Your Guide to Knee Replacement Surgery

by Dr. Sonny Bal
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Your questions answered by Dr. Bal

Dr. Bal and his team have authored this guide for our patients who are considering knee replacement surgery.

Well-informed patients are better able to participate in their health care, know what to expect, and can contribute to a good outcome. The aim of this guide is to enable patients to make informed decisions about the best treatment for their arthritic knees.

A digital copy of this publication can be downloaded from our website, www.hipandknee.com. The site also has videos and animations demonstrating surgical techniques, and other information of interest to patients with hip and knee arthritis.

The material here, and at www.hipandknee.com, reflects the experience and opinions of Dr. Bal and will probably not apply to the techniques or treatment methods provided by surgeons elsewhere.
What are the “top ten things” I should know about knee replacement surgery?

The following points apply to knee replacement surgery, no matter what implants are used, or how skilled your surgeon is. Please keep in mind the following:

1. Minimally invasive or not, knee surgery is painful. AVOID surgery if you can.
2. Results from knee replacement depend critically on YOUR motivation, commitment, and participation.
3. Proper PREPARATION for knee replacement will improve your outcome.
4. Artificial knees can be NOISY; they sometimes pop, click, and clunk during movement.
5. SWELLING, ACHING, and HEAT continue for longer than most people expect.
6. Full recovery from knee replacement takes LONGER than most people think.
7. Physical, family, emotional, and spiritual SUPPORT will help recovery after knee replacement.
8. OLDER patients with knee arthritis will typically recover faster than younger patients; while this makes no sense, it is usually the case.
9. If you cannot EXERCISE before and after surgery, avoid knee replacement surgery.
10. Your surgeon, Dr. Bal, performs the entire surgery, NEVER an assistant.

About this Guide

This guide is not sponsored by any company, and there is no conflict in presenting you with the information here.

No manufacturer pays us to implant or promote specific products.

Nothing in this guide should encourage you to have surgery. The goal is to help you make intelligent choices by sharing what we know.

Questions are welcome. Please contact Dr. Bal or his staff at anytime; e-mail works best for us.

Surgery is a serious undertaking, and successful outcomes require information sharing and patient participation. We can always learn from each other. This book is the perfect example!

This guide was illustrated and designed by Medical Illustrator at the Department of Orthopaedic Surgery, Stacy Turpin Cheavens, MS, CMI. Staff and cover photos by Josh Bishop.

Other Resources

Additional information authored by Dr Bal is available on his web site www.hipandknee.com. There you can read more, find links to further information, view animations of procedures, and download this and other publications, including “Your Guide to Knee Replacement Surgery”.

Suggestions for improving any aspect of our service are welcome. Patient insights and curiosity keep us growing and improving.
Staff Contact Information

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Dr. Bal is Professor of Orthopaedic Surgery, with the University of Missouri, in Columbia, with clinical practice limited to hip and knee disorders. He also serves as Adjunct Professor of Material Sciences at the Missouri University of Science & Technology in Rolla, Missouri.

As a university-based practice, Dr. Bal and his team perform a high volume of routine hip operations, as well as difficult and challenging cases referred by other surgeons. Our typical surgical volume ranges from 800-1,000 operations per year.

Dr. Bal’s research interests focus on investigating ceramics and related biomaterials for bone regeneration, implant bearings, and tissue engineering of cartilage. A detailed curriculum vita (resume) is located on the website, www.hipandknee.com.

Although Dr. Bal is a licensed attorney, nothing in this book pertains to legal advice or to the legal aspects of Dr. Bal’s education or work.

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Anatomy of the Knee

Fig 1. Anatomy of the knee as viewed from the side

- **knee**: The joint between the thigh and the lower leg. Unlike the ball-and-socket joint of the hip, the knee is a complex joint, involving many types of movement, such as rotation, sliding, and translation of one joint surface relative to the other.

- **femur**: The longest bone in the body. It extends from your pelvis to the knee joint.

- **tendon**: A strong band of tissue that attaches muscle to bone, like the Achilles tendon just behind your ankle joint. When calf muscles are tightened, for example, the Achilles tendon gets tight, allowing you to step on the gas pedal or push off from a standing position and start walking.

- **patella**: Commonly known as the kneecap, lies in front of the knee joint.

- **ligament**: A band of tissue that holds bones together, thereby stabilizing and strengthening joints. Thus, when a ligament in the knee is torn (sprained), a brace can help support the joint while the ligament heals.

- **tibia**: The larger of the two bones of the lower leg; it connects the ankle to your knee.

- **fibula**: The outer, narrower, and smaller bone in the leg, extending from the knee to the ankle.

- **cartilage**: A tough, elastic, gelatinous tissue that lines all joints, including the knee. Cartilage is the natural bearing surface in human joints, such as the knee. Cartilage absorbs the shock of impact and walking, and reduces the friction in the joint to allow smooth, pain-free movement. Once injured, cartilage does not heal in adults. With enough injury, progressive deterioration can result in a worn out (arthritic) joint.

- **meniscus**: A tough, fibrous cartilage disk that cushions the bones in the knee joint.

- **synovial fluid**: Yellow-white transparent fluid that lubricates joints such as the knee; this is a natural, biological lubricant to help joint movement, much like grease in mechanical, non-living joints.
Knee Joint & Arthritis Overview

What is the knee joint?
The knee joint is the mobile connection between the thigh bone (femur) and the shin bone (tibia). Cartilage lines the knee joint, and the moving surfaces are held together by strong ligaments and tendons (see fig 1).
The knee works roughly as a hinge joint, although actual knee movement and geometry are far more complex than a simple hinge. Knee motion involves rotation, sliding, and many other types of movement.

How does the normal knee joint get lubricated?
The joint lining (called synovium) secretes a grease-like liquid called synovial fluid, which reduces friction in the knee joint. This fluid is produced in other joints also, and it is the equivalent of biological "motor oil." This oil-like fluid keeps the knee joint lubricated.

What is a degenerative knee joint?
As cartilage gets rough, the friction in the joint increases (see fig 2). The result is an inflamed knee joint that swells and hurts. Arthritis and injury are usually responsible for degenerative changes in the knee. Pain, leg deformity, and disability can get severe enough so that patients seek help.

Why does cartilage get damaged?
Cartilage can be damaged by injuries, overuse, inflammatory conditions (like gout, rheumatoid arthritis, and others), and genetic causes.
Obesity, poor joint alignment, age, and repetitive trauma to a joint can also damage cartilage. Diseased cartilage loses its smooth, friction-reducing surface, leading to progressive roughening of this biological bearing.

What causes the painful and annoying symptoms of arthritis?
When bone touches bone in the knee joint after loss of cartilage, the result is pain, grinding, swelling, and stiffness.
The pain comes from inflammation in the tissues lining the knee joint; inflammation comes from abnormal movement and friction. This is why anti-inflammatory medicines such as aspirin and ibuprofen can often help arthritic pain, at least early in the disease.
Swelling and fluid on the knee are adaptive mechanisms by which the body tries to deal with an inflamed and arthritic knee joint.

Is the wear of knee cartilage inevitable with old age?
Not particularly. Even though everything wears with time, the knee joint wears differently from person to person. Most people will never need knee surgery regardless of age. Others are at increased risk of developing arthritis.
While family history, racial origin, and genes may play a role in this, there are things you can do to manage an arthritic knee. Establishing a routine of light aerobic exercise, maintaining ideal body weight, and avoiding extreme sports that injure the knee are some steps that will help reduce the risk of wear in the knee.

How is worn cartilage diagnosed?
Symptoms such as pain, swelling, stiffness, lack of movement, and grinding in the knee can suggest that knee cartilage is no longer...
smooth. X-rays are a common way of diagnosing diseased cartilage in the knee. The X-rays show the bones around the joint. The cartilage layer cannot be seen on X-rays, and shows up as a space between the femur and tibia bones (see fig 3).

In a healthy knee, this space is about a quarter of an inch thick. When joint space taken up by cartilage is destroyed by arthritis, X-rays will show joint-space narrowing. With significant cartilage loss, the bones may touch each other; doctors call this finding “bone-on-bone” on the X-rays.

Over time, cysts and bone spurs may form around the knee. Left untreated, the leg can get so deformed that it appears to be either bow-legged or knock-kneed.

Are there other ways to see the extent of damage to knee cartilage?

MRI scans are a special X-ray study that can diagnose diseased cartilage somewhat more accurately and at an earlier point than plain X-rays.

Another method includes actually looking inside the knee during a procedure called “knee arthroscopy.” This involves the surgeon placing a small camera in the knee and inspecting the cartilage (see fig 4). We have a separate book, in print and on our website, describing knee arthroscopy in specific detail.

Treatment Options for Arthritis of the Knee

Does exercise help arthritic knees?

Yes. Exercises to stretch and strengthen the quadriceps muscles and hamstrings are helpful in reducing the pain of arthritis. Stronger muscles and weight loss will decrease the mechanical loading of the knee joint, resulting in pain relief.

Walking, swimming, light aerobics, elliptical exercisers, and other related activities can be very useful. In some patients, a physical therapist can help design an exercise program to help an arthritic knee. Any exercise is far better than no exercise. Exercise will not make arthritis worse, and will not accelerate the wear and tear in the knee.
Does weight loss help with knee arthritis?
Yes. Excess body weight is multiplied across the knee joint. Thus, gaining 10 pounds of body weight can lead to a 30-pound load on the kneecap, making getting up, climbing stairs, and squatting very difficult.
Losing weight takes load off the cartilage, and decreases the burden on your knees. Weight loss also makes surgery safer. Generally speaking, weight loss and the maintenance of proper body weight can help reduce the pain of knee arthritis.

Does using a cane help with knee arthritis?
Yes, it does. Similarly, using a walker or other assistive device can help by off-loading the knee joint and reducing the tendency to limp. Most people would rather not use a cane, but using one will help with the pain of an arthritic knee.

Will a brace help with knee arthritis?
It depends. Over-the-counter knee braces can be very effective at controlling pain and giving you more confidence and balance in the knee. More expensive custom braces are rarely necessary. Wrapping the knee with an elastic bandage can also relieve arthritic pain.

What other non-surgical steps can I take to relieve pain of knee arthritis?
When possible, avoid stairs and concrete floors, lifting weight, deep bending, twisting activities such as golf, and repetitive impact such as jogging. These are all reasonable, non-surgical options that people use to relieve the pain of an arthritic knee until they are ready for surgery.

Will alternative therapies like supplements and acupuncture help?
Some patients find relief by using over-the-counter remedies like glucosamine, vitamins, oils, shark cartilage, herbal supplements, etc. Such remedies often lack scientific proof of their beneficial effects; be sure to read and understand the package label.
Chiropractor manipulations, acupuncture, massage, heat packs, prolotherapy, aqua-therapy, and related alternatives may also help. Explore and use these options if you feel they are of value. Of course, you should stop any therapy or manipulation that increases your pain.
One important note: If you are scheduled for surgery, stop all herbal, vitamin, and alternative medications at least 10 days before surgery, to avoid excess bleeding and interactions with anesthetics.

Do knee injections help?
Cortisone injections placed in the knee joint can provide relief; the duration of relief varies from patient to patient, often depending on how worn out the knee is. Most patients will get a month or so of relief after a cortisone injection; others may get longer-lasting relief.
Lubricant injections can be given weekly over three to five weeks; these replace the normal knee lubricants. Modern versions of these injections allow for one injection that is given every three to six months or so.
For arthritis that is not quite bone-on-bone yet, these injections can help, and allow patients to enjoy life without having the knee replaced.
We are working on a new-generation of gold nanoparticles with low-grade radioactivity with our basic science research colleagues to come up with injections that can help with arthritic pain relief for a long time. Right now, this exciting work is in progress.

How long can I rely on medication as treatment for my arthritic knee?
It depends. Anti-inflammatory medications such as aspirin, ibuprofen, and others in this class of drugs are not addictive drugs. As long as your primary physician is aware and monitors your kidney function, these medications can be taken, within the safe dose range, for many years, even on a regular basis.
Alternative medicines such as glucosamine chondroitin might also help with knee pain. These medicines may not work for everyone, but they are worth a try; in some cases, they can help considerably.
Narcotic drugs are more risky and can create dependence. Also, long-term use of narcotics before surgery makes pain control after surgery more difficult. If your knee pain has progressed to the point where you require narcotic medication, it may be time to think about surgery.
Why not just replace my knee instead of trying non-surgical treatments?
Surgery should be the last option. No knee operation can ever restore the complexity and superior function of your own knee. Surgery also has risks. Experience shows that patients who wait and exhaust all other options before knee surgery have the best outcomes.
Those who rush into surgery without all the information are often unhappy afterward. That is why any responsible surgeon will work with you to try all non-surgical options first. Never rush to surgery, and never bypass other methods of obtaining pain relief.

Does arthroscopic surgery help in the treatment of knee arthritis?
For some patients, yes. Knee arthroscopy can help by providing several years of pain relief. Such cases usually involve early knee arthritis that has caused a cartilage tear.
Arthroscopy is an outpatient surgery where two or three holes are made in the knee for a camera and instruments that can remove arthritic debris, loose pieces, tears, and related pathology. Sometimes, injections and physical therapy are necessary after knee arthroscopy.
The key value of arthroscopy, in selected cases, is the ability of the surgeon to get a first-hand view inside the joint. This information is not usually available by other methods, and can be useful in planning treatment and understanding the prognosis.
If the cartilage destruction is severe, however, arthroscopic surgery is unlikely to help, and a knee replacement may be indicated. More details about arthroscopy are contained in a related guide.

Are there non-implant surgical options to treat arthritic knees?
In young patients with non-inflammatory arthritis of the knee joint that is not yet extensive and in whom leg deformity is significant, an osteotomy can be done to realign the leg.
This procedure involves cutting bone and realigning the axis of the leg, similar to wheel alignment in a car, to take off the wear from inside or outside the tires. Only a few patients are candidates for such joint-conserving procedures, and we can advise you if you are such a candidate.

When should knee replacement be considered?
The right time to consider knee replacement is when pain pills, exercise, weight loss, bracing, ice, heat, injections, and various alternative therapies no longer provide sufficient relief from the pain of an arthritic knee.
Knee replacement offers dramatic pain relief and increased motion. Some soreness and stiffness will persist for weeks to months in a few patients, but ultimately most people are glad they had surgery.
If pain, swelling, grinding, deformity of the leg, and decreased ability to function are severe enough to get your attention, and non-surgical options have not worked, it may be time to consider replacement surgery.

“...” - Yvonne Angerer, Jefferson City, MO
Knee Replacement Surgery Basics

Is knee arthroplasty different from knee replacement?
No. The terms can be used interchangeably. Total knee replacement is also called total knee arthroplasty. Similarly, a partial knee replacement is called uni-compartmental knee arthroplasty.

Is knee replacement surgery a fairly routine operation?
Yes. Hundreds of thousands of knees are replaced each year in the U.S., and world demand for knee replacements is increasing as people live longer and want more out of their lives. In our practice, we perform hundreds of knee replacements each year. While routine, knee replacement is still serious surgery. Each patient is unique, and each person’s anatomy demands careful attention to detail and precise steps during surgery.

Will a new knee joint be a perfect substitute for the real knee?
No, and you should be skeptical of any doctor or advertisement telling you otherwise. Those advertisements are designed to make a sale, rather than educate and enlighten consumers.
Normal human knee movement consists of gliding, rotation, sliding, and other complex movements. A synthetic joint can only approximate the intricacy and complexity of the knee joint that you were born with. No artificial knee joint, regardless of manufacturer’s advertising claims, or surgeon claims, has ever duplicated the complexity and intricate movements of the natural human knee.
The human knee joint has major ligaments and other soft tissue supports; these have fine nerve endings that send sensory, positional, and perceptual feedback to the brain from the knee. An artificial knee is simply metal and plastic. For severely diseased knees, modern total knee replacements provide excellent pain relief and function, but they are never a perfect substitute for the real thing.

What does an artificial knee feel like, if it does not feel natural?
Replacing your natural knee joint is a bit like replacing your natural teeth with dentures. Your own teeth are more than mechanical devices; they play a complex role in biting, chewing, hot-cold sensation, positional sense, vibration, and even taste.
Dentures are not natural or normal; they lack nerve endings and cannot feel vibration, heat, cold, touch, or any of the things we take for granted with our natural teeth. That is why dentures are useful only for patients whose own teeth are decayed or destroyed. Similarly, knee replacements are useful for patients with severe cartilage destruction, who have no other options, and who have thoroughly explored all their options.

How can I increase my chances of a successful knee replacement?
The success of knee surgery depends on your participation and how your body heals. Any operation on the human body has some uncertainty with respect to the outcome, despite the best of care.
Healing is a complex process, and each person heals differently. It has been our experience that knowledge and a strong partnership between us leads to greater success, and also allows us to work through any unexpected outcomes. The purpose of this guide is to bridge the information gap; to tell you what we know from experience; and to encourage communication.

Can arthritis occur in a knee that is replaced?
No. Since cartilage is replaced by metal and plastic during knee replacement, there is no cartilage left in the knee to deteriorate. However, arthritis is a complex disease that frequently affects surrounding tissues, such as muscles, nerves, ligaments, and the synovial lining of the joint. This is one reason why despite a successful knee replacement, some pain, stiffness, and swelling may persist for many months.
In some patients, arthritis in other joints, such as the back and hip, can contribute to continu-
ing symptoms after surgery. This is an important point to understand. Not all knee pain is from the knee; some may be coming from a diseased hip or spine, or other systemic illness like fibromyalgia or rheumatoid arthritis.

Stiff muscles, tendons, and ligaments can take many months to return to normal, even after healing from a knee replacement.

**How long is the recovery after a total knee replacement?**

Most patients are happy, mobile, and about 70 to 80 percent recovered by one month. Individual medical conditions such as diabetes, smoking, advanced age, obesity, neuropathy, heart and lung disease, Parkinson’s disease, and related variables can change recovery time drastically.

About 80 to 90 percent of the recovery is complete by six to eight weeks, but some aches and stiffness can persist for many months. The last 5 percent to 10 percent of soreness, aching, and stiffness can take a year or two to subside completely.

For most patients, the most significant part of the recovery takes place during the first month. But keep in mind that patient variability is great; there is no value in comparing yourself with anyone else. Each person has a unique recovery.

**Is recovery from knee surgery faster for younger patients?**

No, and you should know about this paradox. Experience shows that the best recovery from knee replacement is in older patients, who have severe arthritis, and who have tried all reasonable conservative means of treating pain before surgery.

Younger patients, especially those of male gender and muscular physique, generally tend to have a noticeably slower recovery and higher level of pain from any knee surgery. This may reflect different expectations, different pain tolerances, body image, hypersensitivity of younger tissues, and other variables, but it is a fact that the younger patient should approach knee replacement surgery with added caution.

**What is the best age for knee replacement surgery?**

The optimal range is late 50s to late 70s. Most knee arthritis affects this age group, and a properly implanted total knee replacement should last the rest of life in such patients.

**Should I get a second opinion before knee surgery?**

Yes. If you have unanswered questions or doubts, additional opinions are always a good idea. A wealth of information exists on reputable websites. You can also learn a lot from orthopaedic implant companies as well as from friends, family, and others who have had knee surgery.

It is best to explore all your options and make your decision accordingly. Treat all information with a healthy dose of skepticism; any credible resource should be able to answer your questions to your satisfaction, no matter how authoritative or influential that resource holds itself to be.

**A surgeon replaced my knee, and it did not work well. Can anything be done?**

Usually, yes. Knee replacement surgery can be complicated by subtle infection, implant malpositioning, and other unexpected outcomes that can leave patients unhappy. If this is the case, you should always seek a second opinion, even if a doctor has told you that nothing can be done. We have been able to help many people who had a poor result after a knee replacement done elsewhere, and who were told to live with it. A variety of complex factors can compromise the results of knee replacements; fortunately, most such problems can be fixed effectively.

**What are the risks of knee surgery?**

Knee surgery, regardless of technique, has a small risk of infection, nerve injury, deep blood clots, premature implant loosening and failure, unexpected knee stiffness, continued pain, and unpredictable complications, which can even include death. There is no hospital, doctor, or surgical technique in the world that can claim to have reduced the risk of these adverse outcomes to zero. Be suspicious of any
Potential risks include the following:

- Blood clots
- Pneumonia
- Nerve injury
- Blood vessel injury
- Blood transfusion risks
- Anesthetic complications
- Heart attack/cardiac complications
- Stroke
- Failure of implants
- Dislocation of the components
- Infection
- Fracture
- Leg length inequality and complications related to malalignment of the leg

surgeon or hospital that claims otherwise, and seek treatment elsewhere.

Complications are very rare, but patients planning any surgery should know about them, and take the time to understand them. Note: You will find a comprehensive listing of complications and a detailed discussion at www.hipandknee.com. If you are unable to access this site, Dr. Bal and his staff will provide this information.

How much does a total knee cost?

It is hard to give an answer since insurance contracts, hospital pricing, medical billing, and other variables related to cost are very complex. If you want to know the costs involved, please contact our office and a member of our staff will be glad to assist you.

Will Medicare or my insurance cover my surgery and therapy?

Each insurance plan is different, and benefits can vary and change over time. To get information on your plan’s coverage please check with your insurance company or contact our office with your insurance information. Rest assured, we always obtain pre-authorization for any surgery and hospital stay. Many patients have traveled from other states and outside our geographic area to have surgery; many insurance companies will allow such travel for treatment.

Types of Knee Replacement Surgeries

What is a “total knee” replacement?

Total knee replacement is a surgical procedure that removes all (hence, “total”) diseased joint surfaces in the knee, and replaces them with artificial surfaces (see figs 5, 6, and 7). These artificial surfaces are metal alloys based on cobalt-chromium and titanium metals. Some total knee designs used overseas are made of ceramics; such designs are not used widely in the United States.

Actual movement of an artificial knee is between a very smooth, polished cobalt-chrome metal, contoured like your own knee, and a low-wear plastic bearing that sits inside a titanium tray designed to attach to bone. Ligaments inside the knee joint are removed, while ligaments supporting the knee on the outside are usually preserved. A total knee replacement provides all new weight-bearing surfaces in the knee joint. It serves to decrease pain and increase motion in the joint since the synthetic metal and plastic surfaces do not have any nerves.

What is a “partial” knee replacement?

Total knee replacement involves all three compartments (or sub-joints) in human knee joints. Usually all three compartments are all worn out by arthritis, but in some knees, only one or two compartments may be arthritic. If so, the affected compartments can be replaced selectively, thereby preserving bone and minimizing Fig 5. In a total knee replacement, the joint surfaces of the femur, tibia, and patella are replaced with a metal alloy prosthetic, and a plastic bearing is inserted
surgery. Such knee replacements are called partial knee replacements (see fig 6).

Very few patients are proper candidates for partial replacements, despite the marketing claims of surgeons and manufacturers. If a partial replacement is done improperly, or in the wrong patient, premature repeat surgery is usually needed to put in a complete knee prosthesis, which likely should have been used in the first place.

Is recovery faster after a partial knee replacement?

Yes, in part, because all the knee ligaments (anterior cruciate ligament and posterior cruciate ligament) are preserved in all partial knee replacements. These ligaments are removed during a total knee replacement. Newer knee implant systems now allow selective replacement of one or more arthritic compartments in the knee, thereby customizing the amount of surgery to each patient, and ensuring even faster recoveries. In these selective compartmental replacements, ligament preservation leads to earlier recovery, a more natural feeling joint after surgery, and less blood loss and surgical trauma. Still, keep in mind that for most patients, a total knee replacement is usually the most durable and satisfactory option.

What is “minimally invasive” knee replacement?

The term “minimally invasive” is misleading, over-used, and abused. Many hospitals, companies, and doctors use the term simply as a means of attracting patients in today’s competitive health care environment. For many community surgeons, minimally invasive surgery means doing the same old operation through a shorter skin cut.

Minimally invasive or not, you should know that all surgery is inherently invasive. The response to surgery includes discomfort, altered emotions, nausea, altered appetite, constipation, and other unpredictable sensations. It takes time for the body, soul, and mind to heal. Other conditions such as diabetes, heart disease, smoking, stress, obesity, and lack of family support can prolong recovery after any surgery.

How does your practice define “minimally invasive” surgery?

In our practice, minimally invasive knee surgery reflects a comprehensive treatment program involving the latest implants, better instrumentation, smaller incisions, improved anesthetic techniques, earlier rehabilitation, altered pain management techniques, enhanced patient communication, a team approach, surgical efficiency, and new surgical methods that reduce or eliminate trauma to muscles and tendons.

Our minimally invasive surgery program is a comprehensive and continually improving collaborative effort to bring together the latest technologies and techniques from the best surgeons and anesthesia doctors worldwide. This effort is always progressing and improving, for every member of our team. We also recognize that minimally invasive surgery can reduce, but cannot eliminate the normal physiologic and psychological responses inherent to surgical trauma.

Parts and Materials Used for Knee Replacement

Are there different kinds of knee implants?

Yes. There are several different types of knee replacements. All of them are variations of the basic design introduced more than 30 years ago, which is called the “total condylar posterior stabilized knee.” The choice of implants depends on factors such as the status of ligaments and the amount of deformity in the knee. Usually, we use a “high-flex” design that is safe for deep knee bending. The implants
come in “gender-specific” versions engineered to match the knee anatomy of men and women. As new designs in total knee replacements are developed, we will adopt them in our practice only after carefully considering the advantages, safety, and scientific merits of such designs.

What brand of knee implants do you use?
For most knee replacements, a custom implant tailored to each patient is the best option. The company that makes these is Conformis (www.conformis.com). This technology is the best design today. We have also used the Zimmer brand of knee implants (www.zimmer.com, and www.pacewithlife.com) (Note: No implant company pays Dr. Bal to promote or implant its products and no commercial entity has contributed, in any way, to the preparation of this guide.)

Can ceramic parts be used in knee replacements?
Yes. The advantage is the lower wear rate of ceramics when compared to metals. In the United States, ceramic knees are used on a limited basis since the Food and Drug Administration (FDA) has not approved them for general use. Several years ago, we conducted one of the few clinical trials in the country on ceramic knees.

Ceramic parts are useful in the rare cases of a true metal allergy in selected patients. Ceramic components will likely become more common in the future. At the time, ceramic materials in total knees are more common overseas. Balancing the very low wear rates of ceramics is the fact that we do not have enough scientific data from U.S. studies to support their routine use in total knee replacements as of yet.

Do you use the same model of knee implant for all knee replacements?
No. Each patient situation is unique, and the type of implant chosen depends on many patient variables, including age, gender, weight, bone dimensions, ligament condition, bone quality, anticipated activity level, and occupational history.

In older patients with weak and osteoporotic bone, for example, the best choice may be a...
cemented model supplemented by design features that will support external knee ligaments. On the other hand, for a healthy young person with physically demanding job, the ideal model may be an uncemented total knee design that allows as much bone preservation as possible.

In patients who have had knee replacement in the past and are in need of repeat surgery, it is often necessary to use more complex models, to reconstruct deficient and missing bone. To see some of the different models we use, view the video related to this subject on our website, www.hipandknee.com.

**Are newer knee implants much different from old ones?**

Yes. There are newer “high-flex” knee designs that allow greater safety during deep knee bending. There are also newer “gender-specific” total knees made to fit the anatomical differences in the knees of men and women. All knee replacement components that we use incorporate these modern design features. As newer designs evolve and are approved by the FDA, we offer them to our patients. Other variations in total knee implants include a ceramic “oxinium” surface, the “rotating-platform” knee, and other brands marketed by implant companies. Let us know if you have a preference, and we will help you make an informed choice.

**Can I get a “golfer’s knee” implant?**

As above, if you prefer one kind of implant over the other, we can discuss the options. Keep in mind that no knee implant is better suited for golf or any other sport. Participation in activities such as golf is equally possible, and equally easy with any of the competing knee designs out there, whether or not they claim to be a “golfer’s knee.”

**What about a custom knee replacement made just for my leg?**

The newest, and in our opinion, most exciting innovation in knee replacement is the concept of custom-manufacture of knee implants that are made specifically to each patient’s size and unique anatomy. CT or MRI imaging is used to determine the precise anatomy of the patient’s ankle, hip, and knee. These data are sent to a company called CONFORMIS (Boston, MA), where the metal and plastic pieces are custom-made for the patient in about 5-6 weeks, much like a tailor-made suit. The instruments used to implant the knee prosthesis are designed for a one-time use, specific to the patient, and are made of a biodegradable material. One neat package contains everything needed for the operation, and is unique for each knee joint, fitting only that one.

This technology, in use in our practice since early 2013 is truly innovative and reflects a meaningful step forward in knee replacement surgery. So far, our results show earlier and easier recovery for the patient, and x-rays that are beautifully precise in terms of rotation, alignment, and sizing. This technology incorporates all of our knowledge and design understanding in knee replacement, worldwide. It increases patient safety, promotes quality and consistency, ensures precision and a perfect fit every time, and therefore has our full support.

(Please interpret this information in light of a conflict, in that Dr. Bal serves as consultant surgeon for CONFORMIS, and is on a surgeon advisory and design team for this company. We do not receive any royalty or other payment to promote or implant CONFORMIS knee products, however, since the consulting activities concern other CONFORMIS technology platforms.)

**Are there other implants that are used to treat knee arthritis?**

In unusual cases of knee arthritis and in relatively young patients, a shim-like device called the uni-spacer may be used. This device acts like a spacer to separate the worn-out knee surfaces and keep them from grinding against each other. Very few patients meet the criteria for this type of surgery, and a uni-spacer is a temporary option, best reserved for very young patients with knee arthritis.

**In what cases do you use human tissue for knee replacement?**

In rare cases, we use cadaver tissue for reconstruction of the extensor mechanism in selected knees. These are complex cases with previous trauma that has ruptured the quadriceps tendon in addition to causing arthritis of the knee. For the majority of knee replacements, no human tissue is ever needed.

**How does the artificial knee joint get lubricated?**

After a joint replacement, the artificial bearing
gets its lubrication from synovial fluid, just like the natural knee joint. After surgery, the synovial lining re-forms and secretes synovial fluid. In cars, oil must be changed regularly, but in the body, synovial fluid is recycled by the cells. No external lubrication of the knee joint is ever necessary. In fact, any injections placed into your artificial knee joint increase the risk of infection.

**Can patients become allergic to the knee replacement parts?**

The metals used in artificial knees are alloys of cobalt-chromium and titanium. The bearing portion of the joint is made of a high-grade, wear-resistant plastic. The metal-plastic bearing combination is the most common type used in knee replacement implants worldwide. These metals have been used in humans for many decades and millions of patients with very successful results. Allergic reaction to artificial knee parts is virtually unheard of, and is not a routine clinical concern.

In the extremely rare case of a true metal allergy verified by testing, we have material science options to replace a knee without exposure to titanium, nickel, or cobalt-chrome, which are the usual metals used in standard knee replacements. In other words, metal-allergic patients can still get a knee replacement.

**What actually moves inside an artificial knee joint?**

In an artificial knee joint, highly polished cobalt-chromium metal moves against a very durable plastic spacer to allow movement. This bearing is lubricated by your body’s own synovial fluid, which is constantly replenished by living cells. The power to move the artificial knee, once implanted in your body, comes from your own muscles. That is why the condition of your muscles affects how quickly you recover after any type of knee surgery, including a total knee replacement.

**Techniques Used During Knee Replacement**

**How do you attach the artificial knee to my bone?**

We use bone cement to do this. The majority of total knees are affixed with cement, although un-cemented designs are also used. Outcomes from both are very good. For young and active patients, cement-less total knees are usually preferred because of excellent fixation and durability. Living bone next to the prosthesis keeps the implants secured over time, whether or not cement is used. The choice of cemented versus un-cemented knee depends on many factors, such as patient age, knee deformity, status of ligaments, and the quality of bone.

**Who does the actual surgery?**

Although team members will assist, and resident physician or students may observe, rest assured that I will perform the entire operation.

**Do you replace my kneecap too?**

In part, yes. On the underside your own kneecap (also called the patella) a thin layer of arthritic cartilage and bone is removed during surgery. In its place, we affix a plastic kneecap to your own remaining kneecap. This new part functions just like your own kneecap. The front surface of the kneecap is your own bone; it is the underside of the kneecap that is lined with plastic.

**Are knee ligaments removed during surgery?**

Internal knee ligaments (anterior cruciate ligament and posterior cruciate ligament) are usually so worn out in arthritic knees that what remains of them is removed (see fig 8). The knee prosthesis itself is engineered to substitute for internal knee ligaments and stabilize the joint.

New knee designs, such as the CONFORMIS custom-knee that is built for each patient offer the benefit of preserving knee ligaments. This is one reason we have switched to this brand and custom-design of knee replacement in our practice.

The supporting ligaments outside the knee joint are usually preserved during replacement surgery. These external ligaments are called the medial collateral ligament (located to the inside the knee) and the lateral collateral ligament (located to the outside of the knee). These ligaments continue to function after knee replacement surgery. For severe deformity, arthritic destruction, or unusual cases, we use prosthetic designs that can substitute for all knee ligaments, providing more stability when compared to routine total knee prosthesis.
Thus, even very unstable and deformed knee joints can be replaced successfully, allowing the patient to fully weight-bear immediately, without fear of the knee giving out, and without knee braces. The choice of implant is based on the individual case and amount of knee joint deformity, as well as surgical judgment.

Will my leg have a tourniquet on during surgery?

No. A thigh tourniquet is a device like a blood pressure cuff. It is placed on your thigh and inflated to let the surgeon operate more easily by cutting off the blood supply to the leg while the knee joint is open. Tourniquets lead to increased tissue trauma to the thigh muscles, which are squeezed hard for the entire duration of surgery, and a lack of oxygen to the entire leg during the operation. The result is pain, tissue damage, and delayed recovery.

We do not use a tourniquet on any knee operation, no matter how complex the operation. Keep in mind that for convenience and out of habit, most surgeons in the United States do use a tourniquet for knee replacement surgery though, so our practice is very different in this regard.

Will the knee bleed more without a tourniquet?

Studies have shown no difference in blood loss during knee surgery done with or without a thigh tourniquet. Without a tourniquet, most blood loss occurs during the operation. If needed, this blood can be collected by a cell-saver device and given back to the patient. With a tourniquet squeezing the thigh, all the blood loses after the tourniquet is let down and oxygen-deprived tissues get the blood flow restored. This blood is usually collected in a drain placed in the knee joint after surgery and discarded.

Given these considerations, our practice is to avoid damaging muscles and other soft tissues by not using a tourniquet to choke off the blood supply to the leg during knee replacement surgery. Our patients recover faster, in part because of this practice.

How does computer navigation help in knee replacement surgery?

Precise alignment of the bones during knee replacement is critical to the long-term performance of the joint replacement. Computer programs can help in such alignment of bones, and reduce the possibility of error. Beyond computer-assisted technology, robotic arms help position bone preparation guides very precisely, and optimize the result for each patient.

With the advent of the custom-made knee replacement by CONFORMIS (Boston, MA), the need for gender-specific knees, left versus right knees, race-specific knees, high-flex knees, computer navigation, robotic-assisted surgery, and other supportive technologies is entirely obsolete and a thing of the past. With a custom-designed knee replacement, the fit, fill, sizing, orientation, rotation, depth, shape, contours, geometry, flexibility, and instrumentation are all optimized for one particular knee, unique to the individual patient. These parameters are optimized to their theoretical extreme, such that surgeon-to-surgeon variability is minimized, thereby maximizing patient outcomes, recovery, safety, reliability, and quality. This technology, in our opinion, is truly revolutionary, and we use it for all total knee replacement now in our practice. Added benefits are simplification of surgery, reduction in product inventory and complexity, and the reduced chance of error.
In the world of knee (and hip) replacement surgery of tomorrow, custom-built implants will increasingly become adopted as surgeons and hospitals see the efficiency and benefits of this technology, at no added cost, and little downside. That is why we prefer to build each knee implant on a custom basis, for each patient. No two people are alike, and that applies to the knee joints as well, providing the most compelling, logical, and reasonable rationale for a custom, patient-specific approach to knee replacement.

Before Surgery

What do I need to do to prepare for knee surgery?
Reading this guide, communicating with your surgical team, and paying close attention to the checklists at the end of this guide will best help you prepare for knee replacement surgery. The importance of preparation and information to successful surgery cannot be overemphasized.

Health Considerations

What health conditions must be considered before undergoing surgery?
Some patients have unusual problems, such as HIV infection, hemophilia, cancer, bleeding disorders, liver or kidney transplants, enzyme disorders, and other conditions that require specialty consultations before surgery. If these considerations apply to you, we will work with you to obtain the necessary testing and treatment prior to surgery.

What medical testing is needed prior to knee replacement surgery?
Pre-surgical checks are essential for your safety and it is unwise to short-circuit them; they are comparable to pre-flight checks that every responsible pilot makes before taking off. Out-of-town patients, or those traveling long distances, can have local doctors perform these checks; we will work with your doctors to expedite this. The necessary pre-surgical checks are listed below.

Medical Check: Prior to your surgery, you should see an internal medicine specialist to identify and manage your health risks. Examples of increased risks are heart and lung disease, tooth and gum disease, infection, obesity, and diabetes. That is why patients should undergo testing and clearance by a medical doctor prior to knee replacement surgery.

Dental Check: A dental check-up is necessary to identify any hidden infection in your teeth or gums. Such infections must be treated before knee replacement to eliminate the
risk that bacteria from decayed teeth enter the bloodstream and end up infecting the knee implants. If you are traveling from out of town, visit your dentist and forward us the information.

Heart Check: If there is any reasonable suspicion of heart disease based on your history, it is best to find out ahead of time if your heart is healthy enough for knee replacement surgery. Heart disease is usually silent; patients do not have symptoms until the heart is stressed. If indicated, we will have you see a cardiologist before surgery for clearance.

What if I have bowel problems?
Pre-existing trouble with constipation usually leads to constipation and related problems after knee replacement. If you regularly take supplements to encourage bowel movements, let us know and we will plan accordingly, since the medicines we use during and after surgery can result in serious constipation.

You will be given a stool softener before surgery to avoid problems with constipation later. Even so, you can probably expect disturbance of bowel patterns and at least some degree of constipation after knee replacement surgery.

How does diabetes affect my surgery?
Blood glucose levels over 200 will lead to poor wound healing and increased risk of infection. Therefore, it is critical that your diabetes is under control prior to surgery. A medical consultation and lab data before surgery will help us ensure your diabetes is controlled and your surgical risk is minimized.

Does osteoporosis affect the success of a total knee replacement?
No. If bone has severe osteoporosis, it may not be possible for us to use an un-cemented prosthesis. However, the cemented version of total knees can be implanted in nearly every type of bone, including bone that has osteoporosis, and the outcomes are very successful.

What about alcohol and drug use?
Regular alcohol consumption should be disclosed to your anesthesiologist and surgeon ahead of time. Alcohol withdrawal can happen to anyone, regardless of economic or social background. When it happens, it can be life threatening and can complicate your recovery from surgery. If we know about alcohol consumption, we can take steps to avoid withdrawal. The same is true of recreational drugs. Be sure to talk about this with the anesthesia doctor.

What if I am a smoker?
Smoking increases the chance of lung complications during and after surgery, delays wound healing, increases the risk of complications after surgery, and increases the odds of residual knee pain even after successful knee replacement. Therefore, you should try to stop smoking, both for your general health, and to improve the odds of a successful result from knee replacement. Most hospitals are smoke-free, and you may not be able to smoke on the premises.

Does my body weight affect knee replacement?
Obesity will increase the risk of complications from surgery, such as blood clots and slower wound healing. Ideally, your weight should be within reasonable limits before knee replacement surgery. In some cases, for excessively heavy patients, knee replacement is not an option without drastic weight reduction, such as with gastric bypass surgery.

That said, many people are somewhat overweight and unable to lose weight while dealing with a painful arthritic knee. The knee components are designed to handle enormous loads, and are safe, even in very heavy people. There is no evidence to suggest that the components loosen up prematurely, or wear out prematurely in heavy people.

Exercise Before Surgery

What about dieting and exercising before surgery?
Maintain a nutritionally sound diet including a variety of foods in preparation for surgery. Crash dieting is not necessary; rather, regular exercise will help control weight and improve overall health.

Exercise before surgery, done within reason, and within the capability of the patient, will improve the recovery from knee surgery. Therefore, a reasonable exercise program to
strengthen your thigh and calf muscles before knee replacement surgery is the best thing you can do to speed up your recovery.

How can exercise before the surgery help my recovery after?
Exercising and strengthening the thigh and leg muscles before the operation will result in faster recovery and return to function, with less suffering, struggle, depression, and mood swings. Some helpful exercises are described on pages 34-35. Consultation with a physical therapist before surgery can be very useful. The reason exercise helps is that the knee, even if worn out, is a living joint. Living tissues respond positively to physiologic stress, and exercise is known to improve self-perception, esteem, and outlook.

Preparing for the Hospital

When do I first visit the hospital?
About a week or so before surgery, you will visit the pre-op department in the hospital. This visit is to read and sign consents for the surgery, for the anesthesia, and for blood products (if needed). You will have lab tests, possibly a chest X-ray, and an electrocardiogram. Please make a list of your medications and their dosages prior to this visit.

At this visit, you will be instructed on where to report on the morning of surgery. You will receive instructions on not eating or drinking after midnight the night before your surgery. This includes chewing gum and hard candy.

Keep in mind that surgery schedules change often; this is why the exact timing of the operation is not known until the day before. If you have a special preference, such as being the first in the day, or last, or in between, simply let us know and we will do our best to accommodate.

When will I be assigned a surgery time?
The hospital will contact you a day before the surgery to tell you what time to arrive at the hospital. Surgery schedules tend to change, which is why most hospitals will confirm the exact surgery time only a day or so before the operation. Please arrive early. The actual operation will usually be less than an hour in duration, but preparation takes much longer.

We have a program called “Joint Camp” that is designed to introduce you, in person, to the hospital and other resources, and to provide further education before your operation. You will get information on this program as part of the preparation, in case you decide to attend.

When do I see the anesthesiologist?
On the morning of your surgery, you will see an anesthesia doctor (anesthesiologist) who will have already reviewed your medical records. If your medical condition so requires, we will have consulted with the anesthesia doctor ahead of time. This doctor will inquire about your health and plan the anesthetic technique, including any regional nerve pain blocks. If you know of a particular anesthesiologist at the hospital whom you would prefer to provide this service, simply let us know ahead of time.

Should I donate my blood for surgery?
No. This is not necessary since not everyone needs a blood transfusion after knee replacement. If you have religious convictions against blood products, let us know and we can arrange to recycle your own blood. Blood loss differs from patient to patient, and pre-existing conditions such as anemia and other diseases can affect the odds of needing blood after surgery.

As a general rule, major bone surgery is associated with blood loss, but it is impossible to say how much blood a particular patient will lose. If needed, blood transfusions today are very safe and effective.

Medication Use Prior to Surgery

Can your office fill narcotics medications until my surgery?
Before surgery, we can prescribe medications that are non-narcotic and non-addictive. These typically include anti-inflammatory medications and some light narcotic pain medications.

Any addictive drugs, such as narcotic painkillers, should be obtained from your primary care doctor before surgery. Your primary care doctor and surgical team should be aware of all your medications, especially narcotic medicines.
When, and what medicines should I stop?

In consultation with anesthesia and the pre-surgical medical consult, we will advise you personally which medications to stop in anticipation of surgery, and when to stop. The following are some general guidelines:

Ten days before surgery, stop taking blood thinning medications, such as clopidogrel bisulfate, ticlopidine, or aspirin, as well as vitamins, nutritional supplements, herbal supplements, fish oil, and anti-inflammatory medications, such as ibuprofen.

Five days before surgery, stop taking warfarin. This is a blood thinner that is usually prescribed for conditions such as blood clots, strokes, and irregular heart rhythm.

Other medications can be continued until the day of surgery. If you are taking steroids, chemotherapy, or medications for rheumatoid arthritis (such as methotrexate), we will advise you when to stop those.

If a medication is not listed here, check with your internist or family doctor. You can also discuss these with us, the anesthesia staff, or the pre-op staff when you visit the hospital. When in doubt, please e-mail or call any of our staff.

Should I take vitamins and supplements before surgery?

No, and these should be stopped around 10 days before surgery. Vitamins, herbal supplements, and nutrition supplements can interact with the other medicines we use during surgery, and can lead to excessive bleeding during and after surgery. After knee replacement, patients usually take a blood thinner for around a month. You can resume taking vitamins, supplements, and alternative therapies once you are off the blood thinner.

The Night Before Your Surgery

What do I need to do the evening before surgery?

The evening before surgery take a shower, but avoid shaving the legs, since this increases the bacterial load.

For your hospital stay, pack a bag with a robe or housecoat that opens in the front; house shoes or comfortable shoes for physical therapy; personal hygiene items; underclothing; glasses or contact lenses with case; dentures or partials with case; a case for hearing aid and spare battery; a walker if you have one; a C-Pap machine if you use one; loose fitting clothing to wear for physical therapy; advance directive if you have one; a list of current medications with dosages; an inhaler if you use one; and reading material, cell phone, and laptop computer if you prefer. The hospital has wireless Internet for your use.

Can I take my medicines the night before surgery?

You should take your blood pressure and heart medications with just a sip of water the morning of surgery. Your medical doctor may advise differently; if so, please follow his or her instructions and provide us with this information. For example, in some patients, warfarin may be an essential medication safeguarding against stroke. In that case, we would work with the medical doctor to continue this drug, and alter our surgical preparation accordingly.

The pre-operative visit to the hospital is a good time to take notes and ask questions. Each patient is different; we customize our procedures and planning to your individual needs.

Why might surgery be cancelled at the last minute?

If you have an unexpected health problem, it may be safest to postpone the surgery until the situation is addressed. Let us know if you have any of the following close to your scheduled surgery: symptoms of a cold or flu (chills, fever, or a cough); pain, burning or frequency when you urinate; cuts, scratches, rashes, bug bites, non-healing sores on your skin; new swelling.
on the leg undergoing surgery; or a change in your medical condition, such as high blood sugar or chest pain. These situations could mean that surgery has to be rescheduled.

Preparing for Your Return Home From the Hospital

Do I need someone to stay with me after surgery?

If you live alone, an adult friend or relative should stay with you, in addition to the home health nurse visits during the week. For very elderly patients and patients with other health problems, a stay in a rehabilitation unit or a nursing facility may be necessary.

You might consider local home health agencies prior to coming to the hospital. If you have private insurance, you will need to make sure you choose a home health agency contracted with your insurance. The best time to do this is before you have surgery. We have the resources to arrange many of these things for you to ensure a smooth transition to your home.

How long do I need someone to stay with me after surgery?

You should plan on about two to four weeks, depending on your individual circumstances and available resources. During the first month, a home health nurse will visit you several times a week. Having someone with you can help with daily activities and chores, even though you will be able to walk and transfer yourself by the time you leave the hospital.

Where can I get a disabled parking sticker?

We have forms that allow you to get a temporary disabled parking placard. A permanent disabled placard is not necessary after knee surgery, since the new knee is designed to increase your mobility. Some patients need a few weeks or months of parking in disabled zones, and others do not. Let us know if you need help with this.

How do I prepare my home for after surgery?

Prior to surgery it is a good idea to take a close look at your home environment to determine if it is “user friendly” for someone on crutches or a walker. Modifications and equipment needs can be addressed ahead of time to ease your return home.

Tips for preparing your home

- Remove loose throw rugs, runners, area rugs in pathways. They can get tied up in the wheels of a walker, catch on a crutch tip or slide when stepped on.
- Moving furniture to widen pathways and making sure doors open fully will make it easier for you to navigate with a walker or crutches. Bathroom doors are often too narrow to get through. Your physical therapist will instruct you in a safe technique to use.
- A toilet riser, commode, grab bar on wall, or arm rests that easily attach to a toilet may be helpful as getting up and down may be difficult initially.
- A step-in shower is the easiest to access. Many have seats built right in. If you have a bathtub only or tub/shower combination, a portable shower chair may be necessary for about a month. Having a grab bar is also recommended for optimum safety. Towel racks are not designed to hold the body’s weight and do not replace a grab bar.
- Having at least one rail on stairways to provide support is recommended.
- Night lights are recommended for all pathways used after dark.
- A portable telephone comes in handy when you are alone at home.
The Day of Surgery

Where will the surgery be done?
We use the new Missouri Orthopaedic Institute in Columbia, a state-of-the-art, technologically advanced specialty orthopaedic hospital in the University of Missouri system. Such centers are specifically equipped for joint replacement surgery and national data show a lower risk of complications, such as infections, and better outcomes from hip and knee replacement surgery at such specialized centers.

What should I do the day of my surgery?
Remember not to eat or drink anything, including gum, candy, chewing tobacco, etc. Avoid make-up, nail polish on fingers or toes, perfume, or cologne. Remove all jewelry in anticipation of surgery.

Can I wear my contact lenses to surgery?
You will have to remove your contact lenses prior to going into the operating room. Bring glasses, if you have them, or bring solution and a holder for your contacts.

What type of anesthesia will I have?
We routinely use a spinal anesthetic with sedation. This type of anesthesia is safer than general anesthesia for knee replacement surgery. In addition, we use a combination of injections and pain pumps. If you have any preference for a certain kind of anesthetic, please let us know. Modern anesthetic drugs ensure that you will probably remember very little, if anything, about the surgery, and are developed to ensure your safety and comfort.

Where does my family wait and how will they know about surgery?
Your family will wait in a designated waiting room while you are in surgery. They will be informed (usually by telephone) when surgery is completed and you are in the recovery room. You will remain in the recovery room for approximately 1½ to 2 hours before going to your room. Your family can see you once you have arrived in your room.

How much will I hurt right after surgery?
Early pain is almost eliminated with modern pain medications and anesthetic techniques. Recovery from surgery is far more comfortable today than it was just a few years ago. Pain medications may be given through a fine catheter in your back, or may be injected close to the femoral nerve.

Pain medications may also be given in the form of a patient-controlled analgesic (PCA) which runs into the IV; you control the dosing. The knee joint itself and the tissues around it are injected with local pain-killing drugs.

If you have been taking narcotic drugs before surgery, pain control after surgery is usually more difficult since the body is already desensitized to the pain killers. In such cases, we typically use a higher dose of pain killers, and sometimes use a combination of drugs.

Pain medicines can be given by mouth, intravenously, or by intramuscular injection. If you hurt, please let someone know; we want to minimize discomfort and customize the treatment for you.

By the time you leave the hospital, your pain will be properly controlled by an oral pain medication. Depending on the patient, such medications may be taken for several weeks to several months.

“One of the things I have been most impressed with is the individual care I received. I was never made to feel like they were too rushed to respond to me as an individual.” - Rosie Shelton, Jefferson City, MO
What can I expect right after surgery?

You will be monitored in the recovery room for about an hour, and most patients are reasonably alert by this time.

You will notice a bulky dressing on your knee and an ice pack. This ice pack helps to control pain and swelling. You may also have a drain in the incision that looks like a plastic tube; this is removed within 24 to 48 hours. Expect a catheter in your bladder to keep urine drained; this is usually removed within 24 hours.

After an hour or so the nursing staff will take you to a private room on a floor that has expertise in caring for knee surgery patients. If your family plans to stay in the hospital room with you, please talk to your nurse so that arrangements can be made.

The nursing staff will coach you to take frequent deep breaths after surgery. You will have a breathing device to help with this. This is a plastic breathing exercise machine designed to prevent pneumonia and keep the lungs healthy.

You may have an overhead trapeze or lift on your bed to assist you in moving independently. This allows you to use your arms to move your body. Feel free to position your body in any way you want after knee surgery. The knee can be bent or straight after surgery, as you prefer. For the first night, we prefer the leg slightly bent, on a pillow, since this reduces bleeding in the knee. The head of the bed can be in any position that you like.

You will have some sort of pump device squeezing your feet or legs to reduce the chance of a blood clot. You should exercise your calf and ankles regularly after surgery while you are awake. This will cut down the risk of a blood clot.

Right after surgery, avoid eating solid foods. It is better to start with liquids, and make sure that you can handle these before you progress to a full diet. Nausea is a very common side effect of modern pain medications.

Why are there foot pumps on my feet after surgery?

Mechanical foot pumps are used to squeeze the feet and ankles intermittently after surgery in order to help reduce the chances of a blood clot forming. These are useful while you will be in bed and resting. We use them while you are in the hospital; you will not use them at home.

Will I have nausea and pain immediately after surgery?

Typically, patients have little to no pain, but nausea is more common. This nausea can come from the anesthetic drugs or from pain medicines and we can help control it by changing pain medicines and prescribing anti-nausea agents if necessary. If you have pain, nausea, or any other disagreeable sensation, let the nursing staff know. They are very knowledgeable in controlling such symptoms. Usually, an adjustment of medications is all that it takes.

Is there a risk of falling in the hospital?

Yes. A combination of unfamiliar surroundings, surgery on the leg, narcotic medications, nerve blocks used to control pain, and the effects of anesthetic drugs can increase the risk of falling.

To avoid a fall in the hospital and after discharge, use a walker when out of bed, even if you feel that the knee feels fine and will hold you up. If in doubt, ask the nurse or therapist for assistance.
The Days and Weeks Following Surgery

What can I expect during the hospital stay?
You can expect several professionals to see you and help you with recovery. A physical therapist will help with knee exercises and walking with an assistive device, such as a walker. An occupational therapist will help you with everyday activities, such as dressing and bathing, while your knee is recovering. My associates or I will see you daily, as will a primary care doctor. Nursing staff will attend to your daily needs, ensuring that the doctor’s instructions are carried out and that you are comfortable. A nursing assistant will help with bathing and activities that you are unable to do yourself.

As you can imagine, the first night or two may be difficult; the hospital environment is new, the bed is not your own, and you will have multiple medications in your system. If you have trouble sleeping in the hospital, please ask the nurse for a sleeping pill. Expect to take a nap during the day, and anticipate several weeks before your normal sleeping patterns are restored, even after you go home.

How long will I be in the hospital?
Most patients are in the hospital for two to three days after a routine knee replacement; some need a longer duration of stay. A social worker will communicate with your insurance about the expected length of stay, and the duration approved by the insurance carrier. The social worker will help with discharge planning.

Preventing Blood Clots After Surgery

What measures are taken to reduce the risk of blood clots?
We routinely use a blood-thinning medicine called warfarin. This drug, or an alternative blood thinner, will be taken for about two weeks after surgery to lower the risk of a blood clot. The hospital pharmacist will monitor the blood-thinner dose, and will advise you if there is any change in the dosage.

After leaving the hospital, you will have a blood test twice a week, or more if necessary, to monitor the efficacy of the blood-thinner.

In addition, the exercises, foot pumps, lack of a tourniquet, efficient surgery, and early walking after surgery all serve to minimize the risk of blood clots. We thus use a multi-modal program to reduce the risk of blood clots forming.

What more should I know about blood clots?
Any surgery increases the risk of blood clot formation. Some patients are genetically predisposed to clot formation and are at a higher risk. If you have ever had clots in the past, please be sure to let us know.

Clots can cause serious problems such as heart or vascular disease, or a stroke. A lung injury can occur if the clot migrates to your lungs from the leg. A large enough clot migrating to the heart or lungs can be fatal.

Anticoagulation (blood-thinning) therapy is recommended after all knee replacement operations to reduce the likelihood of developing a clot. Even if a clot develops in the leg, if you are on a blood-thinner, the risk of the clot enlarging and migrating to the lungs is reduced. Exercises, spinal anesthetics, early mobilization, intermittent foot pumps, and blood-thinning medications are all aimed at reducing the risk of blood-clot formation after surgery.

“I was walking the day after surgery. It was 100 percent different. My knee is now much, much better.” - Faye Bleigh, Hannibal, MO
What should I know about the blood-thinning medicine that I will be given?

The most common blood thinner used after knee replacement is the drug warfarin. It is an inexpensive medication that requires adjustment on the dosage for each patient.

You will take warfarin at the same time each day. The dose will be based on a blood test that measures how fast your blood clots. The results are recorded as PT (prothrombin time) and INR (international normalized ratio); the pharmacist will look at these test results and figure out how much warfarin you should take. The goal of taking warfarin is to keep your INR between 1.8 and 2.5. If you miss a dose of warfarin, take it as soon as you remember, but do not double the next dose.

Many things, such as diet, other medications, physical activity and illness can affect warfarin dosing. Vitamins, over-the-counter remedies, herbs, nutrition supplements and other alternative treatments also affect warfarin, and should not be taken while you are on warfarin.

There are other, newer blood thinners that we use now, and that do not usually need close monitoring. In some cases, enteric-coated aspirin works just as well as warfarin for thinning blood.

Are there risks to taking a blood-thinner?

Yes, and the obvious risk is bleeding. By thinning blood, we increase the risk of bleeding (something that can be managed), and decrease the risk of clot formation (which can be lethal). Thus, there is a trade-off in risks. The risk of bleeding is common to all blood thinners.

Drugs sometimes used instead of warfarin include heparin and aspirin. Some people may not be able to take warfarin; in that case we usually use a drug called enoxaparin. After about 10 days of warfarin, or enoxaparin, we can switch patients to twice-daily aspirin; this combination is safe.

Side effects of warfarin and enoxaparin include dizziness, headache, weakness, cuts from shaving/injury that do not stop bleeding, nosebleeds, bleeding of the gums when brushing your teeth, vomiting blood, bruising or skin rashes, dark brown urine, red or black color to stools, unexpected vaginal bleeding, or unusual pain or swelling. If any such symptoms appear, we may have to switch to a different blood-thinner.

Warfarin interacts with many drugs, both prescription and over-the-counter. Special caution should be given to anti-inflammatory medications such as aspirin, ibuprofen-containing drugs; naproxen, ketoprofen, cimetidine, ranitidine; and food supplements that contain vitamin K.

Supplements, such as ginkgo biloba and dan-shen also interact with warfarin. Some herbal teas have tonka beans, melilot (sweet clover), or sweet woodruff in them, which contain vitamin K. In addition, foods containing fat substitutes such as olestra are supplemented with vitamin K.

Because so many dietary items affect warfarin, it is essential to monitor the action of this drug two or three times every week with blood draws that are done by the home health agency while you recover at home.

Common Sensations

Why do I hear a popping noise in the new knee?

Clicking, popping, and other noises in the knee alarm many patients. These are the harmless result of synthetic joint surfaces contacting each other and are common to all prosthetic knee components. The sounds may change over time, may disappear entirely, or may persist. The noises of an artificial knee joint will take some getting used to.

Why are my appetite, mood, food-taste, and sleep different after knee replacement?

Altered appetite, bowel habits, depression, and mood swings are common after any major elective surgery, including knee replacement. This is very important to know, understand, and anticipate. In some cases, medications might be necessary to control such symptoms.

All surgery elicits powerful psychosocial and physiological responses from the patient and vary from one person to another. These responses are normal, and we will help you get through them. It takes time for the body, mind, and soul to recover from any invasive operation.
Why is the outside of my knee numb?
This is normal after all knee surgery. The incision cuts small nerve fibers that run from inside to outside of the knee, so the skin to the outside of the cut always feels numb after knee surgery. Usually, this sensation will resolve over time and is not a major problem for patients. Most patients will not notice that the outside of the scar feels numb.

Is it normal for the muscles to spasm and tighten after surgery?
Yes. Sometimes unexpected spasms of the leg muscles occur after surgery, usually as the person is healing from the operation. These spasms will go away. If they are particularly troublesome, we can prescribe a muscle relaxant medicine, which can help.

Will my leg be longer after knee replacement?
Not noticeably, since it is not possible to lengthen or shorten a leg after knee replacement surgery. The reason is that blood vessels and nerves behind the knee present a practical limitation. Some patients say that the leg feels slightly longer. This comes from straightening out a crooked leg, which ends up feeling longer as a result. The sensation disappears as the patient gets used to having a normally aligned leg again.

Caring for Your Incision

How long is the scar for knee replacement?
In most cases, a four- to five-inch incision is enough for knee replacement surgery. We use the shortest possible incision length in combination with the other less invasive techniques discussed elsewhere in this guide. Incision length ultimately depends on each patient’s disease severity, anatomy, and amount of body fat.

Many orthopaedic implant companies have developed special instruments to assist in making shorter incisions, and provide training on their effective use. The general rule is to make the incision as short as possible, without compromising the accuracy, precision, or safety that is required for a successful long-term outcome. Since each patient is different, incision length can vary from person to person, even though the same type of knee replacement implants may be used.

Who will remove the staples from the incision?
For the first month, a home health nurse will visit you to check the incision, do blood work to monitor the blood thinner, and help you exercise and walk. That person should remove stitches no earlier than 21 days (three weeks) after surgery.

If there is any question about healing, it is safer to wait another week before removing stitches. Home health nurses can take a digital photo of the incision if there is a concern and send it to us via email.

The preferred method to remove staples is to remove every other one, and apply adhesive-reinforced tape strips to ensure the skin stays together. If there is any concern about the skin edges coming apart, the rest of the staples can be left in for another week; delayed healing can occur in patients with a history of poor wound healing, cancer, diabetes, obesity, and other factors.

Please share this information with the home health person if there are any questions about staple removal. It is safe to shower anytime after staples are removed. Immersion of the incision in bath water, or in a pool should wait till the skin is fully healed.

Can I put any lotion on the scar?
While the staples are still in, it is best not to apply anything to the incision, and to keep the wound clean and dry. Once the staples are out, you can use vitamin E cream to massage and loosen up the scar. Most patients find this beneficial, and some feel that it makes the scar less visible. Massaging the knee area with an anti-inflammatory or cortisone cream can also help reduce skin inflammation and tenderness after knee surgery.

When can I shower after knee replacement?
You can shower as soon as you want after surgery. The incision will be covered with a plastic dressing, and the nursing staff will assist you. If the wound dressing gets wet, you can change it after the shower and use a towel to dry the skin around the incision. Showering reduces
the bacterial load on your skin. Once the staples are out and the skin is dry, you can soak the knee in a bath also, but do not soak the incision area in a bath before the staples are removed. Showering with the incision uncovered is fine too; wash around the incision with soap and water; pat dry, and apply a new dressing.

Swelling

Why is there swelling and fever in my newly replaced knee?

Swelling and some heat will persist in the knee from several weeks to several months after surgery. This is normal. The heat is from the healing process and residual inflammation in the operated knee.

For many months after knee replacement, there is increased blood flow to the bone around the implants; this manifests as heat, swelling, and achiness around the replaced joint. These sensations disappear with time.

What can I do about knee, ankle, and leg swelling after surgery?

Measures that may help include wearing a compression stocking, wrapping the knee with an elastic bandage, icing the knee with a cold pack or alternating ice and heat on the knee, and resting with the leg elevated. If necessary, try backing off from exercises for just a day or two; you will not lose any knee mobility in doing so.

Typically, the swelling will subside over several weeks, although it may take longer in some people. Swelling often persists for a lot longer than most people anticipate.

Why does the leg swell after knee replacement surgery?

Surgery is traumatic to the tissues. The tissues respond by swelling, especially when you are up and about. Swelling is the most common complaint after knee surgery. Typically, patients exercise or walk during the day, then notice increased leg and ankle swelling in the evening.

Obesity, diabetes, poor circulation, poor muscles, varicose veins, high activity, heart disease, and swelling before surgery will usually result in a longer period of swelling and heat in the knee joint after surgery.

Elevating your leg at night and wearing compression stockings during the day will help. Over time, and with exercise, swelling will gradually go away.

Another reason for achiness and swelling in the knee, even months after surgery, is the fact that the bone, a living tissue, continues to re-model and adapt around the metal implants. This increased metabolic activity in the bone, which can persist for one to two years after knee replacement, leads to soreness and swelling after heavy activity. The only remedy for this is the passage of time.

When can I stop wearing the stockings after knee replacement?

Compression stockings may be applied to both legs after surgery to control swelling, and many patients inquire when these can be discontinued. The answer is that if swelling is not a concern, you can stop wearing the stockings at anytime.

These stockings are prescribed to control one of the most common nuisances after any knee operation, namely, swelling in the leg and ankle. The stockings have nothing to do with preventing blood clots; for that problem, we give you a blood thinner, and use other strategies discussed elsewhere in this guide.

If swelling is a concern, it is best to continue wearing compression stockings when you are up, and even when you are in bed, if you can tolerate them. The stockings can be discontinued in a month, or earlier if you feel the swelling is under control. The stockings can be washed, and we can order a new pair. If stockings bother you and swelling is not a concern,
discontinue the stockings anytime. Patients who had circulation problems, venous disease, and major swelling before surgery will typically require a tighter brand of stockings, and will need them for a longer time.

**Should I apply heat or ice to the knee?**
For the first month or so, ice seems to work better to reduce swelling and provide pain relief. Then, once the staples are out, a moist towel and heating pad can help, especially at night. This can be combined with a topical anti-inflammatory ointment, like Ben-Gay, or Icy-Hot. Deep tissue massage around the knee can help at this stage also. Around 6 weeks or so after surgery, many patients will use ice during the day, and moist heat to the knee at night, with good results.

**Preventing Infection**

**How do you prevent infections during knee replacement?**
Scrubbing of the skin with an antiseptic, antibiotics given before surgery, surgeon experience, a team-approach designed to promote efficiency, and standardized protocols are some of the key steps in reducing the risk of infection. It is impossible to completely eliminate this risk, but we can get the risk down to nearly zero. It is very rare to have an infection after routine knee replacement.

**Is there a long-term risk of infection in an artificial knee?**
Yes, there is a lifetime risk of infection with any artificial implant in your body, whether a knee joint, heart valve, or other synthetic component. As long as you maintain good health and appropriate body weight, avoid smoking, maintain proper hygiene, keep diabetes under control, and promptly address even minor infections in your body, the risk of infecting an otherwise well-functioning knee implant is very low.

**What if an infection does develop?**
An early infection shows up as redness and pain around the healing incision. This can usually be treated with oral antibiotics alone, usually taken for five to 10 days. Very rarely, as a precaution, the knee joint has to be opened up and washed out to clean the tissues and effectively treat an early infection. This usually happens if the knee starts draining fluid after surgery, which is a rare occurrence.

A late infection that happens months or years after surgery is more serious, and will require additional surgery.

In these rare cases, the infected prosthesis is removed and a temporary antibiotic-loaded knee is implanted, to allow the patient to walk and function, while the infection resolves. After three or more months, a new knee joint is implanted. Six weeks of antibiotics and these two operations will effectively treat an established deep infection in the knee.

Fortunately, deep infections after knee replacement surgery are very rare, usually occurring in immune-compromised patients who have other serious medical problems.

**Leaving the Hospital**

**What is the average length of hospital stay?**
The length of hospital stay after knee replacement varies from just one day to five or more days. There is no standard formula; each person and each recovery is different. Typically, a routine knee replacement requires two to three days in the hospital; there is little to be gained by trying to accelerate this process. People need time to heal.

**How is the discharge from the hospital handled?**
During your hospital stay, a case manager will work with your doctor to plan your discharge,
whether to your home, a skilled nursing facility, in-patient rehabilitation facility, or nursing home. A social worker may also visit, and work with the case manager to formulate a discharge plan.

What determines when I can go home after knee replacement?
You can go home when you are able to get into and out of bed; walk up to 75 feet with a cane, walker, or other assistive device; go up and down stairs; and get to the bathroom. Typically, you will have had a bowel movement before discharge, and will be able to take a shower. Your doctor is the one making the ultimate decision about the safety and timing of your discharge. You will need someone to drive you home from the hospital.

How will I manage at home?
After knee replacement surgery, you will need help at home from an adult family member or friend. If this is not possible, it may be necessary to stay at an inpatient rehabilitation facility. You will not be able to drive for the first couple of weeks.

A home health agency will check on you at home, about three times a week or more, to help with walking, exercise, incision checks, medications, and communication with the doctor. The home health agency will provide a nurse to do blood draws and follow-up care, a physical therapist to continue therapy, and possibly an occupational therapist. The nurse also communicates with our office to regularly update us on your progress.

While at home, if a concern arises, please call or e-mail our office. If there is a worry about the incision, taking a digital photo and sending it by e-mail works very well.

When do I have to come back to see the doctor after knee surgery?
You will return for a visit about one month after your operation. If you have problems or questions before then, do not hesitate to call or e-mail. Your home health nurse is also an excellent resource. Patients coming from far away have communicated by e-mail, used digital photos of their incisions, and sent digital X-rays the same way; this works very well and saves a lot of driving and time.

Under what circumstances should I contact a doctor?
It is advisable to contact our office if you have any of the following:

- Temperature above 101 degrees
- Drainage from your incision
- Excessive redness around the incision
- Increase in the incision pain
- Increased leg swelling
- Pain and swelling in the calf of the leg
- Numbness or tingling down the back of the operative leg
- Any other concern, even if it seems minor

Your family doctor may be your closest resource for advice if you develop a cold, flu, nausea, vomiting, diarrhea, or constipation. If you are unsure which doctor to call, call your surgeon.

If you cannot reach a doctor and feel that there is a problem, please go to the nearest emergency room. It is best to be vigilant and not take chances.

Getting Moving

How long will I be off my feet after knee replacement?
You can put full weight on the replaced knee right after surgery. The therapist will get you up and walking the day after surgery. You will need the assistance of a walker or crutches, but putting weight on the knee and twisting is safe. Most patients are reasonably independent after four weeks, although individual recovery times will vary.

Will I need a walker, crutches, cane, or other assistive device?
Yes. You will likely require a walker for some time after knee surgery. If you have a walker, bring it with you to the hospital. If you do not have one, we can arrange for a walker while you are in the hospital.

Prior to surgery, you should pick up all throw rugs and secure extension/electrical cords at home, and make sure your furniture is arranged to allow you to use a walker safely, without the risk of falling. You can transition to a cane or crutches at any time you are comfortable.
I have pain and stiffness in the first few steps, then the knee feels OK. Is this normal several weeks, or even months after knee replacement?

Yes. Muscles, tendons, and ligaments take time to stretch and accommodate after surgery. The pain that is worse after sitting and goes away with walking is called start-up pain, and can persist for a long time. These symptoms will decrease as tissues heal. An anti-inflammatory medicine can help.

Will I have to learn how to walk again?

Considering that a prosthetic knee has no nerves and that the arc of movement after knee surgery will vary from before, many people feel like they must learn how to walk again. This is to be expected after knee replacement surgery. Take your time, and do not rush the process. There is no point comparing your recovery to anyone else, since recovery is very individual and depends on many patient-specific variables. At some point in your recovery, the new knee will begin feeling like a part of your body. Until then, it is true that you are, in a sense, learning to walk again.

How much therapy will I need?

You need a minimum of four weeks of therapy, usually at your home, with a visiting home health nurse. This person will see you about three times a week. Some patients need therapy after this four-week period, and others are already independent. If you need outpatient therapy, usually four to six weeks will suffice. Once you learn basic knee exercises, you will be able to do them at home. Maintaining a regular program of exercise and mild aerobic activity over the longterm is an excellent idea, and you will maximize the benefit of your new knee.

Can I kneel after having a knee replaced?

Yes, although it may take several months before you can do it comfortably. The reason is that the kneecap experiences heavy loads during knee bending; loads that exceed your body weight. Soreness may keep you from kneeling after knee replacement surgery. You can safely kneel as soon as you are comfortable; you cannot damage the knee replacement by kneeling.

What happens if I do not get motion back in the knee quickly?

With minimally invasive surgery, lack of a tourniquet, and minimal muscle disruption, knee motion returns very quickly after replacement surgery. In very few cases, if the knee is not gaining mobility, it may be necessary to manipulate the knee joint under an anesthetic to “fast-forward” you in therapy, and break up early scar-formation in the knee joint. This is rarely necessary, and performed only on individuals who form heavy scar tissue.

Why does scar tissue form in the knee joint?

Scar formation is normal after all operations. After knee replacement, scar formation inside

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**Tips on Walking**

Proper walking is the best way to help your knee recover. At first, you will walk with a walker or crutches. Your surgeon or therapist will tell you how much weight to put on your leg; in most cases full weight is safe right away. Stand comfortably and erect with your weight evenly balanced on your walker or crutches. Advance your walker or crutches a short distance; then reach forward with your operated leg with your knee straightened so the heel of your foot touches the floor first. As you move forward, your knee and ankle will bend, and your entire foot will rest evenly on the floor. As you complete the step, your toe will lift off the floor and your knee and hip will bend so that you can reach forward for your next step. Remember, touch your heel first, then flatten your foot, then lift your toes off the floor. Walk as rhythmically and smoothly as you can. Don’t hurry. Adjust the length of your step and speed as necessary to walk with an even pattern. As your muscle strength and endurance improve, you may spend more time walking. You will gradually put more weight on your leg. You may use a cane in the hand opposite your surgery and eventually walk without an aid. Early on, it is best to moderate the exercise and avoid overdoing it. When you can walk and stand for more than 10 minutes and your knee is strong enough so that you are not carrying any weight on your walker or crutches (often about two to three weeks after your surgery), you can begin using a single crutch or cane. Hold the cane or crutch in the hand opposite the side of your surgery. You should not limp or lean away from your operated knee.
the joint is usually overcome by knee movement. Because of genetic factors and other variables, some patients will form scar very quickly inside the knee joint. Such patients may need additional or more aggressive therapy, and such patients will find that their recovery of knee mobility takes longer than others. This is normal, and again emphasizes that no two patients recover alike since patient anatomy and physiology vary from person to person.

How much bending will I get in the knee joint after replacement?

Implants bend safely to 150 degrees, which is about the physiologic limit of human knee anatomy. Existing scar tissue, contractures of the knee joint, severity of arthritis, pain tolerance, motivation for exercise, body size, and other variables profoundly affect how much mobility a person will get. For most patients, zero degrees of knee extension (bringing the knee out straight) and about 125 degrees of flexion (bending) are easily achieved; this is more than enough for almost all activities of daily living.

Do you use a machine to move the knee after surgery?

No benefit has been shown from the use of continuous passive motion (CPM) machines. Most surgeons use them now out of habit, or because some patients prefer them. If you would like a machine to move your knee after surgery, let us know and we can discuss the option. However, it has been our experience that outcomes from knee replacement are just as good without these machines. CPM machines are never a substitute for using your own muscles and motivation to regain mobility.

Should I exercise after knee replacement?

Yes. A regular program of light aerobic exercise is best, with weight training added to the exercise regimen. Exercise is beneficial from many standpoints, and will optimize the outcomes of your knee replacement. Recommended exercises include walking, swimming, light aerobics, golf, treadmill, stair-climbing, weight-training, and elliptical exercise equipment. See pages 34-35 for a list of recommended exercises.

How soon will I be able to return to everyday activities?

Soon after surgery, you will begin to walk short distances in your hospital room and perform everyday activities. This early activity aids your recovery and helps your knee regain strength and movement. A nurse or therapist will assist you as necessary.

Returning to regular activity in terms of walking, exercising, and work vary greatly between patients; most patients return to their regular activities in six to 12 weeks.

How active can a person be after a total knee replacement?

You can be as active as you want and carry as much weight as you can tolerate. Heavy impact exercises, such as basketball, football, soccer, and tennis are probably best avoided, since they contribute to increased prosthesis wear. Low-impact aerobics, bicycling, treadmills, swimming, and similar exercises are fine. Climbing, hiking, and other outdoor activities can be performed as tolerated.

Strength and endurance will build up over time. Modern total knee implants are very durable and designed to take repetitive impact loading for many decades, even in active and heavy patients.
When can I drive after knee replacement surgery?
For the left leg and an automatic transmission in your car, drive whenever you can comfortably sit in a car and have control of the operated leg. For the right leg (and left in the case of driving a car with a clutch), it takes about two to four weeks before you regain the confidence and control in the leg to drive. Of course, you should not drive if you are taking narcotics that make you sleepy or reduce alertness. Avoid driving any time comfort or pain is an issue.

How much can I lift?
You can lift as much as you are comfortable doing. Start out with small weights, and build up your tolerance. As long as the knee does not hurt, lifting weights is fine.

Can I ride horses after knee replacement surgery?
Yes, once your recovery is such that you are independent, strong, and comfortable, you can ride horses, ATVs, and bicycles, with reasonable precautions that apply to each.

When can I go back to work after knee surgery?
The faster you get back to work, the better it is for you, psychologically and physically. We can accommodate your requests for time off work and your return to limited duties. Each individual and job situation is different. We will work with you to expedite your transition back to your job. Some people with desk jobs have returned to limited work in two weeks after knee replacement; others have preferred to take several months off.

Can I climb ladders?
Yes, climbing ladders is fine as long as the knee is fully healed and your strength has returned.

When can I resume sex?
You can resume sex at any time after knee surgery that you feel comfortable. Unless specifically instructed otherwise in very selected and unusual cases, there are no precautions to follow after knee replacement surgery.

When can I travel after surgery?
Whenever you feel comfortable, go ahead and travel by car or airplane. It is best to avoid the same seated position for over an hour, so try to get up and move around when possible. Otherwise, make sure to do ankle and calf exercises every hour to keep the blood pumping and avoid the possibility of blood clots forming. Prolonged sitting will also cause leg swelling, so it is best to change position during travel if possible.

When can I drink alcohol after surgery?
Moderate, social alcohol use can be resumed anytime that your appetite dictates. Avoid alcohol if your blood is too thin on the warfarin, and your warfarin dose is being held. Heavy alcohol use after any surgery is dangerous.

How long does it take for me to feel normal after a knee replacement?
While 80 to 90 percent of recovery is usually over by the first two months, the last 10 percent can linger. Even though patients can resume normal activities, the bone around the new implants will keep remodeling in response to the altered biomechanics. As a result, it can be up to two years or so before an artificial joint really feels like your own. It can take that long for the skeleton to accommodate the new knee, and feel normal.

Why is recovery after knee replacement said to be harder than after hip replacement?
One, the hip has more muscles covering it, and fewer nerves. Two, the hip joint is relatively simple, consisting of one kind of movement (ball and socket). Three, hip surgery can be done even less invasively than knee replacement using modern techniques. Four, after a hip replacement, very little exercise is necessary for recovery, since there is little risk of the hip getting stiff.

In contrast, the knee is a complex joint, relying on outside ligaments for support. These ligaments get stretched with every step. There is very little muscle cover around the knee, so that any bump is felt in the joint. Finally, the knee tends to scar and stiffen quickly, and the joint must be moved actively to prevent this, and regain motion. For these reasons, recov-
ery after hip replacement is typically a lot easi-
er than recovery after knee replacement.

Managing Pain and Discomfort

How much pain can I expect?
With modern surgery, pain can be controlled very well. Even though modern pain medicines are very effective, some aching and soreness in the knee may persist for many months. This is part of a normal recovery, as long as you notice steady improvement.

Each patient will recover differently; even two knees replaced in the same patient on the same date will recover differently. For example, effective pain control may be a problem for patients who take narcotics regularly before surgery. In these patients, pain relief can be hard to attain since the body desensitizes itself to narcotics.

Will there be persistent pain after surgery?
No, although pain perception varies greatly among patients and the time to full recovery is highly variable. The important thing to watch for is a steady decline in the level of discomfort; the knee should feel better month-to-month. If there is persistent pain, or increasing pain, then further inquiry is necessary. Remember, there will always be patients who go home in a day or two, and never seem to have any pain after knee replacement. There are others who recover far more slowly. The important thing to remember is that both types of recovery are entirely normal.

Should I apply ice or heat to the knee as it is healing?
After surgery, and for the first two weeks, ice is more effective in reducing swelling and pain. After complete healing of the skin and removal of staples, you can use a moist heat pack if it feels comfortable. Once healed, soaking the knee in a hot tub helps, too.

Whom should I call for pain pills?
Please call our office at 573-882-6762 for pain medicines. State regulations allow some medicines to be phoned in; others require a written prescription. Please plan ahead, since narcotic prescriptions on weekends or Friday afternoons can be difficult to call in, mail in, or otherwise get filled.

How long should I take pain pills?
Most patients use the narcotics that we send them home with for anywhere from one to three months. Over time, they taper off and begin anti-inflammatory medicines and other non-addictive medicines for pain by three months. Narcotic drugs taken over a long time creates a tolerance that makes them less and less effective. That is why it is preferable to taper off narcotic drugs after three months, unless there are compelling reasons to continue use. This is a general observation; some patients will require narcotic medications for a longer period of time.

What if I need narcotics three months after surgery or if I have been taking them before surgery?
In such cases, the doctor who was filling the prescriptions prior to surgery may resume dispensing the medication. Very rarely, referral to a pain specialist is necessary for patients who are dependent on long-term narcotics. These medications are carefully monitored and tracked in the pharmacy databases, and specialized pain doctors are better trained and equipped to monitor their long-term use.

If you were taking narcotics regularly before surgery, pain control is usually more difficult and complicated since the body is desensitized to the pain control medicines we use after surgery. In such cases, let us know what you are taking before surgery so that we can adjust pain medicines accordingly.

There are no hard rules. We are here to help and recognize that every person is different and that pain is very individual.
How do I know if I have a metal allergy to the knee part?

Orthopaedic implants are made of alloys of cobalt-chrome and titanium that have been implanted in millions of patients over the past three decades. Allergies to solid metal alloys are sometimes speculated, but are rarely seen in practice. Most instances of a painful knee after replacement have to do with a problem related to the surgery, or possibly an infection. A true metal allergy is extremely rare, and seldom encountered in clinical medicine.

What will weather changes feel like in the knee?

Some patients report increased pain and stiffness, or can feel changes in the weather after knee surgery, especially with an artificial joint. These sensations are not common though, and usually will disappear over one to two years after surgery. For the first couple of years, the bone adapts and grows around the metal prosthesis, and this bone activity probably leads to increased sensitivity to weather and pressure changes that some patients can feel in their joints.

What do I need to know about future dental work and other surgery?

Because you have an artificial knee joint in place, you must take care to protect it from infection. The same applies to any artificial implant in your body. Before having dental work (teeth cleaning, fillings, extraction or root canals) or certain medical procedures (colonoscopy, biopsy, endoscopies, etc.), you must take an antibiotic.

The antibiotic will help prevent bacteria from getting into the blood stream and thus into your knee. The odds of this happening are very rare, but the antibiotic can reduce this already small risk.

For routine dental prophylaxis following knee replacement surgery, antibiotics are required for your lifetime after the surgery.

What antibiotics are used to protect the prosthetic knee joint if I have dental work?

Cephalexin and amoxicillin are antibiotics commonly prescribed before and after dental work. You may take azithromycin or clindamycin if you are allergic to amoxicillin. You also may take any antibiotic recommended by the American Heart Association.

What other situations will I need antibiotics for, after the knee replacement?

Antibiotics given for other medical procedures may vary. Contact us for advice if there is any doubt. Keep in mind that it will be necessary for you to be treated with a full course of antibiotics if you develop an infection such as an abscessed tooth, pneumonia, bronchitis, and skin or urinary infections.

If you cut your foot, or have broken skin on the leg, or infection in a toenail after a knee replacement, seek medical attention immediately. Ignoring a festering sore means that there is a risk the bacteria could migrate to the knee implant, resulting in a serious deep infection, even though it happens rarely.

Will the knee set off a metal detector at the airport?

Most likely, it will. Tell airport personnel that you have an artificial joint prior to entering the metal detector. Metal detection sensitivity at airports is highly variable, and it is impossible to say if a certain detector will set off the equipment. We will supply you with an implant identification card that you can carry to prove that you have metal knee replacement parts.

Can I have a MRI scan after knee replacement?

Yes. MRI scans of other parts of your body are safe after knee replacement. Although some old MRI scanning equipment may not be compatible with your prosthesis, the majority of MRI scanning equipment today is safe and compatible with knee replacement parts. You may also have a CT scan of any part of your body after a knee replacement.

How will I know if my knee implants happen to be recalled?

In the extremely unlikely event of a recalled implant, you will be contacted by the compa-
ny who made the device. All implants have lot numbers registered with the implant maker. This information is kept in your medical record. If you want a copy of your X-ray or exact implant type and model for your records, please let us know.

Rest assured that of the millions of artificial joints implanted each year, the incidence of recall is exceedingly rare. Implant companies monitor the performance of their products very carefully.

Is there a long-term risk of failure of knee implants?

No, the implants are engineered to withstand your body weight and activity level, but the moving parts of a knee replacement do wear over a period of several decades. A properly aligned knee replacement done by a competent, experienced surgeon will usually last the lifetime of most patients.

Subtle component malpositioning and suboptimal orientation can however compromise the lifespan of the implant. This is why the skill and expertise with which the knee is implanted in your body is a critical determinant of how long the knee will last and how well it will perform.

How many times can you replace a total knee?

With modern technology, cases that were considered hopeless a few years ago can undergo successful knee replacement surgery. Such complex knee replacements are done every week in our specialty practice, and are referred from all over. So, there is no hard and fast rule as to how many times a knee can be replaced. Knees that have had multiple operations may be missing structural bone support, muscle cover, and quadriceps support.

While we hope that you never need such complicated knee operations, it is possible to get patients mobile again in situations that would have resulted in an amputation in the past. This reflects advances in surgery techniques and related technology.

What if I receive conflicting advice and opinions from other people taking care of me in the hospital or during home health visits?

Please use this book as your reference. This information was written by Dr. Bal, specifically for our patients and the operations that he performs. If there is ever a question or conflict in your mind, email Dr. Bal or any of our staff.

What if I have a question not covered here in this guide?

Please email or call us. Every member of our team is experienced and knowledgeable. Knee and hip replacements are our specialty and we keep up with the latest technology, innovations, and research. Many of the questions in this book were raised by patients like you, and we may include your comments or questions, with your permission, in future editions of this guide.

“When you have pain in your knee joint, it affects you physically, mentally, socially, and even economically. You can’t do the things you need to do, or just the things you enjoy. It’s absolutely fabulous to get my life back.” - Gary Duncan, Columbia, MO
Knee Strengthening Exercises
for before and after knee replacement surgery

**Ankle Pumps**
Move the ankle up and down maximally. Flex and extend your ankle by tightening the calf and shin muscles. Perform this exercise for 2 to 3 minutes, 2 or 3 times an hour, beginning once you are fully awake in the recovery room. Continue this exercise until you are fully recovered and all ankle and lower-leg swelling has subsided.

**Calf Stretch**
Sitting with your legs straight out in front of you, loop a towel or belt around the ball of your foot. Keeping your knee straight, pull on the towel for 10 seconds, stretching the calf. Relax and repeat.

**Short Arc Quadriceps**
Lying on your back, place a rolled towel under the operated knee so that it bends 6 inches above the bed. Tighten the thigh muscle to straighten your knee, lifting your foot off the bed. Hold 5-10 seconds. Lower your foot to the bed, repeat.

**Straight Leg Lift**
Lying down, tighten the thigh muscle with your knee fully straightened on the bed, as with the quad set. Lift your leg several inches. Hold for 5 to 10 seconds. Slowly lower. Repeat until your thigh feels fatigued. Also, try this exercise with the foot turned in, or out, maximally, and repeat the straight leg lifts.

**Quad Sets**
Lying down, straighten your knee, and tighten your thigh muscle to push the knee down against the bed. Hold for 5 to 10 seconds. Repeat this exercise approximately 10 times during a two-minute period; rest one minute and repeat. Continue until your thigh feels fatigued. The goal is to get the knee to straighten completely.

Try a variation of the above: Lying down, place a small rolled towel under your ankle so that your heel is not touching the bed. Tighten your thigh. Try to fully straighten your knee and to push the back of your knee as close to the bed as possible. Hold knee fully straightened for 5 to 10 seconds. Repeat until your thigh feels tired.

**Lying Hamstring Curls**
Lie on your stomach with your hands beneath your forehead. Bend your operated knee, slowly bringing your heel to your buttock. Return to starting position, relax, and repeat.
While lying down, slide your foot up towards you, to bend your knee as much as possible. Hold your knee in a maximally bent position for 5 to 10 seconds and then straighten. Repeat several times until your leg feels fatigued.

**Bed-supported Knee Bends**

Lying on your back, knee bent, hold both ends of a folded towel wrapped around the front of the ankle. Apply gentle pressure through the towel to increase the bend. Hold for 5 to 10 seconds; repeat several times until leg feels fatigued.

**Assisted Knee Bends**

While sitting at bedside or in a chair with your thigh supported, bend your knee as far as you can until your foot rests on the floor. If you are able, increase your knee bend by sliding your body forward in the chair. Hold for 5 to 10 seconds. Straighten your knee fully. Repeat several times until your leg feels fatigued. You may add support to the operated leg by placing the other ankle behind to assist in raising the leg.

**Standing Knee Bends**

Standing erect with the aid of a walker or crutches, lift your thigh and bend your knee as much as you can. Hold for 5 to 10 seconds, then slowly return your foot to the floor, beginning with the heel. Repeat several times until leg is fatigued.
# Pre-Surgery Checklist

<table>
<thead>
<tr>
<th>Task</th>
<th>Timeframe</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit a medical doctor for a complete check-up to make sure you are</td>
<td>Must be completed prior</td>
<td></td>
</tr>
<tr>
<td>ready for surgery. We can arrange this visit, or you can see your</td>
<td>to surgery.</td>
<td></td>
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<tr>
<td>own family doctor.</td>
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<tr>
<td>Visit your dentist for dental clearance; have any necessary dental</td>
<td>Must be completed prior</td>
<td>(This step is not necessary if you wear dentures or if a dental check</td>
</tr>
<tr>
<td>work completed.</td>
<td>to surgery.</td>
<td>was clear in the past six months.)</td>
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<tr>
<td>If requested, see a cardiologist for a heart examination.</td>
<td>Must be completed prior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to surgery.</td>
<td></td>
</tr>
<tr>
<td>Attend pre-op screening arranged by Dr. Bal’s office.</td>
<td>7-10 days before surgery</td>
<td></td>
</tr>
<tr>
<td>Prepare your home for post-surgery. See page 20 for details.</td>
<td>Any time prior to your</td>
<td></td>
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<tr>
<td></td>
<td>scheduled surgery date</td>
<td></td>
</tr>
<tr>
<td>Make arrangements for an adult companion to stay with you during</td>
<td>Any time prior to your</td>
<td></td>
</tr>
<tr>
<td>the first few weeks at home.</td>
<td>scheduled surgery date</td>
<td></td>
</tr>
</tbody>
</table>
# Post-Surgery Checklist

<table>
<thead>
<tr>
<th>Task</th>
<th>Timeframe</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep leg in compression hose or elastic bandage</td>
<td>A month after surgery, or at least until swelling goes down</td>
<td></td>
</tr>
<tr>
<td>Staples and stitches removed</td>
<td>No earlier than 3 weeks after surgery</td>
<td></td>
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<tr>
<td>Follow-up visit with surgeon</td>
<td>One month after surgery</td>
<td></td>
</tr>
<tr>
<td>Home health, physical therapy</td>
<td>Home health services, including therapy, for one month after surgery</td>
<td></td>
</tr>
<tr>
<td>Outpatient physical therapy</td>
<td>For 4-6 weeks after home health visits are completed</td>
<td></td>
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<tr>
<td>Travel after surgery</td>
<td>Anytime you are comfortable traveling</td>
<td></td>
</tr>
<tr>
<td>Driving after surgery</td>
<td>About 2-4 weeks, or whenever comfortable and in control of limbs</td>
<td></td>
</tr>
</tbody>
</table>
Notes and Questions
In the area below, you can keep a log of any questions, medications, or other matters that may be helpful in discussions with Dr. Bal or any of the staff.