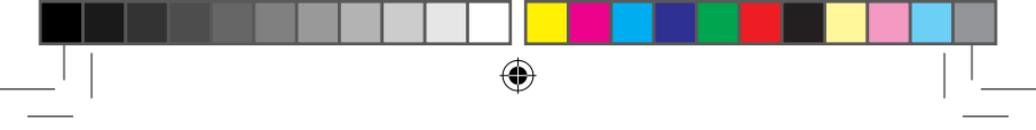


**UNDERSTAND
SOFTWARE-
GUIDED JOINT
REPLACEMENT
SURGERY**
for hip



Software-Guided Surgery:
memorialhospital.org/smartmove



HELLO

Across the world, approximately 355 million people suffer from arthritis and joint degeneration, including 151 million diagnosed with Osteoarthritis (OA) and 24 million with Rheumatoid Arthritis (RA). In fact, OA is the sixth leading cause of years lost to disability worldwide.^[1]

Osteoarthritis is the most common reason for people to undergo a hip replacement surgery. Nearly 2.9 million joint replacement procedures are performed globally each year, including more than 1.4 million hip replacements.^[1]

In the late 1990s, the first ‘computer-assisted’ joint replacement systems were introduced. These “helping hands” have been refined over the last 15 years and include sophisticated software guidance systems, robotics, surgical tools and new implant designs that support surgeons in their daily routine.

Joint replacements surgery can relieve stiffness and pain, help restore normal activity levels and increase quality of life. If you and your doctor decide that joint replacement surgery is the next best step, you may be interested in learning more about surgery using software guidance.

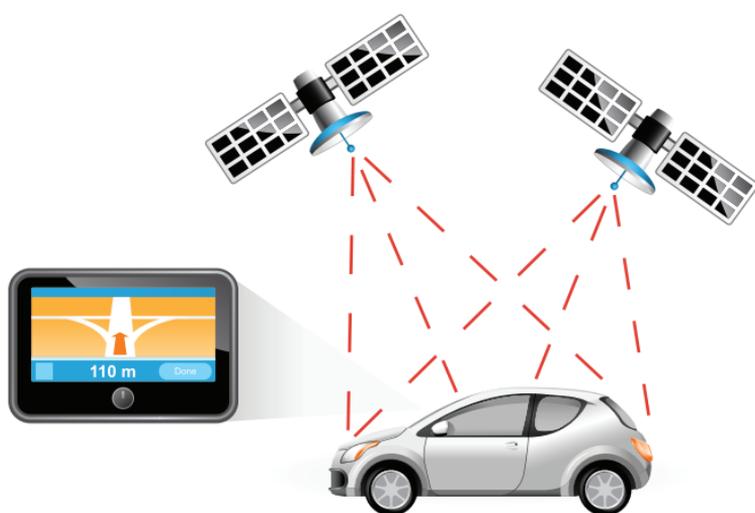


WHEN IS JOINT REPLACEMENT NEEDED?

The most common reason for joint replacement is pain and decreased quality of life from osteoarthritis. Demand for joint replacements is growing rapidly. By the year 2030, the number of total hip replacements is expected to increase dramatically to approximately 570,000.^[2]

Joint replacement surgery is often performed when the cartilage in the joint is damaged or starts to erode, eventually causing the bones of the joint to rub together, increasing pain and limiting mobility.

Once the decision to have a joint replacement surgery has been made, the main goal for surgeons and patients is reducing pain and restoring the natural range of motion of the joints.



WHAT IS SOFTWARE-GUIDED SURGERY?

Similar to a car or mobile Global Positioning System (GPS), software-guided surgery – also called surgical navigation and computer-assisted surgery – continuously tracks points of your anatomy and displays them on a computer monitor in the operating room before, during and after surgery.

The software-guided surgery system provides your doctor with additional information and measurements and tracks the surgical instruments being used for the procedure. In hip replacement surgery, the surgical navigation software will measure the position of your hip bones and the surgical instruments in relation to each other – helping to measure leg length and accurately place implants.



WHY SOFTWARE-GUIDED SURGERY?

Benefits of software-guided surgery

Software-guided surgery for hip joint replacement offers many benefits to surgeons and their patients:

Hip:

- Helping accurate restoration of leg length and offset ^[3,4]
- Intra-operative assessment of range of motion ^[5]
- More control in minimally invasive surgery ^[6]
- Supporting accurate positioning of the implants ^[6,7]

Software-guided surgery does not take the place of the doctor nor is it a robotic surgery. Rather, it helps guide the surgeon through surgery by tracking surgical instruments used in relation





IS SOFTWARE- GUIDED SURGERY NEW?

History of software-guided surgery

Software-guided surgery, also known as surgical navigation and computer-assisted surgery, is an important example of today's technological capabilities being applied to medicine. It has emerged as one of the most reliable medical technologies and it continues to help transform surgeries into safer and less invasive procedures.

Orthopedic surgeons have been using navigation software for more than 15 years now, making it an established and well-known procedure worldwide. Today, surgeons can use navigation on mobile, handheld technology. The Brainlab Dash® software runs on an iPod touch®, utilizing the iPod touch as the monitor.^[8]



WHAT TO EXPECT IN SOFTWARE- GUIDED HIP SURGERY?

Hip replacement surgery is typically used to help improve function and reduce pain when symptoms of degenerative hip disorders worsen. Today a diseased hip joint can be partially or fully replaced with an artificial joint through total hip replacement surgery.

Total hip replacement (THR) is the most common and well accepted procedure for hip replacement. Your surgeon restores function by replacing damaged hip joint parts with metal and polyethylene implants. It is used in cases of severe pain, considerably compromised mobility and cartilage that is so worn that a complete artificial joint replacement is necessary. The artificial joint may allow the patients to move better and with less pain after the surgery.

There are several studies that show that hip implant cup alignment using software-guided surgery / surgical navigation is more precise than alignment using conventional mechanical instruments. The studies also show that software-guided surgery is useful for optimizing limb length, range of motion and stability.^[6,7]

SOFTWARE- GUIDED HIP SURGERY STEPS

Here you will find the five detailed steps of software-guided hip replacement.



1. Anesthesia, incision and dislocation

The first step in surgical preparation is anesthesia and covering of the hip area. Once you are under anesthesia, an incision is made down the side of the upper thigh to expose the joint and give your surgeon free access to the diseased or damaged bones.

There are different positions from which to perform hip replacement surgery, and your doctor may choose to operate on the joint from the side, back or front depending upon which is best for your condition, anatomy and surgical needs. Approaching the surgery from the back of the hip is the most common.

2. Surgical planning

Your surgeon will plan the implant insertion before the surgery using diagnostic X-Rays and the surgical navigation planning software to template the size, style and position of the implants.



DIGITAL PLANNING OF HIP PROSTHESIS

3. Bone and hip socket preparation

Your surgeon must prepare both the head of the femur as well as the hip socket when performing total hip replacement surgery.

Femoral head

Once inside the joint, your surgeon separates the ball-shaped head of the femur from the hip socket (acetabulum), and cuts off the head to reduce the damaged cartilage and bone.

Hip socket

A special tool called a 'reamer' is used to shape the hip bone so that the socket portion of the implant – the metal acetabulum component – fits properly into the anatomy.

SOFTWARE- GUIDED HIP SURGERY STEPS (cont.)

4. Implant tests and femur preparation

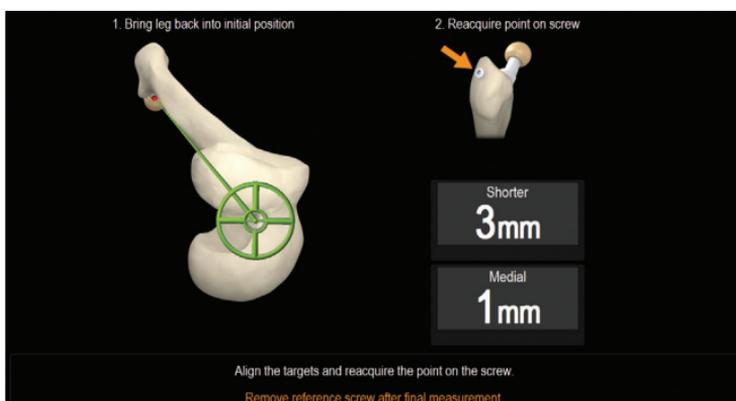
Once surgery has begun, your surgeon uses navigation to 'track', 'see' and 'control' the angle and position of the cup, and to navigate it to the planned position.

To prepare the femur for placement of the stem portion of the implant, the surgeon first drills a hollow tunnel inside the thighbone to open the stem. The stem may be cemented or simply held in place by the tightness of the fit. A metal ball is attached to the end of the stem and fits into the artificial socket in the hip bone.

A plastic or metal liner is placed in the hip socket cup to provide smooth joint movement. These three components replace the natural ball and socket joint.



**SAMPLE SOFTWARE IMAGE
HIP CUP NAVIGATION**

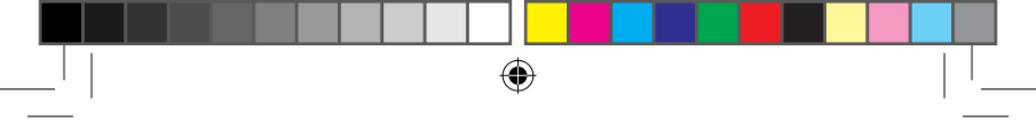


**SAMPLE SOFTWARE IMAGE
LEG LENGTH CHANGE**

5. Leg length and range of motion check

With trial implants in place, your surgeon will use surgical navigation to perform a leg length check. The results displayed on the computer monitor can be checked against the preoperative plan and the implant size or style can be changed if needed.

During and after surgery, your surgeon verifies the correct fit and range of motion of the hip replacement components. By mimicking the anatomy and function of the natural hip joint, hip replacement can reduce pain and permit a return to many activities.



WHERE CAN I GET MORE INFORMATION?

Resources and information

Make an appointment:

Center for Hip Surgery

Address:
Memorial Hospital
1236 Medical Avenue
Chicago, IL 60607

Phone:
1-800-555-7700 or
1-708-555-1343

Website:
memorialhospital.org/smartmove

Find supportive information:

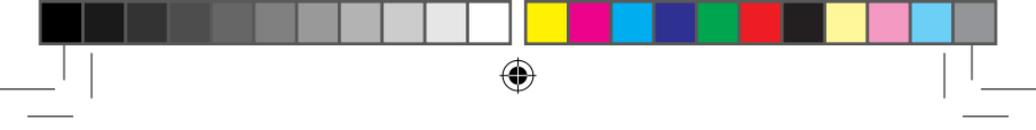
www.orthoinfo.aaos.org
www.arthritis.org

Understand software-guided surgery:

www.brainlab.org

Our goal, at Brainlab.org, is to demystify health conditions, support how they make people feel, and provide useable information on Brainlab technology.

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