

## Rotationplasty Offers Greater Functionality for Patients with Cancer

**M**aya Oberstein was diagnosed with osteosarcoma of the distal femur in 2012, at age 9. After she completed chemotherapy, Maya's treatment options were an above-knee amputation, limb salvage with an internal prosthesis or a more unconventional approach: rotationplasty. **Carol Morris**, chief of Johns Hopkins' Orthopaedic Oncology Division, is one of a select group of surgeons in the United States who perform this alternative reconstructive procedure. Morris counseled Maya and her family on the available options. "She was the first doctor who asked me how I was feeling," says Maya, "how I was doing."

Developed in 1930 to treat femoral deficiency in a patient with tuberculosis, rotationplasty today may be indicated for lower-extremity bone sarcoma. The procedure involves resecting the knee while retaining the femoral artery and sciatic nerve. The distal segment is rotated 180 degrees and reattached to the proximal segment, converting the reversed ankle joint into a functional knee joint. The foot acts as a tibia, fitting into a modified transtibial prosthesis.

Rotationplasty presents unique challenges that Morris considers when preparing for the procedure. In younger patients, she says, "you have to calculate how much growth they have left in the foot and in the ankle of that side so when they're done growing, the heel matches the level of the knee on the other

side. Cosmetically, if you're sitting, it's nice if the knees are even."

Morris recalls her initial reluctance about the procedure. "I thought it was a physically challenging thing to do to a child when prosthetics had made tremendous advancements," she says. "As I gained more experience in the field, I began to appreciate the limitations of internal prostheses and the functionality rotationplasty could provide. For the right parents and the right child, under the right set of circumstances, rotationplasty is a good operation. It's much more functional than an above-knee amputation."

Traditional prostheses, especially growing protheses, are more restrictive than the modified transtibial prosthesis, limiting a patient's ability to participate not only in sports, but in typical activities such as running, dancing and jumping.

"It's a great option for patients with cancer around the knee. It's great for kids who want to be very athletic. It's even great for adults who want to maintain a high level of function," says Morris. Although there is concern that the cosmetic issue could affect quality of life, Morris says patients who choose rotationplasty "turn out to be some of my happiest patients." ■

**Three years after her surgery, Maya has adjusted well to the prosthesis. She is an active cyclist and gymnast, and she recently completed a 25-mile bicycle ride to raise money for cancer research.**



Since Maya Oberstein's initial 9.5-hour procedure, Carol Morris has been following up every six months to monitor her progress.

**If you believe in yourself, you can do anything."**

—MAYA OBERSTEIN





# Training in Orthopaedic Team Science

**T**homas Clemens is no stranger to translational research. “I’ve spent my entire career in clinical departments working with physicians on translational research projects,” says the vice chair for research in the Johns Hopkins Department of Orthopaedic Surgery. “What struck me when I joined Hopkins was that the surgeons and residents were so busy, they simply had no time to collaborate with us on research projects. We may as well have been on different planets.” This separation, popularly known as the “bench-to-bedside gap,” severely impedes the translation of new discoveries into clinical practice.

Today, however, Clemens has a powerful new mechanism for closing the bench-to-bedside gap: a National Institutes of Health-sponsored training program called TOTS, short for Training in Orthopaedic Team Science.

Clemens believes that the key to developing meaningful translational research studies is to create multidisciplinary teams. “I took a page from what industry does,” he says. “They form big teams that comprise people from very different backgrounds. Here, we’re consolidating the entire program, bringing surgical faculty, residents and Ph.D. basic scientists together on projects.”

Because residents are key to its success, the TOTS program sponsors a dedicated research year for an orthopaedic resident to collaborate with clinical faculty and a basic science team to address



Thanks to an NIH T32 grant, orthopaedic surgery resident John Thompson is taking a year off from his residency to devote himself to research with clinical and research mentors, including Thomas Clemens, right.

an important question related to diagnosis or treatment of a musculoskeletal disorder.

The first TOTS-sponsored project joins faculty from several Johns Hopkins departments, including dermatology, orthopaedic surgery and radiology, to study infection in bone via a mouse model in which they can monitor the bacterial burden with fluorescent bacteria. The aim is to apply their research to treating infection after orthopaedic implant surgery, with the goal of avoiding costly revisions.

Clemens believes this project exemplifies how effective the team approach can be in developing translational research. “You can’t expect busy surgeons to make a genetically altered mouse or to work in a wet lab culturing cells. That’s our bailiwick,” he says. “Conversely, I wouldn’t know how to deliver biologic molecules during surgery, but I can

learn the basics from my surgical colleagues. It’s all about teamwork: the surgeons to provide input on the most pressing clinical questions and the researchers to develop the methods to study them.

“The applied nature of orthopaedic science is ideal for translational approaches,” he continues. “The great diversity of problems that affect the musculoskeletal system provides unique opportunities for training in a wide range of fields, including basic cell biology, genetics, bioengineering, biomechanics, regenerative medicine and public health.” With the support of the T32 grant, the Hopkins Orthopaedic Department is poised to take a lead role in developing the next generation of therapies that will greatly benefit patients with disorders of the musculoskeletal system, such as osteoporosis and arthritis. ■

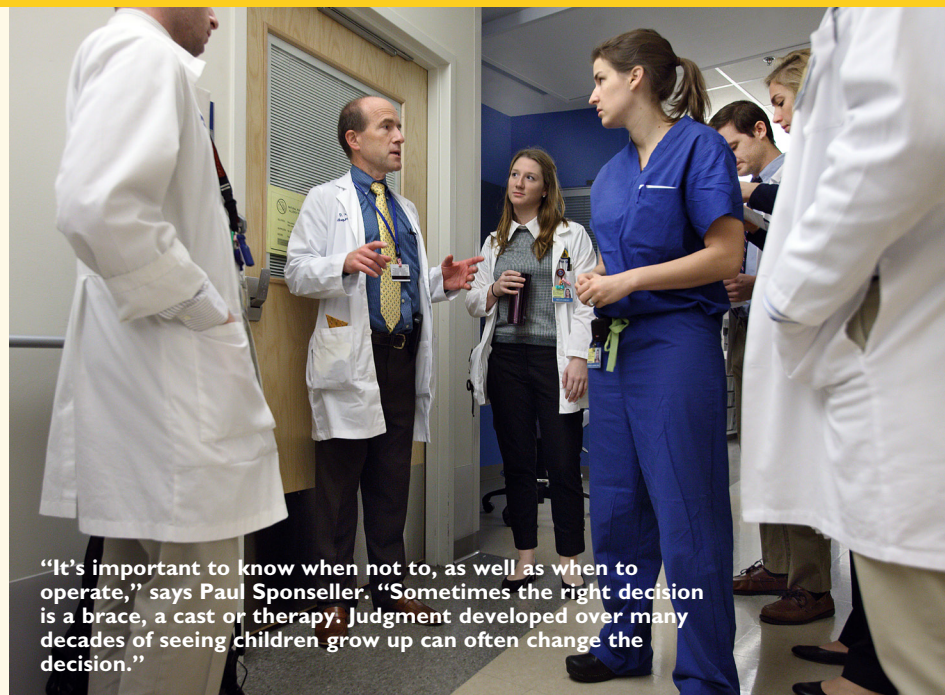
## CLINICAL DECISION-MAKING

# Ahead of the Curve: How Clinical Research Drives Pediatric Care

**P**aul Sponseller, director of the Division of Pediatric Orthopaedic Surgery at The Johns Hopkins Children’s Center, has been treating children at Hopkins for 30 years. His practice is a prime example of the Center’s mission to lead innovative research for the treatment of childhood diseases while providing continuity of care as children grow.

“What’s noteworthy about my practice,” says Sponseller, “is that we see many difficult syndromic, genetic, neuromuscular and idiopathic patients with severe deformities.”

Many families come to Johns Hopkins because of the specific expertise he offers. Payton Mueller, 15, for example, was diagnosed with spinal muscular atrophy (SMA) after his first birthday. At age 7, he and his mother, Rachele, traveled from their home in North Dakota to a Families of SMA conference. There they connected with Johns Hopkins pediatric neurologist **Thomas Crawford**, who recommended a thoraco-lumbar-sacral orthosis for Payton’s scoliosis. “Dr. Crawford was the one who told us about



“It’s important to know when not to, as well as when to operate,” says Paul Sponseller. “Sometimes the right decision is a brace, a cast or therapy. Judgment developed over many decades of seeing children grow up can often change the decision.”



# Bridging Over the “Silos” of Care

As director of orthopaedic surgery at Johns Hopkins, **James Ficke** is among the nation’s leading experts on lower-extremity reconstruction. Beyond surgical excellence, his work focuses on eliminating the barriers to collaborative clinical decision-making, cutting through the “silos” of care that complex patients tend to receive. His goal? To build teams with a common, patient-oriented purpose.

When consulting after the 2013 Boston Marathon bombing, Ficke called on his experience in the Army, where he led the Department of Orthopaedics and Rehabilitation, including the Center for the Intrepid, a rehabilitation facility in San Antonio that treats victims of blast injuries.

“Serendipity brought me the privilege of caring for tremendous patients with severe traumatic injuries and then understanding how to build programs around that,” says Ficke. “What became clear was that we had young amputees who wanted to keep their lifestyle and continue doing their activities. Sitting in a wheelchair was not an acceptable option.”

Ficke recalls the high level of skill among the clinicians in the U.S. military and Boston who treated the amputees and limb-salvage patients. What he sought to bring to the environment there, and what he pursues at Johns Hopkins, is a connection among all members of the medical, surgical and rehabilitation teams to achieve outcomes that serve the needs of even young, athletic patients.

“We’ve now established collaboration with

a multidisciplinary amputee service, so that orthopaedic surgeons, vascular surgeons, podiatrists, physiatrists, therapists, prosthetists and nurses work together to take someone who has had traumatic limb loss and get them running again.” He views this collaborative team as the spokes of a wheel, each serving as a point of entry for comprehensive care.

“It turns out that by building something like this, we give people a hope and an opportunity that really is unique to Hopkins.” This support system is driven in part by the research of the Major Extremity Trauma Research Consortium (METRC), funded through the Department of Defense. With the central coordinating center in the Johns Hopkins Bloomberg School of Public Health, METRC is the largest orthopaedic trauma research program, involving more than 30 sites around the country.

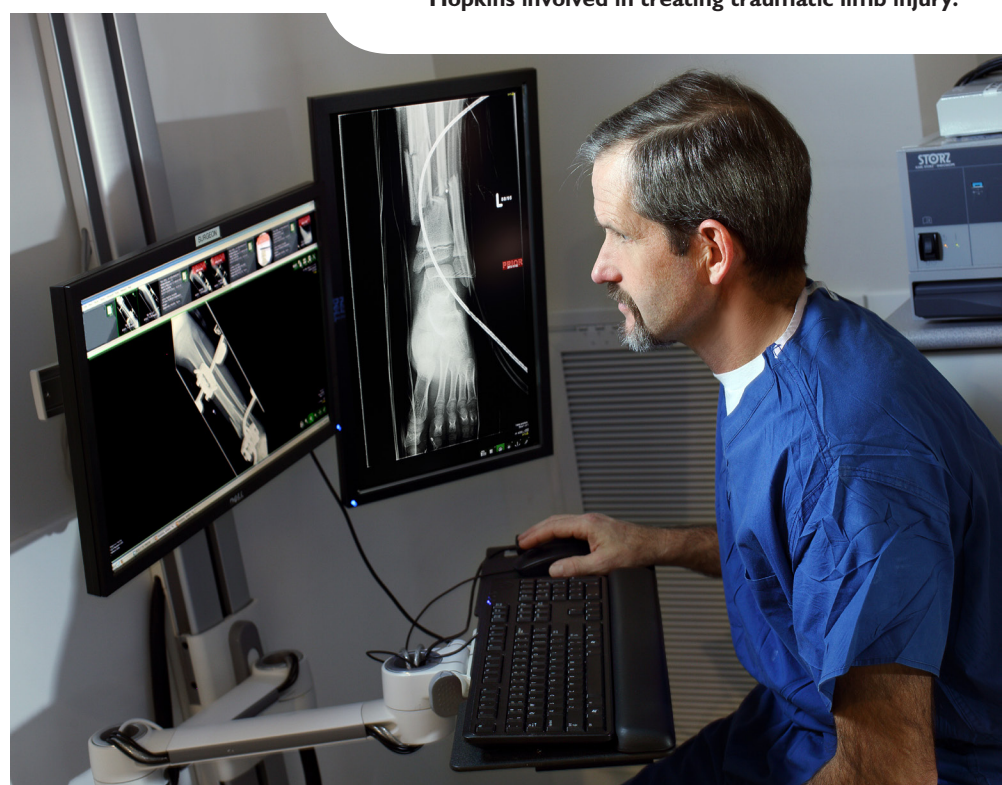
“Through METRC, we are actively working to understand how to improve outcomes for these patients,” Ficke says. “We cover both sides: the clinical side, which is multidisciplinary, and the research side. It’s a holistic approach.”

For patients who have undergone amputation and are seeking greater

function, Ficke believes that collaborative clinical decision-making is a powerful approach. He recalls his first patient at Johns Hopkins, a runner seeking an amputation after seven previous surgeries. Ficke was able to return her to high function with bracing, and after physical therapy, she completed a 112-mile run across Florida.

“We carefully consider the expectations of the patient,” Ficke says. “We want to get the person, as well as the function, back.” ■

**James Ficke is leading an innovative plan that coordinates communication among all the departments at Johns Hopkins involved in treating traumatic limb injury.**



**“Serendipity brought me the privilege of caring for tremendous patients with severe traumatic injuries and then understanding how to build programs around that.”**

Dr. Sponseller,” Rachele says, “and his success working with kids with SMA.”

Two years later, Payton underwent his first growing rod surgery with Sponseller. “Dr. Sponseller has been wonderful at explaining things to Payton over the years,” says Rachele. “During our first visit, he told Payton how he would be with and without the surgery. The outcomes of not having the surgery were not something Payton wanted, so we chose to do the growing rods.”

To be sure he’s recommending the best options for each patient and family, says Sponseller, “I participate in nearly every pediatric spine study group, including the Growing Spine

Study Group, which deals with very challenging patients who need care for a very long time, such as Payton, and often many operations.”

“As a parent of child with SMA,” Rachele says, “you have to make choices that your child may not like but it is for the better. I have the utmost trust in Dr. Sponseller.”

Sponseller explains, “We have a lot of research coming out demonstrating the value of care. We have a project that shows improved quality of life using up-to-date methods of outcomes assessment.” The measurement tool, CPCHILD (originally designed by a colleague for children with cerebral palsy) sensitively measures quality

of life. It has shown improvements in children treated operatively versus nonoperatively. “Otherwise,” Sponseller says, “it’s sometimes hard to value the surgery because the kids are often so challenged that they don’t do the traditional things like playing sports.”

Payton travels annually to see Sponseller and have the growing rods lengthened. “Payton and Dr. Sponseller have a great relationship,” says Rachele. “The benefits of seeing the same doctor are valuable. We’ve fallen in love with The Johns Hopkins Hospital and staff.” ■

## The Dega Osteotomy/Acetabuloplasty

The Dega osteotomy as originally described provides anterior and lateral coverage for patients with developmental dysplasia of the hip by preserving the inner table of the pelvis posterior to the iliopectineal line and the entire cortex of the sciatic notch. The operation, however, can also be modified to provide posterior coverage if needed.



Watch **Paul Sponseller** demonstrate how the osteotomy can be performed to provide enough stability that a spica cast is not needed postoperatively: <http://bit.ly/SponsellerDegaOsteotomy>

## Mark Your Calendar



### THE TEAM PHYSICIAN: A Review of Multiple Aspects of Sports Coverage

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# JOHNS HOPKINS Orthopaedic Surgery

This newsletter is one of the many ways we seek to enhance our partnership with our thousands of referring physicians. Comments, questions and thoughts on topics you would like to see covered in upcoming issues are always welcome.

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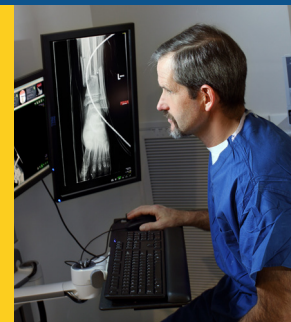
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