalities in conjunction with increased running volume.

Among the foot abnormalities are flat feet and hyperpronation (inward rolling). Hyperpronation causes improper biomechanics of the lower extremity, creating undue stress on the tibia and muscles of the lower leg. These features combined create microfractures of the bone and traction periostitis (inflammation of the covering of bones) due to either the soleus, flexor digitorum longus, or tibialis posterior pulling on the bone to perform lower extremity movements. The periostitis and microfractures involve cytokine (chemical messengers) release, which promotes pain, swelling, and tenderness. The condition is more common in women, those with higher body mass indexes (BMI, a measurement often used to determine healthy weight status), smokers, and people with vitamin D deficiency.

Medical evaluation

Often, people who suffer from shin splints do not undergo a formal medical evaluation. The symptoms are often self-limiting to the point that people decrease their activity to reduce the

Fig. Shin splint (Cross-sectional view in the middle of the shin)



pain, which results in symptoms either improving or diminishing. When a patient does see a doctor, MTSS is diagnosed by history and physical examination alone. On physical examination, there may be pain on percussion (tapping) of the shinbone or tenderness to palpation (pressure) in the symptomatic area. During physical examination, the patient walks and demonstrates range of motion of the ankles, knees, and hips. The physician can also provide resistance to plantarflexion (pointing toes toward the ground), which will provoke pain. Imaging, including computed topography (CT or CAT scan) and magnetic resonance imaging (MRI) are rarely needed unless you have swelling, redness, or loss of sensation.

Treatment

Conservative therapies include rest, activity modification (such as swimming instead of running), icing, stretching, and wearing compression stockings. Resting is the most popular treatment as it combats the overuse that causes MTSS. In the acute phase (first onset), resting, icing, and nonsteroidal anti-inflammatory drugs, such as ibuprofen or naproxen sodium are more beneficial, but as time progresses, activity modification helps to mitigate future symptom flare-ups. Recovery should be gradual since setbacks can occur. If you start exercising again and the pain recurs, take a few days to rest. Then, you can start at a less intense activity level and increase the intensity more gradually than before, giving your body time to adapt to the new stresses. Rarely do you need surgery for shin splints.

Avoiding Chronic MTSS

Most people can adapt to MTSS with few issues by listening to your body and finding what works best for you. However, returning right back to previous activity levels without modification or intensity changes can cause a recurrence of symptoms. You should adjust your routine upon onset, since avoiding recovery can prolong your symptoms and lead to the development of chronic MTSS, where pain persists even after exercise, or leads to a stress fracture. Chronic MTSS can be difficult to overcome, so pushing through the pain is not wise.

Prevention

You can avoid shin splints altogether by taking a few preventive measures. First, make sure your shoes are designed for your sport. For example, runners should wear running shoes and basketball and tennis players should wear court sneakers. You should also cross train to take a day off from your usual regimen. You can substitute a jogging day with a lower impact exercise such as cycling. Take it slow, increase your time or distance gradually, so your body can adjust to the change.

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Wide-Awake Local Anesthesia No Tourniquet

Wide-awake local anesthesia no tourniquet, or WALANT, is an anesthetic technique used by surgeons to achieve pain control at the procedure site through a local injection. Most surgeons use WALANT in the upper extremity for cases such as trigger finger release, carpal tunnel release, flexor tendon repairs, and fracture care; however, the technique is gaining popularity for other areas, including trauma and foot and ankle surgery.

Dr. Donald H. Lalonde first described using wide-awake local anesthesia with no tourniquet in treating operative hand cases. Since its introduction in the 1990s, WALANT has continued to gain popularity among surgeons with high patient satisfaction and clinical outcomes. The surgeon uses a very small needle to inject a mixture of lidocaine, epinephrine, and bicarbonate. Lidocaine is used as a local anesthetic or numbing medication to block pain, while epinephrine causes vasoconstriction and prevents bleeding. Sodium bicarbonate buffers the solution to make it less painful. This anesthetic technique allows the patient to be awake during their surgical procedure without pain from the surgery or from a tourniquet.

Steps for an effective WALANT procedure

The surgeon first sees you in the preoperative waiting area to mark the surgical site and explain the procedure in detail. After the staff moves you to the operating room, the physician presses firmly near the injection site to help decrease the initial needle stick you will feel. The doctor stabilizes the syringe with the injection using both hands and slowly injects a small amount under the skin. The surgeon then asks you to say when the pain has stopped from the initial needle stick. At that time, the physician slowly injects more of the local anesthetic mixture. Ideally, you will only feel the first part of the injection. The surgeon then continues to inject the operative site with the anesthetic mixture to ensure you gain the full anesthesia effect.

Can I feel anything during a WALANT procedure?

You will feel the initial part of the injection, similar to an IV, which is what you would otherwise feel if you had surgery under general anesthesia. During the procedure, you may be able to feel that the surgeon is doing something, but you do not feel anything painful. What you can do is move your hand, if instructed to do so by your surgeon, and you can listen as the surgeon tells you what is happening. You can bring headphones to listen to music or watch a video to distract yourself if you believe this awareness may bother you.

What are the benefits of WALANT?

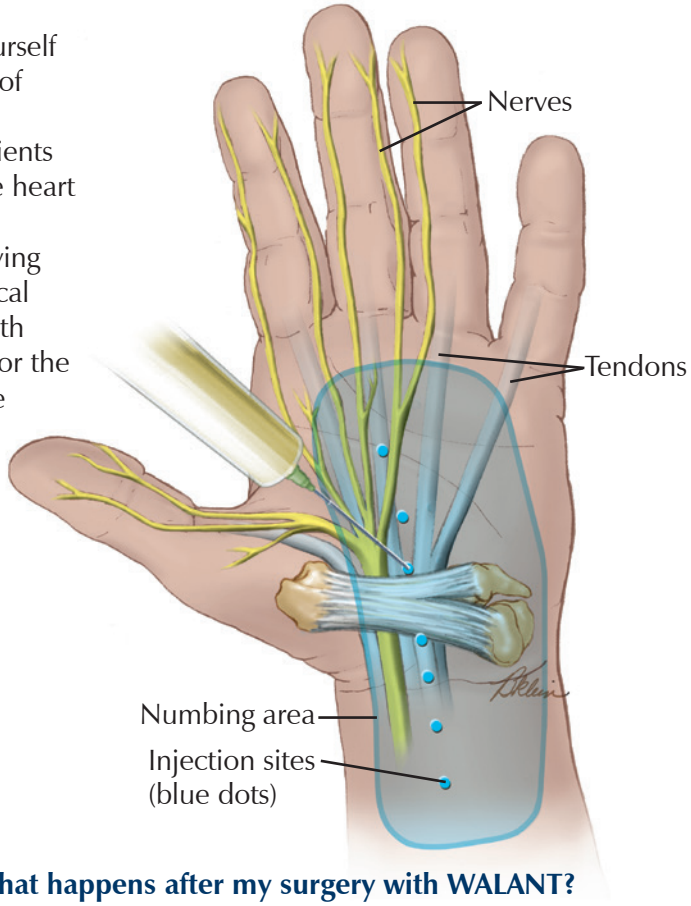
Some of the major benefits of WALANT surgery include what you don't need, such as no required preoperative

testing, no IV line, no formal sedation, and no monitoring during the procedure. In some cases, anticoagulation medications (blood thinners) may be continued. You may drive yourself to and from surgery. If you want, you can go back to work the day of surgery if your physician approves. You do not have to fast prior to surgery. There is no tourniquet pain. It is safe and preferred for patients with poor peripheral circulation, vascular conditions, and extensive heart or lung conditions.

Another added benefit is the ability for you to participate by moving your extremity as indicated by the surgeon depending on the surgical procedure. Staying awake and engaged for the procedure helps both you and the surgeon. Active participation offers many advantages for the surgeon to evaluate the success of the surgical procedure. You have the ability to perform active range of motion, enabling surgeons to assess the procedure and make adjustments if necessary. You can also visually see the results of the procedure, which can be helpful during rehabilitation.

Over the past decade, the WALANT technique has proven to be valuable to both patients and surgeons by optimizing patient satisfaction and providing substantial healthcare savings. The advantages of WALANT offer patients the convenience of fewer office visits by avoiding the need to obtain preoperative clearances and presurgery fasting. Some surgeons perform the procedures in an office setting while others use surgical centers, which result in sizeable cost savings.

Fig 1. Wrist anatomy, injection sites and numbing area.



What are the potential side effects or complications?

Sometimes, nervous jitters or trembling can occur after an epinephrine injection. You may feel a little jittery or shaky after the injection, which is similar to the feeling after consuming too much coffee or caffeine. Physicians consider this a normal reaction to the numbing medication, and it will go away after approximately 20 to 30 minutes. Additionally, the use of epinephrine can cause an elevated heart rate in patients with cardiac conditions, but these risks are also minimal. Overall, the risk of complications from WALANT remains low. With the benefits to the patient and healthcare system, the usage continues to grow.

What happens after my surgery with WALANT?

After surgery using WALANT, your nursing staff will take you to the outpatient area where the surgeon can talk to you about the procedure and your postoperative care. Often, the lidocaine with epinephrine can last for several hours; however, you can go home soon after your procedure because you do not have to wait for the effects of general anesthesia or sedation to wear off. Before you leave, your surgeon's staff will schedule your first follow-up appointment, typically within 10 to 14 days.

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Outpatient Spine Surgery

Advances in minimally invasive techniques, pain management, and at-home-rehabilitation have contributed to the increase of spine surgeries performed in an outpatient setting. As healthcare costs continue to rise, and patients and providers try to minimize those costs, outpatient surgery has come into focus as a less expensive option.

Spine surgery is one of the largest fields of surgery in orthopaedics. Elective spine surgeries can correct a deformity or relieve pressure to compressed nerves and the spinal cord. Surgeons successfully complete single-level (the single disc space between 2 spinal bones) or multiple-level surgeries depending on the pathology (disease and its causes). Some of the procedures performed on 1 to 2 levels, for example, C5-C6 in the cervical spine or L4-L5 in the lumbar (lower back) spine, are appropriate for outpatient surgery.

What is outpatient spine surgery?

Outpatient spine surgery can be divided into same-day surgery or outpatient observation. In same-day surgery procedures, the patient is discharged home on the same day that their surgery took place, after the effects of anesthesia have worn off. Typically, for the doctor to discharge you home the same day, patients must tolerate eating, walk safely, urinate, and have good pain control.

Surgeons can perform these types of procedures at surgery centers or hospitals.

Outpatient observation surgery, however, means that the patient will stay 1 night in the hospital. Your doctor will typically discharge you home the day following your surgery, provided you are ambulatory, have good pain control, are voiding, and tolerating a diet. Surgeons often perform this type of surgery at a hospital, although some surgery centers have the ability to monitor patients overnight.

What are the benefits?

The most obvious benefit of outpatient spine surgery is that you get to recover in your own home. Since you can go home the day of or the day following your procedure, it places you in charge of your recovery. This means that you do not have to rely on calling for the nurse for pain medications, allowing you to stay ahead of your pain more efficiently. Likewise, there is less disturbance, particularly at night, as you sleep and recover. Finally, minimizing the time you spend in the hospital minimizes the risk of developing an infection in the hospital.

Cost savings is another important benefit of outpatient spine surgery. Multiple studies have looked at outpatient spine surgery in the setting of cost savings. These studies have shown anywhere from $4,000-$41,000 in cost reduction for procedures performed in a surgery center versus a hospital setting.

There is a lower readmission rate to the hospital following outpatient spine surgery in the lumbar spine and some studies have shown a lower rate of complications associated with outpatient surgery. However, additional studies are needed to confirm these statements.

Outpatient spine surgeries

Procedures with minimal blood loss and small incisions tend to be less painful, have a low risk of serious complications, and receive insurance approval for outpatient surgery. Currently, orthopaedic spine surgeons can perform the following procedures on an outpatient basis:

Box. Outpatient orthopaedic spine procedures

- Single- and 2-level lumbar decompression
- Single-level lumbar fusions
- 1- and 2-level anterior cervical (front neck) surgeries,
- Cement augmentation (kyphoplasty) of vertebral compression fractures
- Spinal cord stimulator placement
- Lumbar discectomies

Who qualifies for outpatient spine surgery?

The surgeon will first consider the patient's pain tolerance, medical condition, overall health, and presence of a caregiver at home. True outpatient (discharged home the same day) surgery is often limited to patients who are physiologically young, have few or no medical comorbidities (co-occurring medical conditions or diseases), to include psychiatric issues, and have a reasonable tolerance to pain. Additionally, the procedure must qualify for an outpatient procedure by the insurance carrier.

Outpatient-observation surgeries, however, can be performed on a larger number of patients, as these procedures have the benefits of early discharge in addition to the services that hospitals offer. Typically, older patients with a few medical comorbidities can safely have outpatient-observation surgery.

Prior to any procedure, you will see your medical doctor, who will clear you, meaning it is safe for you to have the surgery. This medical clearance will help you and your surgeon decide whether outpatient spine surgery is right for you.

Preparing for outpatient surgery

The most important aspect in preparing for outpatient surgery is a discussion with your doctor. You and your surgeon should be comfortable with you going home on the day of or following your procedure. It is important that you know what to expect from the surgery, and to have an understanding of the potential complications. This will give you peace of mind when returning home.

You will also need to have your home prepared for your arrival. This means minimizing trip hazards such as removing loose rugs or cords and having someone take care of your pet. Some patients may have difficulty with stairs for the first few days, thus having a place to sleep on the ground level floor is important. Ensure that you have picked up your discharge medications prior to your surgery, so that you can stay on top of your pain control. Typically, your physician will discharge you with a narcotic and muscle relaxant. Finally, mobilization is very important following spine surgery. Make sure there are clear paths through your home so you can walk and move frequently, and eat meals in a place other than where you are otherwise recovering.

Surgeons are performing outpatient spine surgery on an increasing basis around the country. The type of procedure you need is the main determinant, but multiple patient factors should be considered while planning your surgery. If you are preparing for spine surgery, discuss all options with your surgeon, to see if you qualify for an outpatient procedure.

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