Patellar failure after TKA is often multifactorial. A careful assessment of patient factors, implant design and surgical technique must be performed. If there are major problems with implant design or component positioning, revision of the entire arthroplasty may be necessary to correct the patellar failure and ensure a durable result. Isolated revision of the patellofemoral joint for any reason must be approached cautiously, as a high failure rate is often encountered.

Introduction

In a recent series of revision total knee arthroplasties (TKA), extensor mechanism problems comprised almost 12% of the reasons for reoperation [1]. Reasons for failure in the patellofemoral joint are multifactorial and may be related to patient selection, implant design, surgical technique, or combinations of these factors. Therefore, any discussion of patellar component failures must consider multiple potential reasons for failure. Unfortunately, most studies of patellofemoral complications have not considered the importance of the tibiofemoral joint for the complication. Anterior knee pain, patellar instability, fracture, loosening, wear, extensor mechanism rupture, and a variety of miscellaneous problems affecting the patella can adversely affect the results of a TKA.

Etiology

Patient selection is an important variable influencing extensor mechanism complications. Patellar complications are increased in patients with a diagnosis of patellofemoral arthritis, obesity, osteoporosis, valgus deformity, post-traumatic arthritis, and prior proximal tibial osteotomy (Fig. 9-1).

A diagnosis of osteoarthritis and obesity has been associated with an increased risk of patellar complications [2]. In the presence of valgus deformity, varying degrees of lateral femoral condyle hypoplasia make rotational positioning of the femoral implant difficult. In knees with
preoperative valgus, a lateral retinacular release was necessary in 102 of 134 knees to treat intraoperative patellar subluxation [3]. The presence of patella infera following proximal tibial osteotomy or post-traumatic arthritis can result in impingement between the patella and the tibial component, resulting in pain or patellar instability. The patient with severe osteoporosis is at risk of patellar fracture following patellar resurfacing.

Surgical technique is an important variable influencing patellar complications. A midvastus or subvastus surgical approach results in improved patellar tracking and less frequent need for a lateral retinacular release than does an anteromedial arthrotomy. Using meta analysis, a lateral retinacular release was required in ten of 164 (6%) subvastus approaches compared with 31 of 172 (18%) medial parapatellar approaches [4–6]. Femoral and tibial component position affect patellar alignment and complications. Patellar complications are diminished by maintenance of the joint line and patellar height, lateral placement of the femoral component on the femur, medial placement of the patellar component on the patella, and posterior placement of the tibial component on the tibia. The femoral component should not be flexed on the femur, and the trochlear flange should be aligned with the anterior femoral cortex. If the trochlear portion of the femoral component is prominent, the extensor mechanism will be displaced in an anterior direction, resulting in increased lateral retinacular tension. The result is a potential decrease in knee motion and possible patellar maltracking. In severe cases, the patella may mechanically catch on the trochlear flange of the femoral component. Any deviation of the femoral, tibial, or patellar components from these ideal locations can adversely affect patellar alignment, leading to patellar failure. Internal malrotation of either the tibial or the femoral component will adversely affect patellar tracking (Fig. 9-2).

Alignment of the femoral component with the epicondylar axis or the AP axis appears to be best. Femoral component rotation parallel to the epicondylar axis resulted in the most normal patellar tracking and decreased shear forces early in flexion [7]. Rotating the femoral component either internal or external to the epicondylar axis adversely affected patellar tracking. There is a close relationship between the femoral epicondylar axis and the patellar axis. Placing the tibial component perpendicular to the epicondylar axis resulted in correct rotation in 73% of cases [8]. In a study of 102 TKAs, there was a mean of 6.2° of internal rotation in the knees with anterior knee pain compared with 0.4° of external rotation in the control knees [9]. In a comparison of 30 TKAs with patellar complications and 20 controls without, combined internal rotation of 1°–4° resulted in lateral patellar tracking and tilt, 3°–8° patellar subluxation, and 7°–17° patellar dislocation or patellar failure [10].

Reproduction of patellar thickness, correct size and position of the patellar component, and balance of the extensor mechanism are necessary for a satisfactory result. A lateral retinacular release was required for 17% with medial compared with 46% with a central placement of the patellar implant [11]. The amount of bone resected from the patella will affect patellar tracking and patellar strain. Resection of excessive patellar bone can result in weakening of the patella, leading to fracture or implant fixation in poor-quality bone predisposing to loosening. Thickening the patella at the time of resurfacing will tighten the lateral retinaculum, resulting in patellar tilt or subluxation. If the patella is resurfaced, the original patellar thickness should be reproduced. Asymmetric resurfacing of the patella should be avoided.