Mark Klaassen, MD, FACS, Board Certified Orthopedic Surgeon, received his medical degree from the Indiana University School of Medicine at Notre Dame and Indiana University Medical Center. He completed his orthopedic surgery residency at Lutheran Hospital of Indiana and is a Fellow of the American College of Surgeons and the American Academy of Orthopaedic Surgeons. Dr. Klaassen has been a member of the Elkhart General Medical Staff since 1987.

Balancing Act

Elkhart General Hospital is one of only 10 hospitals in the country offering joint replacement surgery with OrthoSensor™ Knee Balancer

Advanced technology continues to improve outcomes for joint replacement patients. Biologics that supercharge the body's own healing abilities can be used to accelerate post-surgery recovery times. MRI scans work in conjunction with new surgical devices to ensure optimum alignment of the new joint. And now microelectronic technology is helping the surgeon ensure the weight that's loaded onto the new joint is properly balanced so the joint will perform well in the long run.

According to Board Certified Orthopedic Surgeon Mark Klaassen, MD, FACS, from the Elkhart General Hospital Center for Joint Replacement, "A natural knee generally comes with good balance as 'standard equipment,' ensuring the weight that's placed on the joint is properly distributed. So when severe osteoarthritis or a similar joint condition leads to knee replacement surgery, one of our goals is to make sure this good balance is maintained. The new knee implant must act in harmony with the muscles, ligaments and other connective tissue that hold the leg together. But if a ligament on one side is too tight or too loose after surgery, the balance is off. That can cause a range of problems and contribute to early failure of the joint." Dr. Klaassen related it to an automobile wheel that's out of alignment. It creates excessive wear, and before long you need a new tire.

Orthopedic surgeons generally rely on their experience and "feel" to evaluate whether the new knee is properly balanced. During the procedure, the surgeon installs temporary or "trial" components, the placement of which will be precisely duplicated later in surgery when the permanent system is implanted. With the temporary components in place, the surgeon grasps the leg and tests the placement by taking the new joint through range of motion, carefully but firmly bending and twisting the leg to evaluate alignment and balance. Only when that feels right to the surgeon, are the temporary components removed and replaced with the permanent prosthetics.

"There's a lot of art involved here," said Dr. Klaassen. "I've been doing this for a while now (Dr. Klaassen performs upwards of 300 joint replacement surgeries a year) and I know when things feel right. But now I've got a new tool that will help my patients have an even better outcome." The tool he referred to is the OrthoSensor™ Knee Balancer.

The OrthoSensor™ system includes an "intelligent" insert – one of the temporary trial components that are first implanted during surgery. The insert features embedded sensors that pick up the pressure or load placed on the various compartments of the knee – vital information that is wirelessly transmitted in real time to a computer display in the surgical suite. This lets Dr. Klaassen see exactly how the knee is performing while he puts the trial knee through its paces, enhancing his ability to precisely position the knee implant to fit the patient's individual anatomy and soft tissue conditions. "If the sensor tells me one part of the knee is getting more pressure than another, I can make the necessary adjustments – realigning the implant, releasing tight ligaments, whatever it takes to optimize the balance of the joint. Once the readings confirm I've achieved that balance I remove the temporary components including the OrthoSensor™ and replace them with the patient's new, permanent knee system."

Dr. Klaassen first used this technology earlier this summer with a patient who suffered with a severe knock-knee condition. "That was a real demonstration of how well the system works," he said. "With this patient we couldn't just duplicate the original balance. We needed to actually create a new weight distribution scenario that would support the straighter leg. The prosthesis allowed us to get the leg aligned and the soft tissue adjustments I made – guided by data from the OrthoSensor™ – gave us the confidence that it would stay that way."

Dr. Klaassen firmly believes we're seeing just the tip of the iceberg in terms of where technology like this can take joint replacement surgery. "My goal with every patient is to score an A+ in surgery," Dr. Klaassen stated. "And with every advance in technology – with every tool like the OrthoSensor™ that comes along – my ability to hit that goal every time improves." He envisions not far down the road patients will be benefiting from the next generation of this technology. What he refers to it as a "smart knee."

Dr. Klaassen explained that, whereas the OrthoSensor™ is a temporary device used on a one-time basis during the surgery, developers are already working on a version that can be part of the permanent prosthesis. "And it won't be limited to measuring only balance and pressure. Temperature sensors could tell us if an infection might be attacking the joint. Chemical sensors could alert us to any abnormal reactions to the prosthetic alloys. If you fall and bang your knee, we'd know right away if you damaged the joint. And all of this information will be available without having to surgically go into the knee. In fact, it's possible that the patient won't even need to come into the office for initial diagnosis. The real-time information could be transmitted wirelessly from the knee to a computer in my office."

Clearly, with devices like the "smart knee" on the horizon, exciting times are ahead in terms of joint replacement technology. But the benefits patients are receiving today – with advances like the OrthoSensor™ system – are equally exciting.

Elkhart General Hospital Center for Joint Replacement is ranked among the top 10 percent in the nation for joint replacement four years in a row by HealthGrades™. For more information why joint replacement may be right for you, visit us online at www.egh.org.
