

## LIMITED ACCESS TOTAL HIP REPLACEMENT.

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### INTRODUCTION:

The evolution of hip replacement technologies is among the most fascinating stories of modern surgical advancements. As early as 1826, Dr. Barton of Philadelphia corrected the deformities of the thigh bone (by breaking and realigning the broken pieces) to treat the arthritis of the hip. Dr. Murphy of Chicago published a similar procedure combined with interposition of soft tissue between the ball and socket of the hip joint, in 1915. In 1939, American orthopedic surgeon Smith-Peterson published his pioneering work in which he developed and used an artificial mould to replace the ball of the hip joint. Dr. Bohlman and Dr. Moore separately published an improvement on Smith-Peterson device by attaching an anchoring peg to the mould (the peg was Dr. Smith-Peterson's invention to fix the broken neck of the thigh bone). Later on Dr. Moore and others improved the pegged device by replacing the peg with a stem that fitted into the shaft of the thigh bone; these devices improved the security of fixation and stability of the joint but did not address the issue of pain emanating from the hip socket. This led to the development of the concept of total hip replacement by Mr. Ken McKee, F.R.C.S., and Mr. John Watson-Farrar, F.R.C.S. (a male British surgeon who is a certified fellow of the royal college of surgeons is referred to as Mr.) of Norwich, England, who developed a metal cup which served an artificial socket to go along with the metal ball-stem component. In spite of all these advances, secure fixation and elimination of pain related to the motion of the components within the bone remained elusive until Sir John Charley developed and used bone cement to securely fix the components to bone. The search for alternative articulating surfaces led to the introduction of a plastic socket and metal ball-stem components for what was termed "low friction arthroplasty" popularized by Sir John Charnley, the man who immensely contributed our knowledge of modern artificial joint technology. The search continues for better designs; better materials; better understanding of the hip biomechanics; and better surgical techniques of the artificial joints to improve the functionality and the longevity of the device.

The purposes of artificial hip joint replacement are to alleviate pain and improve function. It is not necessary to replace the hip joint or any other joint simply because radiological diagnosis of arthritis, as long as the pain is controllable by non-operative means and that the patient's ability to function is not significantly compromised. Even if pain is significant and function is compromised, the surgeon has to determine the safety of joint replacement if there are other significant health issues which may compromise the outcome of such a procedure or even lead to mortality.

Although the track record of the total hip replacement is generally good, and continues to improve, it is not without risk, and the risks tend to be higher in patients with other medical problems. Complications related to the surgery may occur during surgery or at different intervals after surgery. During the surgery nerve and vascular injuries can occur, the bones may break during the operation and the artificial joint components may be positioned sub-optimally leading to recurrent dislocations. After surgery the patient may experience troublesome recurrent dislocation of the artificial joint (which may necessitate multiple operations), joint loosening and joint infection. A good surgical technique can minimize these

complications but cannot eliminate them! The patient's compliance with the doctor's and therapist's instruction after surgery is of paramount importance.

#### APPROACHES TO THE HIP:

There are several approaches used by surgeons for total hip replacement. Most surgeons are familiar with one approach – the one learnt during their residency. Those who have good experience with different approaches generally can tailor the approach to the specific needs of a patient to ensure a good outcome of surgery.

The most widely used approach in the United States is through the back (posterior). It is very safe approach and quite versatile and can be used for complex situations. Its main weakness is the risk of dislocations. Since the approach violates the structures which stabilize the back of a normal hip joint, sitting on a low stool, bending low to pick up objects, and crossing legs are all likely to lead to dislocations. The meticulous technique by the surgeon and the thoughtful design of the components significantly reduce, but cannot eliminate the risk of dislocations. The approach from the side avoids injury to the stabilizing structures at the back of the joint and thus reduces the risk of dislocations. Its main drawback is that it violates some muscles of the hip and may cause weakness. The approach slightly to the front of the "true" side approach avoids violating the stabilizing structures at the back of the joint, and accesses the hip between muscles, thereby minimizing injury to the muscles. The joint is accessed through the front. Approach is versatile, and even in the hands of a less experienced surgeon is less likely to dislocate as compared to the posterior approach.

#### THE LIMITED-INCISION APPROACHES TO HIP

I am being careful in the choice of the terms I use here. The term "minimally invasive surgery" is very appealing to patients and is often inappropriately used to promote a procedure. While one can justify the use of the term "minimally invasive" to remove a torn cartilage arthroscopically from the knee, or remove gall bladder laparoscopically from the belly, I would have difficulty using the same term to describe a joint replacement procedure, irrespective of the size of the incision. There are, often, trade-offs with the lesser incisions, and this may impact the accuracy of implantation of the artificial device even if auxiliary aids such as x-rays and navigation technologies are available. I prefer to use the term "limited-incision" approach to the hip joint, and consider the incision size of lesser importance than the accuracy and safety of the implantation of the artificial joint.

As many of you know, I have a lot of interest in the least trauma surgery of the spine, and that interest stretches to joint replacements. The goals for this stance are to: minimize surgical trauma; reduce loss of blood; reduce surgical pain; reduce hospitalization; shorten rehabilitation; and facilitate return to productive activities. The ideals of this approach also include: reducing risk of complications; proper alignment and secure fixation of the device; long term benefit from surgery; and reduction of treatment cost.

I learned the technique of the total hip replacement from John Watson-Farrar, F.R.C.S., when I was his orthopedic resident, at the Norfolk and Norwich Hospital, in Norwich, England. As stated above, Mr.

Watson-Farrar was a pioneer in the total hip replacement technology and has his own artificial joint which he designed and used after the metal-on-metal device, which he developed along with Ken McKee. Incidentally, the metal-on-metal design, based on the McKee-Farrar concept, is now being used increasingly throughout the world. The approach I learned from Mr. Watson-Farrar is the one which is placed to the front of the “true” side approach. After completion of my residency in Norwich, I went to Edinburgh, Scotland, to train as a clinical fellow. There I learned the approaches through the back, as well as the “true” side of the hip joint. I have used all these approaches extensively throughout my training in different places and in my private practice. After relocating to the United States, during my training at the Case Western University, I used the approach through the back for my entire time of training.

The extensive experience in the surgery of the hip as well as the other joint replacement technologies, has given me the unique ability to tailor the approach to the needs of individual patients. To achieve the goals of the limited incision surgery listed above, I shall be using a modification of the approach I learned from Mr. Watson-Farrar for the care of my patients, unless the specific condition of the patient dictates otherwise. This approach has important attributes: it can be performed with the patient lying on his or her back – this is particularly helpful to the anesthesiologist if a complication occurs during surgery, as the patient would be in a ideal position for resuscitation; the approach preserves the important hip stabilizing structures at the back of the joint, therefore minimizing the risk of dislocation, especially in the old and the infirm patients and those patients with mental or neurological abnormalities; the approach is through a plane between muscle groups and thus, at least theoretically, avoids muscle damage and facilitates a quicker and a more complete recovery of the muscles than approaches which split muscles; while the artificial joint implanted from the front is not immune to dislocations, it affords more room for error of alignment of the joint components than implantation from the back; the limited exposure reduces surgical trauma. Surgical time in the hands of an experienced surgeon is shorter than other approaches and return to normal activities are expected to be quicker than the standard approaches.

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