When It Comes to Knees, One Size Doesn't Fit All

Patient-specific joint implants improve outcomes

Marshall Van Wagner, III, is one of a kind, and so is his knee. That's why the idea of a "made to order" total knee replacement was appealing to the 58-year-old retired Pepco senior engineering analyst, whose many years of climbing up high-voltage steel transformers had caught up with him.

"Two of my favorite activities were fishing and walking my dogs, and the pain got so bad that I couldn't do either," he explains. "Just walking down the river bank to catch fish was torture. My father went into a nursing home relatively early in his life because of bad knees, and I didn't want that to happen to me."

Suburban Hospital orthopedic surgeon Christopher Cannova, M.D., performed Van Wagner's total knee replacement with an implant that mimicked his patient's anatomy. Whereas conventional "off-the-shelf" knee implants come in standardized sizes that are approximations of a patient's knee, the customized implant is designed precisely for each patient's unique anatomy.

The innovative process uses CT scans of a patient's knee, hip and ankle. These are uploaded to a sophisticated computer-aided design (CAD) software program that creates a 3-D model. Metal is poured into a mold to create a patient-specific knee implant that provides a nearly perfect fit to the shape and load-bearing capabilities of the patient's own knee. The system also produces instruments perfectly designed to match the patient's anatomy, so that the surgeon can perform cuts in the bone and soft tissue exactly where they need to be.

"The patient-specific implants and instrumentation allow me to put the metal in the exact position where the bone was," explains Dr. Cannova. This minimizes the amount of the patient's bone

(femur) that the surgeon needs to shave down in order to make the implant fit. According to Dr. Cannova, this is important because preserving or restoring the natural shape of the femur allows the implant to bend, flex and carry weight more like a natural knee.

"Bone is gold," he says. "Preserving bone during the procedure mitigates the future risk of osteoporosis and fractures. In addition, because most knee replacements last about 15 or 20 years, in younger patients the bone-sparing benefits leave the door open for a wider range of treatment options if the need arises later on."

The customized implants and instrumentation also significantly reduce the amount of soft tissue and ligament cuts that must be made to stabilize the implant, which reduces pain and bleeding and speeds recovery.

The FDA-approved technology for the patient-specific total knee replacement has only been available for about 18 months. Dr. Cannova was one of the first orthopedic surgeons to use it, and

Marshall Van Wagner, III, of Gaithersburg, enjoys a walk in the park with his dogs Reo, left, and Bear.

Dr. Christopher Cannova

"This technology could be a major sea change for total knee replacement procedures."

Suburban Hospital is the only hospital in the Washington, DC region that has adopted the technology. Last year, Suburban Hospital surgeons performed more than 1,300 joint replacement procedures, representing a record for the hospital and the highest volume among Montgomery County hospitals.

"While traditional total knee replacements are very successful in eliminating pain and restoring the patient's mobility, some patients say the implant often does not feel like a real knee," notes Dr. Cannova. "In part, this is because a degree of instability remains in the joint. However, when we can map the original anatomy, the implant begins to feel more like a normal knee. This technology could be a major sea change for total knee replacement procedures."

Meanwhile, Marshall Van Wagner has a piece of advice for those suffering from knee pain. "Don't wait two years like I did," he says. "Do the surgery now."

TO LEARN MORE | For information about Suburban Hospital's Joint Replacement Center, go to suburbanhospital.org/jointcare For a referral to an orthopedic surgeon, call 1-855-JHM-3939.

U.S. News & World Report Rankings Announced

The Johns Hopkins Hospital has once again been ranked the #1 hospital in the nation by U.S. News and World Report.

Given the competitive, rapidly changing health care environment and the realization that U.S. News evaluated nearly 5,000 hospitals, the organization is proud about achieving these rankings among the best hospitals in the United States.

The Johns Hopkins Hospital is again ranked #1 nationally in five specialties and is the only hospital to have been ranked #1 for 21 consecutive years.
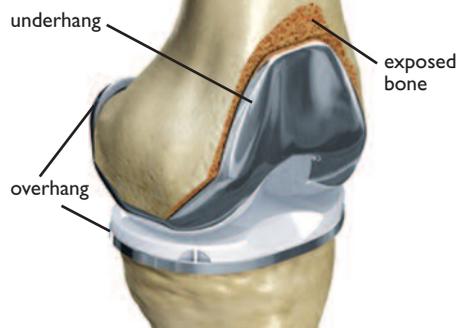
In addition, again this year, both Suburban Hospital and Sibley Memorial Hospital were ranked "high performing" in orthopedics in the regional Washington, DC rankings. Suburban was also ranked "high performing" in Gastroenterology and GI Surgery.

About Suburban Hospital's Joint Replacement Center

Suburban Hospital performs more joint replacement procedures than other hospitals in Montgomery County and is one of the busiest joint centers in the state. The hospital's Joint Replacement Center also received the "Gold Seal of Approval" from The Joint Commission's disease-specific certification program.

Traditional Knee Replacement

underhang

exposed bone

overhang

Custom Knee Replacement

Traditional knee replacements come in standardized sizes that require shaving the femur bone to fit the implant. The result can be "overhang" or "underhang," which describes the degree of mismatch between the size and shape of the femur and the implant. Even a couple of millimeters of overhang or underhang can cause lingering pain long after surgery.