

Patellar Fractures Following Total Knee Arthroplasty: A Review

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ABSTRACT: There are several periprosthetic complications associated with total knee arthroplasty, with femoral fracture as the most common and patellar fractures as the second most common. Patellar fractures are challenging complications that occur almost exclusively on the resurfaced patellae, although unresurfaced patellar fractures have been reported in literature. The purpose of this study is to describe the anatomy of the patella, the etiology of patellar fractures, and strategies to treat and manage these fractures following knee arthroplasty. The vascular supply to the patella may be compromised during total knee arthroplasty and special care must be taken to preserve it. Vessel injury may result in further complications, most notably avascular necrosis with subsequent fracture. Other patient-, surgical-, and prosthetic-related factors can contribute to increased risk of patellar fracture. Patellar fractures are classified into three types. Type I fractures have an intact extensor mechanism with a stable implant. Type II fractures have a complete disruption of the extensor mechanism with or without a stable implant. Type III fractures, which are further subclassified into types IIIa and IIIb, have an intact extensor mechanism but a loose patellar component. While type IIIa fractures have reasonable remaining bone stock, type IIIb fractures have poor bone stock. Type I patellar fractures may be best managed nonoperatively, but types II and III patellar fractures often necessitate surgical intervention. Patellectomy should be reserved for comminuted fractures, as well as fractures in patients with poor bone stock. Larger prospective randomized studies are necessary to better evaluate the treatment algorithm for patellar fractures following total knee arthroplasty.

KEY WORDS: Patella; fractures; total knee arthroplasty; replacement

I. INTRODUCTION

Complications related to the extensor mechanism following total knee arthroplasty (TKA), including patellofemoral instability, fracture, loosening, wear, clunk, patellar tendon rupture, subluxation, and avascular necrosis,¹ may account for as much as 50% of all revisions associated with TKA. In particular, the incidence of patellar fracture, which has been reported to be as high as 21%, stands as one of the most challenging complications to orthopaedic surgeons performing knee arthroplasties.² The burden of this complication may be underestimated, as some patients are asymptomatic and are not diagnosed until incidental findings are made on radiographic examination.³

Fractures of resurfaced patellae appear much more frequently than fractures of unresurfaced patellae,³ and surgeons often choose not to resurface the patella to avoid this complication. In addition, femoral components that are believed to be friendly to patellofemoral

congruency have been associated with low fracture rates. Furthermore, increased understanding of knee kinematics has led to improved surgical techniques, component design, and patient education, which have helped to further reduce patellar fracture complications.³ Despite these advances in care, patient factors including poor bone stock and decreased capacity to heal with advanced age have made elimination of patellar fracture a significant challenge to orthopaedic surgeons.⁴

In the existing literature, several risk factors have been associated with patellar fracture following total knee arthroplasty. Patient factors include body habitus, osteoporosis, and increased postoperative flexion (see Figs. 1 and 2). Surgical factors include excessive patellar dissections such as fat pad excision, lateral release, excessive resection, and patellar turndown for exposure. Prosthetic factors include a large central peg, cementless fixation, and metal-backed patellae.²

Treatment for patellar fracture following knee arthroplasty can be demanding, and both

nonoperative and operative techniques have been described for patellar fractures and/or extensor mechanism disruptions.^{1,5,6} More importantly, functional gains from the total knee arthroplasty can be compromised, with arthrofibrosis, extensor lag, loss of flexion, pain, and infections reported as potential adverse outcomes following surgical correction of patellar fracture.^{2,7,8}

In this report, we will briefly review (1) anatomy and biomechanics of the patellae; (2) etiology and predisposing factors associated with patellar fracture; (3) treatment options, including nonsurgical and surgical management; and (4) preferred corrective techniques of the senior authors.

II. ANATOMY

The patella is classified as a sesamoid bone of the quadriceps tendon. Its shape is similar to a triangle in which its articular surface is covered by hyaline cartilage, which is believed to be the thickest in

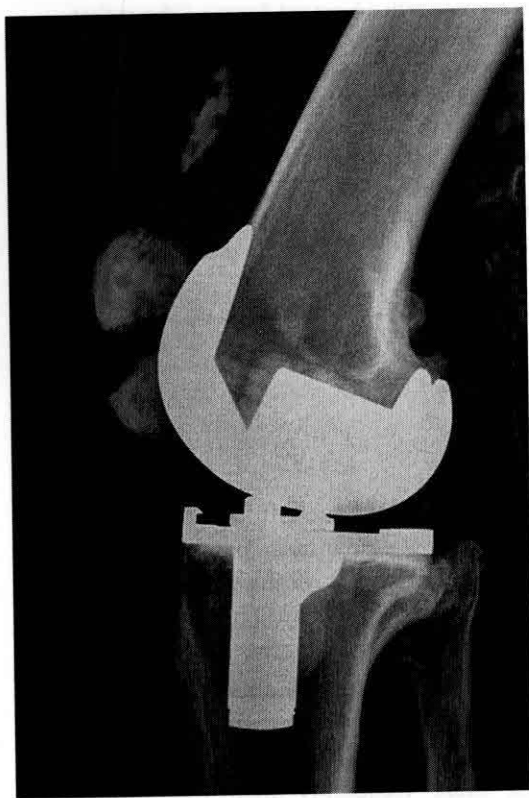


FIGURE 1. Lateral knee radiograph demonstrating patellar fracture after total knee arthroplasty.

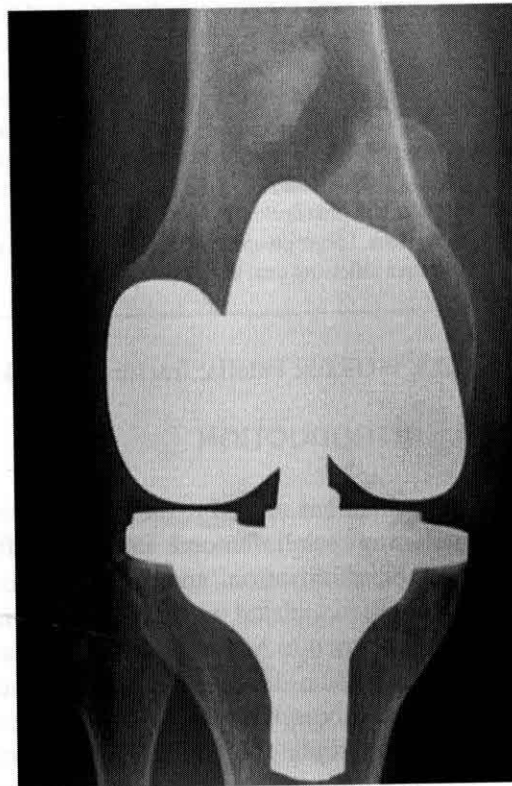


FIGURE 2. AP knee radiograph demonstrating patella fracture after total knee arthroplasty.

