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Honing in on Hamstring Injuries: A Major League Baseball Perspective

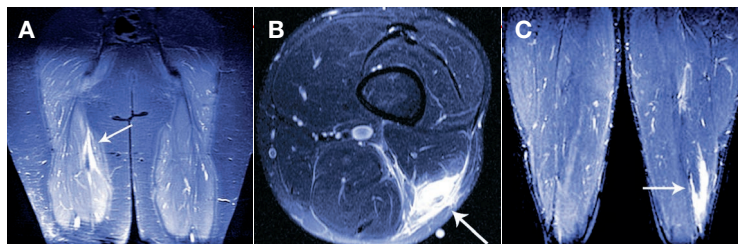
Hamstring injuries, which account for 29 percent of all injuries in elite and nonprofessional athletes, range from mild muscle damage without loss of structural integrity to complete muscle tearing with fiber disruption, leading to prolonged impairment and a risk of re-injury.

“Hamstring injuries rank in the top three of injuries that affect time lost in Major League Baseball, but these injuries are often considered preventable,” says Christopher S. Ahmad, MD, sports medicine orthopedic specialist at NewYork-Presbyterian/Columbia University Medical Center, who is also Head Team Physician for the New York Yankees. “The average time lost with a hamstring injury is between three and four weeks. The other concern is the recurrence rate of hamstring injuries.

Contributing Factors

Through the MLB’s injury surveillance system, which compiles data on all injuries occurring in Major League Baseball, the researchers were able to compare hamstring injuries to all other baseball injuries.

“We reviewed the history, mechanisms of injury, and classification systems for these injuries,” says Dr. Ahmad. “Our research identified features unique to this injury that were never really thought of before. For example, over 50 percent of hamstring injuries occur when a hitter makes contact with the ball and accelerates to first base. That’s the most common mechanism for the injury. There is also seasonal timing and a bimodal distribution where most of the injuries peak very early in the season, and then peak again towards



(A) Proximal myotendinous hamstring injury on coronal T2-weighted MRI
(B) Muscle belly injury on axial T2-weighted MRI
(C) Distal avulsion hamstring injury on coronal T2-weighted MRI

In fact, 20 percent of athletes will have a relapse or repeat injury. When you have an elite athlete whose job it is to play and they’re out recovering from that injury, it has a great impact on the team and that organization.”

A member of the Major League Baseball (MLB) Team Physicians Association, Dr. Ahmad serves as the group leader for the MLB’s research study focused on hamstring injuries – a component of a larger research effort to identify important injuries and strategies for their prevention in MLB players. Using data from 2011, Dr. Ahmad and his research colleagues around the country were charged with pinpointing the causes and impact of hamstring injuries, as well as recommending prevention and treatment strategies.

the end of the season. The thought is that early on, conditioning is still being established so the player is still very vulnerable to injury, while later in the season fatigue factors contribute to the risk.”

The researchers also examined other possible contributing dynamics, including climate, the temperature on the day of injury, and location – southern versus northern cities – in which the injuries occurred, although the numbers didn’t allow for conclusions to be drawn in these areas.

The results, which were submitted for publication in *The American Journal of Sports Medicine*, include considerations for risk reduction and injury prevention, the latest evidence on management of intramuscular and both proximal and distal insertional hamstring injuries, and indications for surgical and non-surgical treatment.

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Weinberg Family Cerebral Palsy Center: Providing a Lifespan of Care

Medical advances in recent years are helping individuals with cerebral palsy to live longer, more productive lives, with nearly 90 percent of children with CP now surviving into adulthood. At the same time, this encouraging news also presents unique challenges in care delivery for individuals with CP, as well as for the medical community.



Dr. David P. Roye, Jr.

Approximately one million people in the United States today are diagnosed with cerebral palsy. “There are even more when you expand the definition – an additional three or four million have childhood-onset neuromuscular disabilities,” says David P. Roye, Jr., MD, Director of Pediatric Orthopedic Surgery at NewYork-Presbyterian/Morgan Stanley Children’s Hospital and Executive Medical Director of the recently established Weinberg Family Cerebral Palsy Center.

“There are now more adults than children living with CP,” says Dr. Roye. “While pediatric medicine is no longer appropriate for them, adult healthcare systems have not yet been able to provide support for adults with CP who face new and emerging health issues. The Weinberg Family Cerebral Palsy Center is designed to meet the needs of this adult population by providing integrated health care to patients of all ages with cerebral palsy.”

An Inspiration Becomes Reality

“I’m at an age where many of the patients I began seeing in the 1980s and 1990s are now turning to me for help as adults,” explains Dr. Roye. “I could no longer care for them within the confines of the children’s hospital. This is what inspired me to develop and grow the Center.”

According to Dr. Roye, care has been truly lacking for individuals with childhood-onset neuromuscular disabilities who leave the pediatric sphere and enter adulthood. “These kids are in a wonderful pediatric hospital like Morgan Stanley Children’s Hospital with multispecialty care,” he says. “But then many of them drop off the map entirely between the ages of 18 and 20. All of a sudden, the hospital can no longer treat or admit them. There are literally hundreds of thousands of adults with CP who do not have services that are adequate for their needs.”

Dr. Roye envisioned a medical home for all patients with CP with access to specialists who could manage their care over their

lifetime. The Weinberg Family Cerebral Palsy Center is the first of its kind in North America to have assembled a full range of specialized healthcare services in one location.

“Our focus is to provide lifespan care,” says Dr. Roye. “When individuals with CP reach age 40 or 45, things begin to go wrong. They start to develop arthritis, their function starts to deteriorate, and they’re not able to cope. That’s when they seek care.”

Care to Call Their Own

With generous funding from Debby and Peter A. Weinberg, in recognition of the support and care that their youngest son, who was diagnosed with a rare form of CP at age three months, received at Columbia, the Weinberg Family Cerebral Palsy Center formally opened in January 2013. The Center offers medical, surgical, and rehabilitation services, including physical and occupational therapy, Botox treatment, surgical procedures, orthotic and prosthetic interventions, and wheelchair clinics, among others. Additional support is provided by speech and language pathologists, and social workers, who provide guidance on community resources.

“More than 40 physicians from 20 specialties have signed on to see our patients,” notes Dr. Roye. “With our expertise in cerebral palsy, we provide them with information about common issues in CP, such as early joint degeneration or how conditions such as pregnancy affect this disorder. These specialists are there for them, listen to their problems, and take the time necessary to examine them and address their concerns.

“We also have multiple subspecialty partners,” says Dr. Roye. “If my patient needs a total hip or knee replacement, hand surgery, general surgery, cardiac surgery – any necessary medical or surgical procedure – we’re able to refer the patient to an appropriate and knowledgeable specialist within our medical center.”

The Center also helps patients attain as much independence as possible. “We want to empower them to take control of their lives, directing them to professionals who can help, for example, with living arrangements, social setting issues, and continuing education programs,” says Dr. Roye.

Research Endeavors

The Weinberg Family Cerebral Palsy Center is also extending Columbia’s current research portfolio. While basic science research focuses on uncovering the disease mechanisms for childhood-onset neuromuscular disorders, clinical research conducted at the Center is evaluating new treatments and the impact of these treatments on patient outcomes and quality of life. The Center is also in the planning stages for the establishment of the first-ever nationwide CP patient registry that will help researchers to overcome longstanding hurdles of insufficient patient and outcomes data for CP, while providing an important platform for multidisciplinary longitudinal research.

Dr. Roye adds, “Our goal is for the Weinberg Family Cerebral Palsy Center to become a nationwide model for an integrated research and treatment program to help children and adults with CP achieve optimum management of their condition.”

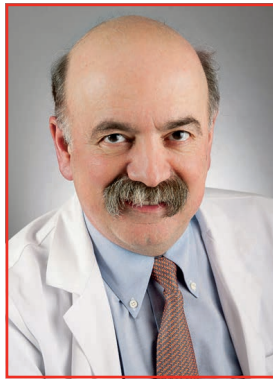
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A New Tactic for Post-traumatic Elbow Contracture

Elbow contracture following surgery or trauma, even after a trivial injury, is a common and often frustrating condition for patients, as well as for orthopedic surgeons. “Every orthopedic surgeon understands how difficult it is to maintain and facilitate the rehabilitation of elbow motion – that’s a universality,” says Melvin P. Rosenwasser, MD, Chief of Orthopedic Hand and Trauma Services, Department of Orthopedic Surgery at NewYork-Presbyterian/Columbia University Medical Center. “A number of techniques have been used in the past to try to enhance elbow motion that have all been mechanical – physical therapy, various types of splints, both dynamic and static – and all intended to assist in the recovery of end range flexion and especially extension.”

The orthopedic surgeon treats elbow trauma, including fractures and/or dislocations, with surgery to restore the anatomy and then, says Dr. Rosenwasser, the biology takes over. “The tearing of the elbow capsular tissues and ligaments, as well as articular cartilage and bone injuries, leads to capsular thickening resulting in a loss of elasticity,” he says. “And although patients work very hard and very diligently, they cannot straighten their arm. They go through weeks and months of therapy, and they wear custom braces with rubber bands and springs to try to stretch the contracted elbow. These are very uncomfortable and often ineffective. Sometimes the



Dr. Melvin P. Rosenwasser

contracture requires a secondary surgery to excise the scar tissue. Even then, the outcome fails to restore the patient to the preinjury state. After treatment the anatomy was reassembled and the X-rays would look okay, but the patient still could not overcome the tissue sequelae of contracture and muscle shortening and spasm.”

Dr. Rosenwasser tried a different tactic to reduce some of the biological factors that lead to contracture. “I decided to work on the muscles as they can go into spasm after trauma. Oftentimes the post-traumatic hemarthrosis inside the elbow joint triggers capsular contracture and muscle spasm. And what’s particularly interesting is that it’s a subcortical brain response of the subconscious mind – you can’t will yourself to relax the muscles despite adequate analgesia provided through pain medications. The muscles are being tensed below your level of conscious thought.”

Dr. Rosenwasser conceived the use of an intraoperative injection of botulinum toxin-A – Botox – into the muscles, the elbow flexors, that mediate the lack of elbow extension through this increased muscle tone. If the early impediment to elbow motion could be modified or eliminated then tissue changes in the capsule may be forestalled and the mobility of the elbow greatly enhanced.

“The Botox weakens or paralyzes the spastic muscles, but it is only temporary

because it wears off within three months,” says Dr. Rosenwasser, who with his Columbia colleagues conducted a number of pilot studies to determine dosages and identify the muscles in which to inject the Botox. He determined that the Botox injection allows the patient to rehabilitate and regain their motion before scarring is established and with much less struggle. Once the healing process is complete – usually within the first three months – motion that has been gained will not be lost.

“The Botox needs to be injected soon after the injury has had its definitive treatment or surgery,” he says. “You always want to know first, is it safe? And the answer is, yes, it’s completely safe. And two, is it efficacious? And, yes, it is. Patients regain their end range motion sooner and better. It’s a wonderful adjunct to traditional therapies.”

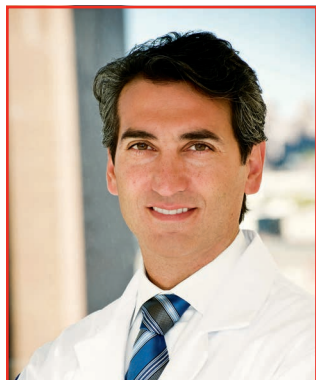
According to Dr. Rosenwasser, patient acceptance is high for this approach because of the widespread awareness of Botox use in cosmetic procedures. “Getting a Botox injection isn’t scary,” he says.

Dr. Rosenwasser has presented the clinical results of this technique at numerous professional societies. This has led many orthopedic surgeons wondering if Botox has general applicability for contracture in other joints, for example, the shoulder. “It may have many other indications but it would require similar clinical studies to demonstrate efficacy.”

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Honing in on Hamstring Injuries *(continued from page 1)*



Dr. Christopher S. Ahmad

“With the study establishing that there is a major impact of hamstring injuries in our professional athletes,” says Dr. Ahmad, “we are now taking the next step to appropriately design prevention strategies. One such study will evaluate a muscle conditioning program, including muscle activation and muscle recruitment exercises for the lower extremity, to optimize the muscle so it is not vulnerable to injury. By conducting these studies in the highest level of professional baseball players, athletes of all levels will benefit.”

Timing the Return to Play

“What is particularly important in the treatment of competitive athletes is determining early on the time required before they can return to the field,” says Dr. Ahmad.

Dr. Ahmad and his colleagues are evaluating newer treatments for hamstring injuries, seeking to make them more predictable for healing and to avoid recurrence. “One of our major goals is to speed healing by biologic manipulation,” says Dr. Ahmad. “We have found that injecting platelet-rich plasma [PRP]

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to the site of injury accelerates the healing process and the timing of recovery is more predictable. The recurrence rate of injury with PRP is also lower. What's exciting about this therapy is that it's easy to administer and can be done in a very timely manner."

To answer a number of questions about PRP therapy in order to further enhance its value, Dr. Ahmad, supported by a separate grant from Major League Baseball, is now studying muscle strains in an animal model. "We want to identify how much PRP to use, when to do the therapy, and whether repeated PRP injections are beneficial. At Columbia, we have developed a system to stimulate the muscle so forcefully that it creates a strain that we treat with or without PRP to examine its effects," he says. "We also treat with

repeated dosing of PRP to analyze the most effective dosing level. As a clinician, I see hamstring injuries all too frequently, so it's very rewarding to be doing cutting-edge research on how to prevent and take care of one of the most major injuries experienced in baseball."

Reference Article

Ahmad CS, Redler LH, Ciccotti MG, Maffulli N, Longo UG, Bradley J. Evaluation and management of hamstring injuries. *The American Journal of Sports Medicine*. 2013 Dec;41(12):2933-947.

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