Knee Problems – Osteotomy

Surgical Advances
Leg Alignment

Dr. Frank Noyes of Cincinnati Sportsmedicine and Orthopaedic Center reported in the literature his clinical experience with the "double" and "triple" varus knee syndromes in 1984. These terms refer to knees that have varus malalignment (bowed knees) and damage to at least one and sometimes two knee ligaments (the anterior cruciate ligament and the posterolateral ligament). Patients with these problems often have had multiple prior knee operations that have failed to alleviate pain and instability, and feel hopeless when they arrive at our Center. Fortunately, advances in surgical techniques and rehabilitation now offer promise of pain relief and return to an active lifestyle for many.

"Patients requiring osteotomy come in different categories. Some people have just the bowed leg condition from birth, which can be corrected by one operation. Other patients have had multiple injuries frequently combined with failed operations, which resulted in the bowed leg condition. These patients usually feel at the end of their rope, so to speak, when they are referred to us. What we can offer at Cincinnati Sportsmedicine is a reasonable chance of relieving pain with daily activities and maybe, if the damage to the joint lining isn't severe, a return to light recreational activities. In a study of 41 patients who had osteotomy and ACL reconstruction, 88% said they would have the operation again and were satisfied."

Sue Barber-Westin
Director of Clinical Studies
Cincinnati Sportsmedicine Research and Education Foundation

"In our experience, patients who come to us who require osteotomy and ligament reconstructions represent some of the most difficult cases we encounter. In many, the correct identification of all of the problems present has not been made and this is why previous operations failed. Through specialized testing and the latest equipment available, we are able to sort out all of the problems and recommend treatment which is often done in a staged approach. The knowledge that we have gained has taught us important lessons in how to avoid or lessen the symptoms with this condition with early surgical treatment that includes ligament reconstructions, meniscus transplants, and early osteotomy."

Frank Noyes, M.D.
President and CEO
Cincinnati Sportsmedicine Research and Education Foundation

Patients

Procedures Make a Difference:
Living Painfree and Lowering Golf Handicap

The history of David Graff's knee problems is typical of the complex knees seen at Cincinnati Sportsmedicine and Orthopaedic Center. Nearly 20 years ago in college, David tore his anterior cruciate ligament playing flag football. His options back then with local doctors in his hometown consisted of either a reconstruction and weeks in a cast, or weeks of rehabilitation and crutches. He chose not to have the reconstruction.
Over time, David's knee slowly deteriorated. "I was still able to be active, but then I would pay the price days later not able to walk because of the pain." He finally sought the advice of a local doctor who told him that he needed either a total knee replacement at age 37, or a ligament reconstruction and leg realignment procedure. "My doctor heard Dr. Noyes speak at a national conference and knew that he was one of the only physicians who could do the needed procedures simultaneously." So David came to Cincinnati and had Dr. Noyes perform a high tibial osteotomy and ACL reconstruction at the same time.

"From the beginning, my experience with the staff in Cincinnati was fantastic on a lot of fronts. I had never had that sort of treatment and I've seen a lot of doctors in 20 years." Now, 2 years after surgery, David is happily playing golf painfree. "The best part is that now I can finally shift my weight to my right side during the golf swing. I lowered my handicap 6 points, from 18 to 12!"

**Question and Answers**

**Varus Leg Alignment**

What is an osteotomy?  
Why do I need an osteotomy?  
When should I see a physician?  
Why should I see a sports medicine trained orthopaedic surgeon?  
Will I need surgery?  
What are my surgical options?  
What can I expect after surgery and avoid complications?

![Diagram of osteotomy technique](image)

**What is an osteotomy?**

An osteotomy is an operation that realigns the lower leg to allow an even distribution of weightbearing forces across the knee. There are two types of alignment problems that can occur to the lower leg. One is called a valgus malalignment (or knock-knee) and the other more common condition is a varus malalignment (or bowed knee). This section will refer to varus malalignment problems only.

**Why do I need an osteotomy?**

Varus malalignment can cause pain to the inner (medial) portion of the knee because the forces from any weightbearing activity (walking, running, kneeling) are unevenly placed across this area. This condition is magnified if the patient has suffered an injury and has had the medial meniscus removed. Even worse, some patients also have torn ligaments in their knee, such as the anterior cruciate, and have multiple problems from both the ligament deficiency and lower leg malalignment.

Patients with varus malalignment need to undergo an osteotomy in order to correct the distribution of forces across the knee joint. Think of a tire that is out of alignment and wears unevenly on one side. That is the perfect example of what happens to the knee joint with this condition.

Not all people with bowed legs need to have this operation. Some have learned to subconsciously compensate with their leg muscles and sophisticated gait analysis testing does not show an uneven weight distribution. Others simply never have pain in their knee until they are much older. However, patients who develop varus malalignment as a result of an
injury, often wind up with severe pain that necessitates an operation.

**When should I see a physician?**

Patients who have never had an injury, but have simply had bowed legs from birth, should seek a physician's advice if they begin to have pain or swelling in their knee, especially on the inside (medial) portion of the joint. This means that arthritis may be occurring, and the operation may slow down or prevent further joint damage. If you have this condition and have had pain for a long time, we suggest seeking attention immediately. Even though you may have significant joint damage already, this operation often relieves the pain that occurs with daily activities and can "buy time" before a total knee replacement is required. This is especially important if you are under the age of 50.

Patients who have had an injury (usually to both the meniscus and anterior cruciate ligament) and who have gradually developed a bowed leg should seek medical advice at the first sign of pain, swelling, locking, catching, or giving-way in the knee. Unfortunately, arthritis is a real concern for these individuals and many require both an osteotomy to realign the lower limb, and ACL reconstruction to stabilize the knee. Young, athletically active patients should not wait until the pain is so bad that they are forced to give up sports. Done early, before the onset of severe arthritis, this operation has a very good success rate and should be seriously considered before pain occurs with normal daily activities.

**Why should I see a sports medicine trained orthopaedic surgeon?**

The training of an orthopaedic surgeon involves many years of undergraduate, medical school, and residency education. The specialization of sports medicine involves additional training, usually at an educational center where a fellowship year is completed. This involves advanced training in arthroscopic surgery, required in the treatment of most knee, shoulder, ankle, elbow and sports medicine-related injuries. The sports medicine-trained surgeon also has knowledge of specific rehabilitation and muscle performance issues to safely regain function and return patients to athletics. A sports medicine center combines the disciplines of physicians, physical therapists, athletic trainers, and more to totally heal all aspects of an injury.

**Will I need surgery?**

For patients with bowed legs from birth who have never had an injury to their knee:

Yes, if you have pain (often accompanied by swelling) on the inside portion of your knee with any activity. This is to slow down or prevent the progression of arthritis.

No, if you do not have any pain or swelling in your knee. Oftentimes a special brace can be used to decrease the loads on the arthritic portion of the knee joint.

For patients with bowed legs that resulted gradually over time from a knee injury:

Yes, if you have pain and swelling with routine activities of daily living. The goal of the operation is to slow the progression of arthritis and delay or prevent the need for total knee replacement.

Yes, if you are young, active, and have pain and swelling with sports activities. You may need to undergo both an osteotomy and ligament reconstruction (if the ACL was previously torn) to obtain the "best knee
possible*.

No, if you do not have any pain or swelling in your knee.

**What are my surgical options?**

There are two types of osteotomy, an opening wedge and a closing wedge.

**Opening wedge:** A small fracture is created in the upper portion of the tibia (shin bone). The fracture site is opened far enough so a space is created to then allow a small piece of bone to be inserted into this space. The bone is usually taken from the patient’s hip. Secure internal fixation is used to promote adequate healing.

**Closing wedge:** A small fracture is created in the upper portion of the tibia (shin bone) and sometimes in the fibula as well. A small wedge of bone is removed and the space is closed so that the ends of the fracture are together. Secure internal fixation is used as shown in the x-ray.

For patients with bowed legs and other problems, such as ligament ruptures or prior meniscus removal:

Usually, the osteotomy is performed first and then, several months later if required, the ligament reconstruction is done. This "staged" approach allows you to recover from the osteotomy, make sure the alignment achieved is stable, and reduces the chance of having a complication. Only in select cases do we perform the osteotomy and knee ligament reconstruction together.

If you also require a medial meniscus transplant, or a posterolateral reconstruction in additional to the osteotomy and knee ligament reconstruction, then the "staged" approach is definitely done. The osteotomy is done first, followed several months later with the other procedures (such as the ACL and posterolateral ligament reconstructions done...
together, or the ACL reconstruction and meniscus transplant done together

What can I expect after surgery and avoid complications?

An osteotomy usually carries a certain risk of complications. We are pleased with the clinical studies at our Center that have shown a very low incidence of these problems after both opening and closing wedge procedures. In patients who require multiple operative procedures, the staged approach lessens postoperative problems and that is why we recommend this type of treatment. In fact, in two studies involving 80 patients who required osteotomy and ACL reconstructions showed that no patient had a postoperative complication of infection, nerve injury, knee motion limitation, or vascular problem.

The reason for our success is not only the clinical experience in dealing with these problems but also our rehabilitation program, and patient compliance.

YOUR SURGERY MAY FAIL IF YOU DO NOT FOLLOW THE RIGHT REHABILITATION PROGRAM.

Your rehabilitation program after osteotomy is typically:

- Knee motion and quadriceps strengthening exercises initiated the day after surgery
- Crutches for 7 to 8 weeks, with limited weightbearing in the initial weeks until the osteotomy has progressed to an advanced healing stage.
- Aerobic conditioning exercises at 5 to 6 weeks postoperatively
- No sports until approximately 10 to 12 months postoperatively, and only for select patients who had limited or no damage to the joint lining. The majority of patients who have this operation are advised to return to light recreational activities only

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