The Noyes Knee Center

An Internationally Recognized Center of Excellence

Cincinnati SportsMedicine and Orthopaedic Center

The Noyes Knee Center
At Cincinnati Sportsmedicine and Orthopaedic Center

Director
Frank R. Noyes, MD

Chairman and Medical Director, Cincinnati Sportsmedicine and Orthopaedic Center
President, Cincinnati Sportsmedicine Research and Education Foundation

Medical School: George Washington University

Residency: University of Michigan

Board Certification: American Board of Orthopaedic Surgery

Academic Appointments:
Clinical Professor, Department of Orthopaedic Surgery, University of Cincinnati

Professor, Noyes Tissue Engineering and Biomechanics Laboratory, Department of Biomedical Engineering, University of Cincinnati

Membership in Professional Societies:
American Academy of Orthopaedic Surgeons, American Orthopaedic Society for Sports Medicine, Arthroscopy Association of North America, American Orthopaedic Association, International Society of the Knee, Herodicus Society

Professional Appointments:
Past Team Physician, University of Cincinnati Athletic Teams

Past Team Physician, Cincinnati Bengals and Cincinnati Riverhawks

Past Chairman, Sports Medicine Advisory Committee, United States Soccer Federation

Past Director, United States Olympic Committee Research Site, Cincinnati, Ohio

Past Chairman, American Orthopaedic Society for Sports Medicine Research Committee

Past Member, American Academy of Orthopaedic Surgeons Board of Directors

Past Member, Arthritis Advisory Board of the National Institutes of Health

The moment patients arrive at The Noyes Knee Center they can be confident they will receive the highest level of care.

Patients from as far as Greece, the Middle East, Europe and South America or as close as Cincinnati have sought the expertise that is only available at our Center. Professional and recreational athletes, injured workers, high school students, and older adults, all receive the same compassion and expertise. Patient satisfaction is always our number one goal.

Awards and Honors:

OREF Clinical Research Award, 2004
Presented by the Orthopaedic Research and Education Foundation and the American Academy of Orthopaedic Surgeons. This award recognizes the most distinguished orthopaedic clinical research project related to musculoskeletal disease or injury.

John Kennedy Memorial Lectureship, 2004
The honor of presenting this distinguished lectureship is given annually by the President of the American Orthopaedic Society of Sports Medicine to one physician to recognize an outstanding career as an orthopaedic surgeon, educator, and researcher.

George D. Rovere Award of Excellence, 1997
Presented by the American Orthopaedic Society for Sports Medicine. This award recognizes one physician annually as the distinguished educator of the year in the subspecialty of sports medicine.

Excellence in Research Award, 1997
Presented by the American Orthopaedic Society for Sports Medicine. This honor is presented to the most outstanding paper submitted in all categories within the subspecialty of sports medicine.

Award of Excellence, 1989
Presented by the University of Cincinnati. The highest honor given by the University of Cincinnati, this award was presented to Dr. Noyes in recognition of his accomplishments as a physician, educator and scientist.

O'Donoghue Award, 1988
Presented by the American Orthopaedic Society of Sports Medicine. This award is the highest honor given for outstanding clinical and laboratory efforts applicable to the understanding, care, and prevention of sports injuries.

Kappa Delta Award, 1977
Presented by the American Academy of Orthopaedic Surgeons. This is the highest award presented annually for outstanding research in the entire field of orthopedics.

Best Doctors in America, 1992 – 2003
Each year, 35,000 physicians across the U.S. are surveyed and asked to name the doctors they would choose to receive care from. For 11 consecutive years, Dr. Noyes has been recognized by his peers as one of the top orthopaedists in America.

Dr. Noyes has published over 200 scientific articles and chapters, and is frequently a guest speaker at national and international orthopaedic meetings.

Welcome to The Noyes Knee Center

The Noyes Knee Center is dedicated to improving the lives of people with knee problems. Under the direction of Frank R. Noyes, M.D., The Center has earned an international reputation for more than a quarter of a century for excellence in patient care and orthopaedic research.

Patients from around the world travel to The Noyes Knee Center for advanced treatment of knee disorders, and the specialized surgery that is performed to restore knee function when it has been compromised by injury or disease. Dr. Noyes and his colleagues have published some of the highest success rates and lowest complication rates for a variety of knee problems.

The mission of The Noyes Knee Center is to provide compassionate and competent treatment for our patients using the most advanced proven treatment strategies available.

Elements for Success in Patient Care

Accurate Diagnosis

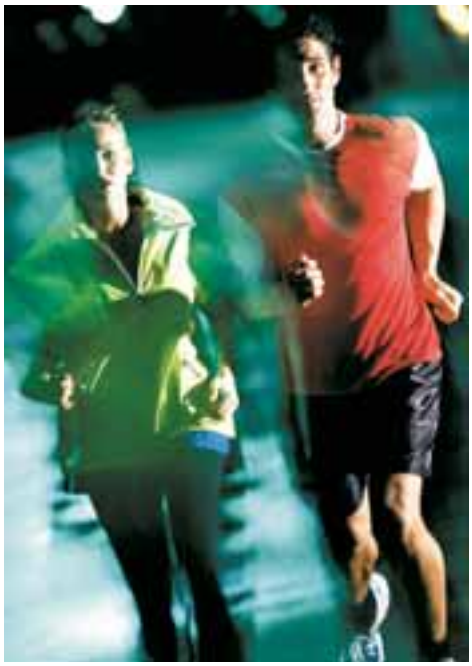
The sophisticated level of expertise it takes to provide an accurate diagnosis begins by listening to our patients. A careful patient history, a thorough physical exam, and the experience to obtain the proper confirmatory tests all play important roles in determining the cause of the problem.

Treatment Excellence

The staff at The Noyes Knee Center is well-versed in the latest treatments and procedures available and has years of experience evaluating and treating the full spectrum of knee problems.

Team Approach

In addition to our surgeons, experienced physical therapists and certified athletic trainers are located in all of our offices to offer convenient, comprehensive treatment. Our team also includes specialists in related fields such as rheumatology, pain management, psychology, and nutrition.



The Noyes Knee Center has Four Major Divisions:

Patient Care

Excellence in patient care is the primary goal of The Noyes Knee Center. This includes providing our results or "outcomes" on all aspects of our care.

Research

We are constantly looking into new strategies and treatment approaches for knee disorders. Our clinical outcome studies have provided the results of treatment for a variety of knee problems to the medical community, and allow us to give our patients solid and realistic information regarding success rates, complications, and future expectations of knee function.

Injury Prevention Performance Enhancement

Our research has lead to the development of injury prevention and performance programs. The internationally-recognized Sportsmetrics™ program, designed to decrease knee injuries and improve performance in female athletes, was developed here and is used in over 100 sites throughout the U.S., Canada and Europe.

Education

We offer continuing educational programs for physicians, physical therapists, athletic trainers, biomedical engineers, and allied health professionals. The Noyes Knee Center initiated one of the first sports medicine fellowship programs in the U.S. and over 100 graduates are now practicing throughout the U.S. and Canada.

Leading the Search to Improve Orthopaedic Outcomes

Dr. Frank Noyes has directed research efforts at the Cincinnati Sportsmedicine Research and Education Foundation and The Noyes Tissue Engineering and Biomechanics Laboratory at the University of Cincinnati for 25 years. The ultimate goal of these efforts – improving the outcome of medical care - is accomplished by applying and implementing research concepts from basic science, bioengineering, and clinical outcome studies.

The outcomes from over 50 prospective clinical investigations at the Noyes Knee Center that followed over 4,000 patients have set standards for orthopaedic and sports medicine centers around the world. The proof is not only in our high success rates and low complication rates, but also in the differences made in our patient's lives.

The knee joint is highly specialized.

The muscles, joint geometry, ligaments and a delicate lining all work together.

With injury or arthritis the treatment is equally specialized to restore function.

Treating Knee Pain

Orthopaedic problems, particularly knee pain, account for more physician visits than any other disease or illness category. Each year millions of people injure their knee or seek treatment for pain that is affecting their daily or sports activities. The good news is that there are advanced treatment options available that can often relieve pain and improve activity levels.

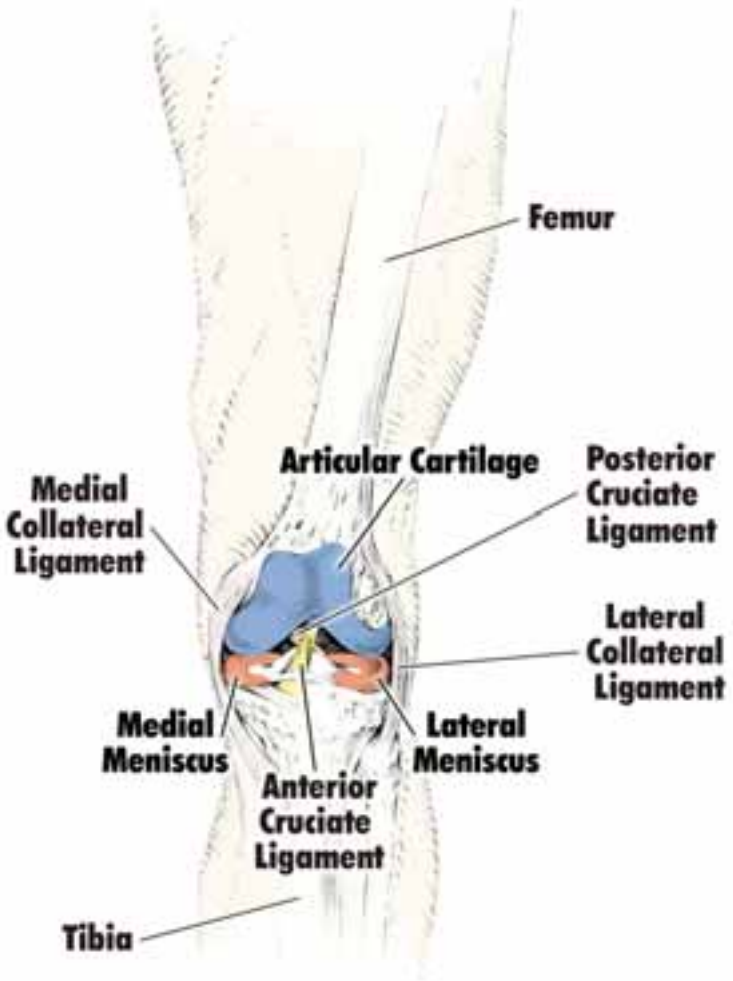
The Noyes Knee Center offers advanced surgical options for patients with knee pain, especially pain that has not responded to other treatments. Some of these procedures are minimally invasive and others require only an overnight hospital stay. In many cases, options are available that can slow the progression of osteoarthritis. Many of these new methods are only available at a few select centers in the U.S. The physicians at The Center have played an important role in the development of many of today's modern operative procedures and rehabilitation programs.

About the Knee

The knee is the largest joint in the body, and one of the most easily injured. It is made up of the lower end of the thighbone (femur) which rotates on the upper end of the shinbone (tibia), and the knee cap (patella) which slides in a groove on the end of the femur. The bones are protected by two kinds of cartilage. Articular cartilage on the ends of the bones allows freedom of movement. Meniscus cartilage forms a rim inside the joint and acts as a shock absorber to protect the articular cartilage from wear and tear.

The knee also contains large ligaments which help stabilize the joint by connecting the bones and bracing the knee against abnormal types of motion. They are the anterior cruciate ligament (ACL), the medial and lateral collateral ligaments (MCL and LCL), and the posterior cruciate ligament (PCL).

The knee is made to withstand tremendous forces and a lifetime of standing, walking, even running. But an injury, a problem from birth, or daily wear and tear disrupt this delicate balance and can cause damage and pain.



Starting with an Accurate Diagnosis

An accurate diagnosis is essential for successful treatment. The specialists at The Noyes Knee Center follow a thorough and systematic approach to obtain the correct diagnosis.

Our Evaluation Steps Include:

A detailed patient self-assessment questionnaire: We believe it is essential to have patients express in their own words how their knee condition affects their lifestyle and well-being.

A personal consult with each patient: Our specialists listen carefully to patients because their stories provide important clues as to the nature of the problem. Did the knee pain arise over time or was it sudden? How has the condition affected their work, sports and sleep at night? Answers to these and other questions lead to the right diagnosis the first time around.

A detailed physical examination: Our specialists perform a thorough examination of the knee. Our physicians have examined thousands of knees and have a wide array of clinical maneuvers and provocative tests to aid in establishing the diagnosis. Leg muscle strength, walking (gait) characteristics, lower limb function, and knee mobility are all assessed.

Special tests: MRIs, CT scans, bone scans and on-site x-rays may be used to confirm a diagnosis. These important tests are ordered after careful consideration of the information obtained from the history and physical examination. Often the tests serve to confirm a diagnosis that is suspected by our specialists. It is important that patients bring to the Center any previous diagnostic tests that may have been done by another physician.

Treatment Options

All available treatments are reviewed with each patient.

Conservative Care

Rest and activity modification: Sometimes the best treatment is simple avoidance of certain activities that produce knee discomfort for a short period of time.

Medication: We may prescribe anti-inflammatory medications, muscle relaxants, or occasionally use cortisone injections.

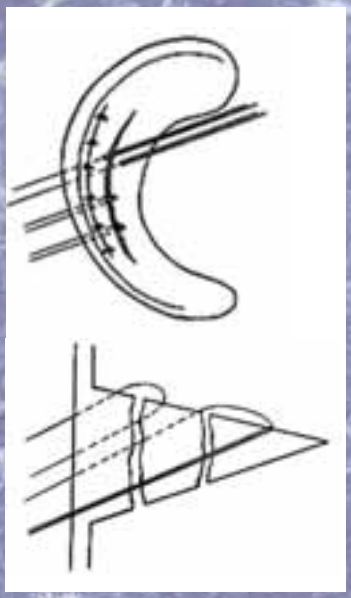
Injectable viscosupplementation: This injectable-solution (also known as Synvisc) can provide pain relief for several months and benefits those who need a joint replacement and are trying to delay surgery.

Physical therapy: The physicians at The Noyes Knee Center work closely with expert physical therapists on site to meet each patient's needs and goals. For many patients, education on correct and safe exercises and adherence to a physical therapy program successfully resolves their knee pain.

Surgery

When conservative treatment options are not successful in restoring comfort and function, or when there is a compelling reason to consider surgery, you can be assured that the physicians at The Noyes Knee Center have a reputation for surgical excellence. Through their advanced training and extensive experience, our specialists have mastered the intricate surgical techniques which may be necessary to correct your knee problem.

Postoperative rehabilitation: Rehabilitation is an essential element of your recovery. The success of your surgery is not only determined by an expert surgeon, but also by following a rigorous rehabilitation program. Our rehabilitation programs begin before surgery and start again the day after surgery.



Treating Meniscus Injuries: Preservation Through Repair

Injury to the meniscus cartilage, the knee's shock absorber, is the most common knee problem leading to arthroscopic surgery. Each year, there are approximately 750,000 operations performed in the U.S. to treat meniscus tears.

Sometimes, surgeons must remove all or a portion of the meniscus when it is torn. Once the meniscus is removed, further damage may occur within the knee joint. Patients with meniscus damage or loss can experience pain, swelling, locking, or giving way episodes and develop knee arthritis.

At the Noyes Knee Center, every effort is made to repair, and not remove, this vital structure. Dr. Noyes was one of the first surgeons in the U.S. to perform meniscus repair in 1983. He developed innovative techniques used today in which the torn tissue is stitched back into place using many tiny sutures with the aid of the arthroscope. Even tears that extend far into the center of the meniscus can often be successfully repaired.

Results of Meniscus Repair Operations From the Noyes Knee Center

- Over 360 patients have been followed 2 to 10 years after meniscus repair.
- Many different types of meniscus tears were repaired, including complex tears that extended into the central portion of the meniscus.
- Patients aged 9 to 58 were included. These studies were the first to document the results of meniscus repair in a large group of adolescents and in a separate group of middle-aged patients.
- 75% to 95% of the operations were successful, depending on the location and extent of the tear and the age of the patient.
- Approximately 75% of the patients also required ACL reconstruction, which was successfully done without effecting the postoperative recovery or complication rate.

Life After a Meniscus Repair

What began as just a minor discomfort turned into pain so severe that some nights Ed Miller couldn't sleep. "If I played sports or had a very active day in my construction business, my knee would swell and hurt all of the time."

Ed came to see Dr. Frank Noyes who diagnosed a lateral meniscus cyst and tear. Surgery was inevitable. In knees such as Ed's, most physicians remove the cyst and the portion of the meniscus that is torn. However, Dr. Noyes took a more aggressive approach at trying to save the vital meniscus tissue. After removing the cyst, he carefully repaired the tear, using the assistance of the arthroscope and multiple sutures.

That was more than ten years ago. Today, Ed gratefully acknowledges that his knee is "just like a normal knee" and that the surgery "allowed me to do all of the things I did before the problems started". He had "no side effects what-so-ever" and maintains a hectic lifestyle managing a successful company. "My operated knee is actually better than my other knee that has some problems, it's just like new."

Sources: Arthroscopic Repair of Meniscal Tears Extending into the Avascular Zone in Patients Younger Than 20 Years of Age, American Journal of Sports Medicine, 2002.

Arthroscopic Repair of Meniscal Tears Extending into the Avascular Zone With or Without Anterior Cruciate Ligament Reconstruction in Patients 40 Years of Age and Older, Arthroscopy, 2000.

Arthroscopic Repair of Meniscal Tears That Extend into the Avascular Zone. A Review of 198 Single and Complex Tears, American Journal of Sports Medicine, 1998.

Arthroscopic Evaluation of Meniscal Repairs After Anterior Cruciate Ligament Reconstruction and Immediate Motion, American Journal of Sports Medicine, 1991.

Meniscus Transplantation

For patients who have had their meniscus removed or have extensive damage that cannot be repaired, a meniscus transplant may be performed. The Noyes Knee Center was one of the first in the U.S. to successfully transplant a meniscus in 1987. The meniscus is implanted into the knee through a small incision and with the assistance of the arthroscope.

We use only meniscus transplants from tissue banks that have undergone FDA inspection and are certified by the American Association of Tissue Banks. The meniscal tissue is tested extensively to ensure it is safe from any transmittable disease. Patients who receive a meniscus transplant do not have to be on medication to prevent tissue rejection.

Not all patients who have had their meniscus removed are candidates for a transplant. A comprehensive evaluation of the patient's knee, general health condition, and prior medical records is first required. Patients must be under the age of 40, have had all of the meniscus removed, and either have early signs of arthritis or have pain and limitation of normal knee function. While clinical data have shown that the transplants can survive for as long as 10 years, the long-term results remain unknown.

Dr. Noyes with meniscus allograft patients, including Olympic Gold medalist Jaycie Phelps.

Results of Meniscus Transplantation From the Noyes Knee Center

- Over 140 patients have been followed 2 to 10 years after the operation.
- 89% believed their knee condition was improved and were satisfied.
- Knee ligament and articular cartilage procedures were successfully done with the transplant in many patients.
- Patients with no or only mild arthritis are the best candidates and the transplant should therefore be done early before severe joint damage develops.
- Patients with severe arthritis usually do not benefit because the transplant will not cure the existing joint damage.

Sources: Meniscus Transplantation in Symptomatic Patients Under Fifty Years of Age, Journal of Bone and Joint Surgery, 2004.
Meniscus Transplantation: Indications, Techniques, Clinical Outcomes, Instructional Course Lectures, 2004.
The Role of Allografts in Repair and Reconstruction of Knee Joint Ligaments and Menisci, Instructional Course Lectures, 1998.

Relieving Knee Pain from Damaged Articular Cartilage

The smooth tissue that covers the ends of bones and helps them glide is called articular cartilage. This type of cartilage can be damaged from either the wear and tear of daily activities or from a traumatic injury. Pain and swelling are often the complaints in patients who have cartilage damage. The Noyes Knee Center offers advanced surgical treatment options to help patients with cartilage damage maintain – or regain – their active lifestyles.

SURGICAL OPTIONS

Arthroscopic debridement and microfracture: With the aid of a small camera, the damaged tissue can be located and areas of torn cartilage trimmed. Surgeons also use this method to carefully create small holes in the uncovered bone - called microfractures –which heal to form a type of scar cartilage and partially restore some lining.

Osteochondral autograft transfer: Similar in theory to a hair transplant, surgeons remove a healthy "plug" of articular cartilage from areas of the knee that bear only a small portion of the body's weight. Then, the plugs are transferred to the areas of damaged cartilage. Research has shown that the cartilage survives the transfer process and approximately 80% of patients benefit from the procedure.

Autologous cartilage cell implantation: This procedure (also known as Carticel) is indicated in patients with large articular cartilage defects and consists of two operations. In the first operation, surgeons biopsy a small amount of healthy cartilage from the knee. The biopsy is sent to a laboratory and cultured for 4 to 6 weeks to produce millions of new cells. Then, in the second operation, these cells are placed into the knee at the site of the damaged cartilage. In the majority of cases, the cells mature and resurface the damaged area with a new cartilage lining. The success rate of this operation is approximately 80% and is slightly higher in patients who have a single articular cartilage lesion compared to those who have multiple lesions.

Osteochondral allograft: Young patients with large defects that cannot be treated with Carticel may receive a transplant to restore function and avoid total joint replacement. Patella, femoral and tibial transplants are available from tissue banks that are certified and FDA approved.

Surgical Options for Advanced Knee Arthritis:

Unicompartmental knee replacement: For patients in whom only one side of the knee is damaged by arthritis, a uni-compartmental knee replacement is considered a better option that a total knee replacement. Because only the arthritic part of the knee is replaced, the healthy portions are left intact. This translates into a shorter hospital stay and faster recovery and return to work or activity compared to a total knee replacement. There is less pain and swelling and the risks of complication are reduced. The goal is to provide replacement for 10 years, realizing that a total knee replacement will be necessary in the future. The success rate, projected at 10 years after surgery, is 80% to 90%.

Total knee replacement: The last surgical resort, when the articular cartilage has worn away in many different areas of the knee, is a total knee replacement. Each year 300,000 of these procedures are performed in the U.S. and usually result in dramatic pain relief and improved movement. In this procedure, the knee's surface is replaced with artificial components allowing for restored, pain-free motion. The surgeons at the Center have extensive experience with joint replacement.

Surgical Advances for Bowed Legs

Patients from throughout the world travel to The Noyes Knee Center due to Dr. Noyes' success in treating bowed legs (also called varus malalignment). These patients often have had multiple prior knee operations that failed to alleviate pain and instability. Patients with bowed legs have pain in the inner (medial) portion of the knee because the forces from any weight bearing activity (walking, running, kneeling) are placed across just this area instead of evenly throughout the knee joint.

Many patients with bowed legs also have other problems with their knee, such as ligament tears or loss of the meniscus cartilage. The advanced surgical techniques at The Noyes Knee Center, along with immediate postoperative rehabilitation, offer promise of pain relief and return to an active lifestyle for many.

High Tibial Osteotomy: This operation realigns the lower leg to allow an even distribution of weight bearing forces across the knee. There are two types of osteotomy done at the Noyes Knee Center:

Opening wedge osteotomy: In this procedure, a small fracture is carefully created in the upper portion of the tibia. A small piece of bone is taken from the patient's hip (iliac crest) and inserted into the fracture site. Special x-rays are taken on the operating table to make sure that correct alignment of the leg has been obtained. Secure internal fixation and the use of crutches for several weeks after surgery allow the fracture site to heal. We do not use external pins at the Noyes Knee Center.

Closing wedge osteotomy: A small fracture is carefully created in the upper portion of the tibia. A small wedge of bone is taken out of the fracture site which is then closed. Special x-rays are taken on the operating table to make sure that correct alignment of the leg has been obtained. Secure internal fixation and the use of crutches for several weeks after surgery allow the fracture to heal.

Results of Osteotomy from the Noyes Knee Center

- 82 patients have been followed 2 to 12 years after surgery.
- 88% of the patients were satisfied and would have the operation again.
- 80% returned to activities of daily living or light sports without knee pain.
- 80% had normal knee alignment 5 years after surgery.
- Knee ligament reconstructions were performed with the osteotomy or a few months later which successfully restored normal knee stability.
- The rate of complications was 5% for both types of osteotomy, one of the lowest published in the medical literature.

Sources: High Tibial Osteotomy in Knees with Associated Chronic Ligament Deficiencies, Master Techniques in Orthopaedic Surgery: Reconstructive Knee Surgery, 2nd Edition, 2003.

The Role of High Tibial Osteotomy in the Anterior Cruciate Ligament-Deficient Knee with Varus Alignment, Orthopaedic Sports Medicine, 2nd Edition, 2003.

High Tibial Osteotomy and Ligament Reconstruction for Varus Angulated Anterior Cruciate Ligament-Deficient Knees, American Journal of Sports Medicine, 2000.

High Tibial Osteotomy and Ligament Reconstruction in Varus Angulated, Anterior Cruciate Ligament-Deficient Knees: A Two- to Seven-Year Follow-up Study, American Journal of Sports Medicine, 1993.

Surgical Advances for Anterior Cruciate Ligament Injuries

More than 5000 ACL reconstructions have been performed at The Noyes Knee Center since the late 1970's. The results of many of these procedures have been reported and published in the medical community's most respected journals.

Dr. Noyes was the first surgeon to publish (in the English medical literature) the recommendation for immediate movement of the knee after this operation, thereby reducing the risk of complications and loss of normal knee motion. Our advanced surgical techniques and postoperative rehabilitation, which begins the day after surgery, have resulted in success rates averaging 95% and complication rates as low as 1%.

Different grafts can be used for ACL reconstruction. The graft is placed in the knee usually through just one very small incision with the aid of the arthroscope. In the majority of patients, we recommend the use of a portion of their own patellar tendon for this operation. Other grafts that can be used from a patients' own body include the hamstring tendons (semitendinosus and gracilis tendons) and the quadriceps tendon.

For certain patients in whom multiple ligaments are ruptured, or in whom multiple prior knee ligament reconstructions have failed, an allograft (or transplant) may be required. We use only grafts from tissue banks that have undergone FDA inspections and are certified by the American Association of Tissue Banks. The grafts are carefully tested before surgery and undergo a low-level of irradiation for sterilization.

Dear Dr. Noyes:

I want to thank you so much for the opportunity you had given my daughter following her ACL surgery. You enabled her to compete once again at the college level.

I'll never forget the year after her ACL surgery, when she came to your office for an examination for your research paper. After examining and talking with her you told her how pleased you are with her. She looked up at you and said "And I'm pleased with you." That statement says it all.

Let me take a minute to tell you of Sheri's achievements since her ACL surgery. She is Clemson's all time assist leader. Sheri was a captain her 4th and 5th year. She made all ACC and the ACC tournament team each year following her surgery.

She is just so happy that she was able to finish her college career with success.

I hope in some small way this letter shows that as parents, we are so happy for what you have given back to our daughter. And I know Sheri feels the same way!

Sincerely,
The Bueter Family

Sheri Bueter, Clemson soccer standout and ACL patient

Results of ACL Reconstruction from the Noyes Knee Center

- 100 patients with complete ACL ruptures treated without surgery were followed for 5 to 10 years after their injury. The majority suffered additional knee injuries, had reduced or given up sports activities, and eventually required surgery. This study provided data for the first time that demonstrated the consequences of this injury and lead to the current standard of care and recommendation for reconstruction of the ACL in active patients.
- 29 studies on the outcome of 2,140 patients that had ACL reconstruction have been conducted which reported.
- Stability was restored in 96% of patients undergoing ACL reconstruction for the first time.
- Stability was restored in 84% of patients who required a second (revision) ACL reconstruction.
- Only 1% of patients had a limitation of knee motion after surgery.
- No difference exists in the results of ACL reconstruction between men and women.
- ACL reconstruction is effective in patients with osteoarthritis, 70% had improvement in pain.
- Patellar tendon autografts provide better stability than allografts in patients with chronic ACL ruptures.

Wrestling Without Pain

Arthur "Mo" Shaw was one of the top ten steer wrestlers in the United States when he suffered a complete ACL tear in 2002. Dr. Noyes reconstructed his ligament and just one year later, Shaw returned to win the Cincinnati Longhorn Rodeo, competing against 150 other professional steer wrestlers. In addition to competing in 60-100 tournaments a year, Shaw roller blades, bikes, and works out to stay in shape. "I have no symptoms whatsoever and can do any activity I want to" Shaw contends. Dr. Noyes used a portion of the patellar tendon from Shaw's injured knee to replace the ACL, an operation with a 95% success rate in the Noyes Knee Center.

Sources: Revision Anterior Cruciate Ligament Surgery with Use of Bone-Patellar Tendon-Bone Autogenous Grafts, Journal of Bone and Joint Surgery, 2001.

Revision Anterior Cruciate Ligament Reconstruction: Report of 11-year Experience and Results in 114 Consecutive Patients, Instructional Course Lectures, 2001.

Prevention of Permanent Arthrofibrosis After Anterior Cruciate Ligament Reconstruction Alone or Combined with Associated Procedures: A Prospective Study in 443 knees, Knee Surgery, Sports Traumatology, Arthroscopy, 2000.

The Role of Allografts in Repair and Reconstruction of Knee Joint ligaments and Menisci, Instructional Course Lectures, 1998.

A Comparison of Results in Acute and Chronic Anterior Cruciate Ligament Ruptures of Arthroscopically Assisted Autogenous Patellar Tendon Reconstruction, American Journal of Sports Medicine, 1997.

A Rigorous Comparison Between the Sexes of Results and Complications After Anterior Cruciate Ligament Reconstruction, American Journal of Sports Medicine, 1997.

A Comparison of Results of Arthroscopic-Assisted Anterior Cruciate Ligament Reconstruction Between Workers' Compensation and Noncompensation Patients, Arthroscopy, 1997.

Anterior Cruciate Ligament Reconstruction with Autogenous Patellar Tendon Graft in Patients with Articular Cartilage Damage, American Journal of Sports Medicine, 1997.

Reconstruction of the Anterior Cruciate Ligament with Human Allograft: Comparison of Early and Later Results, Journal of Bone and Joint Surgery, 1996.

Surgical Advances for Posterior Cruciate Ligament Injuries

The Noyes Knee Center has lead research efforts in the diagnosis and treatment of PCL injuries for more than 20 years. Information from our laboratory and clinical studies has influenced the manner in which physicians treat patients with these injuries. We believe young active patients who sustain a complete tear to the PCL should undergo early reconstruction to avoid arthritis which may develop in the future. Hundreds of PCL reconstructions have been performed at the Noyes Knee Center.

While a variety of grafts can be selected for PCL reconstruction, our research data shows that the a two-strand graft has better results than the traditional graft that is a single-strand structure. We harvest a portion of the patient's quadriceps tendon for this operation.

For certain patients in whom multiple ligaments are ruptured, or in whom multiple prior PCL ligament reconstructions have failed, an allograft (or transplant) may be required. We use only grafts from tissue banks that have undergone FDA inspections and are certified by the American Association of Tissue Banks. The grafts are carefully tested before surgery and undergo a low-level of irradiation for sterilization.

Results of PCL Reconstruction from the Noyes Knee Center

- 130 patients that had PCL reconstruction have been followed 2 to 8 years after surgery.
- Knee stability was restored in 90% of patients who had a two-strand quadriceps tendon reconstruction.
- 88% of patients with multiple ligament ruptures had successful restoration of knee stability, as all ligament ruptures were reconstructed.
- The use of immediate protected knee motion the day after surgery is safe and not deleterious to the healing graft.

Award-Winning Quarterback's Career Saved by Cincinnati Knee Expert

When the 2003 Harlon Hill recipient, Curt Anes (Quarterback, Grand Valley State, Michigan) suffered a serious knee ligament injury in the Division II playoffs, his fans, coaches and teammates thought his bright future with the NFL was over. World-renowned knee surgeon Frank R. Noyes, M.D. at Cincinnati Sportsmedicine and Orthopaedic Center thought otherwise after being contacted by medical experts in Michigan. Dr. Noyes is internationally-recognized for developing successful knee operations, one of which included a procedure that could restore Anes to his pre-injury level of competition. Dr. Noyes was right, and one year after the complex operation Curt Anes not only received Division II's Outstanding Player of the Year Award, the Harlon Hill Trophy, he also led his team to the Division II National Championship. Curt was then drafted by the Detroit Lions.

Curt sustained a complete tear of his posterior cruciate ligament (PCL), a rare knee injury. Typically, this injury can be potentially career-ending for athletes of all levels. However, Dr. Noyes has found promising results with a new type of operation that reconstructs the PCL in a unique way. The operation's development is the result of a multi-year collaborative effort between the Cincinnati Sportsmedicine Research and Education Foundation and the U.C. Department of Biomedical Engineering.

Dr. Noyes has performed the procedure on patients from around the world with great success. The uniqueness of the procedure is that it uses a patient's own tissue, which is taken from the quadriceps tendon, and fashioned into a two-strand graft. Because of the graft's large size and configuration, it replaces a greater portion of the patient's own PCL than other operations which used grafts that only had a single strand. Now that this operation is available, athletes travel to see Dr. Noyes from many sports teams for PCL reconstruction.

Sources: Two-bundle Posterior Cruciate Ligament Reconstruction: A Study of How Bundle Tension Depends on Femoral Placement, Journal of Bone and Joint Surgery, 2004.

Posterior Cruciate Ligament Reconstruction: All-inside Arthroscopic Technique and Tibial Inlay Technique with Double-bundle Quadriceps Tendon-bone Graft, Surgical Techniques of Sports Medicine, 2004.

Arthroscopically-assisted Posterior Cruciate Ligament Reconstruction: The All-inside Technique and the Tibial Inlay Technique Using Double-bundle Quadriceps Tendon-bone Autograft, Techniques in Knee Surgery, 2003.

Arthroscopically Assisted Quadriceps Double-bundle Tibial-inlay PCL Reconstruction: An Analysis of Techniques and a Safe Operative Approach of the Popliteal Fossa, Arthroscopy, 2003.

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This program implements a dynamic warm-up, plyometric and jump-training, strength, and flexibility exercises over a six week period. Training sessions are 1 hour in duration and are held three times a week.

Results of Studies from the Noyes Knee Center

Before Neuromuscular Training:

- Males activated their hamstring muscles at three times the level of females during landing from a jump, an action that protects the ACL from injury.
- Female athletes had very weak hamstring muscles, and also had an imbalance in their lower leg muscles between the quadriceps (thigh) and hamstring muscles.
- Female athletes tended to land either with their knees hyperextended (going backward) or collapsed together, a potentially dangerous position for the ligaments in the knee.

After Six Weeks of Neuromuscular Training, Female Athletes:

- Increased the strength of the hamstrings, eliminating the imbalance in leg muscles.
- Increased the flexion angle and separation distance of the knees on landing into a safer position.
- Increased neuromuscular control and balance on landing from a jump
- Decreased the risk of a knee ligament injury to equal that of male athletes.

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