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PERSONAL HEALTH

It's Not Your Parents' Hip Replacement Surgery

Perhaps the most exciting aspect of modern hip replacement is the increasing use of robotic surgery.

Credit...Gracia Lam

By Jane E. Brody

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If I've learned anything during nearly six decades of reporting on medical science, it's that the longer you wait, the better the methods of prevention, diagnosis and treatment are likely to become. That's true for almost every field of medicine — cardiology, gastroenterology, oncology, etc. And it may be particularly relevant for orthopedic surgery, a specialty facing ever-increasing demands from an aging population with bones, joints, ligaments, tendons and muscles that break down after decades of wear and tear.

Although repairing these body parts is rarely urgent, many people endure painful joints for years, even decades, often out of fear of surgery. The delay can have both obvious risks of ongoing pain and increasing disability, as well as unexpected consequences like injury to previously healthy muscles and joints that are overstressed as a result.

I have good news for people with degenerated hip joints that are in serious need of replacement. The last decade has seen significant incremental improvements in surgical techniques and the ability to fit patients with artificial hips that are highly resistant to mechanical failure or a need for revision.

A close friend recently underwent replacement of a second hip, nine years after the first, and is thrilled with how minimal the pain was and how rapidly she's recovered function this time thanks to the updated techniques her surgeon used.

The essential fact of hip replacement has not changed. Traditionally, the damaged ball-and-socket joint is removed surgically and replaced by one made artificially. But the way this is done, especially the preparation involved, can make a major difference in the immediate and long-term success of hip replacement surgery.

As one surgeon, Dr. Patrick A. Meere, told me, "A large part of today's improved performance — rapid discharge, faster return to function, and diminished need for pain management — is attributable to more refined surgical technique," especially muscle-sparing approaches that result in faster pain-relief and functional recovery. Instead of cutting through muscles to gain access to the hip bones, the surgeon navigates between muscle fibers of the pelvis to reach the bony parts of the joint.

One major improvement is the use of computer-assisted navigation that enables the surgeon to see precisely how to align the implanted joint. Dr. Meere, an orthopedic surgeon at N.Y.U. Langone Health, said that most surgeons now use some form of the technology, which results in more accurate leg length and minimizes the risk of dislocating the replaced joint.

But perhaps the most exciting aspect of modern hip replacement is the increasing use of robotic surgery. Although robots have been used for many decades to manufacture motor vehicles with greater precision, robotic joint replacement is a relatively new kid on the block. And, Dr. Meere said, it typically takes surgeons 15 to 25 operations to develop proficiency in using the robot.

The extra cost involved in robotic hip replacement is not yet covered by Medicare or most insurers. But after learning about its advantages, my friend chose to pay the extra several thousand dollars out of pocket. It involves creating a three-dimensional model of the patient's hip joint. A CT scan of the patient's pelvis is done before surgery, or a 3-D model of the hip joint can be created at the time of surgery. When the scan is done in advance, the surgeon is able to create a more precise operative plan — in effect, a virtual rehearsal of the operation.

Enter the robot. The robotic equipment's software uses the information generated by the scan to create a personalized preoperative plan for the surgery. With the surgical plan in place, the surgeon uses the robotic arm to insert each end of the artificial hip joint exactly where it should go to maximize anatomical function. The robot moves within a predefined area, minimizing the possibility of surgical deviance from the preprogrammed plan while still allowing the surgeon to make adjustments during the surgery if needed.

"Once the robot comes into the field, it acts as a navigator and co-pilot," Dr. Meere said. "The surgeon is still in command but needs to expose less tissue and is more confident because the robot knows exactly where the cutting instruments are and where the boundaries of the safe cutting zones lie."

If the surgeon should drift from the safe zone, the robot issues an alert, comparable to the lane-departure warning in modern cars, and shuts off. In this way, Dr. Meere said,

“the robot minimizes the risk of inadvertent damage to bone or surrounding tissues.” It also relieves the surgeon’s stress when operating on complex cases.

A critical factor in successful hip replacement is making sure the leg that is attached to the new hip matches the length of the other leg. Robotic-assisted surgery is reported to be five times more accurate in matching leg length than is conventional surgery. It is also better at inserting the new hip joint at the proper angle.

Before the surgical wound is closed, the surgeon can tell whether the joint is properly aligned and the leg lengths are even, which results in a more stable joint.

Robotic surgery “is where things are going,” Dr. Douglas B. Unis, orthopedic surgeon at Mount Sinai Icahn School of Medicine, told me. “It more accurately reconstructs the patient’s anatomy and results in better mechanical function. Off-the-shelf implants and the carpentry tools used to prepare bone are not good business or clinical models. It’s becoming more economical and practical to design customized implants,” he said, than it is to customize the patient’s bones to fit an existing implant.

Not only have surgical techniques used in hip replacements improved. So has anesthesia, which now usually relies on a combination of treatments like a regional spinal block and peripheral nerve block together with a pain-relief cocktail that is injected directly into the local wound, Dr. Meere said.

Both navigation and robotic joint surgery can also be applied to the replacement of knee and shoulder joints, although at the moment surgeons have significantly more experience with robotic hip surgery.

A problem in gaining better insurance coverage for robotic hip replacements is the fact that most studies have been sponsored by the companies that manufacture the equipment, Dr. Unis said. In the long run, however, as more surgeons become adept at robotic joint replacements and patients are shown to have faster and easier recoveries, with fewer complications and less need for surgical corrections, the likely economic advantages of robotic procedures are expected to change the insurance picture. Prospective patients, too, can move the needle by insisting on the best surgical repair methods available.

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