



THE OXFORD PARTIAL KNEE REPLACEMENT: THE NORMAL FEELING REPLACEMENT

INTRODUCTION

Each year hundreds of thousands of Americans with painful arthritic knees face the prospect of knee replacement surgery. Recent advances in minimally invasive techniques have shortened the rehabilitation period while advances in implant design have improved overall clinical results. However, patients with successful and pain free knee replacements often report that the new knee still does not feel “normal”. This is in part due to the fact that the anterior cruciate ligament (ACL) is sacrificed in all complete knee replacement designs. The result is that the artificial knee does not have the same stability or kinematics through the arc of motion as does a normal knee.

PARTIAL KNEE ADVANTAGES LEADING TO A MORE NORMAL FEELING KNEE REPLACEMENT:

For many patients the “partial” knee replacement may be an appealing alternative. This procedure, also known as the “hemi” or “unicompartmental” knee replacement, has several potential significant advantages. These include:

1. Preservation of the bone and cartilage of healthy and normal compartments of the knee.
2. The operation is more amenable to the “minimal incision approach” leading to faster recovery and rehabilitation, a quicker return to full activity, and a shorter incision. Usually the surgeon can completely avoid cutting into the quadriceps tendon or muscle, and it is the sparing of the quad mechanism that is the key surgical step in making the approach “minimal” in nature.
3. Perhaps the most significant advantage of partial knee replacement is the preservation of the anterior cruciate ligament (ACL). The ACL is routinely sacrificed in all full knee replacement procedures. Sacrifice of the ACL in full knee replacements can lead to the sense of knee being somewhat “lax” or loose. Partial knee replacement patients, on the other hand, typically find their new joint feels much more like the normal knee due to the preservation of the ACL and of normal knee stability.

PARTIAL KNEE REPLACEMENT INDICATIONS / CONTRAINDICATIONS:

To be considered for partial knee replacement surgery, strict indications must be fulfilled. These include:

1. The arthritis should be isolated to the medial or inside part of the knee joint. Special x-rays of the knee can be performed in the office to help confirm the location of the arthritis.
2. The anterior cruciate ligament (ACL) must be intact.
3. Patients with inflammatory arthritis such as those with Lupus or rheumatoid arthritis are not candidates for partial knee replacement surgery.
4. Very obese patients may be at higher risk of loosening with a partial knee replacement and are probably better served to have a full knee replacement instead.

THE OXFORD MOBILE BEARING DESIGN - THE SOLUTION TO PAST PROBLEMS:

Partial knee replacements have been performed in some fashion for over three decades with varying success. Older implant designs have been subject to the twin problems of cement loosening and plastic wear. A new implant has been designed to address these problems. This implant is the Oxford Mobile Bearing Partial Knee. Developed by surgeons in Oxford, England almost 20 years ago, it was released by the FDA for use in the United States in April of 2004. The

Oxford Group has reported long term clinical data demonstrating the increased durability and dependability of the mobile bearing design.

There are two major differences between the Oxford Knee and other partial knee replacements. These include:

1. The polyethylene plastic articular insert is “mobile”. In previous partial knee replacement designs the plastic bearing surface is fixed rigidly to the underlying metal tibial base and / or bone. Every day normal active use of the knee as it bends and rotates applies shear stress to the plastic of these fixed bearing implants. These stresses are transferred directly to the bone cement interface which can lead to early loosening of the cement from the bone. In the Oxford Mobile Bearing Knee the plastic insert is allowed to freely “float” on top of the tibial base. The stresses to which the knee is exposed are absorbed by the mobility of the plastic insert thus protecting the underlying bone cement interface. Thus, the Oxford implant is much more resistant to the forces leading to implant loosening. The result is an implant that is much more durable and long lasting than any previous partial knee replacement design.
2. Because the plastic insert is mobile, it can be designed with a curved articular surface exactly conforming to the curve of the femoral implant. This spreads the weight bearing out over the entire plastic polyethylene surface thus reducing wear. Extensive studies from England’s Oxford Group have confirmed that the wear rate of the plastic in the Oxford Mobile Bearing Knee is extremely low.



Figure 1. With previous generations of partial knee replacements the plastic polyethylene bearing surface was rigidly fixed to the underlying metal base plate (arrow). This transfers shear stresses directly to the underlying bone-cement interface. Cement is strong under compression but weak under shear loads.

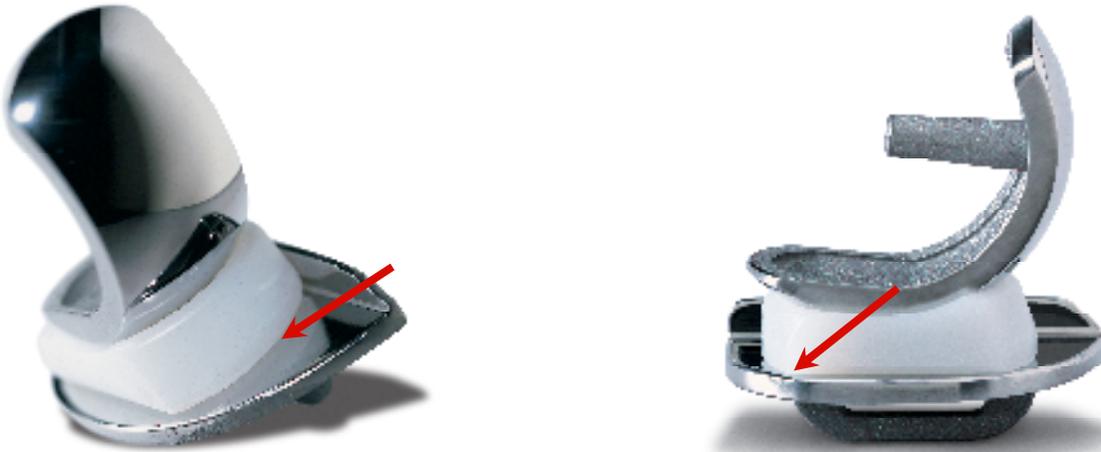


Figure 2. The plastic insert of the Oxford implant is mobile. This minimizes shear stresses on the cement to help reduce the risk of early loosening.



Figure 3. The curved surface of the femoral articular surface conforms exactly to that of the polyethylene (plastic) insert to minimize plastic wear.

OXFORD KNEE REPLACEMENT ANIMATION

For an animated look at the Oxford Partial Knee Replacement go to the following link (requires internet access and Adobe player).

<http://www.biomet.com/patients/oxfordAnimationVideoPopup.cfm>

OXFORD RESULTS:

Clinical follow up data from the Oxford Group demonstrates the successfulness of the mobile bearing partial replacement design concept. The problem of poly (plastic) wear seems to largely be eliminated. The past problems of partial knee replacement implant loosening has similarly found to be minimized. Over 95% of the implants followed survive the first decade of use without failure. Other European centers have reported similar results. Encouragingly, early U.S. results seem to support and match the long term European data.

PARTIAL KNEE REPLACEMENT RISKS:

Though there are clear advantages of a partial knee replacement over a traditional full knee replacement, there are still some special risks that must be considered before undergoing this procedure. These include:

1. Implant loosening. The design features of the Oxford implant have minimized the risk of early loosening. However it has not been completely eliminated it as a risk of surgery. The risk of early loosening is still higher than that observed in full knee replacement surgery. Loosening usually leads to the need for revision to a full knee replacement which can be accomplished in a fairly straightforward fashion.
2. The development of arthritis in the remaining two non-replaced compartments of the joint. The patellofemoral joint is particularly susceptible to the progression of arthritis. Generally this may become somewhat of an annoying problem, but not so severe as to require revision surgery to a full knee replacement in most patients.

CONCLUSION:

In conclusion, the partial knee replacement is an inherently appealing option for the treatment of isolated medial compartment arthritis of the knee. As opposed to the standard full tricompartmental knee replacement, the partial replacement preserves the anterior cruciate ligament and the bone and cartilage of the parts of the knee uninvolved in the arthritic process. The result is the maintenance of normal knee stability leading to a joint that feels more “normal”. The partial knee replacement is especially amenable to minimal incision surgical techniques thus shortening the hospital stay and the rehab period. In short, patients recover much more quickly after partial knee replacement surgery. The twin problems of wear and loosening of past designs appear to have been solved by the unique features of the Oxford Mobile Bearing design.

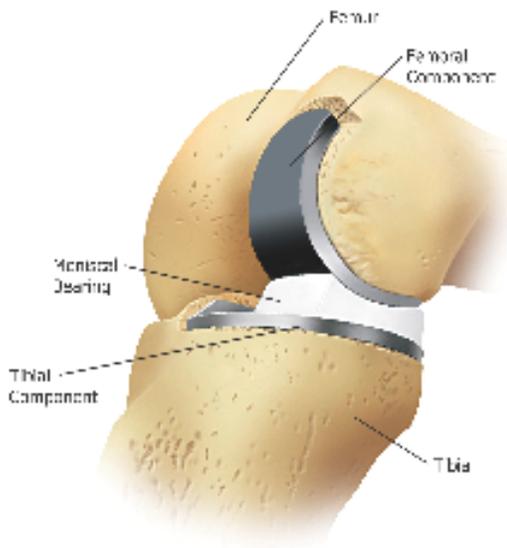


Figure 4. The Oxford Mobile Bearing Partial knee replacement.