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**Media Advisory -- For Immediate Release**

**Computer Navigation for Minimally Invasive Hip and Knee Surgery**

Advancing the Promise of Longer Lasting Joint Replacements in RI

*An interview with Dr. Gary Dr. Ferguson, Surgeon, University Orthopedics*

New computer navigation technology in use at The Miriam Hospital (and some other hospitals in the region) helps orthopedic surgeons navigate inside a patient's joint to make surgical procedures more accurate and longer lasting. University Orthopedics' Dr. Gary Ferguson has been using this computer navigation since the fall of 2006 and now performs all of his minimally invasive hip and knee replacement surgeries with the aid of this equipment. In this interview he discusses advantages of this procedure and how ongoing experience and academic studies are contributing to its advancement here in Rhode Island.

**Question:** How does computer navigation work?

**Dr. Ferguson:** It is similar to the Global Positioning System (GPS) you might have in your car. For example, computer-assisted knee replacement surgery captures a patient's unique anatomy and

translates it to a computer screen, providing the surgeon with an unobstructed view of the patient's knee joint.

To accomplish this the surgeon first attaches temporary markers on the bones at strategic locations around the joint. The computer can locate these using an infrared camera. Next comes a "teaching" procedure. The computer tracks the position of markers while the surgeon guides the joint through a variety of motions. It uses the data it collects to determine where the center of the hip is, where the ankle joints are and where the knee is.

From this information the computer generates a highly detailed and very accurate 3D model of the joint. During the the actual replacement procedure, the surgeon watches the computer screen and sees representations of his tools, the joint replacement and the model of the knee as if he were looking through a window into the actual joint.

**Question:** What is the advantage of computer navigation for joint replacement surgery?

**Dr. Ferguson:** In nearly 30 years of peer-reviewed orthopedic literature, it is clear that the single most important determinant of long-term survival of a total knee or hip implant in a patient is the alignment of the implant with respect to the whole leg. The more accurate the alignment, the longer the implant will last.

Computer navigation allows us to perform surgical procedures within the joint and to align the implant more reliably and more accurately. Based on past experience, these improvements will translate into longer lasting repairs.

**Question:** How much more accurate is computer assisted surgery?

Until the advent of computer navigation we were able to align the joint replacement device to within 7 to 9 degrees of optimal alignment. With computer navigation we can be reasonably certain of achieving an alignment within 3 degrees. That is better than a 50 percent improvement.

**Question:** So how much longer will a computer assisted hip or knee replacement last?

**Dr. Ferguson:** Longevity of a replacement varies from individual to individual. That being said, a standard knee implant without the assistance of computer

navigation typically lasts 10 to 15 years. With computer-assisted surgeries, a knee implant is more precisely aligned to minimize joint wear, potentially extending the life of the implant to up to 30 years. We can't say that with absolute certainty yet because we don't have enough data but we will in the years ahead.

**Question:** Does computer navigation help shorten the recovery period for knee and hip surgery?

**Dr. Ferguson:** There is no conclusive evidence that it does. However, the technology is a perfect complement to minimally invasive surgical procedures which frequently do result in an easier and faster recovery for the patient. Surgeons can operate through smaller incisions (4 to 6 inches compared to 10 to 12 in standard, open surgery) This causes less trauma to the surrounding tissue, which can lead to less post-operative pain, quicker restoration of mobility, and a shorter hospital stay.

**Question.** Are there any other benefits of computer assisted knee surgery?

Yes. Computer navigation could lower the occurrence of a particular complication called "fat embolism syndrome". In conventional knee replacement surgery a rod is inserted in the bone as a guide for lining up our surgical instruments. Drilling a hole in the marrow cavity to insert the rod releases globules of fat which are typically absorbed by the lungs but sometimes puts stress on the heart while they are in the circulatory system. With computer navigation the rod is not required, so the risk of this complication is potentially reduced.

**Question?** Does computer navigation provide similar benefits for hip replacement surgery?

**Dr Ferguson:** Absolutely. Computer navigation allows us to accurately orient the socket for optimal stability of the ball connection. This, in turn, makes the joint more resistant to dislocation. Another issue that is impacted by orientation of the hip replacement is the length of the leg. Without computer navigation, leg length may vary between a centimeter shorter and a centimeter longer. Computer navigation reduces this variability to within a millimeter. That is a big improvement.

Surface arthroplasty, an emerging technique for hip surgery, also benefits from computer navigation. With this procedure the ball is not removed but

resurfaced by putting a specially designed cup over it. The accuracy of cup placement is one of the factors that impacts the longevity of this repair. Computer navigation eliminates the need for invasive drilling to place alignment hardware in the bone while significantly improving alignment accuracy.

**Question:** How has the use of this technology effected your outlook on your profession as a surgeon?

**Dr. Ferguson:** Computer navigation has made me a better surgeon. There is no doubt about it. It causes you to look at what you're doing in ways that weren't possible before. For example, the computer gives me a real-time understanding of the joint's alignment-- whether the knee is perfectly straight, or if it has a 2 degree contracture. It can tell me how far the knee will bend with gravity to let the leg go back. This is real time information I didn't have access to before, and I get it without invading the skeleton or having to use x-ray. It fits in very naturally with the whole philosophy of minimally invasive surgery.

It also provides better surgical research data for evaluating surgical outcomes and improving surgical procedures.

**Question:** Speaking of research, will you be conducting any studies involving computer navigation of hip and knee replacement surgery?

**Dr. Ferguson:** Yes. Under the auspices of the Warren Alpert Medical School of Brown University, we are planning an OR-based randomised trial comparing alignment outcomes of conventional replacement surgeries with comparable surgeries performed with computer assisted navigation. At present, 90% of these surgeries are performed without computer navigation. Favorable results from these studies could expedite the adoption of this technology so that more people can enjoy the benefits of longer lasting hip and knee replacements.

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University Orthopedics serves virtually every orthopedic specialty. From sports medicine, hand and upper extremity surgery, shoulder and spine surgery, orthopedic oncology, foot and ankle surgery to joint replacements, pediatric

orthopedics, occupational medicine, complete physical and hand therapy and trauma surgery.

The practice serves Southern New England with offices in Johnston and Newport along with two Orthopedic Care Centers in Providence and one in East Greenwich. Last year, more than 2,800 physicians referred patients to University Orthopedics and patients received treatment in more than 40,000 physical therapy visits.

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