

The Art of Partial Knee Replacement

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You may consider surgery of any kind to be somewhat of an art form. We place a tremendous amount of trust in a surgeon's knowledge, skill and experience with good reason. Sure cosmetic surgeons are considered by some to be the true sculptors of surgical medicine, but every type of surgical procedure has its own set of disciplines that can be modified and continually improved upon including orthopedic surgery.

Total knee replacement, for example, has recently become a simplified paint by numbers procedure for surgeons. Because of the long muscle splitting incision needed, it is a difficult procedure for recovery on behalf of the patient. However, a new type of surgical treatment for osteoarthritis requires the artistic skill of the surgeon to be utilized in order to be successful. Partial knee resurfacing, as opposed to traditional total knee replacement, can in many cases be an equally effective procedure. This is less invasive and best of all much easier from which to recover.

Osteoarthritis is a degenerative process that involves the slow erosion of the cartilage of the knees. This condition can be especially painful should the underlying bones of the knees become exposed to each other and, therefore, rub together during normal activity. In its early stages, osteoarthritis can be conservatively managed with the help of anti-inflammatory drugs, cortisone injections, and physical therapy. When cartilage is gone and bone rubs against bone, the pain and disability often leads to surgical resurfacing of the knee.

The knee joint has two areas of weight bearing: medial and lateral. Uneven weight distributions on one or more compartments of the knee can over time result in the knee's cartilage wearing thin, much like the soles of shoes.



Surgical Treatment of Osteoarthritis

When non-operative treatment has failed and cartilage has completely worn down to bone, surgical resurfacing of these worn areas with metal alloys and high-density polyethylene (plastic) has been shown to be a very successful treatment. Low friction and durability of these materials allow the joint once again to move freely and without pain. The most common approach to knee resurfacing has traditionally been a total knee

replacement. Total knee replacement surgery consists of replacing the entire knee with an artificial joint. A total knee implant replaces all three compartments of the knee no matter how many have been affected by osteoarthritis. A unicondylar or partial knee resurfacing only resurfaces one of the two weight bearing components--medial or lateral.



Most osteoarthritis patients degenerate the cartilage primarily in one of the two weight bearing surfaces—medial or lateral—while the other surface may remain in excellent shape. It has been shown that simply resurfacing the damaged side will relieve pain as well or better than resurfacing the entire knee. However, the majority of orthopedic surgeons traditionally have chosen to do the total knee replacement surgery on these patients. There are several reasons that the new Repicci procedure is changing our approach to these patients.

Modern total knee replacement has become a simple and reproducible procedure for any qualified orthopaedic surgeon to perform. By using a long, 9 to 12 inch incision, it splits the quadriceps muscle several inches above the kneecap. The kneecap can be dislocated and the entire surface of the knee joint can be easily accessed. Precisely calibrated cutting guides can be placed over the ends of the bones so that the surgeon can fashion a geometric shape that is precise by simply passing a saw blade through a metallic slot. The early joint replacement specialist has to make all the bone cuts freehand, which required great skill and artistry. With the advent of the cutting guides, the surgery became easier on the surgeons but not the patients.



The concept of partial, or unicompartmental, knee replacement is not new. Most one-sided knee replacements in the past have utilized the same long incision and the wide exposure as the total knee replacement. Bone cuts were made with cutting guides, and pegs and screws went deep into the lower tibia bone to help anchor the plastic surface implanted.

There are two major reasons that the unicompartmental knee replacement has had limited popularity up until now:

- The long incision and very long recovery were identical to a total knee replacement

- Because of their design, it made revision to a total knee replacement difficult

Both of these disadvantages are solved with the Repicci procedure because this procedure can be done through a short three to four inch incision without cutting into muscle. I have been amazed at how easily and quickly my partial knee resurfacing patients have recovered. Not having to cut through the quadriceps muscle makes such a huge difference. These patients are bending their knees past 90 degrees and walking down the hall with ease the day after surgery. Most patients never have to do formal physical therapy.

Since the implants are thin and durable, they are placed very superficially, only removing very small amounts of bone. Because minimal bone is destroyed, any future operation to revise the implant is made simple, since all of the bone required for total knee replacement is preserved.



Advantages

- A smaller incision. The incision required for a partial knee resurfacing is less than half the length of that required for a TKR.
- Less blood loss.
- Less pain and swelling. This less invasive procedure results in less post-operative discomfort, shorter hospital stay, less physical therapy, and more rapid healing.
- Shorter recovery times. Most Repicci patients walk on their resurfaced knee the same day as surgery and are generally released from the hospital the following day. Within two weeks, most patients have resumed normal daily activities.
- Less bone removed. The minimal bone removal required of a partial knee resurfacing again reduces trauma to the joint and helps shorten recovery time.

The secret of success for this procedure is the unique inlay of the plastic surface of the tibia (lower leg bone). By sinking the 6.5 millimeter thick wafer of polyethylene 4 millimeters into the bone, it greatly stabilizes the plastic against loosening without the need for screws, pegs, or flanges that go deep into the bone. By keeping any bone removal superficial, this makes conversion to a total knee replacement, if ever needed, very easy. Utilizing a less invasive freehand approach to bone removal, partial knee resurfacing implants are custom fit for each individual patient with minimal bone loss.

The less bone and tissue that is traumatized during surgery, the quicker and easier it is to recover. Fitting total knee replacement implants, on the other hand, involves a template style of bone removal that frankly is easier for the surgeon to perform but causes much more trauma to the patient.

Answering Criticism of this Technique

Some orthopedic surgeons have been critical of this technique for a few reasons:

- There are few published papers proving its long-term success

Dr. Repicci recently published an article showing a 96% success rate of his implants eight years after surgery, using the more durable modern biomaterials. His previous studies used plastic that was not nearly the quality of that being used today. His older studies showed a 10-15 year life span of this procedure with the failure finally

occurring from deformity of the plastics. With the new compression molded polyethylene, there is good reason to hope that these implants will have a life span that approaches that of a total knee replacement.

- Because of its freehand technique the results can be variable.

I will agree in essence that the partial knee resurfacing technique is reserved for surgeons who will take the additional time needed to perform the procedure on a case by case basis rather than one size fits all, generic approach of a total knee replacement. Some surgeons have been taught this technique but are not comfortable performing it on their patients for fear of inaccurate placement of the components since no guides are used. Having performed more than 1600 Repicci partial knee-resurfacing procedures in the fourteen years since adopting this technique, I can truly attest that this can be done accurately time after time with practice.

Results

We have carefully studied all of our partial knee patients to date. Thus far, 2000 have been performed. Overall, in terms of pain relief a patient satisfaction there has been a 94% success rate. Six patients have undergone revision surgery, five were successfully changed to total knee replacements, and one was changed to another partial knee replacement. Three have had just a fair result regarding pain relief. Six patients required subsequent arthroscopic procedures for removal of either fragments of bone or cement from the knee, all of whom have recovered easily and with excellent results. Most every unsatisfactory result occurred during the first fifty patients. In analyzing the handful of failures retrospectively, most failures occurred from technique flaws in the procedure.

I feel that we have improved the accuracy of the technique as well as improving proper patient selection for it over the last year and a half. Improvement of the quality of the cement bone bond by cleaning out the marrow bone more thoroughly with a high pressure fluid wash and using cement when it is more liquid. By carefully studying the contact areas between the femur and tibia, positioning the components so that they contact each other properly despite anatomic variations from patient to patient has helped. It is also important to develop a feel for which patients will do better with a partial knee or a total knee replacement.

A New Way...A Better Way



Total knee replacement is overkill for many osteoarthritis patients. IT has been a pleasure to see my patients recover so quickly and with such ease. In addition to the advantages of the improved recovery period the end result of a partial knee is generally superior to that of a total knee replacement and one partial knee resurfacing knee greatly prefer the end results that they have gotten from the partial knee resurfacing over that of a total knee replacement.

Minimally invasive partial knee resurfacing surgery is revolutionizing surgical care of arthritic knees. Forty percent of knee joint replacement in Europe is based on the Repicci and similar techniques. With this new option I can better pinpoint my treatment for each patient individually taking into account the patient's size, age, level of activity, and the particular location of cartilage damage in the knee. Total knee arthroplasty remains an

excellent procedure for those with more than one compartment of their knee affected, and as a salvage procedure for a failed unicompartmental knee replacement.

I am proud to have been chosen to be a clinical investigator taking part in a multi center study testing the results of partial knee resurfacing. This study will carefully document results at five different locations within the United States. Orthopaedic surgeons from around the country will be visiting Parkridge to learn this revolutionary technique from us, who have had tremendous short-term success with it.

Before considering any form of surgery for osteoarthritis, consult your orthopaedic surgeon about the advantages of partial knee resurfacing. You may be lucky enough to discover a more effective, more artistic treatment for this debilitating disease.