

Arthritis of the Knee

Patient Education Guide



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Definition of Terms

Biomechanics: The biomechanics or the *load disposition* of the knee based on lower extremity alignment and anatomic make up is a very complex multifactorial component of the knee function. In general, when you walk or weightbear, a line directly from the center of your hip joint extends down to on or about the space between your first and second toe. This is basically your weightbearing axis or biomechanical axis for loading your knee joint. When there is any alteration of this axis, either through injury to any of the bones above or below the knee, or due to differences in alignment (bowlegs or knock knees) it may create increased loads or stresses in specific areas of the knee which are not normal.

Degenerative Arthritis: A condition of cartilage breakdown compared to normal cartilage. Also referred to as *Degenerative Joint Disease, Gonarthrosis and Osteoarthritis*.

Hyaline Cartilage: Smooth gliding cartilage that lines the ends of all long bones such as thigh bone (femur). When healthy, it allows for pain free, frictionless range of motion of the joint. Also referred to as *articular cartilage*.

Inflammation: A localized response to injury or destruction of tissue. Usually characterized by pain, heat, redness, swelling and loss of function.

Knee Joint: Made up of the connection between the *femur* (thigh bone) and the *tibia* (shin bone). Associated structures include the *anterior and posterior cruciate ligaments* and the *medial and lateral meniscus*.

Meniscal Cartilage: The menisci are C-shaped biconcave discs which serve as shock absorbers for the knee and help to distribute loads throughout the knee joint surface as well as provide some stabilizing effect to the knee joint. Also referred to as *fibrocartilage*.

Osteophyte: Areas of extra bone that the body makes in order to accommodate unusual stress it is experiencing around a joint. Also called *bone spurs*.

Patellofemoral Joint: Made up of the association of the *patella* (knee cap) and the *femur* (thigh bone).

Rheumatoid Arthritis: A chronic systemic disease characterized by inflammatory changes in the connective tissue throughout the body. Also referred to as *inflammatory arthritis*.

Arthritis of the Knee

Arthritis of the knee may be referred to as osteoarthritis, gonarthrosis or degenerative joint disease. By definition, it is inflammation of the joint or inflammation of the bone and joint. More specifically, it relates to breakdown of the smooth gliding cartilage that lines the ends of long bones. When healthy, this cartilage, which is called hyaline cartilage, allows for frictionless range of motion of the knee, and distributes weightbearing loads over a broad surface area to allow for painless activities. This type of degenerative arthritis occurs over time and is distinctly different from rheumatoid, also called inflammatory arthritis.

The specific cause of degenerative arthritis of the knee is uncertain and may include several contributing factors. It may be due to a specific injury that becomes accentuated over time or may be due to increased loads occurring to one area of the joint. Regardless of the cause, it appears to be progressive in nature.

Possible contributing factors include:

- *Ligamentous injury:* Following a tear to the anterior or posterior cruciate ligament, the knee becomes unstable and may move excessively or shift during activity. Over time, if this shifting or excessive movement continues, the cartilage begins to wear from the excessive forces applied. Because of this wear and tear pattern, it is often recommended that individuals with anterior cruciate ligament tears undergo surgery to reconstruct the ligament and stabilize the knee joint. Even with early reconstructive surgery, these individuals may be at some increased risk for developing early arthritis of the knee.
- *Meniscal Tears:* When a tear occurs in the meniscus, it changes the normal manner in which loads are distributed to the joint. If the tear produces mechanical type symptoms where the knee gets caught or locked, surgery might be necessary. All efforts should be made to repair and salvage as much of the torn meniscus as possible in order to continue to provide shock absorption and protection to the articular/Hyaline cartilage on the ends of the thigh and shin bones that make up the knee joint. If the meniscus is removed, even a portion of it, the weightbearing loads of the knee are directed to a more focal area and wear and tear patterns often develop leading to breakdown of the smooth gliding articular cartilage.
- *Body Habitus/Weight:* The load disposition of the knee is also affected by body habitus or weight. For instance standing on one leg in a single leg weightbearing mode may place up to five to six times your body weight on the knee. This is increased up to ten times your body weight when descending stairs, when all of your weight is on a single leg. Therefore, any alterations in body weight are significantly multiplied with more rigorous activities thus placing you at risk for “biomechanical overload” of your joint. Furthermore, one’s lower extremity alignment may predispose them to increased loads on specific areas of their joint. For example, someone who is bowlegged will have a tendency towards increased loads on the medial (closer to the other leg) side of their joint.

Grading System

Grading systems have been developed which distinguish the degree of advancement of the condition.

- Stage I: Softening of the articular cartilage with some joint narrowing.
- Stage II: Fragmentation of the articular cartilage in a small area with greater joint narrowing.
- Stage III: Fragmentation of an area greater than 1.3 squared centimeters and minor bone wear.
- Stage IV: Erosion of the cartilage to the subchondral bone and moderate bone wear.
- Stage V: Severe bone wear.

Signs and Symptoms

Patients with early gonarthrosis will often demonstrate swelling in their knee, pain at the level of the knee joint and may sense some crepitation (grinding) about the knee. They will frequently have the feeling of stiffness and loss of full motion in the knee, both flexion and extension and will develop increased symptoms with more rigorous activities.

X-rays

X-rays are essential to diagnosing arthritis of the knee. Several x-rays may be taken of your knee which will look at your bony anatomy as well as the integrity of your joint from varying angles. X-rays taken of both knees while you are standing are often the most beneficial in diagnosing this condition. Early on when the arthritis is just beginning, the x-rays may not show significant changes, however, as the condition progresses subtle changes begin to appear. These include, increased bone density or calcification about the affected area above or below the joint and/or a change in the normal contour of the joint. For example, a flattening of the femoral condyle (end of the thigh bone). More advanced changes that occur with progression of the condition include narrowing of the joint space between the femur (thigh bone) and tibia (shin bone) and the development of peripheral osteophytes (bone spurs found on the edges of the bones). These spurs begin to form because biomechanically the knee is seeing increases stresses or loads and is trying to distribute those loads over a larger surface area.

Treatment Options

Non-operative

Over the counter and anti-inflammatory medications are effective in relieving pain. They are also low in incidence of side effects and are inexpensive. Tylenol is often the first medication used to treat degenerative arthritis of the knee. Anti-inflammatory medications are also commonly used and can be obtained over the counter as ibuprofen, Advil or Aleve. The anti-inflammatory drugs can be associated with gastrointestinal and other side effects. Certain prescription anti-inflammatory medicines such as Celebrex have demonstrated decreased gastrointestinal and renal (kidney) side effects, but can be expensive. When any anti-inflammatory medications are taken for long periods of time (i.e. 3 or more months continuously), it is important to have liver and kidney function tested medically to rule out negative side effects.

Glucosamine and chondroitin sulfate have become popular supplements and are said to be protective to cartilage. In July 2003, The Journal of Bone and Joint Surgery reported on a study that showed after three years of treatment, a group of patients taking the glucosamine had less joint space narrowing and were improved overall compared to a group who did not take the supplementation. However, at this time we are not aware of any long term studies that indicate glucosamine and/or chondroitin provide beneficial effects on the articular cartilage of an arthritic joint.

Corticosteroid (Cortisone) Injections are sometimes given to help when acute flare ups occur. When patients have increased pain and swelling, it is sometimes beneficial to aspirate (drain) the knee joint of the fluid which serves to relieve pressure on the joint and improve range of motion. At the same time, a shot of cortisone combined with some numbing medication can be given to provide short term relief of symptoms. The cortisone acts to reduce the inflammation and decreases the swelling in the knee. These injections, however, can increase the risk of damage to the articular cartilage and should be given infrequently.

Viscosupplementation (Supartz) Injections are made of special fluid which is placed within the knee joint with the hope of restoring the lubrication of the joint. It has been suggested that these injections may change the progression of the arthritis of the knee and may decrease some of the inflammation associated with arthritis of the knee. Studies appear to show no advantage of these injections over non-steroidal anti-inflammatory drugs in the treatment of arthritic knees. In studies where these injections were compared to corticosteroid injections, they appeared to be slower in onset, were more expensive and had a higher incidence of a local inflammatory response. More information is needed regarding these injections and hopefully will soon provide us better understanding of the appropriate use of this treatment.

Weight Control has been directly linked to arthritis. Individuals vary as to what is a “healthy weight”. It is thought however that losing 5 to 15 percent of excess weight is considered a good medical result and can produce significant health benefits. Reducing joint stress and the symptoms of degenerative arthritis by decreasing body weight is fundamental arthritic joints. Studies have shown that weight loss by women decreases the risk of the development of degenerative arthritis. According to the July 2003 Journal of Bone and Joint Surgery, losing 11 pounds over ten years time has been shown to decrease the risk of degenerative arthritis by greater than 50%. Being overweight is a risk factor for developing osteoarthritis of the knee and is associated more with women than for men. If you want help with how to safely lose weight, please consult your primary care doctor.

Exercise is a valuable tool in treating arthritis of the knee. In addition, when combined with a healthy diet, regular exercise can aid in weight loss. Frequently when your knee is swollen or sore, such as during a flare up, it may be necessary to avoid many activities. You can almost always bicycle and swim or walk in a swimming pool. Bicycling helps to enhance lubrication of the joint, improves muscle function and aids in restoring joint range of motion. Working out in chest deep water allows you to exercise while only bearing approximately 10% of your body weight, this makes water aerobics an excellent choice of activity. The use of warm moist heat prior to exercise to loosen up the joint and the application of ice packs for 20 to 30 minutes after exercise to reduce inflammation are also beneficial. Quadriceps (thigh) muscle weakness is common among patients with degenerative arthritis of the knee. Strengthening the musculature about the knee lessens the loads to the knee and may allow gradual progression of non-impact exercise such as step machines, elliptical trainers and even walking. Physical therapy can provide patient education and supervision of fitness programs and has been shown to improve function without worsening the symptoms of arthritis, however many patient are able to perform these activities on their own.

Canes and/or crutches are often beneficial when acute flare ups occur. They will allow you to continue to get around while relieving some of the stress on the joint. A cane held in the opposite hand of the affected knee will decrease the weightbearing load on the joint by 30-60%. Crutches decrease this load even further. Many patients find walkers to be more effective because they also provide a sense of control. Often times these items are only necessary temporarily until the symptoms improve.

Knee braces, various types, are available to patients with arthritis. The most commonly used type is the knee sleeve. These are usually made of a neoprene type material that helps to keep the joint warm. They also provide compression which helps to control swelling and some people report that they feel more secure while wearing the sleeve. We think this is because there is improved muscle function while wearing these type braces. These braces are inexpensive and simple to use. An elastic type wrap such as an ACE bandage works very similar to the knee sleeve. Unloading type braces are designed to apply a force to the knee and

relieve pain during activity by unloading the joint and opening up the joint space that has narrowed. Studies have shown these braces to be helpful in decreasing symptoms, however, the patient's desire to wear the brace and the expensive cost of the brace often offset this. Patients report they are difficult to wear for long periods of time because they are fairly big and bulky and because of the amount of force necessary to alter the alignment of the joint. They are used primarily for medial sided arthritis. Well-cushioned shoes or inserts into the shoes can also decrease the load across the knee joint. Heel wedges are often given as a trial if you have medial sided arthritis. These are placed inside your shoes along the outside of your heel. They accommodate to any closed type shoe and can be switched from one pair of shoes to another. Orthotics can help make corrections to alignment issues and can also offer cushioned support. You may be given a prescription to have these custom made for you. Our office will assist you in where to go to have your orthotics designed and fitted.

Operative:

Arthroscopic surgery provides the opportunity to look inside your knee with a camera and see exactly the condition of the joint. Based on this information the surgeon can better plan how to treat the condition. This type of surgery performed on arthritic knees is controversial however because nothing can be done to change the natural history of the condition. Cleaning out the knee during arthroscopy by removing loose particles of cartilage or by removing bony spurs may provide temporary relief to some people but not to all. Remember, the underlying condition is still there. It appears that arthroscopic surgery on knees with degenerative arthritis is most beneficial for patients who are experiencing catching, clicking, locking or giving way, not just pain. Patients who experience the most relief following arthroscopy are those with mild degenerative disease, normal alignment and an unstable meniscal tear.

Operative Treatment of Damaged Articular Cartilage

Specific defects in articular cartilage can be addressed surgically by drilling or by making small cracks in the underlying bone to encourage the body to lay down a new coat of cartilage. This cartilage that forms is not the same smooth gliding articular or hyaline cartilage but is actually a coat of fibrocartilage like the kind of cartilage found in meniscal tissue. It is thought that even so, this may provide a degree of protection and can be treated by transferring cartilage from a place on the bone that does not bear any weight to the area that is damaged. Other treatment techniques include implanting or transplanting cartilage. At this time however there are no true long term comparison studies available to let us know whether or not these procedures are truly beneficial.

Osteotomy

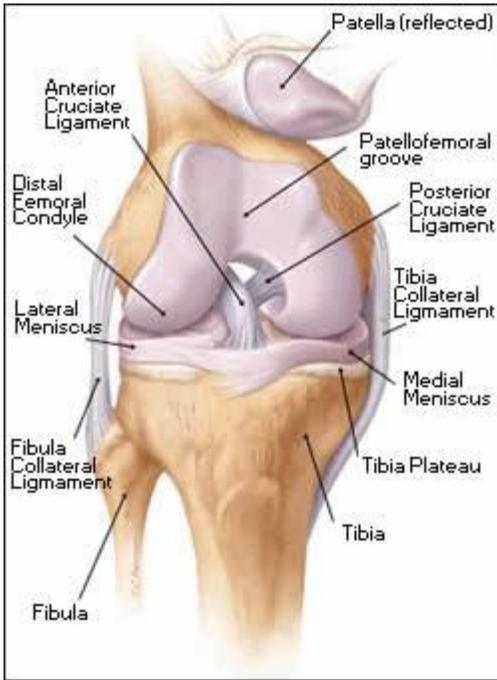
An osteotomy is a surgical procedure designed to correct alignment issues about the knee. The goal of this surgery is to shift the weightbearing load from the degenerative area to an area of the knee that is healthier and better able to accept load bearing forces. Not everyone is a candidate for this type of procedure. It is best suited for patients with a high demand, active lifestyle whose active life expectancy will exceed the survival of a joint replacement.

Joint Replacement

Knee arthroplasty is the procedure commonly called joint replacement. It is an appropriate procedure when all other treatment options have been exhausted or are not indicated. It is a successful treatment and has the potential to provide an excellent functional outcome for many years. Wear of the surfaces and loosening of the implant are concerns in young active patients treated with arthroplasty. Therefore patient demands and activity expectations must be considered prior to a decision to undergo knee replacement.

Unicompartmental Joint Replacement

Some patients are a candidate for a unicompartmental joint replacement. This is a procedure limited to the medial (inside) side of the joint. A unicompartmental joint replacement is typically used for patients who have arthritis in a limited part of their knee. It is intended to preserve the healthy knee structures and restore normal knee motion and function. The surgeon will evaluate you to determine if you are a candidate for this type of procedure.



Knee Osteoarthritis

