

NEW YORK-PRESBYTERIAN COLUMBIA ORTHOPAEDICS

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Studies Help Professional Athletes Play Ball

New York-Presbyterian Hospital became the official hospital of the New York Yankees baseball club in April. Although the relationship makes all of the physicians and services at the Hospital available to the team's players and staff, as well as their families, it has been of particular benefit to the Center for Shoulder, Elbow, and Sports Medicine and the Department of Orthopaedics at New York-Presbyterian Hospital/Columbia University Medical Center in the form of enhanced reputation and increased research opportunities.

"Joining forces are two of the city's top institutions—the legendary New York Yankees and New York-Presbyterian Hospital, New York's largest and highest-rated hospital," noted Herbert Pardes, MD, the Hospital's CEO and President.

The move formalized a relationship between the 2 organizations that has existed for several decades. According to Melvin Rosenwasser, MD, orthopaedic specialists at New York-Presbyterian/Columbia have long been involved in the treatment of a variety of sports injuries among professional athletes in the New York area, including the Yankees. Dr. Rosenwasser has performed numerous hand, wrist, and elbow-related procedures on Yankees over the years, while Louis U. Bigliani, MD, has been the expert consultant for shoulder injuries. Stuart Hershon, MD, has served in the organization as the Yankees'

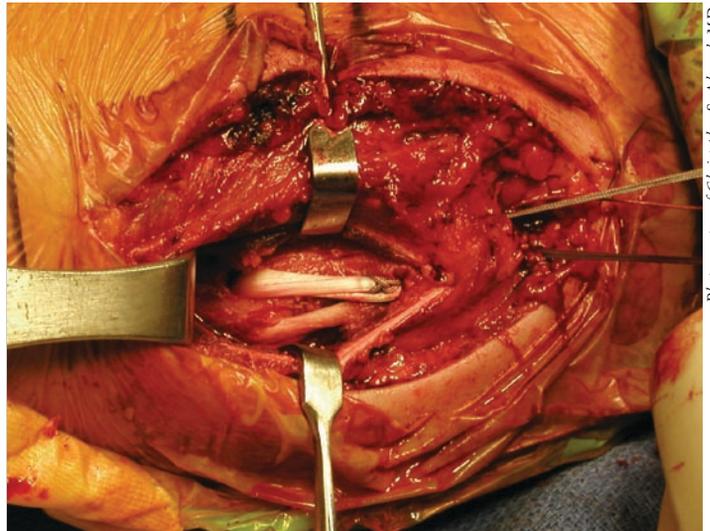


Photo courtesy of Christopher S. Ahmad, MD.

Ulnar collateral ligament reconstruction of the elbow.

team physician for more than 20 years, throughout the long streak of consecutive playoff appearances and four world's championships.

"To have a relationship with one of the most famous sports franchises in the world speaks volumes about the care offered at the Hospital," said Dr. Rosenwasser. "The arrangement brings much-deserved recognition to our sports medicine practice and provides us with new research opportunities in a number of areas."

Indeed, professional athletes present orthopaedic specialists with opportunities to not only apply the latest treatment options but to hone them as well—monitoring their efficacy at the highest level

see **Sports Medicine**, page 7

Spondylolisthesis Research Eyes Outcomes

Using new parameters for examining x-ray films of the lumbar spine and pelvis, several members of the multinational Spinal Deformity Study Group, led in part by Columbia researchers at New York-Presbyterian Hospital, have launched a multicenter, longitudinal study of spondylolisthesis in an effort to better understand the condition and the effects of various treatments, and to identify patients who are the best candidates for corrective surgery.

"Surgeons who have studied spondylolisthesis in the past have focused on the deformity itself," noted Mark Weidenbaum, MD. "We are looking at more than the obvious single-segment displacement and instead look at the relationship between the entire spine and the entire pelvis."

After a group of French researchers described pelvic incidence in 1998 and reported that it was "the

see **Spondylolisthesis**, page 6

Knee Replacement Prosthesis Shows Promising Results

Bicompartmental knee replacement, a new procedure intermediate between unicompartmental knee replacement and total knee arthroplasty (TKA), may provide a less-invasive option for patients with medial patellofemoral joint compartment arthritis.

“We know that the main reason to convert to a total knee replacement after a unicompartmental knee replacement is development of arthritis in the patellofemoral joints,” said Jeffrey Geller, MD. “This obviates that need.”

In the bicompartmental procedure, the compartment under the patella is replaced in addition to the medial compartment of the knee (Figures 1 and 2). This becomes a realistic option over unicompartmental replacement, avoiding the progression of tricompartmental arthritis that eventuates in TKA. The bicompartmental procedure will not replace the unicompartmental technique altogether, but it provides a useful alternative for patients with patellofemoral arthritis or those at high risk for it, and in the long run it may reduce the number of TKA procedures as well as revisional surgeries. The principles of bicompartmental knee replacement are much like those of unicompartmental knee replacement; the only difference is the replacement of the subpatellar compartment.

“I still do a fair number of unicompartmental knee replacements because it’s even less invasive than the bicompartmental, and for the right person, it works quite well,” Dr. Geller said. “But bicompartmental knee replacement is less invasive than TKA, there’s less damage to the tissues around it, and it retains more of the body’s natural tissue, including the anterior and the posterior cruciate ligaments. It maintains more of a ‘natural’ feel to the knee, whereas many people who have a total knee replacement report that it feels a bit more like a mechanical knee. With the bicompartmental replacement, the knee maintains more of its natural kinematics.”

The procedure uses a bicompartmental knee system. Although it has become available relatively recently, Dr. Geller has already made bicompartmental knee replacements an integral tool in his treatment of arthritis of

the knee (*J Knee Surg.* 2008;21[1]:7-14). In general, according to Dr. Geller, the procedure is most suitable for patients who are in relatively good shape physically. While there are no long-term data regarding the safety and efficacy of this relatively new prosthesis, Dr. Geller is confident there will be few long-term complications with the procedure.

“The ideal person is somebody who has mostly medial compartment arthritis and enough patellofemoral changes that you would not do a uni,” he said. “It’s best for people who do not have a tremendous amount of deformity in the knee, people who have been able to maintain a reasonably good range of motion and have not developed too much stiffness, people whose deformity is correctable, and people who have an intact ACL [anterior cruciate ligament].”

“We know that the main reason to convert to a total knee replacement is development of arthritis in the patellofemoral joints. [Bicompartmental knee replacement] obviates that need.”

—Jeffrey Geller, MD

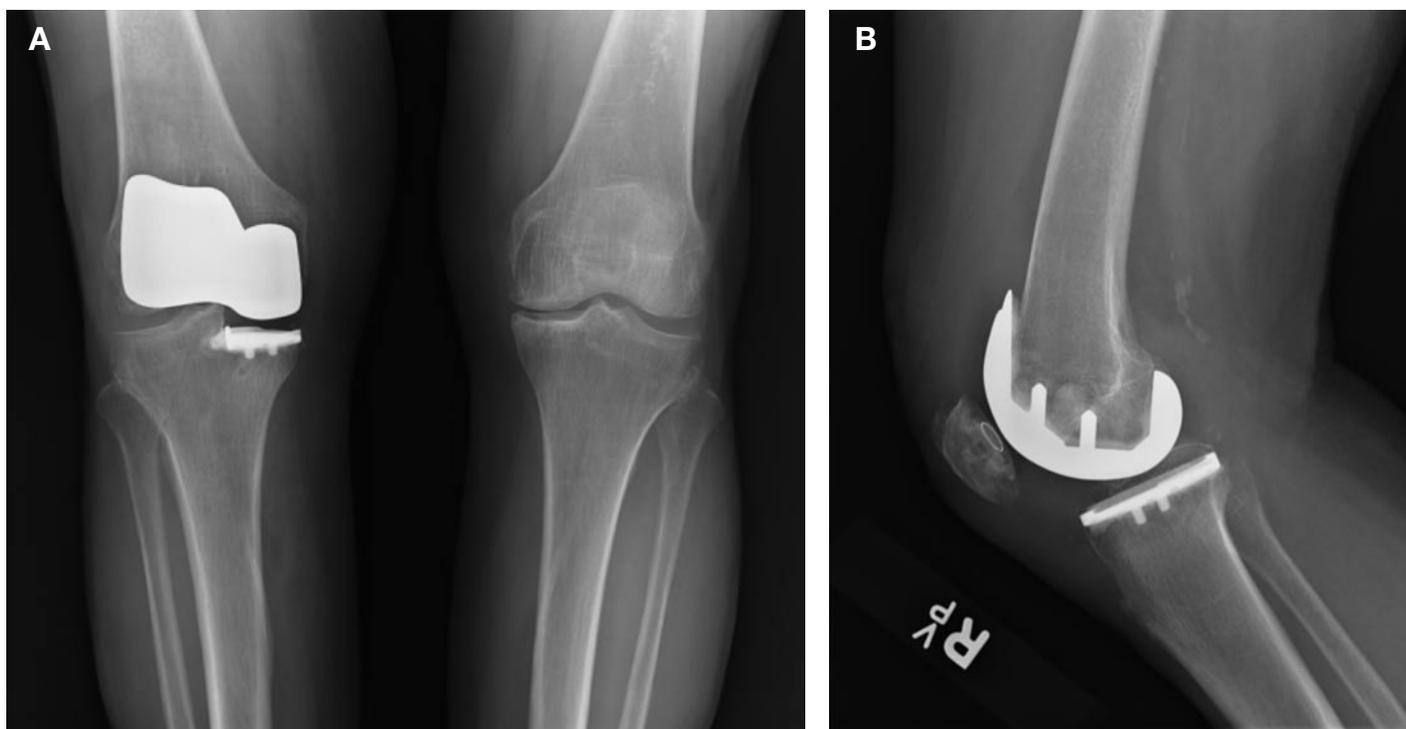


Figure 1. An anteroposterior (A) and lateral (B) radiograph of a bicompartmental knee implant.

Photos courtesy of Jeffrey Geller, MD.

Bigliani Appointed President of the AOA

Louis U. Bigliani, MD, Chief of the Orthopaedic Surgery Service and Director of the Center for Shoulder, Elbow and Sports Medicine at NewYork-Presbyterian Hospital/Columbia University Medical Center, has been named the 121st President of the American Orthopaedic Association (AOA). The announcement was made in June.

Dr. Bigliani, who is also Frank E. Stinchfield Professor and Chairman of the Department of Orthopaedic Surgery at Columbia University College of Physicians and Surgeons, delivered an address entitled “Stand Up and Be Counted—2008” at his inauguration. During the speech, he stressed the importance the AOA mission has today and the organization’s unique position to influence change and provide leadership for the orthopaedic profession, patients, and society as well as graduate medical education for our future. The AOA is the oldest and most distinguished orthopaedic association in the world. AOA membership includes specialists who have made a significant contribution to education, research, and the practice of orthopaedic surgery. During his presidency, Dr. Bigliani will represent the AOA at the orthopaedic association meetings in England, New Zealand, Australia, and South Africa.

NewYork-Presbyterian Columbia Orthopaedics

is a semi-annual newsletter published by NewYork-Presbyterian Hospital. The articles in this newsletter represent the work of the Columbia University College of Physicians and Surgeons faculty at NewYork-Presbyterian Hospital/Columbia University Medical Center, who are at the forefront of research and practice in the diagnosis, treatment, and rehabilitation of musculoskeletal conditions in adults and children.

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To date, few if any data have been published in the form of large, longitudinal trials on the safety and efficacy of the prosthesis. Dr. Geller believes further research would be of value and would like to see the institutions already using the device, pool their data to isolate any trends.

“Multicenter trials will amass a larger database and earlier answers on the impact of this innovation to reconstructive knee surgery,” he noted. “We know there is a slightly higher rate of complications with the unicompartmental replacement, but that may be acceptable if the opportunity to salvage more bone stock prevents the catastrophic complications of revision total knee arthroplasty. We believe that the unicompartmental approach has already been shown to be a legitimate option for younger patients with disabling knee pain, and as we gain experience this may also be the case for the bicompartamental replacement.”

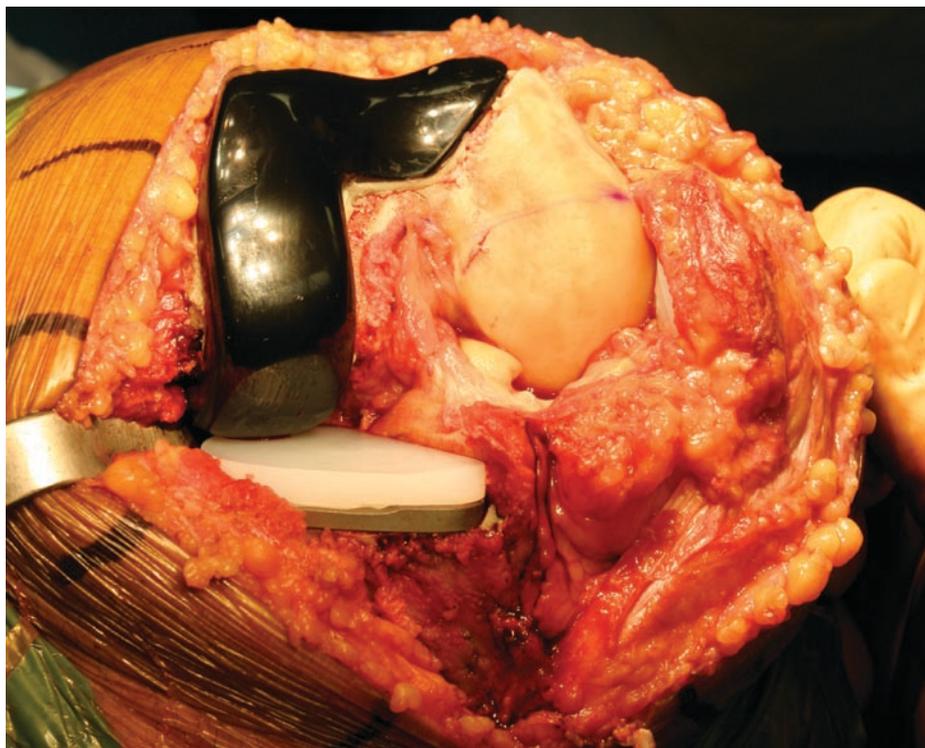


Figure 2. An intraoperative photograph of a bicompartamental implant.

Contributing faculty for this article:
Jeffrey Geller, MD

Surgeon Refines Selection Criteria for Ankle Joint Procedure

Justin Greisberg, MD, likes to call ankle joint replacement a “tricky science,” noting that the multiple and complex joints in the ankle both complicate the procedure and make it easier for patients to tolerate the stiffness engendered by ankle joint fusion.

However, according to Dr. Greisberg, new tools, techniques, and patient selection protocols for ankle joint replacement—many of which were pioneered at NewYork-Presbyterian Hospital/Columbia University Medical Center—are significantly improving outcomes.

“I still do more ankle fusions than ankle replacements,” he noted. “For the majority of patients, it still makes sense to consider an ankle fusion, because the risks and complications are lower, and for most people, the function is similar. But there are some patients who are not good candidates for ankle fusions. An experienced surgeon, with the right patient, can provide a successful ankle arthroplasty, and [this] may be preferable to an ankle fusion. Surgical indications can predict who may be a bad candidate for a fusion and who may be a good candidate for an ankle replacement. The fine tuning of the surgical judgment improves outcome and diminishes complications and early joint failure.”

Converting fusions to replacements is a relatively recent innovation—Dr. Greisberg and colleagues published the first paper on the technique in 2004 (*Clin Orthop Relat Res.* 2004;424:80-88)—and it has improved the outlook of patients with post-fusion problems.

“The newer implants have revision components designed to compensate for bone loss, thus permitting the option of ankle replacement.”

—Justin Greisberg, MD

Although the fusion procedure is a good short-term treatment for many cases of ankle arthritis, after 10 or 20 years it overloads the adjacent joint creating secondary wear and arthritis, Dr. Greisberg explained, which in some cases was treated by amputation of the foot.

“Now we can convert ankle fusions to ankle replacements,” he said, “so a 40-year-old with ankle arthritis is staged first to a fusion, and then 10 or 20 years later can be reconstructed with an ankle arthroplasty as his demands and stresses are more appropriate to the procedure. This evolution to ankle

arthroplasty with satisfactory function and pain relief is a new piece of the treatment algorithm of ankle arthritis.”

Treating older patients means treating patients with more numerous and serious comorbidities, which presents some unique challenges, according to Dr. Greisberg.

Historically, ankle replacement was not an option for patients with conditions such as avascular necrosis, because the talus was insufficient to accept a prosthetic implant. Recently, technology has improved to meet the needs of such patients. Dr. Greisberg cites the example of a patient with steroid-induced avascular necrosis of the ankle with collapse, which was managed with new implants that are durable and stable despite the late bony deformity of end-stage osteoarthritis.

“This patient had a pantalar fusion a few years ago, which did not unite, causing persistent pain,” noted Dr. Greisberg. “Options included a revision fusion or an amputation. This active elder plays golf and walks and would be severely limited by either of those salvages. The newer implants have revision components designed to compensate for bone loss, thus permitting the option of ankle replacement.”

Ankle joint replacement may be far superior to what it was a few years ago, but it still does not have the same outcomes found in hip or knee replacements, and there are more complications.

According to Dr. Greisberg, the next frontier of research will seek to improve the biomechanics of ankle arthroplasty paired with long-term studies of such patients with regard to joint survival.

“We need to learn more about durability,” he said, “about refining indications. Now that we’ve got the basics down, our goal is to get ankle replacement as reliable as the hip or the knee, to enhance our patients’ quality of life.”

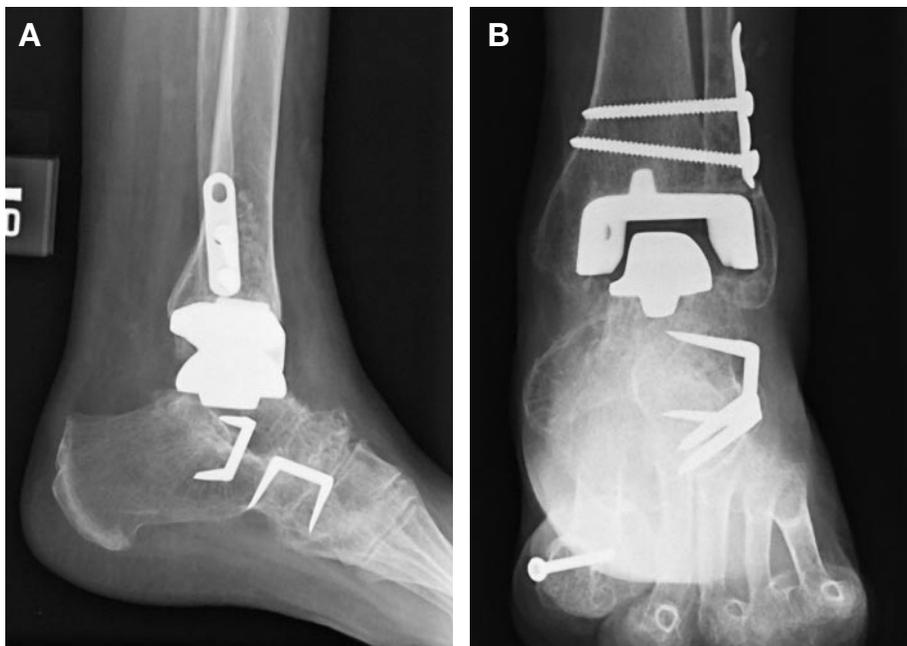


Figure. Historically, a patient with previous hindfoot fusion who developed new ankle arthritis would have undergone an ankle fusion, which would have left him with a stiff leg. However, the patient above underwent successful ankle replacement (A, lateral view; B, frontal view) and now has increased range of motion.

Photo courtesy of Justin Greisberg, MD.

Contributing faculty for this article:
Justin Greisberg, MD

Education Improves Outcomes in Hip and Knee Replacement

The Center for Hip and Knee Replacement at NewYork-Presbyterian Hospital/Columbia University Medical Center has established itself as a leader in clinical outcomes research and in development of new surgical techniques and prosthetic devices for the effective replacement of hip and knee joints. Its latest initiatives will increase patient awareness of the signs and symptoms of advancing osteoarthritis of the hip and knee and educate patients regarding treatment options, including joint replacement surgery, from surgical induction to resumption of normal activity.

“Many centers around the country provide a comprehensive, multidisciplinary approach to the hip or knee patient, but as the No. 5-ranked orthopaedic service in the United States, according to *US News & World Report*, we are proud to offer the capabilities of a center specifically devoted to hip and knee replacement.”

—William Macaulay, MD

“Many centers around the country provide a comprehensive, multidisciplinary approach to the hip or knee patient, but as the No. 5-ranked orthopaedic service in the United States, according to *US News & World Report*, we are proud to offer the capabilities of a center specifically devoted to hip and knee replacement,” said William Macaulay, MD. “We have so many excellent clinicians that help us take care of our patients, even ones with complex medical problems.”

Founded in 2001, the Center has achieved a reputation as one of the nation’s leading hip and knee replacement centers. According to Dr. Macaulay, the increasing number of patients requiring hip and knee

replacement led to the hiring of occupational therapist Maiken Jacobs, OTR/L, in 2006. Ms. Jacobs developed and launched an innovative patient education program for patients with planned total hip replacement, total knee replacement, total hip resurfacing, or unicompartmental knee replacement. She designed an educational strategy for the program, which included one-on-one tutorials and reading material to reinforce all verbal discussions.

“The objective of the program is better psychological preparation for patients prior to surgery,” Ms. Jacobs said. “The classes

deliver detailed information, with realistic expectations following joint replacement, and a laundry list of information about their hospital stay, post-op pain management, post-op physical and occupational therapy, and discharge planning.”

Since the start of the program in April 2006, surveys have been conducted on patients following surgery, which document an improvement in both outcomes and quality of life among patients who participated in the program.

“Patients who chose to participate in the educational program had a significantly shorter length of stay than those who declined,” Ms. Jacobs said, “and the informed

patients were more satisfied with their recoveries and hospital stays.”

Ms. Jacobs and her colleagues at the Center for Hip and Knee Replacement have submitted this experience for peer review and publication. Conclusions detail shorter and more economical hospital stays and happier patients. Total hip arthroplasty (THA) and total knee arthroplasty (TKA) patients had shorter lengths of stay, which saved \$84,351 for 93 THA patients and \$93,493 for 74 TKA patients at NewYork-Presbyterian/Columbia for 1 calendar year. National cost-savings projections for a mean 0.84-day per patient reduction in length of stay for educated THA patients is estimated at an annual savings of nearly \$800 million, while a mean 0.56-day per patient reduction for educated TKA patients translated into a projected annual savings of \$1.1 billion.

These shorter hospital stays are significant for the Center for Hip and Knee Replacement and the Hospital as well as its patients. The Center needs beds to treat increasing numbers of patients, many of whom have rare orthopaedic conditions. As the Center’s patient population grows and changes, the Center for Hip and Knee Replacement adapts to meet their needs. Dr. Macaulay emphasized the Center’s commitment to continued improvement in surgical techniques and the adoption of new ones, such as hip resurfacing.

“It was our hope that implementing this education program, patient satisfaction would increase and length of stay would decrease,” noted Ms. Jacobs. “This has been borne out by our experience and has become part of our protocol and methodology, and we hope we can instruct our orthopaedic colleagues around the United States about its realized benefits.”

Contributing faculty for this article:
Maiken Jacobs, OTR/L; William Macaulay, MD

Table. Effect of Patient Education on Hospital Stays in Total Hip and Knee Replacement

	No. of Patients	Mean Reduction in Hospital Stay
Educated THA Patients	93	0.84 d
Educated TKA Patients	74	0.56 d
	Average Length of Stay, THA ^a	Average Length of Stay, TKA ^a
	3.24 d	2.98 d

^a As reported in: Kim S, Losina E, Solomon DH, Wright J, Katz JN. Effectiveness of clinical pathways for total knee and total hip arthroplasty: literature review. *J Arthroplasty*. 2003;18(1):69-74.

THA, total hip arthroplasty; TKA, total knee arthroplasty

continued from **Spondylolisthesis**, page 1
 key factor for managing the spinal balance” (*Spine* 2002;27[18]:2026-2029), further investigation showed that pelvic incidence influences the lumbosacral region of the spine and can affect the development and progress of spondylolisthesis (*Spine* 2005;30[6 suppl]:S12-S21). This research also found that each person’s pelvic incidence is unique and can be easily measured from standard spinal x-ray films, making it an ideal parameter for a large, long-term study of a diverse population.

“Over the years, there have been many efforts to identify landmarks or parameters on x-rays that can reproducibly measure the spondylolisthesis and assess progression and indicate surgery, but few measurement schemes have been successful,” said Dr. Weidenbaum, who helped to design the study and is leading the participating researchers at NewYork-Presbyterian

Hospital/Columbia University Medical Center. “Then came along this new way of looking at the relationship between the lower lumbar spine and the pelvis. Whether you’re lying down, standing, sitting, or walking, your pelvic incidence is an anatomically fixed thing and very easy to measure. We are now using this as our tool to assess the relationship between the condition of spondylolisthesis and these lumbopelvic parameters. By definition, pelvic incidence (PI) is the angle determined by the line drawn from the femoral head—or the axis between the femoral heads—to the center of the sacral endplate and a line perpendicular to that endplate.”

The vertebral slippage of spondylolisthesis can be either developmental or degenerative, and it occurs in a broad spectrum of patients, from adolescent gymnasts to elderly persons with arthritis. Wide recruitment is important and NewYork-Presbyterian/Columbia is well suited to enrolling and

studying a representative cohort of patients with spondylolisthesis.

“We have a wide population base, different ages, different types of spondylolisthesis and we have state-of-the-art imaging and data collection systems that we need to be able to gather the data,” Dr. Weidenbaum said. “Clinical studies of this type can provide archival data and change screening methodologies. We’re enrolling people of all ages and with any type of spondylolisthesis, regardless of severity, and obtaining standard x-rays, but analyzing them in a different way, with a different set of parameters. Patient screening has yielded high recruitment giving the study immediate traction.”

Dr. Weidenbaum estimates that 5% of the population has some degree of spondylolisthesis. Only a fraction of those seek treatment, until pain is severe. In most cases, it is successfully treated with nonoperative measures; but if the pain persists, the most common surgical option is spinal fusion.

“The surgery for spondylolisthesis, for the most part, is pretty successful,” Dr. Weidenbaum said. “However, there are 2 big issues. In the nonstabilized or nonfused patient, the question remains, ‘Will they progress?’ Often controlled by physical therapy and/or steroid injections, we do not know the natural history of spondylolisthesis. Is this going to be back next year or in 5 years? And we also need to know whether surgical outcomes have durability. Does fusion still work 5, 10, 20, 30 years post-op? Long-term results are the ultimate yardstick of success.”

The Spinal Deformity Study Group will address both questions, first by categorizing patients according to their pelvic incidence measurements and tracking the natural history of each group, and second by following patients after corrective surgery and correlating outcomes. These data will guide surgical indications regarding fusions and spinal reduction.

“Reduction seems like the intuitive way to go, but it’s sometimes associated with a higher rate of nerve injury,” said Dr. Weidenbaum, “particularly if displaced spondylolisthesis is accompanied by secondary soft-tissue contractures with nerve root tethering, which may not be amenable to full correction without risk of nerve damage. We hope this study will instruct us in minimizing the adverse outcome.”

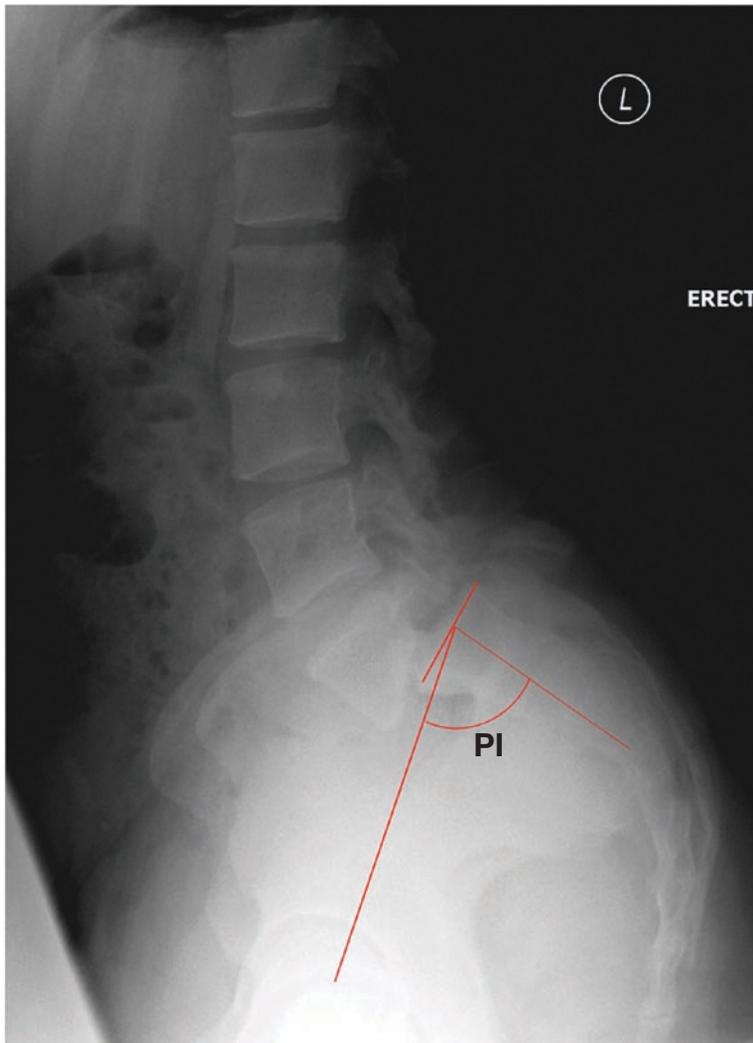


Photo courtesy of Mark Weidenbaum, MD.

An x-ray from a spondylolisthesis study patient illustrating measurement of pelvic incidence (PI).

Contributing faculty for this article:
Mark Weidenbaum, MD

continued from **Sports Medicine**, page 1 of competition. Christopher S. Ahmad, MD, for example, has focused much of his recent research work on refining “Tommy John” surgery, which is named after the former Major League Baseball pitcher who famously served as the first high-profile patient to undergo the procedure. John, who pitched for several teams, including the Yankees, suffered a career-ending elbow injury in 1974 and consulted with famed orthopaedic surgeon Frank Jobe, MD, who pioneered the procedure, also known as ulnar collateral ligament (UCL) reconstruction. Dr. Jobe’s technique involved replacing a damaged ligament in the medial elbow with a tendon graft initially from the forearm, the palmaris longus; today, leg and foot tendons are also used. After the surgery, John went on to pitch for 9 successful years in the majors, appearing in 170 games.

“To have a relationship with one of the most famous sports franchises in the world speaks volumes about the care offered at the Hospital. The arrangement brings much-deserved recognition to our sports medicine practice and provides us with new research opportunities in a number of areas.”

—Melvin P. Rosenwasser, MD

Dr. Ahmad, who joined the staff at NewYork-Presbyterian/Columbia in 2001 after a sports fellowship at the Kerlan-Jobe Institute in Los Angeles, CA, co-authored with orthopaedic resident Mark A. Vitale, MD, MPH, a meta-analysis of studies involving nearly 500 patients who had undergone UCL reconstruction. They reported that recent modifications to the flexor-pronator origin muscle-splitting approach have led to improved outcomes (*Am J Sports Med* 2008;36[6]:1193-1205).

“These enhancements make the procedure easier to perform with less damage to

“These enhancements make the procedure easier to perform with less damage to the patient’s elbow. Our goal is to maximize the likelihood that our patients—the athletes—can return to their previous pitching ability and succeed at the highest level of competition.... The techniques we will learn and hone... will ultimately benefit all patients with similar injuries.”

—Christopher S. Ahmad, MD

the patient’s elbow,” said Dr. Ahmad, who trained under Dr. Jobe. “Ultimately, our goal is to maximize the likelihood that our patients—the athletes—can return to their previous pitching ability and succeed at the highest level of competition.”

In Dr. Jobe’s original procedure, according to Dr. Ahmad, the palmaris longus tendon was used as an autograft for reconstruction of the UCL; the flexor-pronator musculature was detached at its origin and a transposition of the ulnar nerve was performed. The flexor-pronator muscle provides dynamic stability to the elbow but after detachment may be weakened, which will result in longer rehabilitation and perhaps loss of pitching prowess. Recent techniques avoid detachment of the flexor-pronator origin as well as any manipulation of the ulnar nerve via the muscle-splitting technique, by splitting the flexor bundle from the medial epicondyle to 1 cm distal to the sublime tubercle of the ulna.

In a laboratory study at the Center for Shoulder, Elbow and Sports Medicine, Dr. Ahmad and co-workers demonstrated that the flexor-pronator mass is a crucial dynamic force promoting valgus stability of the elbow and thus helps preserve the UCL (*J Bone Joint Surg Am* 2004;86[10]:2268-2274). Another surgical evolution developed by Dr. Ahmad is the use of a construct with a proximal ligament docking fixation and distal ulnar interference screw fixation to make all aspects of this reconstruction more predictable and reliable (*Am J Sports Med* 2007;35[12]:2040-2047). Fixing the reconstructed ligament into a single tunnel distally, nearer to the native anatomic insertion of the UCL, may provide better biomechanical restoration of elbow stability.

Most competitive pitchers develop posterior elbow pain during their careers. X-rays will show osteophytes on the tip of the olecranon. Previously, the posterior humero-

ulnar impingement was treated by resection of the osteophytes, which overloaded the already compromised UCL, often leading to disruption. Dr. Ahmad and co-workers’ basic science investigation demonstrated that olecranon spur formation develops in the presence of UCL injury (*Am J Sports Med* 2004;32[7]:1607-1612). “We believe that every patient with posterior osteophytes on their olecranon must be evaluated for a concomitant UCL injury,” said Dr. Ahmad.

Other throwing injuries involve the shoulder rotator cuff and capsule. Drs. Ahmad and Bigliani and William N. Levine, MD, have pioneered new approaches for repair of these vital structures. Their recent publication found that double-row rotator cuff repair has better fixation than a single row (*Am J Sports Med* 2008;36[5]:888-892). Another recent article (in press) described a new technique to repair a torn labrum in athletes that is less invasive and injurious to the rotator cuff during the labral repair procedures.

Surgeons in the Department of Orthopaedics at NewYork-Presbyterian/Columbia believe that close cooperation and interaction between the Hospital and the New York Yankees provide not only the highest level of care to the professional athlete but will expand the knowledge base for the treatment of these injuries, which will allow for continued improvement in patient outcomes.

“Professional athletes present challenges to their ligaments and joints,” said Dr. Ahmad. “The techniques we use to repair them have to be optimized and minimally invasive. The techniques we will learn and hone on our professional patients will ultimately benefit all patients with similar injuries.”

Contributing faculty for this article:
**Christopher S. Ahmad, MD; Louis U. Bigliani, MD;
 William N. Levine, MD; Herbert Pades, MD;
 Melvin P. Rosenwasser, MD**

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The following is a list of the doctors quoted in this issue of the *NewYork-Presbyterian Columbia Orthopaedics* Newsletter. For more information on their work, please contact them at the e-mail addresses listed.

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NEWYORK-PRESBYTERIAN COLUMBIA ORTHOPAEDICS

Affiliated with Columbia University College of Physicians and Surgeons

Important news from NewYork-Presbyterian Hospital—at the forefront of research and clinical care in the diagnosis, treatment, and rehabilitation of musculoskeletal conditions in adults and children.

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