

TOTAL HIP REPLACEMENT: MODERN SURGERY FOR SEVERE ARTHRITIS OF THE HIP

By John T. Dearborn, M.D.

Please read this pamphlet before your visit so that we can answer any questions that you have during our consultation.

The operation called a total hip replacement (THR) produces the most effective and dramatic relief that has ever been afforded adult patients suffering from severe arthritis of the hip. In the operation, as the name implies, the entire ball is removed and the socket is resurfaced. In the place of the hip joint a thin metal shell with an artificial bearing surface is inserted, in combination with a metal substitute for the upper end of the thigh bone. Because the results of this surgery are helpful for so many people, potential candidates should have a clear understanding of the nature of the operation, its advantages and disadvantages, its limitations and contraindications, and the technique variations available.

THE OPERATION

The basic concept of total hip replacement is entirely different from any previous surgical or medical approach to the treatment of severe arthritis of the hip. In the past, medications were given to offset or reduce inflammation. Surgery was performed to remove the nerves going to the painful joint or to shift unused cartilage into the weight bearing position in the joint when the original cartilage has been worn off. Other operations were done to make the hip completely stiff, or fused it. While these measures had some success in many patients, they all had distinct limitations.

The revolutionary concept of total hip replacement, simply stated, is to eliminate the damaged joint completely and put in a new one. This solution is uniquely effective

because the body is incapable of repairing a joint itself, and because no medicine can stimulate such a process.

For this to succeed, modern materials were needed. The plastic socket is made of a special material called ultra high molecular weight polyethylene. It is in the same family of plastics as the familiar polyethylene bags but is special in being very slippery (important for joint motion), very strong (important for durability) and compatible with the tissues of the body in its solid form. The plastic socket is paired with a thin titanium metal shell, which allows the plastic to be changed if it ever wears out. The metal shell also allows the socket implant to become biologically fixed to the pelvis. Alternatively, the metal shell can be paired with a metal or a ceramic liner. The pros and cons of alternative bearing surfaces are discussed below. The femoral component, used for the replacement for the upper end of the femur, must be very strong and made of a special metal which will not corrode in the body (generally titanium or a cobalt-chrome alloy). The ball must be very strong as well as ultra smooth to minimize friction, and is typically made of a cobalt-chrome alloy or special ceramic material.

A very important problem in such replacement surgery is that of fixation: keeping the new parts firmly attached to the bone. This has been resolved for the socket by using porous coating on the metal shell, which allows bone to grow into the shell surface, providing "biologic" fixation. For the thigh piece, fixation can be achieved in two ways. Originally, the answer was modern bone cement. In the mid 1980s, porous coating became available for the thigh piece, providing bone ingrowth as an alternative to cement fixation. The results of modern uncemented femoral components are generally excellent, as good or better than the results of cemented femoral components, especially in young, active patients.

A "hybrid" hip is one in which the socket is fixed without cement and the thigh piece is fixed to the thigh bone with cement. The hybrid hip is probably the best combination for total hip surgery for most elderly patients. In many other circumstances, such as in younger patients and patients with excellent bone quality, it is preferable to use uncemented thigh pieces.

SURGICAL METHODS

Traditional Technique

Traditional hip replacement surgery typically utilizes an extensive, 6- to 10-inch curved incision on the side of the hip, extending into the buttock area. The deep portion of the dissection divides a number of important stabilizing muscles and tendons and leads to a predictably large blood loss and significant rehabilitation time. The hip joint can be approached from the front or the back of the joint. Approaching from the back does less damage to the muscle that controls limping, but leads to more dislocations, in which the ball comes out of the back part of the joint. Approaching from the front leads to fewer dislocations out the back of the joint, but also generally leads to a more persistent limp for several weeks after surgery, due to muscle damage. Dislocations out the front of the joint can occur with this technique, but are uncommon.

Minimally Invasive Surgery

In our opinion, the term “minimally invasive surgery,” or “MIS,” is ambiguous and should be replaced with the term “less invasive,” and accompanied with a description of how a procedure differs from the standard method as well as data to support its use.

A handful of hip replacement specialists, including me, have developed specialized techniques and instruments to allow the same prostheses to be implanted with very limited incisions and dissection. Various methods have been described, and we have had experience with all of them since 2001. For clarity, the terms posterior and anterior refer to the direction that the hip is dislocated during the surgery.

Mini-Posterior Method

A three-inch incision is generally placed during the surgery on the side of the hip. The muscle dissection is much reduced compared with the traditional technique. The posterior dislocation method is the most versatile, in that straight, curved, uncemented and cemented femoral components can all be placed easily with this technique. The risk of prolonged postoperative limp is virtually eliminated and nerve injuries rarely occur. Excellent direct visualization of the hip joint is facilitated by special instruments and retractors. The deep structures, including the capsule, are repaired after the prostheses

have been implanted. We have shown a very low complication rate with this method in over 4000 cases. Our dislocation rate is approximately 0.5%.

Anterior Method

This surgical approach to the hip enters between natural muscle intervals on the front side of the hip through a single incision. This approach, like the mini-posterior technique, can result in a faster recovery and a lower risk of dislocation than the traditional method. However, recent studies have shown a higher complication rate, with greater blood loss, more nerve injuries, and unrecognized intraoperative femur fractures. I have personal experience with anterior incisions and have found this to be true, without a potential upside of faster rehabilitation.

The incision locations for some of the single incision methods are depicted below.

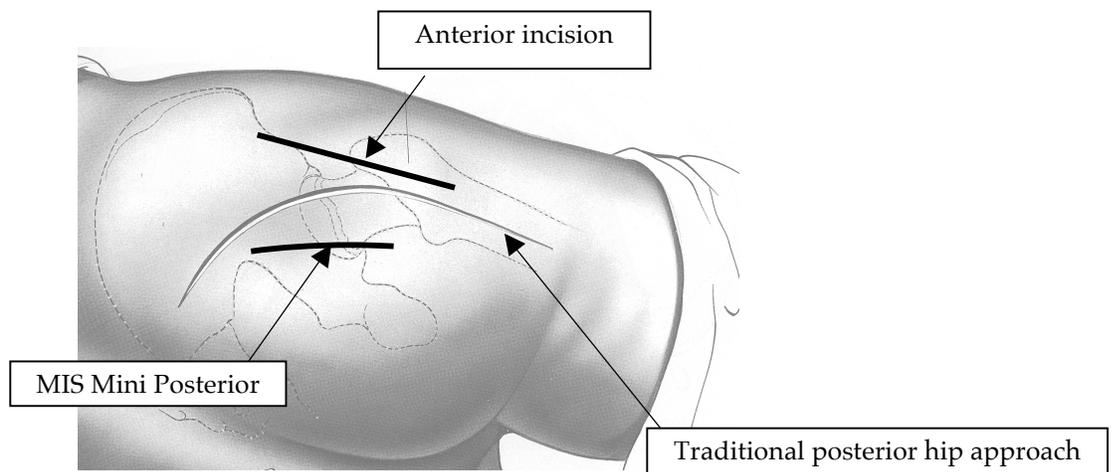


Figure 1: diagram of patient positioned with right side down

Because all of these methods utilize much less exposure than traditional hip replacement surgery, these procedures are reserved for surgeons with special expertise in hip anatomy and less invasive techniques. The advantages of these methods are many, including decreased blood loss, reduced pain, and a faster recovery for the patient compared with traditional methods. The overall complication rate appears to be the same or less than seen with traditional hip replacement techniques. The length of stay in the hospital has also been reduced to one day, and some patients may be candidates for same-day discharge. These improvements have also made hip

replacement surgery available to many patients with health problems severe enough to preclude the traditional procedure.

ADVANTAGES OF HIP REPLACEMENT

Compared to old methods of hip surgery, the exercise program necessary for full recovery from total hip replacement is often quite simple and most patients never have to go to physical therapy after they leave the hospital. They can do all the exercises themselves at home. Moreover, the time necessary for full recovery is much shorter than in the old days. Most patients are fully recovered in three months and some even sooner, although it is important to point out that patients who have a severe or complex problem or those having both hips operated upon may well take longer to recover. These advantages are even more pronounced with minimally invasive surgery.

Another advantage of total hip replacement is the ability it affords the surgeon to correct many discrepancies that may exist in the length of the legs. Such correction is not possible with alternative operations, such as surface replacement. In many cases shortening can be overcome and the legs are made close to equal in length. Similarly, it is often possible to correct some of the deformity that the arthritis has created, making it possible for nearly all patients to stand erect and walk straight.

All of these advantages – important as they are, however – would be of no real significance were it not for the single most important feature of total hip replacement, namely the excellent results for most patients. The relief of pain is usually dramatic. The restoration of function for sedentary adult activities is often complete. Ninety-five percent of the patients who have their first hip operation for common arthritic problems of the hip have no pain or at most only a little pain. About the same percent are able to walk well, without any limp or at most a slight limp, and use neither cane nor crutch. For ordinary activities they are able to function exceedingly well. It is the pain relief and restoration of function that make total hip replacement such an outstanding operation.

WHO SHOULD HAVE A HIP REPLACEMENT?

Since THR does involve major surgery and the risks inherent therein, it should not be done for just minor symptoms or disability. Total hip replacement is the optimal treatment (in those patients of sufficient age and having a serious problem) for a number of conditions, including primary osteoarthritis, secondary osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, traumatic arthritis, avascular necrosis, failed prior hip surgery, arthritis secondary to congenital hip dysplasia, gout, pseudogout, certain tumors of the hip and, in certain instances, infection. It is not ideal for paralytic conditions, although in some instances it may be required here too.

Once special feature is the presence of, or a history of, infection in the hip. If infection has ever been present in a hip, even if it has been many years since infection occurred, surgery may occasionally make it flare up. Because the reactivation of infection after a total hip replacement is a bad complication (and may force the surgeon to take the entire implant out), great caution must be exercised in considering such surgery for cases where infection has existed in the past.

Since we are as yet unsure of the durability of the operation beyond 30 years, in general it is not routinely recommended for patients under age fifty. However, there are certain conditions occurring in younger patients which are not at all well treated by any other method. These conditions do warrant a total hip even at a younger age.

LIMITATIONS, DISADVANTAGES AND COMPLICATIONS

To achieve the advantages that total hip replacement may offer, however, each patient must accept certain limitations, be exposed to a number of significant potential complications and run some risks. First, the artificial hip joint of a total hip replacement is not a normal hip. It is a good hip, but not a normal hip. For example, a THR is not able to withstand repeated heavy impact, meaning that such things as jumping, singles tennis, jogging, volleyball, etc., are not recommended. Swimming, golf and bike riding are safe and skiing is generally well tolerated.

Secondly, some questions remain in terms of the durability of the total hip replacements. The total implant can be vulnerable at several locations, namely the cement, the bony ingrowth, the metal and the polyethylene. Over time, the cement may work loose in the bone, or the cement itself may crack. A cementless THR may come loose. The polyethylene plastic used in the socket may show some signs of wear, and in some cases, it wears rapidly. A new, much more durable polyethylene was made available in 1999 and looks extremely promising. Laboratory testing of this material has shown no signs of wear after 30 years of simulated use. Metal on metal bearings and ceramic bearings share the low wear rates of the improved polyethylene, but each has significant drawbacks, making cross-linked polyethylene the most popular alternative bearing in use today.

Although we have much experience with cemented THR after 30 years, this is not so for cementless THR. At 20 years, cementless THR with well-designed implants perform at least as well as cemented THR. The long-term (over 20 years) risks of cementless THR in terms of ion release, late adverse reactions, weakening of the bone and others are becoming better understood with ongoing surveillance. Because the long-term results of cemented and hybrid hips in young, active patients are marginal, I favor uncemented fixation in all but the elderly.

Cobalt ion release from a metal against metal bearing or from corrosion where the ball meets the femoral component is being reported more and more. Tissue and bone damage can result if the situation is not identified early. Usually this problem is easily rectified by exchanging the metal ball for the ceramic variety.

If the cement or bone ingrowth fails or if the stem of the femoral component breaks, a new total hip can usually be put it but it is a more difficult operation. If the socket wears out, usually a new liner can be inserted quite easily. In some failed THR there can be weakening of the bone around the implants, making the reconstruction more complex if revision surgery is required.

The risks of total hip replacement that are specific to this operation itself are low blood pressure, fracture of the thigh bone or the pelvis, dislocation of the hip, limited motion

because of excessive bony healing, damage to the sciatic nerve, non-union (or failure to heal) of the greater trochanter (if that portion of the femur must be cut to do the operation), leg length inequality, and a number of others. Infection, which can occur after any operation but which causes severe trouble after a total hip replacement, used to be quite high a risk, but nowadays is low. In most centers today, the risk of infection is about 1 in 1000. The risk of having a serious complication, one of the major things listed above or indicated in the broad category or "etc.", is less than 2%.

A number of people have asked about the issue of leg lengths after total hip replacement. We take the issue of leg lengths very seriously and work hard to achieve leg lengths which are as close to equal as we possibly can. Most of the time the leg lengths are equal or very close to equal, but clearly this is not something that we can promise in any specific case. All patients should understand that determining and achieving equal leg lengths in total hip replacement surgery is not an exact science. Occasionally, the leg lengths are not exactly what the patient or we would desire. This is usually because achieving equal leg lengths needs to take a back seat to obtaining a stable hip. Our data suggests that we achieve leg lengths within 5 mm of being equal in 90% of our patients. When the leg lengths are not equal after the operation, it is sometimes necessary to wear a lift in the heel of the shoe. A lift is required in about 5% of cases.

Also, it is common that for a short period of time after the operation, the patient feels as if the leg is too long. This is because, in many instances, we arrange to have the muscles tight for strength and stability. Tight muscles can make the leg feel too long in some patients. Usually, the muscles gradually lengthen a bit and the legs wind up feeling equal in addition to being equal.

In addition to these and other complications specifically related to THR surgery, there are the general risks of any major operation. The number of potential complications is large but the percentage of patients having a complication is small. The risks to be considered are things such as heart attacks, stroke, kidney failure, blood clot formation, pulmonary embolism, heart failure, hepatitis, bleeding, bladder infection, nerve palsy, etc. There is about one chance in a thousand of not surviving the operation.

In summary, there are risks but they can usually be avoided, prevented or corrected, and there are about 2 chances in 100 of having a serious complication, as we understand the problem today. As we have improved our knowledge and control over such factors as anesthesia, blood clot formation, infection, etc., this figure has been reduced.

THE FUTURE

The current treatment options are highly successful. The outlook for the future is, hopefully, even brighter. Considerable improvement has already been made in reducing the remaining small percentage of serious complications. For example, real progress has been achieved in reducing infection, preventing thrombophlebitis, controlling bleeding, lessening the incidence of dislocation and designing better implants with greater longevity. Further advances are bound to come.

ALTERNATIVES

For some younger patients other operations, such as arthroscopy or periacetabular osteotomy may be successful alternatives. For all patients, medicines, heat and a cane will often provide relief in the early stages of arthritis. THR is almost always an elective operation. Generally, it should be done only when other measures are no longer effective.

REOPERATIONS

Revision operations, or operations done to repair the failure of a prior total hip replacement, may be difficult than the first or primary THR. If implants need to be removed, the surgery takes longer, is subject to more complications and carries more risks. The recovery is slower and sometimes the need for crutches or a cane is longer. Nevertheless, for most patients we can build a good hip even in the revision setting. Occasionally in severe failure of prior total hip replacements, it is not possible to redo the operation, but that is very rare.

SUMMARY

Total hip replacement is by far the most effective method of treatment of severe arthritis of the hip in older adults. In fact, it ranks among the top in efficacy in any listing of major surgical procedure of any type. Cemented thigh pieces of total hips generally give excellent results for 20 years for about 95% of the patients. The long-term results of uncemented components are unknown, although our experience with cementless sockets and femoral components is more than 20 years and suggests that these implants will outperform cemented ones. Relief of pain is usually very good. Restoration of function is often remarkable.

The chief limitations are that approximately 2% have a complication, some patients do not do quite as well as expected, the prosthesis does not withstand repetitive heavy impacts as well as the normal hip, and that questions about the ultimate durability of the operation still exist.

From this material and from our discussions and questions during the consultation, you have a broad understanding of the surgery and the risks involved. Prior to accepting you as a patient for total hip surgery, we need you read (or reread if necessary) this document at your leisure. We recommend that you discuss it with your family. Please call us if you have any further questions.

You will be asked to sign acknowledgement that you have read and understand this material prior to surgery. Please file a copy in your records. Final arrangements for your surgery will not be made until we receive the signed copy for our records. Thank you.

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I have read this document entitled "Total Hip Replacement: Modern Surgery for Severe Arthritis of the Hip" under quiet conditions at my leisure away from Dr. Dearborn's office and I have discussed it with those family members I feel should be aware of its content. I understand its contents and accept the inherent risks in such major surgery.

Patient: Sign Your Name Here

Print Your Name Here

Date

Witness: Sign Your Name Here

Print Your Name Here

Date