Can a Machine Make the Outcome of Hip Replacement Surgery More Reliable?

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Hip replacement surgery is an increasingly common surgical procedure for the treatment of hip arthritis and avascular necrosis. The risks of Total Hip Replacement include dislocation, leg length inequality, and need for future surgery (if the components fail). While the implants have changed over the years, and the longevity of a hip replacement has increased, there has never been a reliable way to help determine proper implant placement and limb length equality. Now, however, we have the technology to allow for precise component placement and objective, intraoperative, measurement of leg length—all through the use of Computer Assisted Surgery (Navigation).

I have been using Navigation with Total Knee Replacement for about four years and have been pleased with the predictable implant placement and patient satisfaction. Now, this technology can be used with Hip Replacement surgery to provide the same results. How does Navigation work? Surprisingly, much like a GPS system works in a car. Navigation technology uses special tracking devices, providing the surgeon a comprehensive understanding of joint mechanics in the operating room. Armed with this information, the surgeon can make adjustments within a fraction of a degree, helping to ensure the new joint has the stability and range of motion needed for a successful replacement. Specifically, the technology uses the latest advancements in science and computer engineering to make the procedure more accurate than joint surgery without it. As the surgeon moves an instrument within the joint, special infrared trackers calculate its position and wireless instruments instantaneously transfer the data to a computer in the OR. This information is then displayed on a monitor as an interactive model of the anatomy or "blueprint" that supplies the surgeon with all the angles, lines and measurements of the patient's unique anatomy. The surgeon will then replace the diseased bone with new, artificial joint to replicate a normal, healthy joint.

Due to the surgical precision that Computer Assisted Navigation offers, there are several potential benefits for those who have a navigated total hip replacement including increasing the life span of the replacement, reducing the risk of dislocation, greater stability and range of motion, improving the overall function of the hip replacement and reducing the need for revision surgery. In addition, when used with minimally invasive techniques (such as Direct Anterior Approach), a Navigated Hip Replacement may reduce blood loss during surgery, lead to a shortened hospital stay, cause less scarring, and produce a faster recovery.

Clearly, the quality of life benefits from Total Hip Arthroplasty cannot be denied and are well documented. With the addition of Direct Anterior Approach and Computer Assisted Navigation, we now have the technical components to objectively measure proper component alignment and limb length equality, ensuring a quicker, more reliable return to normal function with a continued decrease in risk to the patient. Can a machine make something so good even better? The answer, in the case of Computer Assisted Navigation, is an overwhelming—yes it can!