

Medicine

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A Joint Venture

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Montefiore
Inspired Medicine

A Joint Venture



Montefiore's orthopaedic specialists pool their expertise to tackle some of medicine's biggest challenges

The photos in this article illustrate different vantage points of actual implants used in total hip, knee and shoulder replacements. **PAGE 3**—Photo 1: Humeral stem and head used in total shoulder replacements. Photo 2: Acetabular shell (top), pictured with a polyethylene liner (inserted), and femoral stem (top left); femoral (bottom) and tibial components (left margin) used in total knee replacements. **PAGE 4**—Photo 1: A femoral component and a polyethylene articular surface used in total knee replacements. Photo 2: The backside of a humeral head used in total shoulder replacements. **PAGE 5**: Top of a humeral head and neck used in total shoulder replacements. **PAGE 6**: The underside of a glenoid component used in total shoulder replacements. **PAGE 7**: Neck offsets for total shoulder replacements. **PAGE 8**: View of a humeral stem used in total shoulder replacements.

To save her life, a 3-year-old cancer patient needed to have half of her hip removed. To preserve his dream, a tennis prodigy needed to undergo a delicate operation to straighten his curved spine. To maintain his independence, a retiree needed to have his knee replaced. And to get back on her feet, a girl with a severe deformity needed to have her badly twisted legs coaxed into alignment.

In all four cases, success relied upon the broad and deep pool of expertise within Montefiore's Department of Orthopaedic Surgery. "Given our commitment to meeting the unique and complex challenges of the diverse population Montefiore serves, we have developed a broad and deep knowledge that relies on the expertise and collaboration of physicians across multiple disciplines," says Neil Cobelli, MD, Professor and Chair, Orthopaedic Surgery, Montefiore and Albert Einstein College of Medicine.

A hallmark of Montefiore's population-based care, this multidisciplinary approach helps the Department, which has earned a national ranking in pediatric orthopaedics and a high-performing designation in adult orthopaedics by *U.S. News & World Report*, tackle some of the toughest problems of a high-risk, traditionally underserved patient population.

Many of Montefiore's patients don't seek help for their conditions until they are harder to treat, exacerbating the issues. When Sun Jin Kim, MD, Chief, Adult Reconstruction, and Clinical Director, Joint Replacement Center, Montefiore, and Assistant Professor, Orthopaedic Surgery, Einstein, and his colleagues presented a prospective study on joint replacement surgery at a national conference, other researchers questioned their demographics table because the Montefiore patients had diabetes and hypertension at rates nearly three times higher than the national average.

The Department regularly sees deformities that are rare elsewhere in the United States, but more common among the city's immigrants or visitors lacking access to healthcare in their countries. To achieve workable solutions, "we have to think outside of the box," says Terry Amaral, MD, Director, Pediatric Orthopaedic Surgery and Pediatric Sports Medicine, Limb and Pediatric Spine Deformity, Montefiore, and Assistant Professor, Orthopaedic Surgery, Einstein.

Treating Complex Deformities

One of the Department's most unusual cases involved a 15-year-old Filipino girl with a clubfoot deformity so severe that her feet were twisted backward and upside-down. "It's almost unheard of in this day and age, with modern surgeries and modern techniques, for someone at that age to have untreated clubfoot and to have it to that degree," says Dr. Amaral. At home in the

Philippines, he says, the girl was forced to hobble along on the tops of her feet, with the aid of makeshift wooden crutches.

Due to the significant bone deformities, an open surgery to reconstruct her feet would have put her at high risk for amputation. Instead, Dr. Amaral used an external fixator commonly used to treat broken bones in trauma cases and paired it with the use of plaster casts to gradually correct clubfoot. By inserting screws into the bones of her feet, he was able to attach them to the fixator, allowing the patient to turn the screws a tiny bit at a time to gradually stretch and rotate her feet back into a more natural position over a period of multiple weeks.

A few months after the pro bono surgery, the teenager took her first unaided steps, and now attends college in the Philippines.

Correcting such complex deformities requires innovative thinking, immense patience, intensive preoperative planning and a comprehensive, three-dimensional understanding of anatomy. And, the patients participate as well, often making the corrections themselves by following simple prescriptions that may call for a millimeter adjustment every day. “They have ownership of this,” Dr. Amaral says. “They’re happy with the fact that they play a role in their care.”

Pioneering Minimally Invasive Scoliosis Surgery

Another groundbreaking advance has spared many scoliosis patients from what Vishal Sarwahi, MD, Chief, Scoliosis Surgery, Montefiore, and Associate Professor, Clinical Orthopaedic Surgery, Einstein, calls one of the most destructive of all orthopaedic operations.

In severe cases, scoliosis can lead to an S-shaped curve of the spine that bends to

the side as it twists. Traditional corrective surgery entails making a 12- to 18-inch-long incision down the length of the patient’s back, cutting through muscles, ligaments, nerves and blood vessels. In more pronounced deformities, surgeons have to remove multiple ribs and entire vertebrae. Through the incision, doctors then implant rods and the dozen or more screws necessary to fuse and realign the spine. The recovery period can take months, and is often marked by muscle weakness, spasms, pain and stiffness.

No longer. Four years ago, Dr. Sarwahi pioneered a minimally invasive scoliosis surgery that requires only three small incisions, each 1.5 to 2 inches long, through which he can slide and secure the rods and screws without damaging muscles, nerves and blood vessels. Compared with the more invasive procedure, Dr. Sarwahi’s



technique can reduce patient recovery times by half. The surgery has been so successful that he and fellow specialist Adam Wollowick, MD, Attending Physician, Montefiore, and Assistant Professor, Orthopaedic Surgery, Einstein, were invited to participate in a course on minimally invasive surgery for spinal deformity technique at the

Dr. Sarwahi pioneered a minimally invasive scoliosis surgery that requires only three small incisions.

2012 Scoliosis Research Society annual meeting in Chicago. In 2011, Montefiore was also the first institution in the world to publish this technique in a peer-reviewed journal.

Scoliosis patients from countries as varied as the Dominican Republic and Oman now come to Montefiore for the operation. In 2012, a teenage tennis prodigy from Alabama and his parents traveled to the Bronx for a surgery they hoped would correct a severe 72-degree curve in the boy’s spine that was pushing his ribs against his lungs.

“The curve became so pronounced that he could hardly play. He would run out of breath, his lungs were being squished, and he had a lot of back pain,” Dr. Sarwahi says. After the operation, the boy gained two inches in height. A few weeks later, he was back on the court and staking his claim as his high school’s number-one tennis player.

Although scoliosis is most commonly seen in teenagers, Dr. Sarwahi has operated on everyone from a 10-month-old to a 70-year-





old. “We treat scoliosis in patients of every age, any size, any insurance,” he says. His youngest patient, he recalls, had a rare spine dislocation that was causing a rapidly progressive paralysis in the baby’s legs. During a joint operation with Rick Abbott, MD, Director, Surgical Neuro-oncology, The Children’s Hospital at Montefiore, and Professor, Clinical Neurological Surgery, Einstein, Dr. Sarwahi was able to realign the baby’s spine using inserted screws. Six months later, the toddler was kicking his legs with no remaining neurological abnormalities.

A Multidisciplinary Model of Care

A new surgical imaging system called the O-arm could boost outcomes even more, says Dr. Sarwahi, by allowing surgeons to achieve a previously unheard-of 99 percent accuracy rate in screw placement—one of the most difficult aspects of corrective surgery.

Much like a Nintendo Wii console, the three-dimensional imaging and navigational system uses high-resolution computed tomography (CT) scans to detect hand movements in space and can provide a precise view of a surgeon’s maneuvers relative to the patient’s anatomy. To minimize the patient’s radiation exposure, Dr. Sarwahi is developing a shielding protocol with Dr. Amaral and Montefiore’s musculoskeletal radiology experts that could

lead to a 20-fold reduction in radiation exposure. Once the team has verified these results, Montefiore can offer this more precise procedure to all children. The team also utilizes social media in patient education, surgery preparedness and shared decision making for patients undergoing scoliosis surgery. This institutional review board (IRB) study is reviewing utility of social media and networking in better preparing teenagers for surgery and helping them with peer support and advice during the process. This team-based approach, says Dr. Sarwahi, is a major reason for the dramatic improvement in scoliosis patient outcomes.

For cancer patients, the Department of Orthopaedic Surgery, in collaboration with the Montefiore Einstein Center for Cancer Care, has adopted a similar multidisciplinary, individualized approach to care. Sarcomas, tumors that arise in connective tissue such as muscle, bone or fat, can often be cured—but only if they are completely removed before they spread. “We try to prioritize these patients so that we can both arrive at a diagnosis and begin their treatment as soon as possible,” says David S. Geller, MD, Director, Orthopaedic Oncology Service, Montefiore, and Assistant Professor, Orthopaedic Surgery and Pediatrics, Einstein.

Dr. Geller leads a weekly conference attended by specialists from multiple cancer-related disciplines at Montefiore to

review diagnostic studies and development management recommendations. “It allows for collaboration and coordination of care among a cohesive group within the Montefiore community,” he says. “This is a group of dedicated physicians who, together, diagnose and treat these very rare and challenging tumors.”

Although in years past, most extremity tumors were treated with amputations, today most patients can undergo limb salvage surgery. These surgeries seek to not only effect a cure, but also to preserve as much normal function as possible. To that end, the orthopaedic oncology service employs a variety of reconstructive techniques, each tailored to address a patient’s goals and needs.

One such technique involves designing custom-made internal prostheses, such as hip replacements, which is done in collaboration with engineers and implant manufacturers. A 3-year-old patient underwent reconstruction of her hip joint, using a custom-designed artificial hip that is lengthened incrementally and grows with her over time. Another young patient has a similarly designed artificial knee, which is lengthened using a spinning magnet in the doctor’s office without surgery or anesthesia.

The Department of Rehabilitation and Physical Medicine also works closely with Orthopaedics to ensure that patients receive comprehensive, multidisciplinary



pre- and postoperative care, says Matthew Bartels, MD, MPH, Chair and Professor, Rehabilitation and Physical Medicine, Montefiore and Einstein. “What is so unique and evolutionary about Montefiore is the collaborative, seamless integration of care,” says Dr. Bartels, who joined Montefiore in September from Columbia-Presbyterian Medical Center, where he served as director of cardiopulmonary rehabilitation and founder and director of the Human Performance Laboratory. For example, Dr. Bartels says that occupational therapists and surgeons will meet with patients concurrently in their office practices, so that patients become familiar with their team of clinicians early in the process. This also allows for a seamless transition to rehabilitation following surgery; physical therapy and rehabilitation are integrated into joint replacement before, during and after the procedure to maximize recovery.

Addressing a Population’s Needs

When he arrived at Montefiore seven years ago, Dr. Kim spent much of his time performing another challenging surgery: correcting hip and knee replacements that had failed due to subpar materials or faulty placement at other centers. Revising a failed joint replacement is far more difficult than performing a standard replacement, says Dr. Kim, because it requires surgeons to determine what went wrong with the original replacement, remove that implant, and then construct a new one.

Some of those joint replacements may have been done improperly, while others simply wore out over time. “The patients in this geographic area, because there’s such limited access to care, will let some of their conditions get to the point where it makes it that much harder to operate on them,” Dr. Kim says. Montefiore’s wide range of joint replacement patients has presented

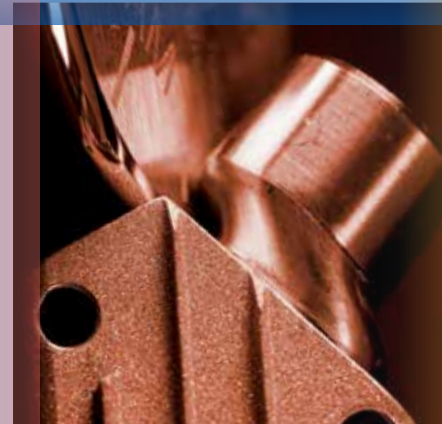
A Collaborative Approach to Hip and Knee Replacements

Montefiore New Rochelle’s Joint Solutions Program, launched in 2012, follows a multidisciplinary model that draws upon the clinical expertise of orthopaedics, anesthesia, pain management, case management and core measures, medical records, perioperative care, physical therapy and pharmacy in order to streamline and systematize the approach to joint replacement.

The program provides standardized protocols and policies derived from evidence-based practice for patients undergoing total hip and knee replacements. Members of Joint Solutions’ Performance Improvement Team meet monthly to discuss best practices and recent cases to determine how to improve procedures, says Peggy Coll, Nurse Practitioner and Nurse Manager, 3 North and Program Coordinator, Joint Solutions Program, Montefiore New Rochelle.

“When you have standardized procedures in place, there’s less room for error, and it makes the surgery routine,” says Ms. Coll.

Joint Solutions received gold medals and dual disease-specific accreditation from The Joint Commission in 2012 for total hip and knee replacements, making it the first healthcare provider in Westchester to do so.



The aim of initiating this collaborative approach was to improve outcomes by educating patients and their support system about the process, says Steven B. Zelicof, MD, PhD, Chief, Orthopaedic Surgery, and Director, Joint Solutions Program, Montefiore New Rochelle.

“Our focus when we created this program was on what we could do to provide great care centered on outcomes-based models,” says Dr. Zelicof.

The team captures data by administering questionnaires, analyzing complications and examining outcomes to inform any process changes, he says. For example, the team was concerned with minimizing blood transfusions during surgery, and tweaked their procedure to address this. Within an 18-month period, transfusion rates fell from roughly 30 percent to about 8 percent, he says.

The Joint Solutions Program, which has 13 beds, was renovated in 2012. That same year, the program performed roughly 350 combined total hip and knee replacements. Joint Solutions received gold medals and dual disease-specific accreditation from The Joint Commission in 2012 for total hip and knee replacements, making it the first healthcare provider in Westchester to do so, says Dr. Zelicof.

other challenges. Beyond a surge in demand from baby boomers, Dr. Kim says, “we’re seeing people in their 40s and 50s wanting to have joint replacement procedures, and at the other end of the spectrum, we see patients in their 70s, 80s and 90s.” Many patients once requested the surgery to alleviate their pain. Increasingly, more want the operation so they can return to an active lifestyle, including a 93-year-old who recently underwent a successful knee replacement.

The creation of Montefiore’s Joint Replacement Center in 2012, now located at the Wakefield Campus, has helped improve care by standardizing surgical protocols and providing focused pre- and postoperative care. Dr. Kim is proud of the Center’s adherence to the patient- and family-centered care, or PFCC, model. “It gives us the perspective of the patient,” he says. Doctors and other care providers periodically follow groups of patients on their journey through joint replacement surgery to find out what difficulties they encounter and how those problems can be resolved.

The Center holds educational classes multiple times a week to inform patients what they can expect during the surgery and postoperative recovery period. Care providers introduce their teams and their role in the process, whether it’s performing lab tests, offering pain relief or providing physical therapy. “These classes allow the patient to feel more comfortable in the hospital setting,” Dr. Kim says.

Less Pain, Patients Gain

Joint replacement specialists at the Center work closely with the new Acute Pain Service at Wakefield Hospital and its fellowship-trained anesthesiologists. Boleslav Kosharsky, MD, Director, Anesthesiology, Joint Replacement Center, Montefiore, and Assistant Professor,

Anesthesiology, Einstein, helped establish the Acute Pain Service upon his arrival at Montefiore in 2011. One of his first major tasks was to develop a more cohesive and targeted pain management protocol for Montefiore’s orthopaedic patients.

According to Dr. Kosharsky, the new protocol involves precisely positioned nerve blocks, supplemental pain medications and early detection of patients with chronic pain who may have a more difficult recovery period and require more attention before and after surgery. Unlike more general pain management techniques, every peripheral nerve block is ultrasound-guided, meaning that anesthesiologists can be more precise in blocking a nerve’s sensory fibers without disturbing the nerve’s role in muscle control and putting the patient at risk for falls. “Basically, this protocol numbs the pain, but still allows the patients to participate in physical therapy,” Dr. Kosharsky says.

The service’s more targeted approaches have led to a significant increase in positive feedback from patients, nurses and physical therapists. “We have received very positive feedback from nurses; they say that the patients barely need any medications on

top of the nerve blocks,” Dr. Kosharsky says. According to internal reviews, he says, patient satisfaction on pain management and anesthesia has “shot up tremendously,” and physical therapists report that patients are now participating more vigorously in their own rehabilitation.

Dr. Kim readily agrees. “Now, I have patients the next day walking out of their room and saying, ‘I don’t even know I had surgery,’ because the function is there but there’s no pain,” Dr. Kim says. “It’s been an amazing change.” The combined initiatives are beginning to pay major dividends. Over the past two years, Dr. Kim and his colleagues have observed a nearly 50 percent drop in the number of patients who require a stay at a rehabilitation center.

A Dichotomy of Extremes

Doctors at Montefiore are also seeing fallout from the local and national obesity epidemic. Among adults, according to Dr. Cobelli, obesity can hasten the development of arthritis through the increased mechanical load on the joints and likely through the pro-inflammatory influence of fat itself. Obesity also raises the risk of injuries to hip and knee joints. Although some medical centers will not operate on patients who weigh more than 400 or 450 pounds, Montefiore does so routinely. “You can’t very well expect somebody to be able to exercise to lose weight when they can barely stand because their knees are so bad. This population is really caught in a Catch-22,” Dr. Cobelli says.

Dr. Amaral and Eric Fornari, MD, Attending Physician, Orthopaedic Surgery, Montefiore, and Clinical Instructor, Orthopaedic Surgery, Einstein, are seeing multiple consequences of obesity in their patients. The added weight can crush growth plates in a child’s hip and knee joints and lead to deformities such as the adolescent form of Blount’s disease. The off-kilter mechanical





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axis of the leg can lead to early-onset arthritis, due to uneven wear on the joints.

Obese children are at higher risk for a condition known as slipped capital femoral epiphysis, in which the ball of the hip joint can literally slide off its attachment point at the shaft of the femur, Dr. Fornari says.

With a standard treatment approach, surgeons insert pins into the hip to prevent further sliding, but the stabilization technique doesn’t correct the underlying deformity or address the increased risk of joint deterioration later in life. Instead, Dr. Fornari uses a cutting-edge treatment in which he realigns the connection before pinning it in place. “You’re not just taking care of the slip, you’re correcting the deformity, all in one operation. It’s tremendously successful,” Dr. Cobelli says.

On the flip side of the obesity epidemic, Montefiore’s orthopaedic surgeons are seeing a spike in injuries due to over-activity, particularly among pre-teens. “It’s like the dichotomy of extremes,” Dr. Amaral says. Children are participating in high-level sports at younger ages, causing their bodies to break down. Dr. Amaral and Dr. Fornari have treated athletes like young

figure skaters who have pushed themselves too far and pre-teen soccer players with anterior cruciate ligament tears, more commonly seen in older players.

The added challenges require more creative solutions, Dr. Amaral says. “These injuries are happening in ways that they never used to,” he says, and with the medical literature struggling to catch up to the rapidly changing population, the onus is on doctors to forge ahead with innovative care.

The Big Picture

Beyond its pioneering work on surgical techniques, Montefiore works to stay ahead of patient needs through a variety of research efforts. Dr. Cobelli, for example, is at the forefront of exploring why joint replacements fail, while Dr. Kim is collaborating with infectious disease colleagues to test different methods for treating infections that can complicate those failed joint replacements.

Other Department efforts focus on identifying the early warning signs of arthritis. Currently, most diagnoses rely on X-rays that reveal a loss of joint space. “At that point, there’s no treatment, short of replacement surgery, that’s going to undo

the change in architecture,” Dr. Cobelli says. “It’s akin to saying, ‘The building has had one wall collapse, so now we can diagnose that the building is in jeopardy.’ It’s too late to intervene for those patients.”

If researchers can find surrogate markers for some of the earliest changes in osteoarthritis, however, identifying and linking them to the disease might improve the odds of developing effective interventions when the disease is still reversible.

Once arthritis does take hold, not everyone is a candidate for joint replacement surgery. Marcie Cobelli, RN, FNP, Director, Education, Joint Replacement Center, Montefiore, says the Department’s nurse practitioners have adopted a holistic approach to care for these nonsurgical patients.

The integrative technique, Ms. Cobelli says, combines traditional medications with education about exercise, nutrition and dietary supplements. The nurse practitioners dispel myths about arthritis “cures” and discuss the patient’s home life. “We try to do this by providing an atmosphere of comfort and security for each patient,” Ms. Cobelli says. They provide

referrals for complementary techniques, ranging from yoga and meditation for pain management to aqua therapy for improving muscle strength around affected joints.

By embracing a more expansive view of patient needs, the nurse practitioners have helped patients minimize their pain, maintain the functional status of their joints and improve their physical and psychological quality of life. A major key to the Department's success, Dr. Cobelli says, is keeping sight of the big picture. "For a lot of patients," he says, "it's just knowing that someone cares and treating the patient as an individual."

Read more about Orthopaedics:
www.montefiore.org/ortho



As part of Montefiore's "hospital without beds," the 11th floor of the Hutchinson Metro Center is shaping the future of technologically advanced and highly personalized orthopaedic care. The Orthopaedic Surgery Department moved into its cutting-edge, 29,000-square-foot floor at 1250 Waters Place in 2011.

Designed to host up to 80,000 patient visits every year, it is the largest full-service orthopaedics facility in the Bronx and Westchester County and a showcase for the

Shaping the Future of Orthopaedic Care

Department's patient-focused attention to detail. "We're patient-centric and full service in every sense," says Neil Cobelli, MD, Chair, Orthopaedic Surgery, Montefiore and Einstein. "We really go to great lengths to focus not just on orthopaedic surgery, but on how the patient experiences his or her interaction with orthopaedic surgery."

Doctors can meet with patients before and after surgery or for regular outpatient treatments and follow-ups in 27 exam rooms individually tailored for a wide range of conditions. The Department's surgeons, podiatrists, rheumatologist and nurse practitioners can provide patients with expert consultations on joint replacements; arthritis; pediatric orthopaedic surgery; musculoskeletal tumors and infections; hand, foot or ankle surgery; scoliosis; spinal surgery and sports injuries.

Advanced computer-guided surgical planning systems help the orthopaedic surgeons improve the safety and effectiveness of their procedures through unprecedented precision. A state-of-the-art

digital X-ray suite allows images to be sent instantly to the exam rooms, eliminating the need to wait for X-ray development. The technology provides top-of-the-line resolution while minimizing patients' radiation exposure. Diagnostic imaging for scoliosis patients, for instance, combines images of the spine into a seamless composite while exposing patients to half the radiation of a traditional X-ray.

Arthritis patients who live with chronic pain come here as well to receive regular steroid and other therapeutic injections. The soothing and spacious environment includes glass-enclosed waterfalls, panoramic views and other features designed to help them feel more at ease. Marcie Cobelli, RN, FNP, Director, Education, Joint Replacement Center, Montefiore, says the calming space allows her and other nurse practitioners to focus on holistic care and discuss breathing and relaxation techniques with their patients. "We recognize and address the outcomes of more than just a specific joint and the patients who need surgery," she says.