MAYO CLINIC

# ORTHOPEDICUPDATE

CURRENT TRENDS IN ORTHOPEDIC SURGERY

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## More Surgical Options for Active Young Patients

Treatment of hip disease is rapidly evolving to meet the needs of active young patients (15-60 years old) who may require more than 1 hip replacement or revision in a lifetime. Initial treatment usually is surgery to correct anatomic abnormalities that result in femoroacetabular impingement of the hip. More advanced cases of joint degeneration—typically seen in active and athletic patients with arthritis after the fourth decade—may benefit from a newer variant of metal-on-metal total joint replacement called hip resurfacing, which was approved by the US Food and Drug Administration (FDA) in May 2006. Patients older than 60 years may be good candidates for contemporary total hip replacement.

### Femoroacetabular Impingement

Femoroacetabular impingement is increasingly recognized as a common, yet frequently undiagnosed or misdiagnosed cause of hip degeneration. Aggressive surveillance is now recommended for the anatomic abnormalities that give rise to impingement, with the hope that early intervention can save patients' hips. The typical patient may or may not have arthritis and presents with activity-related groin pain, which may be intermittent at first and then becomes constant (Tables 1 and 2).

If severe arthritis has not developed, Mayo Clinic orthopedic surgeons attempt to restore normal anatomy of the hip in a procedure popularized in 1996 by Professor Reinhold Ganz of the University of Bern. Two Mayo Clinic orthopedic surgeons spent 6 months with Dr Ganz, evaluating and learning this technique. It involves surgi-

**Points to Remember**

- **Treatment of hip disease is evolving rapidly to meet the needs of active patients.**
- **Femoroacetabular impingement is increasingly recognized as a common—yet frequently misdiagnosed—cause of hip degeneration in patients who may or may not have arthritis. Surgical remodeling may restore normal hip anatomy.**
- **In severely arthritic patients, a new form of hip resurfacing using metal-on-metal implants may be indicated. This implant has both potential benefits and drawbacks, and hip resurfacing should be undertaken in carefully selected patients by trained, experienced orthopedic surgery teams.**

**Table 1. Hip Impingement Examination: What to Look For**

Clinical suspicion of hip impingement should be raised by the following presentation:

- An active young person
- Reports of activity-related groin pain
- Evidence of decreased internal rotation of the hip at 90° of flexion, which may be painful, especially with extreme flexion and internal rotation (anterior impingement sign)

Although impingement may be difficult to detect radiographically, on x-ray examination the clinician should look for retroversion of the socket and prominence of the ischial spine within the pelvic cavity and lack of spherical symmetry of the head.

**Figure 1.** In hip resurfacing, the femoral head is milled and capped with a metal-on-metal implant and the acetabular component is press-fit into the pelvis.

### Inside This Issue

cal dislocation of the hip joint anteriorly through a trochanteric slide osteotomy to provide access to the femoral head and acetabular rim. While preserving blood supply to the femoral head, surgeons trim the rim and sculpt irregularities off the outer femoral head to restore normal hip anatomy and function and to repair tears in the acetabular labrum. When only the femoral head-neck junction is affected, a femoroacetabular osteoplasty through an anterior Heuter or Smith-Peterson approach provides the patient with a faster recovery than does the trochanteric slide approach.

**Figure 2. Intraoperative fluoroscopic imaging helps placement of the pin and implant stem for correct angular positioning and anterior-posterior localization to avoid notching the femoral neck and anterior impingement.**

## Hip Resurfacing

Advances in bearing surfaces have provided a new approach to hip resurfacing. In this type of joint replacement surgery for patients with severe arthritic degeneration, the femoral head is milled to accept a cap that is cemented into place. The acetabular component is press-fit without screws into the acetabulum (Figures 1-3).

Hip resurfacing has both benefits and drawbacks (Table 3). In general, the overarching advantage of hip resurfacing is that the procedure conserves a portion of the neck of the femur. This makes future hip revision surgery easier because more native bone remains.

**Table 2. Typical Characteristics of Candidates for Hip Resurfacing**

- Are <60 years old
- Are candidates for arthroplasty because of end-stage disease
- Are able to tolerate a metal-on-metal implant
- Have good femoral neck bone stock
- Are male
- Have enough femoral head to support an implant
- Have no major leg length or offset problems
- Have no major acetabular problems that might undermine fixation without screws

Hip resurfacing is available in the United States at a limited number of advanced, comprehensive orthopedic surgery centers. Mayo Clinic's orthopedic surgery teams have received special training to perform both hip impingement repair and hip resurfacing. In carefully selected patients (Table 2), these experienced orthopedic surgery teams report early excellent outcomes with both procedures.

## Conclusions

With careful patient selection, Mayo Clinic orthopedic surgery teams are attempting to minimize the disadvantages of hip resurfacing. The result: they achieve reliable pain relief, restore function, and preserve femoral bone stock.

## For More Information

To refer a patient or make an appointment, please call 507-538-4101.

**Table 3. Drawbacks and Benefits of Hip Resurfacing**

| Potential Advantages of Hip Resurfacing | Disadvantages of Hip Resurfacing |
|---|---|
| More normal proximal femoral loading | Metal-on-metal not suitable for pregnant women or those of child-bearing age; kidney patients; hypersensitive patients |
| Minimal femoral bone resection | Possibility of femoral neck fractures |
| Easier revision | Possibility of femoral head necrosis could lead to implant failure |
| Low risk of dislocation (may also be obtained with large metal-on-metal total hip arthroplasty) | |

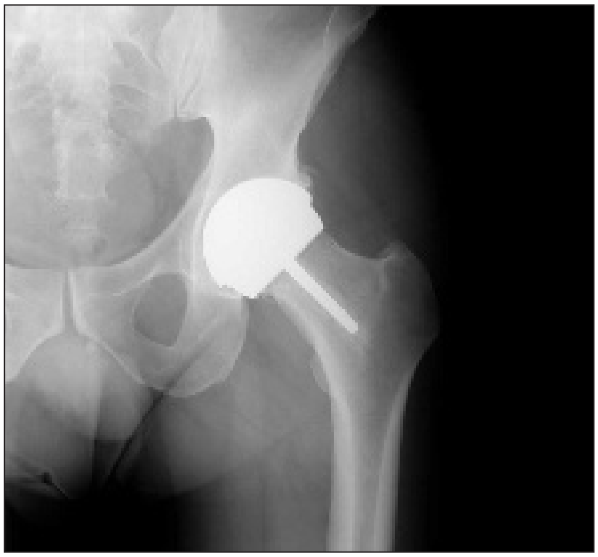

**Figure 3. Postoperative radiographic after total hip resurfacing.**

# Mayo Clinic Orthopedic Scholarship

A rich heritage of collegial communication informed by academic scholarship has shaped Mayo Clinic medicine for more than a century and remains a core value of our institution. As an extension of this institutional value we offer below selected recent Mayo Clinic orthopedics published scholarship. Our goal is to help you to continue to provide your patients with the best care possible and to facilitate working relationships with you, our physician colleagues.

### Shoulder

**Patient perceptions of open and arthroscopic shoulder surgery.** *Arthroscopy* 2007 Apr; 23(4):361-6. JW Sperling, AM Smith, RH Cofield, S Barnes.

**Humeral head replacement for the treatment of osteoarthritis.** *Journal of Bone & Joint Surgery – American Volume* 2006 Dec;88A(12):2637-44. DM Rispoli, JW Sperling, GS Athwal, CD Schleck, RH Cofield.

### Elbow

**Complex distal humeral fractures: internal fixation with a principle-based parallel-plate technique.** *Journal of Bone & Joint Surgery – American Volume* 2007 May;89A(5):961-9. J Sanchez-Sotelo, ME Torchia, SW O'Driscoll.

**Reconstruction for persistent instability of the elbow after coronoid fracture-dislocation.** *Journal of Shoulder & Elbow Surgery* 2007 Jan-Feb;16(1):68-77. RF Papandrea, BF Morrey, SW O'Driscoll.

### Hand

**Proximal interphalangeal joint arthroplasty.** *Journal of the American Academy of Orthopaedic Surgeons* 2007 Mar;15(3):189-97. M Rizzo, RD Beckenbaugh.

**What's new in hand surgery.** *Journal of Bone & Joint Surgery – American Volume* 2007 Feb;89A(2):460-4. PC Amadio.

### Spine

**C1 anatomy and dimensions relative to lateral mass screw placement.** *Spine* 2007 Apr 15;32(8):844-8. DM Christensen, RK Eastlack, JJ Lynch, MJ Yaszemski, BL Currier.

**Degenerative cervical spondylosis: clinical syndromes, pathogenesis, and management.** *Journal of Bone & Joint Surgery – American Volume* 2007 Jun;89(6):1360-78. RD Rao, BL Currier, TJ Albert, CM Bono, SV Marawar, KA Poelstra, JC Eck.

### Hip

**Patients preferred a mini-posterior THA to a contralateral two-incision THA.** *Clinical Orthopaedics & Related Research* 2006 Dec;453:156-9. MW Pagnano, RT Trousdale, RM Meneghini, AD Hanssen.

**Intraoperative fractures of the acetabulum during primary total hip arthroplasty.** *Journal of Bone & Joint Surgery – American Volume* 2006 Sep;88A(9):1952-6. GJ Haidukewych, DJ Jacofsky, AD Hanssen, DG Lewallen.

### Knee

**The Chitranjan Ranawat Award: Long-term survivorship and failure modes of 1000 cemented condylar total knee arthroplasties.** *Clinical Orthopaedics & Related Research* 2006 Nov;452:28-34. MB Vessely, AL Whaley, WS Harmsen, CD Schleck, DJ Berry.

**Minimally invasive total knee arthroplasty with an optimized subvastus approach.** *Journal of Arthroplasty* 2006 Jun;21(4 Suppl 1):22-6. MW Pagnano, RM Meneghini.

### Foot & Ankle

**Foot and ankle kinematics and ground reaction forces during ambulation.** *Foot & Ankle International* 2006 Oct;27(10):808-13. HB Kitaoka, XM Crevoisier, D Hansen, B Katajarvi.

**The compartments of the foot: a 3-tesla magnetic resonance imaging study with clinical correlates for needle pressure testing.** *Foot & Ankle International* 2007 May;28(5):584-94. JS Reach, Jr, KK Amrami, JP Felmlee, DW Stanley, JM Alcorn, NS Turner.

### Oncology

**Mechanical effects of partial sacrectomy: when is reconstruction necessary?** *Clinical Orthopaedics & Related Research* 2006 Sep;450:82-8. RR Hugate, ID Dickey, R Phimolsarnti, MJ Yaszemski, FH Sim.

**Preliminary results of tantalum acetabular components for THA after pelvic radiation.** *Clinical Orthopaedics & Related Research* 2006 Dec;453:195-8. PS Rose, M Halasy, RT Trousdale, AD Hanssen, FH Sim, DJ Berry, DG Lewallen.

# Mayo Clinic Orthopedic Scholarship, *continued*

### Infection

**Management of infection at the site of a total knee arthroplasty.** *Instructional Course Lectures* 2006;55:449-61. JM Leone, AD Hanssen.

**Recent intraarticular steroid injection may increase infection rates in primary THA.** *Clinical Orthopaedics & Related Research* 2006 Oct;451:50-4. AL McIntosh, AD Hanssen, DE Wenger, DR Osmon.

### Pediatrics

**Femoral neck fractures in pediatric patients: 30 years experience at a level 1 trauma center.** *Clinical Orthopaedics & Related Research* 2007 Jan;454:169-73. MW Shrader, DJ Jacofsky, AA Stans, WJ Shaughnessy, GJ Haidukewych.

**Anterior cruciate ligament reconstruction in the skeletally immature patient.** *Arthroscopy* 2006 Dec;22(12):1325-30. AL McIntosh, DL Dahm, MJ Stuart.

### Trauma

**Locking plate fixation for proximal humeral fractures: initial results with a new implant.** *Journal of Shoulder & Elbow Surgery* 2007 Mar-Apr;16(2):202-7. PS Rose, CR Adams, ME Torchia, DJ Jacofsky, GJ Haidukewych, SP Steinmann.

**Results of polyaxial locked-plate fixation of periarticular fractures of the knee.** *Journal of Bone & Joint Surgery – American Volume* 2007 Mar;89(3):614-20. GJ Haidukewych, SA Sems, D Huebner, D Horwitz, B Levy.

### Sports

**Mechanical properties of patellar tendon allografts subjected to chemical sterilization.** *Arthroscopy* 2007 Apr;23(4):400-4. DB Jones, PM Huddleston, ME Zobitz, MJ Stuart.

**Anterior cruciate ligament reconstruction in the skeletally immature patient.** *Arthroscopy* 2006 Dec;22(12):1325-30. AL McIntosh, DL Dahm, MJ Stuart.

### Biomechanics

**Effects of ankle-foot orthoses on ankle and foot kinematics in patients with subtalar osteoarthritis.** *Archives of Physical Medicine & Rehabilitation* 2006 Aug;87(8):1131-6. Y-C Huang, K Harbst, B Kotajarvi, D Hansen, MF Koff, HB Kitaoka, KR Kaufman.

**Gliding characteristics between flexor tendons and surrounding tissues in the carpal tunnel: a biomechanical cadaver study.** *Journal of Orthopaedic Research* Feb;25(2):185-90. C Zhao, Am Ettema, N Osamura, LJ Berglund, KN An, PC Amadio.

### Miscellaneous

**A quantitative composite scoring tool for orthopaedic residency screening and selection.** *Clinical Orthopaedics & Related Research* 2006 Aug;449:50-5. NS Turner, WJ Shaughnessy, EJ Berg, DR Larson, AD Hanssen.

**Analgesia for total hip and knee arthroplasty: a multimodal pathway featuring peripheral nerve block.** *Journal of the American Academy of Orthopaedic Surgeons* 2006 Mar;14(3):126-35. TT Horlocker, SL Kopp, MW Pagnano, JR Hebl.

## Mark Your Calendars: Mayo Clinic Continuing Medical Education

### 17th Annual Mayo Clinic Symposium on Sports Medicine

**November 9-10, 2007, Mayo Civic Center, Rochester, Minnesota**

Health care professionals with an interest in sports medicine or sports-related conditions and injuries should attend this case-oriented symposium. Presentations, lectures, a live physical examination demonstration, and live broadcast anatomy and arthroscopy demonstrations will showcase an integrated approach to the injured athlete.

### Minnesota Memorial Regional Pediatric Orthopedic Trauma Symposium

**November 16, 2007, Mayo Clinic, Rochester, Minnesota**

Join experts from an array of pediatric orthopedic specialties and keynote speaker James R. Kasser, MD, chair, Department of Orthopedic Surgery, Boston Children's Hospital and John E. Hall Professor of Surgery, Harvard Medical School, for a symposium focusing on the most challenging conditions seen in practice. Emphasis will be on treatment and management of pediatric orthopedic conditions related to trauma, the hip, and the upper and lower extremities.

### Mayo Clinic Spine Surgery Symposium

**January 27-31, 2008, Grand Hyatt Kaua'i Resort & Spa, Kaua'i, Hawaii**

Join Mayo Clinic course directors Bradford L. Currier, MD, and Michael J. Yaszemski, MD, PhD, in a program designed for surgeons and nonoperative clinicians with a special interest in managing spinal disorders. In a highly interactive format, national and international experts will discuss the latest advances in the field, as well as offer skill demonstrations, case presentations, and hands-on workshops.

**For more information or to register, go to www.mayo.edu/cme or call 800-323-2688.**

# Ulnotriquetral Ligament Injury Diagnosed Using the "Ulnar Fovea Sign"

### Points to Remember

- **Injuries to the ulnotriquetral (UT) ligament are common sources of ulnar-sided wrist pain, usually associated with high-torque swing sport rotation.**
- **Research by the Mayo Clinic orthopedic surgery team identifies a previously undiagnosed form of UT ligament injury—an axial "split tear" of the UT ligament.**
- **Split tears can be diagnosed with 95% sensitivity by a simple clinical test to elicit tenderness in the ulnar fovea.**
- **Full, pain-free wrist function can be restored by arthroscopically guided repair of the split tear.**

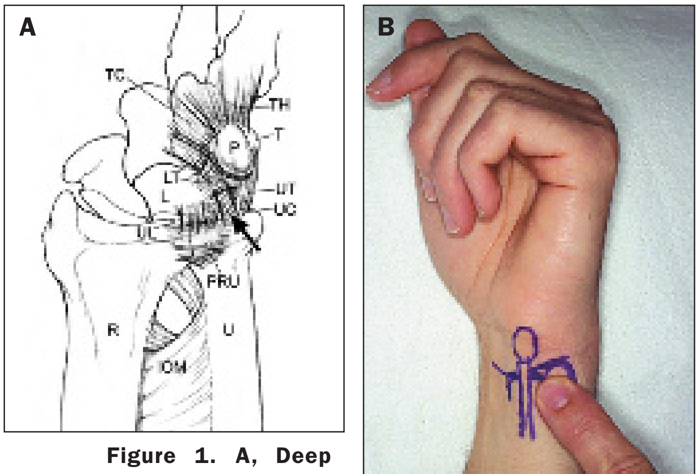


**Figure 1. A, Deep anatomy of the ulnar fovea sign. The ulnar fovea lies between the ulnar styloid process and the flexor carpi ulnaris tendon (arrow). B, Surface anatomy of the ulnar fovea sign. With the forearm in neutral rotation, the patient's ulnar styloid process is easily palpated by the examiner's index finger. IOM, interosseous membrane; L, lunate; LT, lunotriquetral ligament; P, pisiform; PRU, palmar radioulnar joint capsule; R, radius; T, triquetrum; TC, triquetrocapitate ligament; TH, triquetrohamate ligament; U, ulna; UC, ulnocapitate ligament; UL, ulnolunate ligament; UT, ulnotriquetral ligament.**

In the past, finding the source of debilitating wrist pain associated with high-torque "swing sports" such as golf and baseball has usually been difficult. In some cases, complete separation of the triangular fibrocartilage complex from the ulna or a crosswise rupture of the UT ligament (both causing joint instability) have been found to be the cause of the pain, but many times a definitive cause of pain was never identified, resulting in relatively poor clinical outcomes. However, the recent discovery by a Mayo Clinic orthopedic surgery team of an axial "split tear" of the ulnotriquetral (UT) ligament helps explain many cases of wrist pain for which the cause has been unknown or misdiagnosed. (See the Table for comparison of traits of UT ligament injuries.)

The newly defined split tear of the UT ligament is a common source of ulnar-sided wrist pain in which the ligament remains attached to the bone on both ends and is split open lengthwise. The joint is stable, and the MRI is usually interpreted as normal.

## Ulnar Fovea Sign

The Mayo team is the first to devise a simple, quick manual examination to help identify the source of ulnar-sided wrist pain (Figure 1). Called the "ulnar fovea sign," it elicits exquisite pain in patients who

**Table. Traits of 2 Types of UT Ligament Injuries**

| Typical UT ligament injury | Split tear of the UT ligament |
|---|---|
| Complete rupture of ligament-bone unionJoint instability | Ligament remains attached to bone at both ends |
| Pain | Joint stability |
| Crosswise rupture | Pain |
| Easily visible on MRI | Lengthwise rupture |
| | Not easily visible on MRI |

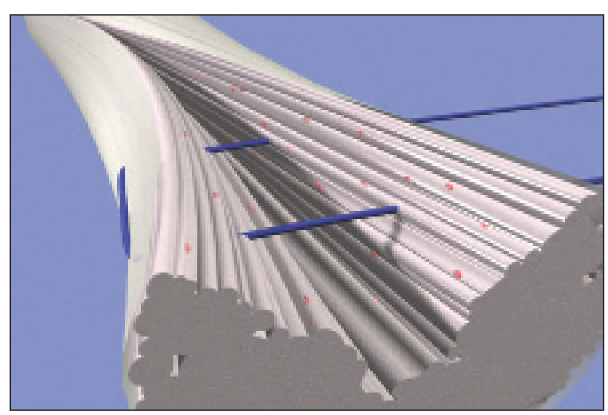

**Figure 2. Suturing the lengthwise tear has proved to be a durable repair allowing patients a return to full function of the wrist, with no reports of reinjury.**

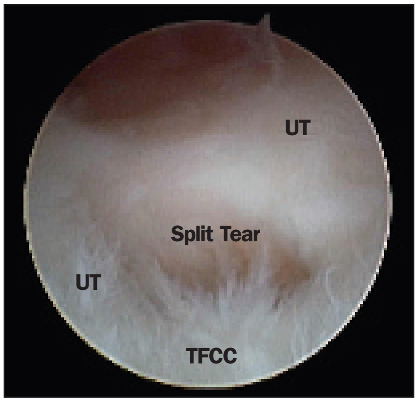


**Figure 3. Intraoperative photo of an axial split tear of the ulnotriquetral (UT) ligament. This axial tear of the UT ligament constitutes a newly described injury. In the past, a complete separation of the triangular fibrocartilage complex (TFCC) from the ulna or a crosswise rupture of the UT ligament has been found to be the cause of ulnar-sided wrist pain. But many times a definitive cause of pain was never determined, resulting in relatively poor clinical outcomes. Effective treatment for a split tear is based on a novel arthroscopically guided procedure to reunite both UT sides of the longitudinal split tear.**

have 2 kinds of ulnar-sided wrist injuries: foveal disruption of the distal radioulnar ligaments and UT ligament injuries.

The split tear discovery occurred when the Mayo team performed the ulnar fovea test on a patient while viewing the joint arthroscopically. This revealed that the source of the pain was the exact spot the physician was pressing. On clearing blood vessel debris from the area, what had initially looked like a normal ligament was, in fact, split open lengthwise, and the physician was actually viewing the inside of the ligament. Repeated performance of the ulnar fovea test on subsequent patients, followed by arthro-scopic examination, demonstrated that a large majority of those with a positive ulnar fovea sign and stable joints had UT split tears.

The diagnostic utility of the ulnar fovea sign was validated in a study published in the April 2007 issue of *American Journal of Hand Surgery*. In this study, the Mayo team reviewed 272 consecutive patients with ulnar-sided wrist pain who were evaluated and operated on by the same Mayo surgeon between January 1998 and December 2005. The review noted the presence or absence of response to the ulnar fovea sign when the test was performed on the injured limb and the uninjured limb. Sensitivity of the ulnar fovea sign to detect foveal disruptions or UT ligament injuries was 95.2%. These 2 sources of ulnar-sided wrist pain are distinguished clinically: UT tears are typically associated with painful yet stable wrist function. Foveal disruptions are associated with pain and instability of the distal radioulnar joint.

### Restoring Full Function

The Mayo team applied a treatment that can restore full, pain-free function and improve quality of life for decades for these patients, most of whom are less than 35 years old. Using arthroscopically guided surgery, the split is repaired by suturing the ligament together (Figures 2 and 3). After 6 weeks in a cast to immobilize the wrist, the patient begins rehabilitation. Follow-up results show the repair has been highly durable and resistant to reinjury. Patients—from sheet metal workers to dairy farmers to a Major League Baseball player—have returned to full strength at work and recreation within a few months after surgery.

### For More Information

To learn more about diagnosis and treatment of split tears of the UT ligament or to refer patients to Mayo Clinic for evaluation, please call 507-538-4101.

# Multiple Ligament Reconstructions for High-Energy Knee Dislocations

**Points to Remember**

- **High-energy knee dislocations are limb-threatening injuries that often involve damage to multiple ligaments.**
- **Controversy surrounds many aspects of the treatment, management, and rehabilitation of high-energy knee dislocations.**
- **Mayo Clinic orthopedic surgery teams have achieved excellent functional outcomes with a 2-step staged surgical protocol.**

High-energy knee dislocations often involve multiple ligaments and are limb-threatening injuries with a high risk of popliteal artery injury. Controversy surrounds many aspects of treatment. The experience of Mayo Clinic's orthopedic surgery team is leading to successful outcomes after multiple ligament reconstruction (Figure 1).

In addition to preferring early percutaneous surgical treatment over nonsurgical treatment, the Mayo Clinic team favors reconstruction over repair (Figure 2). They use a staged surgical protocol to treat patients with high-energy knee dislocations involving multiple ligament reconstruction.

### Staged Surgical Protocol

The goal of treatment for high-energy knee dislocation is restoration of axial alignment, knee stability, and joint function. Recognizing the benefits of a staged surgical protocol in tibial plateau fracture management, the Mayo Clinic team uses a staged protocol also for high-energy dislocations of the

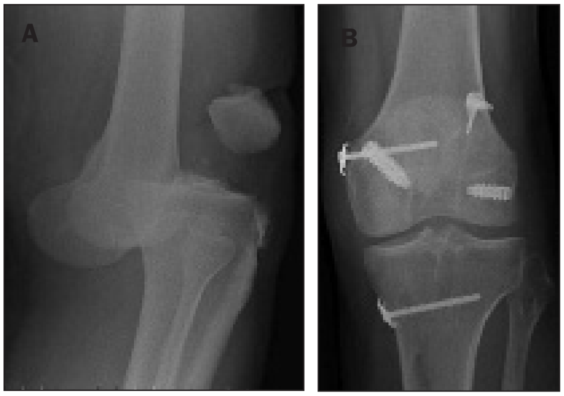


**Figure 1. A, Lateral view of knee showing joint dislocation. B, Anteroposterior view of 4-ligament reconstruction showing the internal hardware to stabilize and restore function to the anterior cruciate ligament, the posterior cruciate ligament, the medial collateral ligament, and the posterolateral corner.**

knee. These surgeons are seeing the excellent results after multiligament knee reconstruction that were first observed in tibial plateau fracture staging, where complication rates decreased from more than 50% to less than 10%.

### *Stage 1*

The first surgical stage involves examination under anesthesia with application of a joint spanning external fixator or a hinged knee brace locked in full extension to align the limb and to extend soft tissues to resting length (Figure 3). Imaging is performed under anesthesia with fluoroscopy for bilateral comparison. Subsequently, further imaging is obtained with MRI, and prophylaxis with low-molecular-weight heparin is initiated to prevent deep vein thrombosis. Swelling is allowed to subside with the tissues in correct anatomic alignment until inflammation is minimal and the limb is amenable to surgery.

### *Stage 2*

Between 2 and 3 weeks after injury, definitive ligament reconstructions begin. The time between the 2 stages allows adequate opportunity for soft tissue recovery, but the interval is short enough to avoid development of extensive fibrosis. Definitive treatment decisions are based on evaluation of the soft tissue envelope and ligamentous involvement.

In a study led by an orthopedic surgeon now at Mayo Clinic, reconstruction of 37 high-energy knee dislocations with the staged protocol approach was durable and functional after at least 22 months of follow-up. Of the 37 patients, 7 required revisions for failed posterolateral corner and/or posteromedial corner repairs.

**Figure 2. Percutaneous treatment is preferred. Intraoperative photograph of ACL and PCL reconstructions using minimally invasive percutaneous surgical treatment.**

### Acute Reconstruction Preferred

Recent data support ligament reconstruction over repair. In a study of 11 acute repairs conducted by an orthopedic surgeon now at Mayo Clinic, 64% failed and required reconstruction—and the reconstructions did not require further revision. The study involved a review of the records of knee patients treated by a single surgeon using the same protocol for acute repair of posteromedial corner and posterolateral corner structures, followed by delayed anterior cruciate ligament–posterior cruciate ligament reconstructions. Of the 11 acute repairs done in 8 patients between May and December 2004, most—7, or 64%—failed and required reconstruction: 5 of the 8 posterolateral corner repairs and 2 of

**Table. Example of Surgical Technique for Multiligament Knee Reconstruction**

**Multiple ligament reconstructions require 6- to 10-hour-long surgical procedures and therefore yield best results when performed at advanced orthopedic surgery centers that have experienced teams to staff the long operations. Numerous soft tissue and bone fixation devices for multiligament knee reconstructions are available. One example of a multiligament knee reconstruction would involve the following:**

- **Anterior cruciate ligament (ACL) reconstruction: Tibialis anterior allograft fixed with double fixation on the tibial side and single fixation on the femoral side.**
- **Posterior cruciate ligament (PCL) reconstruction: Achilles tendon with bone allograft. The bone plug is secured on the femur with a metal interference screw. The soft tissue portion of the graft is secured on the tibia with dual fixation (bioabsorbable interference screws, washer-post construct).**
- **Posterolateral corner (PLC) reconstruction: Achilles tendon with bone allograft. The bone plug is secured on the femoral side at the level of the popliteal sulcus with a metal interference screw. The graft is passed posterior to anterior through a fibular tunnel and then looped back to the lateral epicondyle on the femur. The soft tissue portion of the graft is secured at this level with a bioabsorbable interference screw. The posterolateral capsule is then shifted anteriorly. This technique recreates the 3 main static stabilizers of the posterolateral corner (the popliteal fibular ligament, the fibular collateral ligament, and the posterolateral capsule).**
- **Medial collateral ligament (MCL) reconstruction: Semitendinosus/gracilis autograft. The tendons are harvested and maintained attached to their tibial insertion. The proximal limbs are looped around a screw-washer construct at the medial epicondyle (isometric point) and brought back to the tibial insertion and secured with a second screw-washer construct.**

**To make an appointment** for a patient through the Referring Physicians Service, use these toll-free numbers:

Mayo Clinic Rochester
**800-533-1564**

Mayo Clinic Arizona
**866-629-6362**

Mayo Clinic Jacksonville
**800-634-1417**

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the 3 posteromedial corner repairs.

Because no patients have required further revision reconstructions, the Mayo Clinic team has concluded that abandoning repair techniques is warranted in most cases of multiple ligament injuries to the knee and favors reconstruction instead.

### New Mayo Task Force

To continue to help resolve the controversies surrounding the treatment of high-energy knee dislocations, Mayo Clinic orthopedic surgery team members have initiated a multicenter Knee Dislocation Task Force. Experts in the field of knee dislocations from across the United States and Canada will work together to develop clinical trials and pool data to help resolve the controversies surrounding multiligament knee reconstructions.

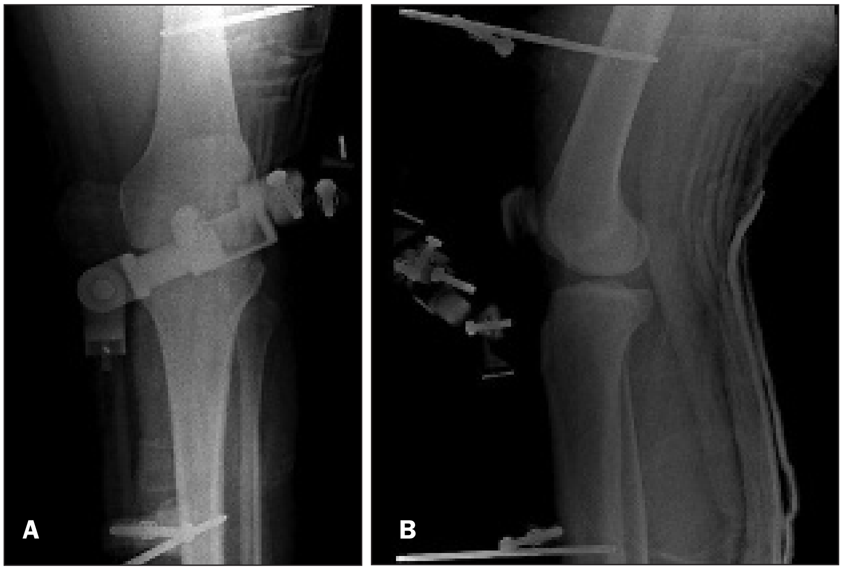


**Figure 3. Anteroposterior (A) and lateral (B) views taken during stage 1. These radiographs show the knee reduced with a spanning external fixator.**

### For More Information

To learn more about Mayo Clinic's approach to multiple ligament reconstructions of high-energy knee dislocations or to refer patients for evaluation, please call 507-538-4101.

## Mayo Clinic W. Hall Wendel, Jr. Musculoskeletal Center to Open December 2007

The new Mayo Clinic W. Hall Wendel, Jr. Musculoskeletal Center will be among the world's most advanced musculoskeletal facilities, bringing together diagnostic, treatment, and rehabilitation services in a center designed to yield high efficiencies for both patients and clinicians. In addition to the orthopedic subspecialty practices, expertise and services will include musculoskeletal radiology, rheumatology, endocrinology, physical medicine and rehabilitation, spine center, outpatient surgery center, and state-of-the-art patient education services. The facility will have a 2-story lobby atrium on the 14th and 15th floors of the interconnected Gonda and Mayo Buildings in Rochester, Minnesota.

"By bringing together specialties engaged in treatment related to musculoskeletal problems, the center will allow patients to be seen by a variety of physicians in a central location," says Daniel J. Berry, MD, chair of the Department of Orthopedic Surgery at Mayo Clinic. "It will also enable the physicians to easily consult with one another—a hallmark of Mayo Clinic care."

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