

Surgeons use video game skills to perform knee replacements

By Sonya Stinson
Contributing Writer

WITH A SETUP that works like a cross between global positioning system and Nintendo, a New Orleans surgeon is giving patients custom-fitted artificial knees using a new computer system.

Dr. Richard Meyer, an orthopedic surgeon at Touro Infirmary, is the first Louisiana doctor to use Ci System (pronounced "see"), a computer navigator for the operating room launched in 2004 by DePuy Orthopedics, Inc. of Warsaw, Ind., a subsidiary of New Brunswick, N.J.-based Johnson and Johnson Co.

Meyer said nearly 400,000 knee replacement operations are performed a year, which make it the most common type of joint replacement in the United States.

Like other products for computer-assisted joint replacement, the Ci System lets doctors make smaller incisions and align implants more precisely, guided by 3D models of the patient's joint on a computer screen. Meyer said this precision makes the prosthesis less likely to wear out over time.

The Ci System also includes features others had not have yet, he said.

"This particular system is the only one that balances the knee ligaments, which provides some added stability to the prosthesis," Meyer said. "It's also the only system that selects the exact size of knee implant for that individual's knee. It completely takes the guesswork out of it."

In January, Meyer completed a two-day intensive training course at the DePuy training center in Cincinnati, followed by another two days of training with a surgeon. Using the technology for all knee replacements, Meyer had done more than a dozen such operations by mid-May.

The Ci System consists of a computer, software, infrared cameras and specialized surgical instruments.

"The computer itself is a little bit like a global positioning system," Meyer said. "After we make a very small exposure in the knee joint, we have two special arrays, which are pins with attached sensors, that are placed on either side of the knee. One is placed at the end of the thigh bone, the other at the top of the tibia (the shin bone)."

Infrared signals pick up the location of the arrays and transmit the information to the computer, enabling the surgeon to generate a three-dimensional model of the knee using a probe that registers data as it touches various points.

"Once we know the precise anatomy, we can then use cutting blocks that are specific for this patient's anatomy and make precise cuts that are not available using conventional techniques," Meyer said.

In Pittsburgh, Dr. Anthony DiGioia was one of a group of doctors at Carnegie Mellon University who pioneered the development of computer-assisted orthopedic surgery.

"We were the initial developers of navigational systems for joint replacement in the mid-1990s," said DiGioia, who is founder and co-director of the Center for Medical Robotics and Computer Assisted Surgery at Carnegie Mellon and director of the Institute for Computer Assisted Surgery at The Western Pennsylvania Hospital in Pittsburgh.

According to DiGioia, computer assisted surgery increases the surgical accuracy and precision and allows doctors to perform less invasive procedures with more consistent outcomes.

One notable drawback, DiGioia said, is computer-assisted surgery takes a bit longer than conventional operations although the amount of time is reduced as the surgeon and operating room staff become more familiar with the technology.

Meyer said another hindrance is the high cost of the technology. He estimates the total price of the Ci System at about \$200,000.

"I think the cost will go down over time just like any new technology," Meyer said. "As surgeons realize the importance of this technology and patients realize the benefits of it, more surgeons will use it and the cost will come down."

Dr. George Chimento, a staff member of the Orthopedic and Sports Medicine Clinic in New Orleans and clinical assistant professor of orthopedic surgery at the Tulane University School of Medicine, has done computer-assisted hip replacement surgery using a navigational system by Stryker Orthopaedics of Mahwah, N.J.

With the Stryker system, Chimento said "you can reproduce the patient's leg length pretty much perfectly" when implanting a new hip, but there is not enough data yet to determine whether the prosthesis lasts longer.

Chimento has not performed knee replacement surgery using a computer but he is interested in the procedure and has attended a seminar on the Ci System. He said he is most likely to use computer technology when implanting a ceramic hip or for a patient with bone abnormalities.

"I don't think that every implant needs to be done with a computer," Chimento said.

Dr. Charles Nofsinger, an assistant orthopaedics professor at the Tulane University School of Medicine, has used computer assisted surgery for total knee and total hip replacements. He prefers the Stryker line because it features light-emitting trackers that give surgeons a better view and range of motion.

Nofsinger says computer technology offers several great advantages in the operating room but it's no substitute for surgical skill.

"Using the computer system is only as good as the surgeon that registers the model," said Nofsinger, who last year gave a presentation on "The Pitfalls of Computer-Assisted Surgery" to a group of fellow surgeons. "If you're not paying attention, the computer can tell you to do the wrong



Dr. Richard Meyer, left, an orthopedic surgeon at Touro Infirmary, is the first Louisiana doctor to use the Ci System, providing a computer three-dimensional model for knee replacement surgery. Kathy Walle, a registered nurse, assists in the surgery.

thing. You need to make sure you know how to do a procedure well, before you ever use the computer."

DiGioia said the technology is not yet mainstream but it probably will be in the near future.

"I'd say there's not a single orthopedic surgeon that does not expect it to become a routine practice," DiGioia said.

Meyer said "most people believe it's going to be the standard of care in the next three to five years."*