

TOTAL KNEE ARTHROPLASTY (TKA)

TKA is one of the most successful surgeries performed with excellent 15–20-year survivorships routinely reported in large series by multiple surgeons. It is widely used in the treatment of severe knee osteoarthritis, Inflammatory arthritis, rheumatoid arthritis, gout and other general arthritic conditions.

When the medical treatments (antalgic and anti-inflammatory medications, heel wedges, off-loading knee braces, weight reduction, activity modification, the use of ambulatory aids , intra-articular corticosteroid or viscosupplementation injections, physiotherapy have failed, time is coming to implant a prosthesis to relieve pain and to restore knee function.

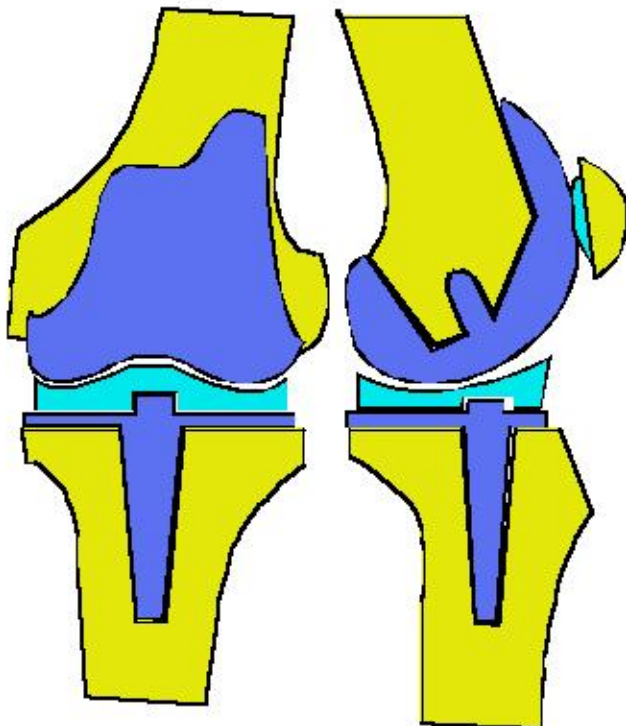
PROSTHESIS COMPONENTS

The devices are composed of:

- a fixed femoral end
 - a fixed tibial plateau
- these components articulate by the intermediary of:
- a polyéthylène insert replacing the two damaged articular surfaces.

The patellar surface is not always damaged and in that case the surgeon doesn't resurface it.

One successful design concept that has evolved over the last 3 decades is the use of **mobile-bearing TKA** : it allows unimpeded freedom of the polyethylene inserted between the femur and tibia to rotate around a central post on a highly polished, cobalt-chrome tibial surface leading to less polyéthylène wear.



schema of a Mobile Bearing Knee



KINEMATICS of THE PROSTHESIS

Kinematically, the native knee joint is much more complicated than a simple "hinge" joint. TKA attempts to recreate the complicated sagittal and rotational plane kinematic motions that occur during range of motion in the normal knee.

The mobile-bearing TKA allows increasing implant conformity and substantially increases contact area, reduces contact stresses, and lowers polyethylene wear . This is supported by in vitro testing and the excellent long-term

It improves control of anteroposterior translation with reduced paradoxical anterior femoral translation and self-aligning behavior to maintain large, centrally located surface contact areas at the femorotibial articulation during both flexion-extension and axial rotation of the knee which is much more difficult to achieve in fixed-bearing TKA designs.

The rotational freedom provided by rotating-platform TKA designs assists in maintaining self-alignment of both the patellofemoral and femorotibial articulations throughout knee flexion, lessens polyethylene surface stresses, and reduces polyethylene wear by decoupling multidirectional motions to more monodirectional motion patterns at 2 differing interfaces, thus **reducing cross-shear stresses and wear.**

CHECK-UP BEFORE SURGERY

In order to detect vital risk for anesthesiology, and to assess a potential risk of post-operative complication in a short or long term follow-up, a medical questionnaire checking list is needed to be accepted by the surgeon and his team.

Risk factors influencing complications are :

factors increasing risk of infection

- **Obesity** is associated with a higher risk of infection. Individuals with a body-mass index (BMI) >35 had a 2.1 times greater risk of infection compared with those with a lower BMI
- **patients with osteonecrosis and rheumatoid arthritis** had a 2.2 times greater risk of infection compared with those with osteoarthritis.
- **diabetis** :
- **previous infection of the joint**
- **arteritis**
- **tooth infection** : a panoramic dental X-Ray and treatment of dental problems is necessary to eliminate a potential risk of infection

factors increasing risks for medical complications

- American Society of Anesthesiology (ASA) scores > 3 is at risk.
- Previous algo neuro dystrophy may be a recurrent risk .
- Previous deep veinous thrombosis is a predisposing factor to recurrent episode

SURGICAL TECHNIQUE

One of the advanced technique is **minimally invasive TKR** :It allowes less blood loss, less pain, a shorter length of hospitalisation stay and an earlier return to function.

This technique of MIS knee surgery involves many different steps :

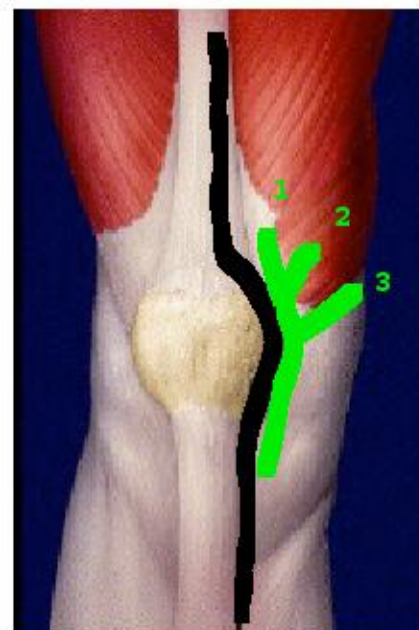
- the length of the skin incision (8 to 10 cm approximately)
- medial arthrotomy avoiding incision of the extensor mechanism, only incising 1_3 cm of the vastus medialis fibers without everting the patella , using particular retractors and ancillary materials adapted as smaller cutting guides.

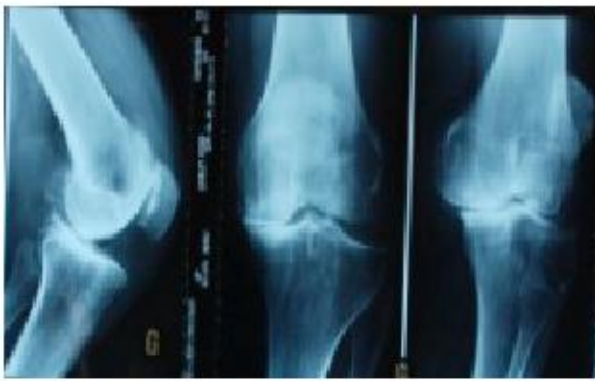
Approach is performed by incising the vastus medialis or along the border of the quadriceps tendon (green line 1 or 2 or 3). These approaches are more limited in their trauma to the extensor mechanism and have lower instances of extensor tracking problems

Once the bonecuts have been made, and the prosthetic trials have been implanted, final soft-tissue balancing must be carefully completed and trial reductions are done to ensure adequate positioning, tacking and soft-tissue tension, stability and good patella tracking. The definitive devices are then implanted generally with cementless components.

Wound closure is achieved with absorbable "vicryl" sutures and a suction drainage and skin closure with staples. A light gauze, cotton wool, and crepe dressing is applied.

During operation blood is aspirated through a blood filtration system (CELL-SAVER) ; this is continued during the next two post-operative hours so that to retransfuse the autologous blood (preventing any risk of blood disease transmission)





before operation



post-operative X Rays of a TKA

POSTOPERATIVE CONSIDERATIONS

Surgical technique is an only one part of the success of TKA ; The role of superior pain management, better soft-tissue techniques, more advanced anesthetic techniques, more aggressive physiotherapy and perhaps, most importantly, improved patient education and enhanced rehabilitations are as important components in improving stability, function, component longevity, and patient satisfaction.

You will stay 7 days in the surgical department of orthopaedics and then usually 14 days in the rehabilitation center.

Day of operation

The patient is mobilised at approximately 4 h post-op, under physiotherapist supervision. Straight leg raising exercises are encouraged, from a flexed position of the leg put on a pillow placed under the knee of the operated leg to allow the knee to rest in a fully flexed position. analgesia schedule plan systems are adapted.

First postoperative day

Ensuring that pain level is well controlled, the patient undergoes further range of motion, quadriceps, and hamstrings exercises twice a day under control of the physiotherapist. Sitting and walking are started. CPM is used twice a day.

Second, third, fourth postoperative day

The dressing was reduced to a light non-adherent dressing, and the drainage removed. Walking with a 2 sticks is started.

The patient continues to walk with the assistance of walking sticks. CPM is used twice a day. Active exercises are encouraged.

fifth and subsequent postoperative days

The patient is encouraged to climb steps, to rollskate while sitting, and to walk safely with two sticks and climb stairs independently.

Seventh day

transfer to the rehabilitation center where exercises of muscles reinforcement, and stability are performed.

NB: a full physiological and functional recovery usually requires more than 2 months.

COMPLICATIONS

Even with a careful act performed by a perfectly trained team, any complications may happen the same as in every surgical act. These are exceptional ; The list below is not exhaustive.

- **Infection** is one of the most dreaded complications of total knee replacement.

the efficacy of prophylactic measures and risk factors play an important role.

prophylactic measures: laminar flow, body suits, drains, surgical time (length), surgeon volume, and hospital volume the use of preoperative antibiotics.

detection and treatment of risk factors :

- Obesity, diabetes, pre op treatment of dental or urinary infection.

- **Skin necrosis** should be well controlled with adapted local healthcare . Its prevention is realised with a central skin incision. If not controlled, the risk is to transmit an infection to the prosthetic joint. A reoperation is necessary.

- **stiffness** Outcome variation in range of motion exists despite excellent surgical technique, refined implants, and uncomplicated postsurgical recovery. Mobilisation under anesthesia without opening the knee is sometimes necessary at the end of first week if flexion is still inferior to 90° and painful.

- **phlebitis** : preventive measure (early mobilisation, anti-thrombotic socks, low Weight Molecular Heparin anti-embolic prophylaxis for 6 weeks) and systematic echodoppler control at 7th day allow the risk to be minimize ; in case

LONG TERM FOLLOW-UP

- **wear** is not a problem with a Mobile Bearing Knee Prosthesis
- **loosening** is not a short term problem : but a regular follow-up control is necessary every three years. Overweight and overuse or traumatism are favorable factors for bone loosening ([see special form](#))

- post-operative requirements

- ***Do not overweight*** to prevent wear and loosening.
- Help with your arms to stand up from a chair, and climbing stairs to lessen the strains on the prosthesis.
- Tell your doctor or dentist that you have a prosthetic knee so that in case of infection he gives you adequate treatment with antibiotics to prevent an infection of the prosthetic knee that may occur even years after your surgery
- Do exercises at home and at least walk 30 mn a day. Sports activities are possible according to comorbidity, age, range of motion and stability, ; waiting 3 to 6 months after a TKA is the current recommended waiting time for return to sporting ([see special form](#)).



X_Rays of a Mobile bearing Total Knee Arthroplasty : front, profile and aerial views