

A black and white photograph showing a person in full tactical gear rappelling down a vertical rock face. The individual is wearing a helmet, goggles, and a vest with various attachments. They are secured by a rope and carabiner system. The background is a clear blue sky.

TECHNOLOGY LEND'S A HAND

The use of robotics has improved knee replacement surgery.

Written by TRAVIS MARSHALL

Robotic orthopedic knee surgery has become so successful that patients find themselves resuming normal lives and careers—even working on a SWAT team.

David Vasquez lives a high-impact life. As a K-9 handler on the SWAT team for the L.A. Sheriff Department's Special Enforcement Bureau, the 48-year-old spends every day on his feet, rappelling out of helicopters, running into buildings loaded with tactical gear, and working alongside a powerful, highly trained police dog to serve and protect the citizens of Los Angeles. But when he started having knee pain four years ago, it almost ended his demanding career.

"An MRI showed that I had advanced, stage 4 osteoarthritis, and it impacted everything," Vasquez says. "I was looking at medical retirement or a desk job—I couldn't even play sports or work out with my kids."

Vasquez's doctor told him that he would eventually need to have joint replacements in both knees, but Vasquez worried that his life would never be the same after the procedures. "I was terrified of what my quality of life would be like after the surgery, and if I'd ever be able to work on the SWAT team again," he says. "I figured I'd have to be very careful with my knees, and maybe they would last for 10 or 12 years if I was lucky."

But Vasquez's preconceptions went out the window when his doctor referred him to Andrew Yun, MD, director of joint replacement services at the Center for Knee and Hip Replacement at Providence Saint John's Health Center. "Dr. Yun told me that with robotic knee replacement surgery I could go back to full duty on the SWAT team and work through retirement," Vasquez says. "I started crying when he told me that I could get my life back."

A ROBOTIC REVOLUTION

Robotic surgical tools are revolutionizing orthopedic surgery, offering higher



quality joint repairs that can be done as outpatient procedures with faster recovery times and less pain. And Saint John's has been at the forefront of this innovation, using a device called the Mako® Robotic-Arm Assisted Technology for partial and total knee replacement procedures as well as some hip procedures.

The program was started three years ago at the urging of Kevin Ehrhart, MD, orthopedic surgeon at Saint John's. The hospital and Saint John's Health Center Foundation leadership backed the idea, and Dr. Ehrhart performed the first partial knee surgery in 2015.

"When I first started doing this, I knew it was the thing to do," Dr. Ehrhart says. "I knew it wasn't a gimmick; it was the future. I was so impressed with the clinical results and the recovery of the patients."

"We were early adopters of this new technology because we felt a responsibility to leverage any tool to give our patients better outcomes," Dr. Yun adds. "Now, with three of the Mako robots, we're not only the busiest and fastest growing robotic

orthopedics program in the world, but more importantly we're also recognized as the top-performing center in the country."

The Mako device is a sophisticated robotic arm that enhances the surgeon's expertise. The robot is programmed and controlled by the surgeon—it does not do surgery autonomously—and it allows surgeons to perform complex repairs with greater precision than is possible with their own hands.

"These robots are augmenting our skills, providing a steady hand that can't slip and the ability to follow a surgical plan based on 3-D imaging of the patient's own body," Dr. Yun says. "We map the whole procedure ahead of time using CT scans throughout the patient's full range of motion. There's no estimating, and the robot will never cut anything beyond the predetermined lines we set for it."

The technology continues to evolve, Dr. Ehrhart says. "I think the benchmark of the future will be robotics," he says. "We're only in the infancy of this. The plans are to use analytics and help the robot do more planning of the surgery."



Dr. Andrew Yun



Dr. Kevin Ehrhart

BETTER OPTION FOR MORE PATIENTS

Before robotic surgery became available, most orthopedic surgeons wouldn't even offer partial knee replacement surgery. "It's technically possible to do partial knee replacements without the robot, but it's very hard to do it accurately," explains Dr. Ehrhart. "The robot has been a total game-changer for partial knee replacements."

The ability to accurately perform partial knee replacements has opened up better options to a wider range of patients, including elderly patients who need knee repair but can't undergo the lengthy rehabilitation process of a total knee replacement. It's also beneficial to younger patients, like Vasquez, who was able to have only the arthritis-afflicted parts of his knees replaced without the loss of strength and mobility that would result from total joint replacement in both knees.

Vasquez had a partial knee replacement with the Mako device on his left knee in November 2017 and returned to have a

second partial knee replacement on his right knee in April. "I was able to start my physical therapy within 36 hours of my procedures," Vasquez said. "The first 10 days were tough, but as soon as I had full extension it was smooth sailing. I was back to work within nine weeks of my surgery, and I was able to start running again four months after my last surgery."

Robotic partial knee replacement has been available at Saint John's for nearly four years, and in January the Health Center's robotic surgical capabilities expanded to include total knee replacements as well. "Patients see quicker return of function, greater range of motion and better pain management with less opioid pain medication," says Dr. Ehrhart, who was among the first surgeons to perform Mako in the LA region. "Now that we're seeing how much better it is than doing these surgeries manually, I think robotics will eventually be the standard of care and grow to include other applications."

ROBOTICS MAKES SAINT JOHN'S A DESTINATION FOR PATIENTS—AND DOCTORS

The availability of robotic orthopedic surgical options is a net benefit to the patients who come to Saint John's from around the world, and it's also a benefit to the Health Center's ability to recruit the best up-and-coming surgeons. "Saint John's read the tea leaves very well, and thanks to the Saint John's Foundation we're one of only two centers in the country that has three of these devices," Dr. Ehrhart says. "This becomes a magnet for attracting the best doctors—many of whom are training with these tools and understand that this is the future of orthopedic surgery."

The Saint John's Health Center Foundation was instrumental in the hospital's early adoption of these innovative tools, providing the funding to purchase the devices and helping establish Saint John's as a leader in the robotic orthopedic surgery field. "All of our efforts are completely funded by our patients and the community we serve," Dr. Yun says. "We are beyond grateful to our Foundation and patients."

"We're involved in creating algorithms and processes for the technology, training surgeons how to use them, and we're working toward continuous improvement of the patient experience," Dr. Yun says.

For Vasquez, the robotic surgeries performed by Dr. Yun were a solution that made a profound difference in the trajectory of his life. "Before I met Dr. Yun, I was anxious, depressed and going to retirement workshops in my mid-40s," he says. "Today I'm back on the SWAT team full-duty, running and working with a 90-pound police dog every day. I feel 100% better." **6**