Sports medicine surgeons, such as Alexis Chiang Colvin, MD, one of the orthopaedists who provided care to the players and officials at the U.S. Open tennis tournament, are usually among the first to treat injured athletes, while joint replacement surgeons, such as Darwin Chen, MD, care for those whose joints are so destroyed that an artificial joint is needed. Now Drs. Colvin and Chen are teaming up to develop innovative strategies to restore the architecture and health of damaged hip joints, allowing a return to active lifestyles by patients who might otherwise have been sidelined. Dr. Colvin employs hip arthroscopy to treat labral tears and femoroacetabular impingement, while Dr. Chen utilizes open techniques and redirectional osteotomies to restore hip architecture. These techniques complement those of our new Chief of Orthopaedic Trauma, David A. Forsh, MD, who has a special interest in periarticular fractures, often using percutaneous and minimally invasive approaches to repair complex joint injuries.

Nelly Andarawis-Puri, PhD, is performing path-breaking basic science studies of tendon healing, trying to understand how to promote tendon regeneration after injury. Her investigations in a rodent model are already elucidating the structural, biomechanical, cellular, and molecular mechanisms of tendon healing. As a shoulder surgeon, I know that while we have improved the mechanics of tendon repair, such as better suture constructs for rotator cuff repair, further progress will depend on a better understanding of the biology of tendon repair and regeneration from the work of Dr. Andarawis-Puri and others.

Through this publication, I look forward to sharing with you these and other pioneering efforts taking place every day at Mount Sinai's Department of Orthopaedic Surgery.

ACCELERATING SCIENCE — ADVANCING MEDICINE

When I was a young assistant professor, I taught medical students that orthopaedists surgically treat arthritis by resection, fusion, or replacement. There wasn’t much focus on restoring or repairing damaged joints. How medicine has changed! At the Leni and Peter W. May Department of Orthopaedic Surgery at the Icahn School of Medicine at Mount Sinai, our world-class scientists and physicians are pushing the frontiers of understanding joint injury and methods of joint repair and tissue regeneration.

Arthroscopic Surgery for Femoroacetabular Impingement (FAI)

The patient, a promising 20-year-old varsity lacrosse player in his junior year at a Division 1 college, developed right hip pain that prevented him from competing. He was seen at an outside hospital and underwent surgery for a hernia. He had persistent pain that continued and was unable to play.

The patient was referred to Alexis Chiang Colvin, MD, Assistant Professor of Orthopaedics at the Icahn School of Medicine at Mount Sinai, who has expertise in hip arthroscopy. “His hip pain was actually due to a labral tear, which was secondary to underlying femoroacetabular impingement (FAI),” says Dr. Colvin. Surgery for FAI has traditionally been performed as an open surgery, involving an osteotomy of the greater trochanter, with the possibility of damaging blood supply to the femoral head and several months on crutches.

Instead, Dr. Colvin performed this complex surgery arthroscopically. Specialized instruments, such as tissue penetrators and long curved shavers, were then used to perform the surgery. The labral tear was repaired and a bone spur was removed. Because there also was injury to the cartilage, Dr. Colvin performed microfractures to stimulate a new cartilage surface to grow back.

The patient returned to play varsity lacrosse his senior year. In nine games, he had an impressive three goals and two assists, and was named to his league’s honor roll. Says Dr. Colvin, “By using a minimally invasive approach, patients can have a quicker and less painful recovery, which can facilitate a return to activities.”

LEFT: Arthroscopic photo demonstrating injury at chondrolabral junction (femoral head is on the right, acetabulum is on the left)
RIGHT: Arthroscopic photo demonstrating chondral surface after microfracture
Alleviating Pain, Restoring Active Lifestyles with Hip-Preservation Surgery

Orthopaedic surgeons at Mount Sinai are making great strides in the rapidly growing subspecialty of hip preservation. Young adults with hip pain have historically been treated conservatively, anticipating the progression of arthritis and the eventual need for hip replacement. Many of these patients can now be treated with a variety of hip-preservation surgery techniques, which aim to alleviate hip pain and restore active lifestyles.

Tendon tears and tendinopathies are common musculoskeletal injuries that account for more than 30 percent of all musculoskeletal consultations. Once damage is done to a tendon, it never regains its full native properties due to scarring, which also makes the tendon susceptible to further injury. Most research has focused on fetal tendons because fetuses heal scarlessly, but significant mechanical and biological differences between fetal and adult tendons, including weight-bearing properties in adults, limit the translational potential of this research. For this reason, Nelly Andarawis-Puri, PhD, Assistant Professor, Orthopaedic Research, is studying the healing ability of tendons in Murphy Roths Large (MRL) mice, which have been shown to exhibit some regenerative ability in several tissues, including cartilage and skin. Preliminary data suggest that the healing ability of these mice extends to tendons.

Dr. Andarawis-Puri’s team is using an inbred mouse strain to characterize an animal model for tendon regenerative healing. In the first phase of their study, researchers plan to examine the mechanical assessment and function of the affected limb and to examine the tendon for visible scarring. Characterizing injury models that represent a response range that includes regenerative, reparative, and poor healing is expected to improve scientific knowledge about adult tendon healing. Exploring the expression of genes as well as key proteins will provide greater insight into their specific roles.

Further, the effect of common interventions such as exercise, immobilization, and passive motion can be evaluated on tendon regeneration to shed light on optimal surgical management protocols. “This research can potentially change the field tremendously,” says Dr. Andarawis-Puri. “Once we’re able to understand the differences in molecular gene expression and inflammation response, we can start developing therapies to improve adult tendon healing.”