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Total Knee Replacement: A Patient's Guide

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Introduction

This guide provides information for you and your family regarding Total Knee Replacement Surgery. The reasons for the procedure, pre-operative and post-operative care, alternatives, risks and benefits of surgery, as well as limitations are explained. Our Staff's goals are to restore your knee to a painless functional status, and make your hospital stay as beneficial, informative and comfortable as possible.

1. What is Arthritis?

Arthritis is an inflammation in a joint such as the knee joint, which is accompanied by increasingly, sometimes quite significant pain and occasional joint swelling to a point which makes you think about having a Total Knee Replacement (TKR) done for pain relief. There are 2 major types of arthritis: the most common form is osteoarthritis, a condition which is the result of either excessive wear/abuse of the joint when you were younger, trauma to the knee in the past or a resection of a torn cartilage years ago, or aging. The smooth gliding surface of the joint, the cartilage layer, is worn away. This condition is made worse by increasing weight and imperfect alignment of the weight-bearing axis like knocked knees or pitched toes.

The other form of arthritis is called rheumatoid arthritis, which is a dysfunction of the immune system whereby a significant inflammation affects the capsule lining which makes the joint fluid. This results in a slow destruction of the cartilage layer.

2. Knee Anatomy:

The knee joint consists of the thighbone, which is called the femur and articulates with the tibia (shinbone) and the kneecap in front, which is, called the patella. Those bones make up 3 compartments of the knee, and are more or less involved in the process of arthritis. A smaller bone, the fibula inside the calf, does not participate in knee function.

Large muscles surround the knee joint. In the front of the thigh are the quadriceps muscles, which straightens the knee (also called extension). There are similar, slightly less strong muscles in the back of the knee, called the hamstrings which make the knee

bend (called flexion). It is very important to recognize that the knee is a very complex motion machine; it not only flexes and extends, it also twists internally.

There are several important soft tissue structures, which influence function of the knee as well as its integrity. There are two ligaments which cross over inside the knee joint, therefore call cruciate ligaments. They hold the knee together on the inside. There are also ligaments on each side of the joint which prevent the knee to buckle to the side. In addition, there are horseshoe shaped cartilage's on each side, sitting on top of the tibia. They are made of tough cartilage material and act as shock absorbers, in medical terms, they are called meniscus. When we talk about degeneration of cartilage, we are talking mainly about the soft covering of the bone structures, rather than the meniscus, the shock absorbers.

All this works only when there is lubrication, which is made by the capsule lining called the synovium. The synovium not only produces the lubrication fluid but also absorbs it if there is too much of it.

When we determine the extent of the arthritis of the knee joint we usually look at x-rays from the front to back and a side view. This will tell how much damage the knee has accrued. The doctor judges the amount of space, which is seen on the x-ray. It is increasingly narrowed depending on how much is destroyed. The worst situation is when there is hardly any joint space left on either view. The bone is then rubbing on bone, which creates significant pain. That pain which you so well know, can be so severe at times that it incapacitates you and destroys your quality of life.

3. What is a Total Knee Replacement?

A Total Knee Replacement (TKR) consists of replacing the damaged cartilage surfaces, on the ends of the three bones, which make up the knee joint in addition to removing the degenerated shock absorbers. The surfaces are replaced with some well-contoured metal components. In order to reproduce the elasticity, which the knee had before it deteriorated, a plastic wedge is interposed as it is also done to the worn-down surface of the kneecap. The component which covers the end of the thighbone may be fitted with a porous surface into which bone can grow in over a period of time or it is grouted just as the tibia is grouted. The grout is a polymer, which is similar to what we use to repair plastic boats. Fortunately the body accepts all these foreign bodies remarkably well.

4. Alternatives:

Before we discuss total knee replacements any further, it is important for you to know what you can do and what is available before you take that important step of having a Total Knee Replacement performed. There are several things: One important thing is doing exercises with or without the help of physical therapy in order to strengthen the muscles around the knee which will help in reducing pain. You can also lose weight, which in itself aggravates the arthritic condition, or you can use a cane.

There are a number of medications available called NSAIDS (Non Steroidal Anti-Inflammatory Drugs) such as Motrin, Voltaren, Celebrex, Relafen, Aspirin, just to mention a few. With any medications, there are always drawbacks such as gastrointestinal upset, a bleeding stomach ulcer, and kidney and liver problems are some of the serious ones. Bracing may help by giving you some feeling of being more stable and can also assist you in walking better. In the early stages of arthritis, we can inject a lubricant into your knee, which is done once a week for a period of 3 weeks. This may push back your need for a Total Knee Replacement. We can also use a cortisone (steroid) injection. Although it may relieve your pain, it accelerates the breakdown of your knee further. There is a so-called arthroscopic washout procedure, of debris, which accumulates over the years while the arthritis develops. This could improve your pain over weeks, months, or possible over a year or two. The very final type of pain relief is a knee fusion. This procedure stiffens your knee forever. It makes you pain free but you will never be able to bend your knee again. Implanting new cartilage, which is grown in the laboratory as you may have read in newspapers, is in an experimental stage and would not be applicable for arthritic knees anyway.

5. Risks and Potential Complications:

As anybody undergoes general or regional anesthesia (epidural anesthesia) there are always risks associated with it. The risks of course are magnified if you have abnormal general medical conditions in addition to your older age, which may have affected the functions of your vital organs such as heart, lungs and kidneys. Therefore a complete evaluation of those systems have to be performed before we take you into the Operating Room. Bleeding is expected during the surgery, which can be significant, because we are opening the inside of the bones, which have a good blood supply. Therefore, your blood loss may have to be replenished either during or after surgery. We prefer to restore your blood level by giving you your own donated blood back. For that, a week or two before surgery you will be asked to donate either one or two pints. If you do not wish or are unable to because of reduced blood counts to donate we need your permission to give you blood from the blood bank which has certain risks associated with it such as transfusion reaction or disease transmission. The risk of transmitting HIV is about 1 in 150,000 which is very low.

Another important complication is the development of blood clots, which are rather common in total joint replacements. A blood clot develops in the lower extremity, which may break loose and pass through the heart into the lungs. It is then called a pulmonary embolism. Fortunately dying from it is rare although it is a risk that needs to be addressed. You will be placed on blood thinners for approximately six weeks after surgery. There are two types of blood thinners. One is coumadin, which needs to be controlled intermittently at least every two weeks as to its effectiveness. This requires taking blood samples done in the laboratory of our Medical Center in pre-determined intervals. The other is injectable which is given twice a day subcutaneously and does not require regular blood testing. Both types of blood thinners are used until you can walk comfortably with or without walking aids but have reached a satisfactory level of activity.

Infection can occur following any type of surgery; for that reason we give antibiotics during surgery and a couple of times afterwards, which are extremely helpful to prevent this complication. This is a serious complication and may require re-operations. First we must wash out the wound, possibly several times. Later on, the removal of the implants may be needed which is then followed by six weeks of appropriate intravenous antibiotics. There is a chance that new components can be re-implanted. As you can imagine, a significant and pro-longed sickness is associated with infection.

Besides the postoperative infection, there is another bacterial infection, which can spread from another location even months or years after your surgery. A urinary tract infection, an infected tooth, a sore throat or a skin infection can cause this problem. The bacteria settle themselves into areas, which have been previously traumatized, as is the case with the total knee replacement. The treatment is the same as if it were a postoperative infection. A bone scan and an aspiration of your knee joint which we test for appropriate bacteria is of great help to identify the existence of such an infection.

Very rarely, practically never, are injuries to major blood vessels located at the back of the knee during the procedure. They are repairable during surgery.

Nerve injuries, if they do occur, will create numbness and weakness in the foot and can occasionally be permanent.

Some patients have greater expectations for pain relief, then one is able to produce by doing the Total Knee Replacement. The reasons for persistent pain are sometimes difficult to identify and to remedy. We have rarely found that a re-do of the procedure is necessary or even helpful for pain alone.

We also have to make notes of the fact that you may lose some motion of your knee as comparison to what you may have had before. This includes some degree of full straightening of the knee as well as complete bend of the knee compared to your good side. The common range of motion, which is usually achieved between completely straight out to about 115 degrees of bend, provided you have participated actively and vigorously in physical therapy and at home with exercising.

6. Limitations of a Total Knee Replacement:

Since our body has not been designed to live with a multitude of foreign bodies such as metal, plastic, or grout, there is always the tendency of our body to reject those. There is no chemical binding between the implants and your body; therefore, a chance of loosening always exists. When this occurs, depends largely on the extent of your level of activity. If you participate for example, in jumping, or running, there will of course be an earlier chance of loosening then later due to the impact stresses which will knock the implants loose. It is difficult to identify the time when it loosens. Then a revision is needed which differs with every person depending on their level of activity.

Usually the artificial knee holds up for approximately 10 years. The younger you are, the greater the chances are that you will require an earlier revision then if you are older. Older persons are naturally more restricted in their activities.

There are two more limitations, which pertain to technology. Those are component breakage, which happens more often with the plastic component. This can be easily replaced. The other is caused by particles, which are created during millions of cycles of walking. A foreign body reaction is created which results in loosening of the implants.

Now keep in mind the following: A Total Knee Replacement is a major procedure. There are always complications possible. Overall, they have done at least 25,000 patients per year in the USA alone, some good. If your pain from the arthritis is so severe that you cannot live with it any longer and all conservative measures such as medications and exercises do not help the pain any longer, when your quality of life is increasingly restricted because of that pain, it is certainly the time to seriously consider this procedure.

Now, since you have made up your mind to go forward with a TKR, we need to discuss planning.

7. Planning for Your Upcoming Surgery:

The date of surgery will be determined during your visit to the Orthopedics Outpatient clinic on the day you have decided to undergo the surgery. You will now be enrolled in a process which we call the PAT (Pre-Admission Testing) which is a comprehensive interdisciplinary process to optimize your health status for the surgery. You will be assigned to our Physicians Assistant, Steve Olster, who will be coordinating and overseeing the events during the following next 2-3 weeks. (You can contact him on his voice mail which is X2065.) If there are any doubts about your sound medical condition you must be "cleared" for surgery which will be documented and is usually performed by your primary care physician, internist, and/or cardiologist. Since the total knee replacement surgery is an elective procedure (not an emergency) we can and need to be as careful as possible. Clearance means that you are medically optimized and are in good shape to have the knee replaced.

It is of the utmost importance that you discontinue the use of any Non-Steroidal Anti-Inflammatory Drugs (NSAID'S), especially aspirin, 2 weeks prior to surgery. You must inform us also if you are taking any other blood thinners such as coumadin or Ticlid. These medicines can cause increased bleeding. If you need pain relief during the time of waiting, you must rely on Tylenol, with or without codeine.

The blood donation will be administered by Long Island Blood Service (1-800-439 6876). You will be asked to take iron pills as well as Vitamin C. The iron pill is needed to build up your blood cells as soon as possible after you have had your blood donated. This may cause black stool as well as constipation, which can be alleviated by milk of magnesia or any over-the-counter laxative. Steve Olster will stay in touch with you. On your return visits for the comprehensive physical examination, you will also encounter the Anesthesiologist to discuss your choice of anesthesia. During the procedure you will receive a prophylactic dosage of antibiotics to prevent you from having a post-operative infection that will be repeated for 48 hours post-operatively. You will also meet our physical therapist who will instruct you on your exercises that you must do after surgery. Included in this is also crutch training, stair climbing, and upper extremity strengthening. You will see a movie which reinforces the important aspects of postoperative rehabilitation. If possible, you

should minimize obstructions in your house by making arrangements to sleep downstairs thereby minimizing the number of stairs you have to climb. Clear walkways inside the house by folding up area rugs. Be careful of animals that you do not accidentally trip over them when they are overly happy to see you return from the hospital. If you live alone, you may want to have a friend or a relative stay with you for a short period of time after the surgery. Make sure that someone will be available when you are in need. Leave all jewelry at home. Only bring personal hygiene articles. We will provide you with gown, robe, slippers, etc. Do not bring your medications but tell us what you take regularly.

If you are unable to provide your own transportation to the hospital we will discuss the options for you to go into our HOPTEL which allows you to stay overnight in a motel like environment. Please note though that there will be no nursing available and you have to provide for your own dinner, which is available in the veteran's dining room, which is located in the basement. You will receive meal tickets. Do not forget to take your regular medication for that day! It is of the utmost importance that you do not have any food or liquids after 12:00 midnight! At 7:00 A.M. you will report to ASU (Ambulatory Surgical Unit) which is on the first floor close to the operating room suite.

In case you do have your own transportation such as being brought in by your friend, relatives, family, you will be asked to be at the ASU at 7:00 A.M. on the day of surgery.

8. Actual Surgery and Postoperative Course:

You are usually the first case of the day in the operating room. The consent for the surgery is usually obtained while in the ASU. From there, you will be taken to the Pre-anesthesia room. The anesthesiologist and the staff will instruct you again on the type of anesthesia you have chosen. General anesthesia puts you into a deep sleep and requires assistance while you breathe. Risks are usually small and related to heart and lungs. With epidural anesthesia, your legs are numbed and you do not feel the operation. Numbing medication is placed around the nerves inside your spine, combined with sedation, which is a great way of not remembering that you had surgery on waking up.

The actual surgery is carried out by the team of physicians whereby your attending physician is the leader and the assistants are residents in different years of training. The Chief Resident will stay on the side opposing the attending at the operating table. There are special cuts made to your bones. It is faster and more appropriate if the instruments are used simultaneously on both sides of the table. It takes about two hours to do the actual procedure. The wake-up period will be in the recovery room with appropriate pain medications to ease your discomfort which is from the surgical incision rather than from the arthritic pain. You will be surprised at the loss of the nagging pain which you had before the surgery. You will be able to control our own pain medication by pushing the button on your PCA (Personally Control Analgesia) Machine. Do not worry about over medicating yourself. The machine will not allow you to do this. Once you are off the PCA Machine, which is usually in about 2-3 days, you have injectable and/or oral pain medications ordered but you have to ask for it at times. . Once your systems are stabilized in the recovery room you will be transferred to Unit 23.

Remember, we can only put the components in place, but you will be the one who will make them move. It is therefore very important for your recovery to start mobilizing the knee as soon as possible. This is done with the assistance of our Physical Therapists and by a machine, which is called a CPM (Constant Passive Motion) machine. Your operated leg is strapped onto it and moves the knee automatically through certain ranges of motion which over a period of 8-10 days increases your range from 0, which is completely straight out, to at least 90 degrees bend. Your goal is to achieve and maintain always full extension, which means that the leg, is straight out all the way. It is less painful to have a pillow under the operated knee because it makes you feel better but it does not help to make the knee straight. Before your exercise routine, we will provide you with enough pain medication so that you are able to work out appropriately. Exercises must be started at least on your second post operative day and continue daily 2 hours in the morning and 2 hours in the afternoon. Bending is similarly as important as getting the knee straight. The CPM Machine is most helpful to achieve this goal. The physical therapist will assist, and supervise your progress. You will note that your wound is covered with a circular dressing with a tube extruding, which is connected to the interior of the knee to collect excessive blood. It is connected to a plastic suction canister and is emptied by the nurse at regular intervals. This is usually discontinued on

your second or third day, depending on how much post operative bleeding there was. On the second or third day, we also extract the catheter from your bladder which was necessary for monitoring your systems as well as allowing you to more easily urinate. On the third day your dressing will be changed. After that you can now even better exercise your knee. You will learn how to walk again first with the aid of a walker. When you feel more secure on your feet, you will then be instructed on how to walk with crutches.

On the third day, a paper transfer will occur to Physical Medicine & Rehabilitation. You will still remain in the same room. Along with the Orthopedic staff, you will also be cared for by the staff of the Physical Medicine and Rehabilitation Service. Your chores will still be the same namely to exercise your knee for as much bend as possible and making your knee absolutely straight. Physical Therapy will also assist you to strengthen the necessary muscles on a regular basis.

You will note that you have some intermittently pumping cuffs on your legs which are intended to prevent blood clots from forming, a complication which we discussed earlier.

In about three days you will be walking with a walker around your hospital bedroom, to the sink and probably out in the hall. Climbing stairs will happen in a period of about 4-5 days. Your dressing will be regularly checked for excessive bleeding and for the looks of the wound to ensure that it is healing properly. The medical staff will continue to encourage you to straighten out your knee and that it continues to bend increasingly. In ten days to two weeks, you will be going home. You will receive return appointments 3 times per week after your discharge, to our Physical Therapy Department for supervision and continuation of your exercise programs which will continue to improve your range of motion, strength, and endurance. You will continue to be on blood thinning medication which will be checked regularly as we have explained earlier. This will be done by your Primary Care provider. If you go home with Lovenox injections, you will be instructed on how to give these injections to yourself. It is given for about 2 weeks. There is a non-invasive test called a sonogram, which checks for blood clots. If it is negative, your injections will be discontinued. The surgical staples are removed two weeks after surgery, either while you are still in a hospital or during your first visit to the Orthopedic out patient clinic. The physical medicine doctor will usually see you 4 weeks after discharge or at a time when you are in physical therapy. As I have mentioned before, the most important thing is for you to keep your knee straight and bend it to at least 90 degrees. You will be allowed to take a shower after approximately a week. You can drive a car in about 6-8 weeks after surgery. You will be seen in the orthopedic clinic roughly 2 weeks after your discharge from the hospital. In about 3 months you will be able to climb stairs, do all the personal chores you need to do in the house, also ambulate outdoors for certain distances. Your improvement will continue for at least a year after which time you must have achieved full straightening and bending to approximately 100 – 120 degrees. Let me restate that it is up to you as to work hard to reap the benefits of the surgery

9. How Long Will a Total Knee Replacement Last?

That is controlled by several factors. The older you are, the less active you will be, and therefore there are fewer chances that you will be abusing your new knee. The younger you are, the greater the chance of a revision after about 10 years. This is especially true if you participate in any impact sports such as basketball, running, etc. You certainly will be allowed to do gardening, dancing, golfing, walking, swimming and bicycling without any restrictions but contact or impact sports are prohibited.

10. Summary:

A Total Knee Replacement has proven to be quite successful and beneficial and contributes significantly to pain relief and improvement of your quality of life. We pray that your surgery will be successful and your stay at the hospital a pleasant one. Many of your questions I hope are answered with this message and remember you always can talk to us. Good Luck!