Hughston Health Alert

6262 Veterans Parkway, PO Box 9517, Columbus, GA 31908-9517 • www.hughston.com/hha

VOLUME 29, NUMBER 4 - FALL 2017

Inside...

Fig. Procedure using a Tenex™ needle and an ultrasound machine

Percutaneous Ultrasound Tenotomy

A NEW TECHNIQUE TO TREAT TENDINOPATHY

Tendonitis is a common term used to describe pain caused by tendon irritation around a joint. It is usually associated with overuse and is aggravated with activity. It is very common, impairing over 20 million people a year in the US and it impacts individuals of all ages, backgrounds, and activity levels. It affects all major joints, from shoulders to ankles and every joint in between. Symptoms can range from mild discomfort to debilitating pain and can cause a significant socioeconomic burden with the loss of work and productivity.

What's causing your pain?

Researchers once considered tendon pain to be an inflammatory process, thus the term tendonitis was often used when diagnosing the condition. However, it has now been established that symptoms are associated with tendon degeneration rather than inflammation. Repetitive microtrauma causes changes to the tendon on a cellular level, which impede its ability to remodel into normal healthy tissue. The diseased tendon can be identified using MRI or diagnostic ultrasound in combination with a physical exam.

How can the pain be treated?

Initial treatment for tendinopathy is a combination of various conservative measures including: rest, ice, stretching, strengthening, bracing, nonsteroidal anti-inflammatory medications, and corticosteroid injections. While most symptoms do improve with nonsurgical treatment, a significant number do not. For example, up to 15% of elbow and 25% of Achilles tendinopathy cases

fail to improve with conservative treatment. Traditionally for those patients, the only remaining option was surgical intervention to remove the diseased tendon. While successful, the surgery comes with inherent risks as well as prolonged recovery time.

New advances in treatment

A new minimally invasive option to surgery is percutaneous ultrasound tenotomy (PUT), which uses 2 types of ultrasound—diagnostic and therapeutic. Advances in diagnostic ultrasound technology have lead to an expanded role in orthopaedics. It is now possible to easily identify diseased tendon with small handheld ultrasound machines. The affected portion of tendon is typically enlarged and hypoechoic (darker than normal). A trained physician can recognize the dark areas that represent partial tearing or chronic degeneration of the tendon. After locating the diseased tissue, the ultrasound can be used to precisely and accurately guide treatment to the intended area.

Therapeutic ultrasound, such as with the Tenex™ system, can eliminate a diseased tendon using an ultrasonic "jack-hammer" effect. As the damaged tissue is cut, it is removed through continuous irrigation and suction. By using this technology and live ultrasound guidance, the surgeon can precisely remove the diseased tendon tissue while sparing healthy tissue (Fig). Multiple studies have demonstrated that this technique is a safe and effective treatment for tendinopathy that has failed conservative treatment.

What does this new technology treat?

PUT can be used to treat different tendon conditions that typically are treated with open or arthroscopic surgical methods. Currently, PUT technology has been studied and successfully used to treat:

- Lateral epicondylitis (tennis or golfer's elbow)
- Patellar tendonitis (jumper's knee)
- Plantar fasciitis
- Rotator cuff tendonitis
- Achilles tendonitis
- Gluteal tendonitis (hip tendon injury)

Because PUT is still a relatively new technology, its uses are still being developed; however, almost all areas of the body that develop tendonitis can be treated using this method. The Hughston Clinic is currently involved in a prospective study for gluteal (hip) tendonitis.

How is the TenexTM procedure done?

Before the procedure, the physician presses over the area of concern to locate the point of maximal tenderness. This gives the physician an idea of where the diseased tendon is located. Next, the doctor sterilizes and drapes the area with sterile towels. Using a sterile technique, the physician again confirms the point of maximal tenderness and "numbs up" the area with a local anesthetic. Using the diagnostic ultrasound, the physician locates the damaged tissue and makes a small sub-centimeter incision. Finally, the diagnostic ultrasound guides the therapeutic probe to the exact location and targets only that area, so healthy tissue is not damaged. The procedure removes the damaged and degenerated tendon tissue in minutes. After the procedure, the wound is covered with a dry sterile bandage. Often, a compression wrap is applied to help reduce swelling.

Am I a candidate for this treatment?

You may be a candidate for this treatment if you:

- can point to or touch with your finger the location of your pain
- had pain for 3 months or longer and it gets worse after activity or movement
- tried conservative treatment, but it failed to relieve your pain
- reduced or modified your activity, but the pain continues

After a physical examination of the painful area, your doctor can tell you if you are a good candidate for the procedure.

What happens after the procedure?

Since the procedure is done as outpatient, you will go home that same day. Your incision is small, and there are no stitches, but you must not submerge the wound in water for about a week to give it time to close. You will leave the surgical center or doctor's office with instructions to follow until you return for your follow-up visit.

Some swelling, bruising, and soreness are expected after the procedure. You can ice the area for 20 minutes every few hours to help with swelling, and take acetaminophen for pain. Depending on what area is treated, you should take it easy for the first few weeks with no excessive lifting or strenuous activity. Most patients experience full recovery in 6 weeks.

Does it really work?

The PUT procedure is noninvasive and safe, and very few patients have any complications at all. Many complications associated with surgery are related to anesthesia and long surgical times; however, because this procedure uses local anesthetics and it only takes minutes to complete, complications are rare. Most patients are pain free within weeks after the procedure and back to full activity in a quarter of the time when compared to other traditional surgical procedures.

M. Canaan Prater, DO, and J. Ryan Mahoney, DO
Columbus, Georgia

Cheerleading Injuries

Cheerleading has evolved from once being considered "not a sport" to a revolutionized activity that involves acrobatics, tumbling, complex stunts, and fast-paced routines. It's a growing sport with participants in school cheerleading squads, youth leagues, and all-star traveling teams. Likewise, the rate of injury continues to rise as more athletes become involved and as routines and stunts increasingly become more complex.

How do injuries occur?

Surprisingly, most injuries occur while cheerleaders are on the ground basing and spotting. Basing and spotting refers to participants who are responsible for either holding a teammate in an elevated stunt (basing) or who stand nearby to catch their teammate before he or she hits the ground (spotting). Not surprisingly, falls from heights are also a common mechanism of injury in cheerleading. Falls usually occur when flyers, or cheerleaders who are held in an elevated position, fall or are dropped and they land on an outstretched arm, ankle, or more traumatically, on their head or neck. Tumbling causes a significant number of injuries as well. Tumblers either begin from a standing, stationary position or they take a running start before executing their tumbling pass.

Common injuries

No matter the age group, when cheerleaders are evaluated, lower extremity injuries are the most common. However, younger age groups (6 to 11 year-olds) are more likely to suffer from upper extremity injuries while older 12 to 17 year-olds are more likely to have a lower extremity injury.

Cheerleading-related injuries range from sprains (stretching or tearing a ligament), strains (stretching or tearing a muscle or tendon), fractures, lacerations (a cut), and a multitude of other injuries. Sprains and strains are the most common injury with skin abrasions (cuts and scrapes) and contusions (bruises) the second and third leading injuries. Fractures and dislocations are common injuries as well. A dislocation involves a displacement of the bone; for example, the head of the humerus (upper arm bone) displaces out of the glenohumeral (shoulder) joint. Finally, concussions and head injuries are the least common injury seen in cheerleading. Concussion rates are low compared to other sports; however, the number of concussions reported in cheerleaders are on the rise, most likely due to the intensity and difficulty of stunts being performed.

Risk factors

While there are many risk factors that contribute to the likelihood of an injury, the major cause is practicing or performing on the wrong type of surface. Cheerleaders tend to practice on many different types of surfaces, that include mats, foam floor, spring floor, concrete, tile floor, football fields, and gym floors. The preferred and safer surface would be those that are designed for the sport (mats, foam floor, or spring floors). The hard, less-safe surfaces put athletes at risk when stunting or tumbling during a routine.

Injury prevention

Prevention is key in keeping athletes healthy and injury-free. Coaches should take part in training and certifications to learn the safety rules and standards that will keep their athletes safe. A safety-certified coach knows what surface the squad should use and will follow the recommendations set forth by the American Association of Cheerleading Coaches and Advisors (AACCA).

Make safety a high priority

The safety of each cheerleader should be the highest priority when planning, practicing, and performing. Setting that priority can come from the coaches, administration, medical personnel, and participants—everyone can do their part. If athletes are supervised by knowledgeable coaches who follow the safety recommendations, cheerleaders are most likely to finish the season and competition injury free.

BreAnna Hankins, MS, LAT, ATC
Nashville, Tennessee

Hamstring Injuries

Hamstring muscle strains (stretching or tearing a muscle or tendon) are common among athletes, accounting for about 29% of all sports related injuries. They often occur during sports that require running, jumping, kicking, pivoting, and rapid acceleration. Athletes of all sorts, but especially those who run are more likely to endure this painful injury. Others, including skaters and skiers, are known to strain their hamstring by falling while their hips are bent and their knees are straight. Hamstring injuries can be minor stretching or partial tearing of the muscle or tendon (attaches muscle to bone) that resolves with rest, rehabilitation, and medication; however, strains can also be much more serious, such as complete ruptures or avulsions (pulls bone away) that require surgical intervention.

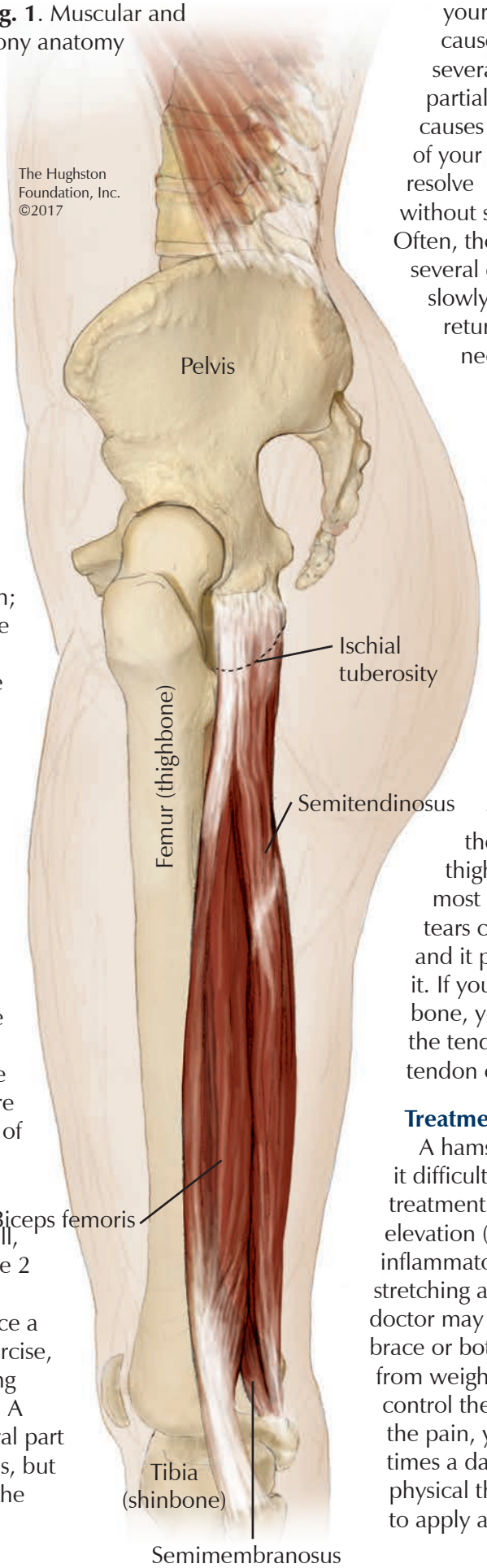
Anatomy

The 3 hamstring muscles—the biceps femoris, the semitendinosus, and the semimembranosus—start at the ischial tuberosity at the bottom of the pelvis, and run along the back of the thigh, pass the knee joint, and stop at the tibia and fibula (lower leg bones) (**Fig. 1**). This group of muscles allows you to bend your leg at the knee and it helps with posture of the pelvis. All hamstring strains are painful to some degree, but the type of injury and where it is located determines the seriousness of the injury and how it will be treated.

Types of injuries

While a hamstring strain can be a pull, partial tear, or a complete tear, there are 2 distinct types of injuries that require different treatments. You may experience a sudden onset of severe pain during exercise, along with a snapping or popping feeling when walking or straightening your leg. A tear often occurs in the middle or central part of the muscle group, while more serious, but less common, complete tears occur at the ischial tuberosity. In the mildest form, your muscle tissue is stretched and causes mild pain and tenderness for several days. If the muscle is torn, even partially, you may have bleeding that causes a bruising appearance at the back of your thigh. These symptoms often resolve without significant long term problems. Often, the bruising starts to improve after several days, the tenderness and pain slowly subsides, and the muscle strength returns after 6 to 8 weeks without need for further treatment.

Fig. 1. Muscular and bony anatomy



A more serious type of injury involves the tendon that attaches to the pelvis at the ischial tuberosity. This injury typically occurs after a fall with the knee straight and the hip bent forward. Your symptoms will be similar to a mid-thigh injury; therefore, your orthopaedist will often request a magnetic resonance imaging (MRI) to confirm the diagnosis. In rare cases, when the tendon has completely torn away from the bone, the muscle will slip down and ball up, making the tear evident at the back of your thigh. An avulsion injury is one of the most severe cases in which the tendon tears completely away from the bone and it pulls a piece of bone away with it. If you tear the tendon away from the bone, you may need surgery to reattach the tendon so that the muscle and tendon can heal.

Treatment

A hamstring strain can be painful making it difficult to stand or walk. Nonsurgical treatment includes rest, ice, compression, elevation (RICE), nonsteroidal anti-inflammatory medications (NSAIDS) and stretching and strengthening exercise. Your doctor may prescribe crutches or a knee brace or both to give your muscles a rest from weightbearing and movement. To help control the swelling, which also helps with the pain, you should ice the area several times a day for 20 minutes. Your doctor or physical therapist can also show you how to apply and wear a compression bandage.

RICE (*R*est, *I*ce, Compression, *E*levation)

Essential elements for managing pain and swelling

- **Rest** from your activity to allow the affected area to heal and to avoid further trauma to the injury.
- **Ice** can be applied for 20 minutes, 3 times a day to help eliminate swelling and discomfort.
- **Compression** can be applied using an elastic bandage or another type of compressive stocking to further combat swelling.
- **Elevation** can be accomplished by supporting the leg so it is above the level of the heart. This helps decrease swelling in the affected area.

When applied correctly, the compression will help reduce swelling. You should also elevate the injury above the heart whenever possible during the day, but especially when resting. Taking NSAIDS as directed will also help reduce the pain and swelling. After you have rested the injury a few days, and if the pain and swelling has improved, your physical therapist (PT) can start you on some gentle stretches to keep the leg flexible. As your range of motion improves, your PT will increase your stretching time and then begin strengthening exercises. Everyone is different, but typically, injuries that are treated nonsurgically will take 6 to 8 weeks to heal.

If the tendon has torn off the bone, your doctor will discuss surgery as an option for treatment. To return to full preinjury strength you will likely need surgery. Surgery involves an incision at the bottom of the buttock or at the top of the thigh. Your surgeon will use special sutures to reattach the tendon to the bone. Unfortunately, you will not be able to walk on this leg for at least 6 weeks. Your surgeon may require you to use a knee brace to protect your surgical repair. Usually at the 6-week mark you can begin therapy. To prevent blood clots your doctor may prescribe aspirin or a blood thinner.

Prevention

The best way to treat a hamstring tear is to never have one. You can prevent the injury by preparing your body for exercise and not over doing it. First, be sure to warm-up before and stretch after physical activity. Always boost physical activity slowly, no more than a 5 to 10% increase weekly. It's important to stop exercising if you feel pain in the back of your thigh. Learn some stretches and exercises that stretch and strengthen your hamstrings and make sure you work the quadriceps too (**Fig. 2**). If your quadriceps (front thigh) muscles are tight, they will pull your pelvis forward and tighten the hamstrings, which can cause a strain. You should also work your gluteal muscles (main extensor muscle of the hip) because your glutes and hamstrings work together; therefore, if your glutes are weak, your hamstrings can become over worked and lead to a strain.

Don't rush it

Most hamstring problems heal without surgery; but whether you have surgery or not, don't rush back to your old level of activity. After resting and giving your hamstring time to heal, gradually increase your activity level until you are back to your preinjury self. Let pain be your guide. Once you feel no pain, first walk, then walk and jog, then sprint, then jump and move as you did before you were hurt. Progress slowly, to avoid reinjury. You should not attempt your previous level of activity until you can move your leg as easily as your uninjured leg without pain, and both legs feel equally strong. If you progress too fast, you could end up back at square one.

Darren E. Barton, DO
Crossville, Tennessee

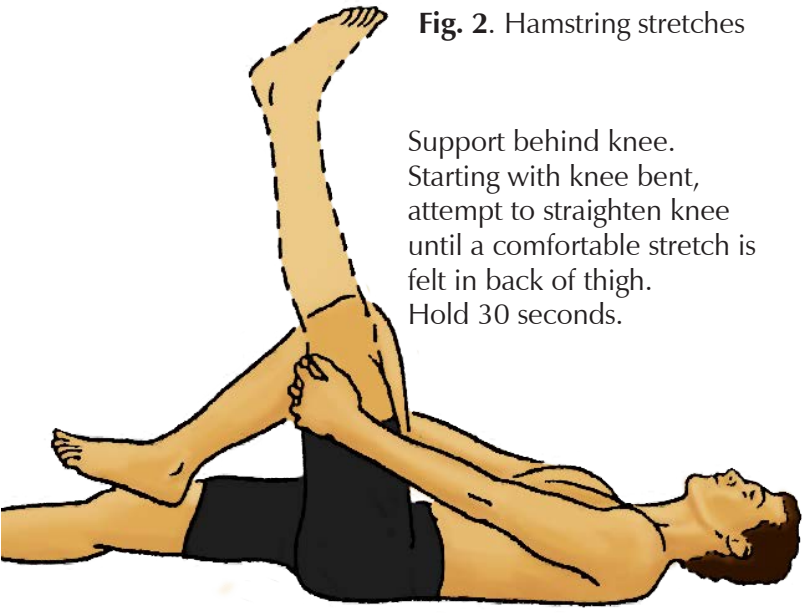


Fig. 2. Hamstring stretches

Support behind knee. Starting with knee bent, attempt to straighten knee until a comfortable stretch is felt in back of thigh. Hold 30 seconds.

Sit on edge of chair with one foot flat on the floor (knee bent) and the other out in front of you with knee straight. Lean forward from the hips keeping back arched and head up.

Chondral and Osteochondral Lesions

AN OVERVIEW OF TREATMENTS FOR THE KNEE

On the ends of your bones there is a smooth white surface only a few millimeters thick that helps the opposing bones that form the joint work together with less friction. This covering, called articular (joint) cartilage, has no blood supply to aid in the healing process; therefore if it becomes damaged, it is unable to heal on its own. Articular knee injury can be separated into either chondral lesions, which involves only the articular cartilage, or osteochondral lesions that includes a fragment of bone with the articular cartilage. Factors such as genetics and hormones have been associated with articular lesions but they are most often caused by a traumatic injury. These injuries can be as simple as bruising the cartilage and bone or more serious when either the cartilage or both bone and cartilage are damaged. The lasting effects of an injury are related to the size and location of the lesion, and other factors, such as your age, weight, and limb alignment.

Diagnosis

Diagnosis of chondral injury has historically been difficult. Some patients describe the pain as a slight discomfort while others experience sharp, unbearable pain. You may have swelling, locking, or catching, but some patients never have any symptoms at all. Since the symptoms can masquerade as different conditions that occur within the knee, a thorough history, examination of the knee, and imaging is used to make a diagnosis.

X-rays are generally obtained as part of the initial evaluation of a knee injury. X-rays may not identify chondral or even osteochondral lesions of the knee when no or very little bone is involved, but they do help rule out other possible conditions. CT scans can be used to identify and determine the extent of injury when a bone fragment is involved. It can also be used to assess for bone healing, but a CT scan will not identify cartilage lesions that do not involve bone. A magnetic resonance imaging (MRI) scan is the best way to detect chondral and osteochondral lesions. Using a MRI scan, your physician can accurately locate the injury, show the extent of damage and assess the lesion.

Treatment options

There are a variety of treatments available for cartilage injury; however, no particular treatment has been identified the single best approach. Although, articular cartilage is not capable of repairing itself, injury to subchondral bone does stimulate a healing response but it does not restore the articular surface to its natural state and properties. The scope of treatment ranges from nonsurgical to a variety of surgical techniques that can reduce the pain and restore function. The treatment approach should take into account the injury as well as your lifestyle and goals.

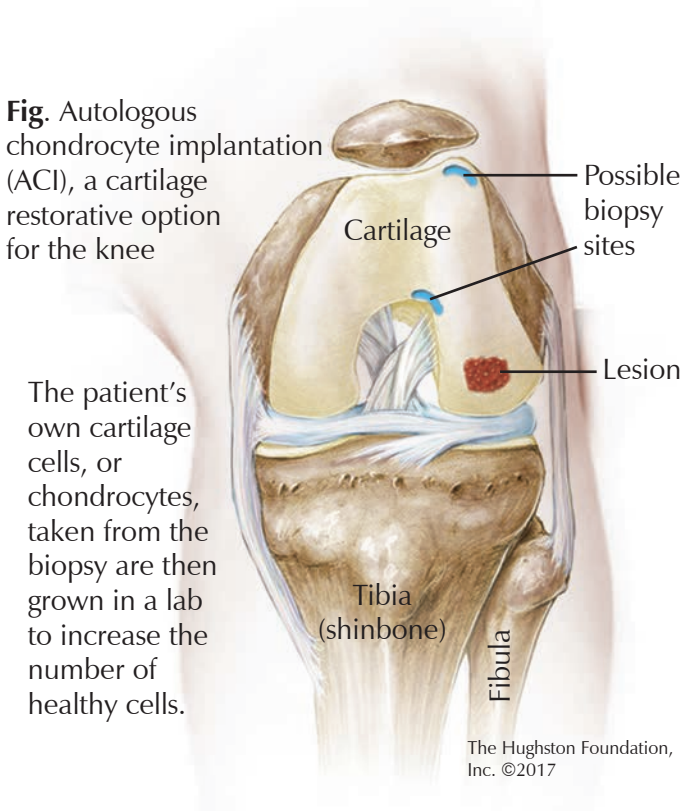


Fig. Autologous chondrocyte implantation (ACI), a cartilage restorative option for the knee

Nonsurgical management

The goal of nonsurgical treatment is to limit your symptoms, but it does not fix the problem. Treatment options include bracing, oral and topical anti-inflammatory medications, corticosteroid and hyaluronic acid injections, physical therapy, and modifying or avoiding specific activity.

Surgical management

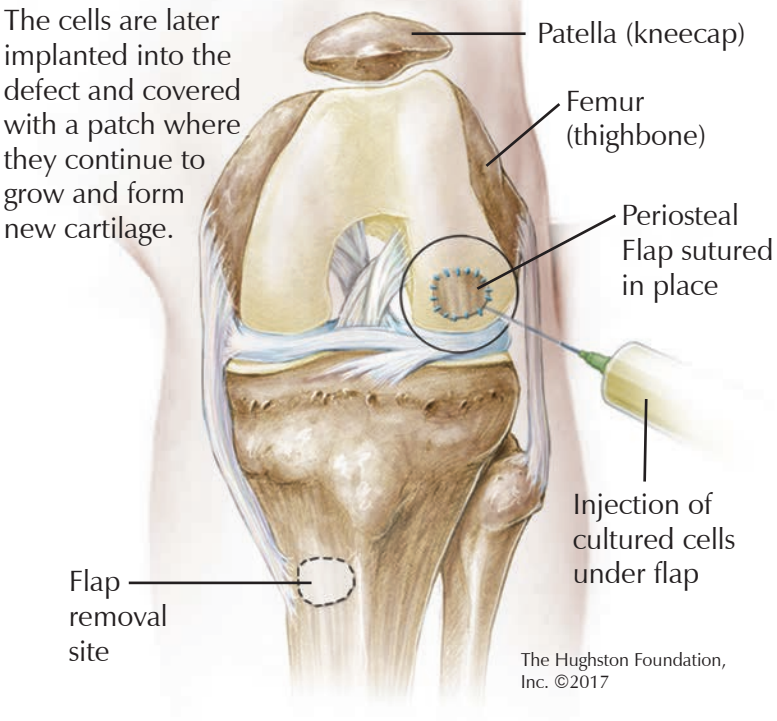
For patients with more severe symptoms, surgery is often performed to relieve pain, restore function, and prevent further damage. The surgical continuum ranges from simple removal of loose bodies and debridement of a lesion to replacement of the joint. The course taken is based on many factors to include: injury size, depth, and location, and the patient's symptoms, age, activity level, physical characteristics, and prior treatments.

Arthroscopic washout and debridement

Surgeons perform arthroscopic surgery using a tiny camera and instruments inserted into the joint through small incisions. Arthroscopic washout and debridement entails flushing the knee with a sterile solution to remove inflammatory agents and loose bodies and then using tools to remove and shape unstable cartilage edges. This technique alone was shown to improve symptoms in 68% of patients.[1] After surgery, recovery is quick since there is no healing of bone or cartilage that needs to be protected with activity restrictions.

Marrow stimulating techniques

There are several marrow stimulating techniques used when a full thickness cartilage injury is present with exposed subchondral bone. Better results are seen with



lesions <2cm^2. The techniques release bone marrow cells into the damaged area to form a clot of cells. Bone marrow provides stem cells with the ability to form cartilage. The cartilage produced is not identical to the articular cartilage, but it does fill the defect and can relieve symptoms. Recently published outcomes of microfracture (a marrow stimulating technique) show that at 7 years, 80% of patients rated themselves as improved.[2]

Osteochondral grafting

Osteochondral grafting involves using a graft from the patient or from a donor that has both cartilage and bone. This procedure works well for full thickness cartilage defects of moderate size, 2-4cm^2 with well-defined borders. The process entails an open procedure to expose the damaged area, then removing a cylinder of bone from the damaged area and replacing it with a matched cylinder of bone with articular cartilage. The graft can be harvested from either the nonweightbearing portion of the patient's knee or from a cadaver knee. For larger lesions cadaver graft is often used due to limitations on donor site from the patient. For patients with damage on either the femur (thighbone) or tibia (shinbone) side alone, osteochondral grafting has shown to provide good relief. In patients with damage to the femur and tibia, diffuse arthritic changes, or bone necrosis the outcomes are not as good.

Autologous chondrocyte implantation

Autologous chondrocyte implantation using your own chondral tissue is an option for knee lesions in the 2-4cm^2 range with intact bone surface (**Fig**). The procedure is performed in 2 separate surgeries. First is a knee arthroscopy for evaluation and harvesting of cartilage. Between surgeries the cartilage gathered is cultivated for 6 weeks. The second surgery involves an open procedure to expose the damaged area and implant the cartilage cells that have been cultivated. The cells are contained within the defect by either a periosteal flap or a collagen membrane. The periosteal flap is sutured in place while the collagen membrane is held in place with fibrin glue. Outcomes with autologous chondrocyte implantation are good; however, have not been proven to be superior to other treatments. Brittberg et al[3] presented the results of 23 patients with a mean follow-up of 39 months. Good or excellent clinical results were reported in 70% of cases.

Osteotomy

In younger active patients with arthritis limited to a single compartment of the knee, osteotomy (cutting of bone) can provide pain relief and delay further deterioration of the joint. The surgery involves cutting either the femur or tibia and realigning the bone to unload the affected compartment. Although early results demonstrated successful outcomes in 90% of patients, this rate had declined to only 65% by 10 years.[4]

Knee arthroplasty

Some chondral or osteochondral injuries are not amenable to any nonsurgical or surgical treatment. In those patients, a partial or total knee replacement may be the best option. Knee arthroplasty is an open procedure that involves removing the bone and cartilage from a single or all compartments of the knee and replacing it with metal and plastic. A knee replacement can reliably alleviate the pain associated with chondral or osteochondral defects.

No single method

Treatment of chondral or osteochondral lesions is difficult and must be evaluated and individualized for each patient. No single method of cartilage repair has been proven superior. Each technique brings with it advantages and disadvantages and these must be considered with the characteristics of the injury, and the patient's expectations when treating these injuries.

Dan Morris, DO
Columbus, Georgia

References

1. Jackson RW, Marans HJ, Silver RS. Arthroscopic treatment of degenerative arthritis of the knee. *J Bone Joint Surg Br.* 1988;70(2):332.

2. Steadman JR, Briggs KK, Rodrigo JJ, et al. Outcomes of microfracture for traumatic chondral defects of the knee: average 11-year follow-up. *Arthroscopy*. 2003;19:477–84.

3. Brittberg M, Lindahl A, Nilsson A, et al. Treatment of deep cartilage defects in the knee with autologous chondrocyte transplantation. *N Engl J Med*. 1994;331:889–95.

4. Coventry MB. Ilstrup DM. Wallrichs SL. Proximal tibial osteotomy. A critical long-term study of eighty-seven cases. *J Bone Joint Surg Am*. 1993;75(2);196-201.

Hughston Health Alert

The Hughston Foundation, Inc.
6262 Veterans Parkway P.O. Box 9517
Columbus, Georgia 31908-9517

WINNER 2016 APEX AWARDS FOR PUBLICATION EXCELLENCE
2002-2016

NONPROFIT ORG
US POSTAGE
PAID
COLUMBUS GA
PERMIT NO 99

You may receive the *Hughston Health Alert* via e-mail by registering at: www.hughston.com/health-alert-sign-up.aspx

The *Hughston Health Alert* is a quarterly publication of the Hughston Foundation, Inc. The Foundation's mission is to help people of all ages attain the highest possible levels of musculoskeletal health, fitness, and athletic prowess. The content of the *Hughston Health Alert*, including text, graphics, images, and all other material considered "content," is published for educational purposes only. It is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Always consult your physician or other qualified healthcare provider about any questions or concerns you may have regarding a medical condition. You should never delay seeking professional medical advice, disregard medical advice, or change or discontinue medical treatment based on information found in the *Hughston Health Alert* or on the Hughston website. Moreover, the *Hughston Health Alert* does not recommend or endorse any specific physicians, products, tests, procedures, or opinions mentioned therein. Reliance on any information published in the newsletter or appearing on the website is solely at your own risk.

Send inquiries to Medical Writing, The Hughston Foundation, Inc., P.O. Box 9517, 6262 Veterans Parkway, Columbus GA 31908-9517 USA.

ISSN# 1070-7778