Dr. Vivek Mittal

M.B.B.S., M.S. (Ortho),
ASIF fellow

E-Mail: ask@drvivekmittal.com
Phone: +91 9811082458

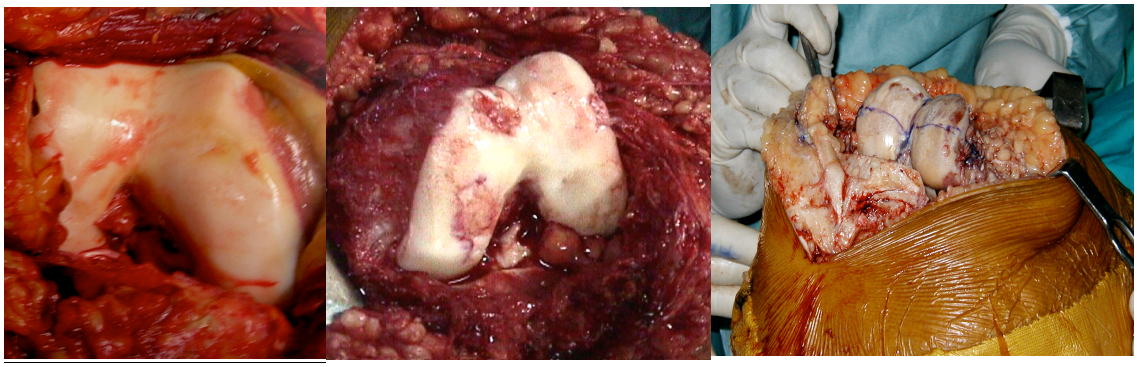
TOTAL KNEE REPLACEMENT

Total knee replacement surgery is the most common and successful joint replacement procedures in Orthopedic Surgery. Now approx. 200,000 Total Knee Replacement operations are done in USA alone every year.

Our knee joint moves millions of time to allow us to do routine activities like walking, sitting / squatting, climbing, playing, dancing etc in our life without us even knowing. Arthritis of the knee joint makes our joint painful, stiff and deformed thereby restricting our activities significantly.

What is knee arthritis?

Arthritis is a disease that destroys the cartilage in a joint. It is characterized by progressive wearing away of joint cartilage leading to exposure of bare bone within the joint. Osteoarthritis or degenerative joint disease is the most common arthritis of the knee joint. Other causes can be Inflammatory Arthritis for example Rheumatoid Arthritis, or post Injury (old malunited fracture, neglected meniscus injury, or neglected ligament injury), and post Infection, etc.



Normal Knee Cartilage **Partial Damaged Knee** **Severely Arthritic Knee**

Symptoms of knee arthritis patient?

If you are suffering from knee arthritis then you may have one or more symptoms in varying severity:

- Pain in the knee joint is the commonest symptom. In the beginning you will notice pain after walking or stressful activities, but as advanced arthritis sets in, you may have constant pain even at rest
- Restriction or Limitation of knee movements (Knee Stiffness)
- Recurrent or persistent swelling of the knee joint
- Tenderness in the front and back of the knee joint. In severe arthritis tenderness is also seen along the shin (tibia bone below the knee joint)
- Deformity of the joint (mostly bow-leg deformity, less often knock-knee deformity). You will see these deformities more pronounced on weight bearing or standing.
- Feeling of instability especially on getting up from a chair / bed
- Difficulty in walking

Other Symptoms:

1. Most of you having persistent flexion and bowleg deformity may also notice progressive low back ache unless you use a cane / stick.
2. Similarly, you may also experience shoulder pain, as you start supporting your body weight on your elbows and upper limbs, especially when getting up, climbing a high step or even while walking.

"With progression of your knee arthritis, most of you may not notice a steadily deterioration in symptoms, but rather good periods or bad periods in which your symptoms may vary in intensity. However, in advance stage, duration of good period reduces drastically and you will become aware of pain most of the time"

How to diagnosis Arthritis of the Knee joint?

Besides clinical history, physical examination along with X-rays of B/L Knees AP Standing and Lateral are sufficient enough to diagnose Osteoarthritis of the knee joint. However, some times one may require MRI of the knee joint for early arthritis. There is no blood test to diagnosis Osteoarthritis, however, blood tests are done to rule out infection, rheumatoid arthritis etc.

For inflammatory arthritis one may need to undergo blood test for confirmation and to see activity of the disease

Is it possible to manage knee pain without surgery (NON OPERATIVE TREATMENT)

It is certainly possible to manage pain and stiffness without surgical treatment, however the duration of relief may vary from patient to patient. You may choose one or more of the following methods to reduce your pain:

Medications:

- Analgesics / NSAIDS / Pain Killer Medicines: *help in pain and stiffness by reducing swelling, and inflammation in the joint. Occasional or limited use of analgesics is accepted, however, overuse or excessive use of pain killers can damage your kidneys adversely or even irreversibly. Topical use of pain-relieving cream / oil / balm is safe.*
- Nutritional Supplementation: *Nutritional supplements like Glucosamine and Chondroitin can help in early knee arthritis patients to improve the joint's mobility and knee pain from arthritis. Both*

are naturally occurring substances found in the cartilage. Glucosamine is believed to promote the growth of new cartilage and repair the damaged cartilage while Chondroitin is believed to inhibit cartilage-destroying enzymes and promote water retention, improving the elasticity of the cartilage. These medicines are safe for consumption for a prolonged period, but have limited or no effect in advanced arthritis.

- **Injections**:

  Synvisc / Hyluron injections: *like oral glucosamine supplementation may delay onset of arthritis in some patients, but unlikely to provide relief in patients with advanced arthritis or in patients with marked deformity.*

  Cortisone injections: Intra-articular Corticosteroid injections *decrease inflammation in the joint thereby reducing pain. Though lot of myth surrounds use of steroid injection, but they are effective in mild to moderate arthritis, however not much beneficial in advanced arthritis. The duration of relief varies to a large extent from patient to patient and is less with advanced arthritis. The duration of relief also reduces with subsequent injections. 3 to 4 injections per year are safe. Always inform your doctor if you have diabetes mellitus.*

- DMRD or disease modifying drugs *are must in patient suffering with Rheumatoid Arthritis*

Non-surgical Life style Modification for patients suffering with knee arthritis:

"Temporary relief from symptoms"

- **Weight Reduction:** *can help a morbidly overweight patient. It is important to reduce weight before surgery, however difficult to accomplish in advanced arthritis due to pain, stiffness and immobility caused by arthritis.*

- **Modification of activities**: *activities causing excessive strain on your knee joints should be avoided as much as possible. These include squatting (Indian toilet position), sitting cross-legged, climbing steep steps, high-impact sports activities / prolonged walking, etc.*

- **Exercises / Physical Therapy:** *Strong and flexible muscles around the knee joint can reduce burden on an already damaged knee joint. Strong muscles not only act as a shock absorber but also maintain functional use of the knee joint. A strong muscle also reduces the severity of knee deformity besides reducing feeling of instability while getting up from the chair, etc. So start doing stretching and strengthening exercises, even if they cause some discomfort and remember you will also be required to do these exercises after surgery. Though not popular in our country, various aquatic activities are also effective in treating arthritis since they allow mild resistance while removing the weight-bearing stresses. To do the exercises properly learn them from a trained physiotherapist.*

- **Physiotherapy**: *Hot packs, ultrasonic therapy, IFT, wax bath etc. can also help you in reducing acute exacerbation of symptoms as a result of arthritis.*

- **Braces / wedge heel in footwear / kneecap** *They are made of plastic, metal, leather or foam. They provide external stability and help to realign the joint by putting pressure on the sides of the joint. Though they try to decrease the contact between the bone surfaces and increase mobility while reducing pain, yet they cannot substitute for strong and flexible knee joint muscles. They mostly help on temporary basis.*

- **Walking aids** (Cane / Stick / Crutch / Walker) *they all help as they reduce load / demand on an already damaged joint.*

"Though these above measures will help reduce your symptoms temporarily, but remember they can never reverse changes of arthritis in your knee joints"

Myth: *"Many people believe that avoiding activities or spending life in bed will preserve their knee joint from damage, or more activities will quickly damage their knee joint"*

Nothing can be farther from the truth, as **"saving the joint" by becoming totally sedentary** will not slow down the arthritis, on the contrary sedentary life style will weaken bones &

muscles thereby predisposing your joint to early deterioration. Also routine activities including walking will not make the knee joint vulnerable for arthritis earlier.

Most or all of these measures can be made use of from time to time and will give relief, the duration of which can vary from few days to even a few years. However, if your disabilities or pain persist for more than 4 – 6 months, you may have to opt for surgical procedure.

OPERATIVE TREATMENT

When one has tried all non-operative measures, then one has to resort to operative treatment. Operative treatment can be broadly divided into two broad categories.

Joint saving procedures

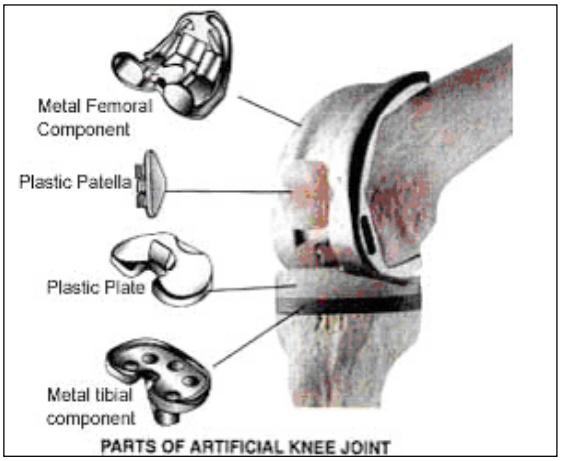
Arthroscopy: key hole surgery where joint can be seen through a small cut (5mm). This procedure is used to remove loose fragments / bodies of cartilage or bone and to wash out the knee joint.

Knee Osteotomy: A realignment procedure of tibia is usually opted for in younger patients with partial damage to the joint.

Joint replacement procedures

They can be either Partial knee replacement or Total knee replacement. In a properly selected patient total knee replacement gives a new life by greatly improving quality of life for a long time.

What is knee replacement surgery?



PARTS OF ARTIFICIAL KNEE JOINT

It is an operation where your surgeon just resurfaces the damaged knee joint. In other words the damaged articular surfaces of both the femur (thigh) and tibia (leg) bones are fashioned in such a way so as to allow capping on both sides using high quality metal implants (as is done in capping of a damaged tooth).

The final implant consists of a metal cap on femur, metal plate on tibia and a plastic insert in between. Sometimes, undersurface of patella the bone is also then shaven to accommodate a plastic button.

This resurfaced joint needs your ligaments and muscles for smooth functioning.

Myth: Whole knee joint is replaced by an artificial implant

"Knee replacement surgery is not a heart transplant surgery where entire heart from another person is transplanted to recipient. It is a simple, precise and less extensive operation"

Who Needs a Total Knee Replacement?

To make our life comfortable, all of us seek various non-operative modalities, as mentioned above, from time to time to eliminate pain and regain movements. Some of us may get respite from pain and stiffness for a very long time, most for a varying period while a few failed to get

any relief. You should consider total knee replacement if despite trying for a significant period of 4-6 months, you still have the following:

- Severe pain in spite of daily analgesics or restricting ordinary activities of daily living and recreations
- Significant instability (constant giving way) of your knee
- Significant leg deformity (bowing / knock knees / flexion deformity) causing pain and inability to walk

Is there any harm in living with the damaged joints?

Knee replacement surgery is considered only for severely damaged knees and when conservative treatment is not helping. Knee replacement surgery not only changes your life style for better but also brings independence in your activities, thus making it a wonderful operation.

However if you choose to live with your damaged joints:

I. Then you will continue to live with pain and walk with difficulty due to the deformed joints.
II. If your damaged joint becomes unstable, then you may fall and sustain fracture either around your hips or develop stress fracture along the shin bone. Your osteoporosis may also worsen as a result of inactivity thereby making your bone more prone to fractures.
III. Your deformities and instability will only worsen with your age or passage of time.
IV. Also regular consumption of analgesics and anti-inflammatory drugs may damage your kidneys and cause ulcers in your stomach.

I am afraid of getting operated in my old age and also the pain thereafter!

"Most of the patients believe that they will either have a lot of pain during operation or after operation they will get up in severe pain. On the contrary you will certainly have no pain during surgery. After surgery also you stay comfortable enough to allow active or passive mobilization of your knee on CPM machine".

Please understand that Knee replacement surgery is considered in the elderly, however, this should not create any undue apprehensions in your minds. Most of you may be suffering from one or more of the followings ailments, i.e., hypertension, diabetes mellitus, coronary artery disease (MI / Angina / heart surgery), asthma, and hypothyroidism. You will undergo a thorough medical evaluation by an anesthetist and intensivist before surgery.

Newer anesthesia and modern surgical techniques ensure that the surgery is painless. An injection of a painkiller cocktail inside the joint during surgery and (PCA) patient control analgesia helps in taking care of the pain after surgery. Within 4 to 5 days after operation (during hospital stay itself), almost all of you will be comfortable to ambulate (with support initially), start going to the toilet and able to climb few steps.

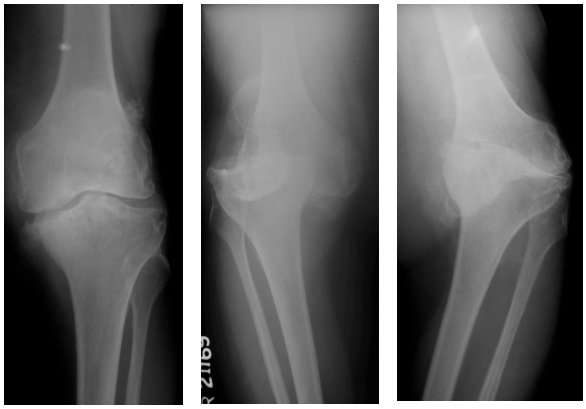
Advances in anesthesia, surgical techniques, and newer generation of medicines have made this operation more tolerable, comfortable, and a pleasant experience.

I am scared that I can become worse after the surgery and are there any risks from the surgery?

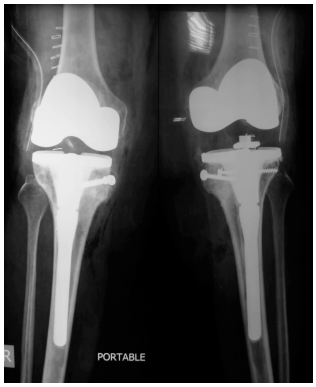
Total knee replacement is a highly successful and predictable operation. It has a success rate of over 95%. This means that an overwhelming number of patients reap the benefits of surgery. Over 250,000 operations are performed in USA alone every year. In India too this operation is an established procedure. But if you delay the surgery for too long, it can either lead to extensive damage or loss of bone from the joint surface or can cause severe ligament instability. Once this happens then you may not get the optimal result after surgery.

Example of a patient who refused surgery for a long time

X-ray of a severely arthritic knees who refused surgery 4 years ago



X-ray of the same patient now with grotesque deformity at the time of surgery



X-ray of the same patient after the surgery

Complications after Total Knee Replacement Surgery?

As with any major surgery, potential risks are also involved with total knee replacement surgery. Their incidence, fortunately, is small. Those complications, which are not directly related to the knee joint, usually do not affect the result of the replacement surgery, but can be life threatening. These complications are blood clots in legs or blood clots in lungs.

Other complications are also less common and they directly affect the outcome of surgery. The operation is not considered as successful in these cases. They are Infection in the knee, some knee pain, stiffness, loosening of the prosthesis etc. Although extreme care and due care is taken to prevent such complications, however they can still happen in the best of hand. Most of these complications can be set right by timely investigations and subsequently by operation.

What benefits can I expect after the surgery?

Knee Replacement Surgery in India is a highly successful operation and large numbers of such operations are performed through out the world every year. Once the surgical scar has healed then you will appreciate the true benefits of the surgery that are as follows:

- A dramatic reduction in joint pain; many do not have any pain
- Correction of deformity and regaining knee alignment
- Independence in movement and mobility like walking / getting in and out of bed / climbing up and down the stairs

Before surgery X-ray of before surgery After surgery X-ray of after surgery

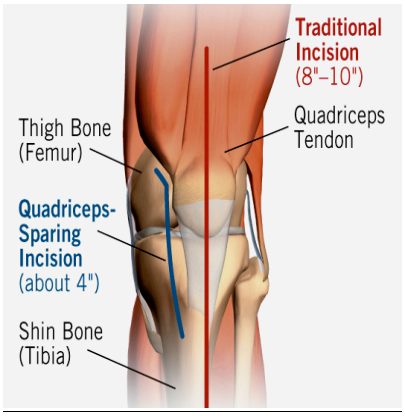
Knee Replacement not only improves your quality of life but also gives you independence by allowing you to return to your activities like driving, attending office and social functions, shopping, enjoying holidays, etc. **With high flexion knee implants you are even allowed to sit on the floor**. Running, jumping, jogging, or other high impact activities are discouraged. But you can resume bicycling, swimming, golf, and other low impact sports.

How long will my artificial knee be expected to last?

With advances in science and metallurgy, current generations of implants are strong and durable. Average life span of a knee implant is considered 15 years. Even after 15 years the survival rate of a knee implant is approx. 85%, which means a sizable population does not need revision surgery. The major long-term problem is aseptic loosening and osteolysis, occurring as a result of the crumbling of cement or wearing of plastic insert. Newer material implant Oxinium knees are now available and expected to last even longer.

What is new in knee replacement surgery?

Minimally Invasive Surgery: Broadly speaking an knee replacement surgery can be carried out either through the traditional approach, or newer minimally invasive approach (MIS), also known as quadriceps-sparing approach.



It allows surgeons to insert the same artificial implant through a shorter incision.

This surgical approach avoids trauma to the quadriceps muscle, which is the most important muscle group around the knee, thereby allowing quicker recovery time including walking and knee bending movements.

The less-traumatic nature of the surgical approach may also reduce post-operative pain and diminish the need for rehab and therapy compared to more traditional approaches.

This technique is appropriate for majority patients, however needs expertise from your surgeon to prevent any wound complications or component Malalignment.

Newer Materials "Oxinium Knees": The latest advancement is the availability of newer materials for knee replacements; pure ceramic or ceramic coatings on metal are the latest in technology. Oxinium or Oxidised Zirconium is the wonder material that has been used successfully for knee and hip implants. It is a metal with a coating of ceramic. This ceramic surface is more durable than normal metals.

The advantage of Zirconium knees implant is in its hardness, thereby lasting 85 times longer on a simulator test machine. Additional advantage is that they are scratch resistance. As a result, the Oxinium total knee replacement will generate far less quantity of plastic wear debris that cobalt chrome will, and therefore implant should last considerably longer. As Zirconium is one of the six most biocompatible elements known to man, so your immune system will more easily tolerate your new implant and can be easily used in patients allergic to nickel the metal most often used in the current implants.

It is ideally suited for younger and active patients and those patients allergic to metal. On the downside, it is more expensive than conventional total knee replacement implant.

Computer Navigation: Joint replacement surgery is a combination of precision and surgical skills. The most important aspect of knee replacement surgery is to accurately restore the mechanical alignment of the leg. Computer navigation improves component position and alignment after knee replacement; thereby it is expected to further improve the results.

The use of such a technology has certain additional benefits. Not only does the computer guide the accurate bony cuts, but they can also be carried out with a small incision, which is called 'minimally invasive surgery' (MIS). Computer navigation also reduces the risk of complications by providing constant guidance and monitoring during the surgery.

Patient Specific Instrumentation: (see what's new) There is a close correlation between poor implant alignment and poor clinical outcome in total knee replacement surgery. Most surgeons strive to ensure that implant alignment is optimal for excellent outcome.

Patient Specific Instrumentation is one of the new and visionary technologies in total knee replacement surgery.

You are required to under go X-rays of entire lower limbs while standing and MRI of the knee joint. These images are then used to create a virtual, computer-based model of the patient knee, based on which, specific bone cutting zigs (custom block) are made. These blocks provide a "hand in glove" fit during surgery as they "exactly matches the patient's unique tibial and femoral anatomy". During surgery they provide accurate bony cuts thus allowing precision to the final implant position. These "Blocks" are patient specific (even to the individual knee) and disposable.

Patient Specific Instrumentation is advantageous to patients, Surgeons and Hospitals alike.

For patients: improves accuracy of alignment and reduce incidence of clotting and blood loss during surgery.

For Surgeons: quicker & efficient surgery with greater accuracy.

The main disadvantage of Patient specific instrumentation at the moment is waiting period of approximately 4 weeks (time taken to deliver custom bock after patient X-rays & MRI) and additional cost of approx., Rs 45000/- (or approx. 1000$) each knee.

Should I go for one knee at a time or both knees simultaneously?

The decision for one side or both in bilateral knee arthritis is dictated by your medical condition. As there is a very small risk of mortality, in a patient with high-risk, one knee is operated at a time. Otherwise, both knees are replaced in the same sitting in majority patients. The advantages of simultaneous knee replacement surgery include one-time anesthesia, one-time hospital stay, one-time medicines, and one-time physical therapy. It means saving the cost too. Your doctor can advise you for the need of replacing both the knees simultaneously.

How do you plan my surgery for total knee replacement?

First step in planning your surgery is to ascertain whether knee is the cause of your pain and is damaged severely enough to warrant surgery. At times, affliction from spine or hip joint can simulate knee pain and total knee replacement will fail to relieve your pain in these situations. Your evaluation is therefore essential by not only ensuring your knee to be the cause of your disability but also to assess the stage of your arthritis. One can also set goals for returning you to a better quality of life after knee replacement.

In history, we assess when your pain began, any prior knee injuries or problems like sepsis, your activities of daily living, quantifying the need of pain killers, any drug allergies, etc. We will also be discussing your medical history with you to assess the risk during surgery.

A physical examination will identify your knee's mobility, strength, and alignment. A standing X-ray of both knees from front and supine X-ray of both knees from side will help evaluate the extent of damage and deformity in your knee.

You may be subjected to blood tests, an MRI (magnetic resonance imaging scan), or a bone density scan if required.

We recommend surgery when non-surgical treatments like lifestyle changes, medication, injections and physical therapy have been exhausted. Surgery can provide you adequate relief of pain and good functional recovery to return to the best possible quality of life.

Correction of knee deformity, relief in pain, and restoration of the movement with the least amount of risk is our goal.

What happens during my hospitalization?

Before Surgery: Most of the patients are admitted a day before surgery and undergo a through medical checkup which includes evaluation by the treating surgeon, anesthetist, intensivist, and physiotherapist besides investigations like Chest X-rays, *ECG,* blood and urine test. X-ray images of knees from different angles are taken to plan your surgery.

Knees are scrubbed with soap and water, painted with betadine solution, and then covered with a sterile drape in your room a night before your operation.

Surgery: Preferable choice of anesthesia is Spinal anesthesia (it anesthetize both legs only) with sedation. The duration of surgery for one knee is about approx 45 minutes, while that of both knees approx 1hr 40 minutes. You will be kept in a recovery room for one day for the monitoring of vital parameters. Knee bending is started on an exercise machine on the day of operation.

After Surgery: On the *2nd* day your drainage tubes will be removed *while on 3rd day your dressing will be changed. In some cases a knee immobilizer will be worn. Knee bending on the CPM machine is started on the day of surgery; bedside sitting is started on the 2nd day while walking with support and toilet training are started from 3rd day onwards.*

Most patients can ambulate comfortably with the support of a stick or walker, bend knee up to 80^0 to 90^0, start going to toilet and are also able to climb a flight of stairs. Most patients are comfortably discharged on 6th or 7th day. In an exceptional case, or if your medical condition warrants, then you stay a little longer in the hospital.

What happens after I go home?

The process of steady recovery started in hospital continues at home as well.

You will continue to take medicines prescribed by your doctor including analgesics for a few more days.

Do not wet the knees until after removal of the stitches 2 weeks after the surgery.

Your ambulation / walking will progressively increase as per your comfort level; initially you will need the support of a stick or walker. You will also be needing a physiotherapist at home to help you in regaining knee movements, in muscle strengthening exercises, in climbing stairs and gradually helping you walk without the support of walker / stick.

How long does it take to recover?

You must understand that the surgery can only correct the knee problem, but the muscles will remain weak and need to be strengthened through regular exercises for achieving your goals after surgery. The time taken to regain the complete range of movements and to achieve good muscular strength varies from patient to patient. It needs proper understanding, determination and full participation from the patient to achieve this.

On an average, when both knees are operated upon together, the usual time to walk around without support is six to eight weeks, while one knee replacement requires three to four weeks.

What is the cost of total knee replacement surgery?

Total knee replacement is relatively an expensive surgery. The most expensive component is the artificial implant. Still the cost of Total Knee Replacement in India is far less compared to the western world. Our charges for Total Knee Replacement Surgery vary from the category of the in patient bed chosen by you for surgery and also the type of Total Knee Implant selected.

Please refer to TKR packages

Is there any special care after knee replacement surgery?

Replaced knees remain an integral part of your body and little extra care should give you years of service. You can protect it by taking a few simple steps:

Watch for and prevent infection: *Any foreign implant (like your new knee) is more susceptible to infection, and therefore you must be diligent about preventing infection. If you suspect infection of any kind in the operated area or elsewhere in the body, please contact your doctor right away. This instruction should be followed through out your life.*

Regular Follow-up: *Your regular follow-up visits will ensure the long-term success of your operation. After removal of the stitches at 2 weeks your routine visit schedule will be 6 weeks, 3 months, 1 year, 2 years followed by every 5 years. If required, follow-up X-rays will confirm proper placement and alignment of the artificial joint.*

Weight control and regular exercises: *It is difficult to reduce weight in a morbidly obese patient with severe arthritis before surgery, but after surgery keeping your weight under control is very important. This will reduce the amount of pressure and stress on your new knee. Participate regularly in low impact activities to strengthen your replaced knees and get the exercise you need to stay fit.*

Regular treatment of medical conditions like diabetes mellitus, rheumatoid arthritis, gout, hypertension, hypothyroid, asthma, heart conditions, etc., is to be continued as before.

What I am Not supposed to do after knee replacement surgery?

Avoid high impact sports
Do not attempt to squat or sit cross-legged after conventional knee replacement.

Can I sit cross-leg after knee replacement surgery?

It is not advisable to sit cross-legged on the floor after conventional Total Knee Replacement. But now it is possible to sit cross-leg or squat after High Flexion Total Knee Surgery as this implant allows deep flexion. However, it is important to realize that the ability to sit cross-leg and squat does not only depend on the implant or the surgeon, but to a large extent on pre-operative good range of motions and also on your muscle strength.

After High Flex and Gender Knee Replacement




How should I prepare for total knee replacement surgery?

The above facts will not only help you understand the issues involved in the success of total knee replacement surgery, but will also help you prepare mentally for the surgery. Preparation for surgery requires:

- Faith and commitment
  - In your doctor and accepting realistic goals
  - Total commitment and positive thinking: *because outcome of surgery depends on the team consisting of yourself, your surgeon, and the physiotherapist. Your family is also an important part of this team. All of them together will work for a common realistic goal and towards the success of your surgery.*
- Loose
  - Excess weight: *Because excess weight causes more strain on already damaged joints, losing weight is one of the best ways to improve the condition of your knee and optimize surgical results.*
- Exercises
  - To strengthen your muscles and improve the range of movements.
- Thorough medical checkup
  - *Before surgery we would like to make sure that your condition is well enough to undergo this operation and also to exclude certain conditions such as dental infection, ear, nose and throat infection, skin infection, urine infection, etc.*
- Stop
  - Smoking: *if you have not already done so, it is suggested that you stop smoking. This will be good for you during and after your surgery.*
  - Stop analgesics / pain killer medicines *7 – 10 days before surgery.*
- Inform your doctor
  - Blood thinner medicines need to be stopped, under medical supervision, before surgery.
  - Allergies to medicines, etc.
- Arranging blood donors for surgery
  - *Routinely* blood transfusion *is not necessary after a Single Total Knee Replacement. But if your hemoglobin is less than 10 gm% then you may require 1 to 2 units of blood for your operation, so kindly arrange donors for this purpose. If both of your knees need replacement in the same sitting, then up to 2 to 3 units of blood may be required depending on your hemoglobin levels.*
- Timing of surgery
  - Total knee replacement *is a family affair in our circumstances as your surgery affects the entire family. Therefore you and your family should look at the convenient date and discuss with your doctor rather than other way around.*

You can reach me on ask@drvivekmittal.com for more information.