

Knee joint replacement

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There are three compartments within the knee: medial and lateral tibiofemoral, and patellofemoral. In 20–50% of cases, OA affects only one compartment and these patients may be suitable for a partial or unicompartmental knee replacement (UKR) (Figure 40.4), while in tricompartmental disease a TKR is indicated (Figure 40.5). Patients are suitable for UKR if disease is limited to one compartment, if ligaments are intact and if fixed deformity is less than 15°. UKR has complication rates of one-third to one-half those of TKR with a lower infection rate, lower medical risks and lower risk of death. UKR is associated with a more rapid recovery , shorter hospital stay , preservation of knee kinematics and generally superior function to that of TKR. Revision rates for UKR are significantly influenced by the surgeon's experience and the implant. In optimal conditions the revision rates are similar to TKR, but on national registries UKRs have higher 10-year revision rates (6–12 %) than TKRs (2–6%). Isolated patellofemoral replacement is also performed but the numbers are low in view of the scarcity of isolated patellofemoral disease. Revision rates are higher than other partial knee replacements, largely because of progression of arthritis in the remaining compartments. A TKR can be regarded as a resurfacing procedure in which the femoral articular surface is replaced with metal and the tibial articular surface is replaced by a tough polyethylene insert, usually inserted into a metal tibial baseplate. TKR is one of the most successful surgical interventions, with most patients getting significant pain reduction and improvement in mobility . Revision rates are less than 5% at 15 years. Patient satisfaction with TKR is generally lower than that achieved with hip replacement. TKR implants are generally cemented into the bone using polymethylmethacrylate (PMMA) cement. The design of the articulation can provide varying amounts of stability or constraint. Unconstrained TKRs are the most common and can either retain or sacrifice the PCL; these implants are called cruciate-retaining (CR) or PCL-sacrificing (PS), respectively . The more constrained the implant the greater the force transmitted to the implant-cement-bone interfaces, therefore increasing the risk of loosening. More constrained implants are generally only used in revision cases. If the joint is very unstable or deformed then a hinged knee replacement is used as it does not rely on the ligaments for stability . Modern knee replacements try to reduce wear by using enhanced bearing surfaces such as cross-linked polyethylene, vitamin E-enriched polyethylene or ceramicised surface coatings. The TKR surgical technique aims to correct the deformity and leave the leg aligned with the mechanical axis and with the joint parallel to the ground. More modern philosophies of TKR try to match the patient's more individual alignment in the hope that this feels more natural to the patient, but it may require additional technology to allow this to be done accurately , e.g. computer navigation or robotics. It is important

Figure 40.5 Anteroposterior (a) and lateral (b) radiographs of a total knee replacement.

balanced to allow good stability , range of motion and patellar tracking. Early weight-bearing and mobilising are now possible, with some patients treated as day cases but most staying in hospital for 2–4 days. Complications following TKR can be broadly classified into intraoperative and postoperative (Table 40.2).

TABLE 40.2 Complications of total knee replacement. Intraoperative Implant malposition and malalignment; with subsequent contribution to instability, stiffness or pain Nerve or vessel injury, including tourniquet damage Fracture Patellar tendon avulsion Fat embolism Postoperative Infection Deep vein thrombosis/pulmonary embolism Pain/stiffness Instability Osteolysis Component loosening Dislocation Correct deformity caused by arthritis Align the knee to the mechanical axis or slightly under- corrected Joint line perpendicular to the mechanical axis Balanced collateral ligaments Ensure patellofemoral joint tracks normally

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Summary box 40.4 Aims of TKR

TABLE 40.2 Complications of total knee replacement.

Intraoperative	Implant malposition and malalignment; with subsequent contribution to instability, stiffness or pain
	Nerve or vessel injury, including tourniquet damage
	Fracture
	Patellar tendon avulsion
	Fat embolism
Postoperative	Infection
	Deep vein thrombosis/pulmonary embolism
	Pain/stiffness
	Instability
	Osteolysis
	Component loosening
	Dislocation
	Correct deformity caused by arthritis
	Align the knee to the mechanical axis or slightly under-corrected
	Joint line perpendicular to the mechanical axis
	Balanced collateral ligaments
	Ensure patellofemoral joint tracks normally

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