

Total Knee Arthroplasty for Degenerative Arthritis in a Patient With Femoral Trochlear Dysplasia: A Case Report

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Femoral trochlear dysplasia is characterized by abnormal growth and development of the anterior knee joint.¹ In this condition the lateral condyle of the distal femur is blunted, resulting in a shallow or absent femoral trochlear groove.² This blunting is often associated with a small and hypoplastic patella with flattened articular facets.^{1,2} Trochlear dysplasia often leads to abnormal patellar tracking and can result in subluxation or recurrent dislocations of the patella. Multiple surgical methods of realignment have been described to treat trochlear dysplasia. However, there is scant literature regarding the late complications of untreated dysplasia and its treatment. We present a patient with patellofemoral dysplasia who required a total knee arthroplasty for severe degenerative joint disease.

CASE PRESENTATION

A 68-year-old woman presented with bilateral knee pain that had slowly worsened over 40 years. She described the pain as a moderate to severe sharp pain in both knees that occasionally awakened her from sleep. She required a cane for ambulation and could only walk a few blocks before the onset of severe anterior and medial knee pain, which greatly interfered with her normal activities. Conservative treatment, consisting of physical therapy and anti-inflammatory medications, provided only minor relief. The patient also reported occasional painful episodes of her “knees giving out.”

On physical examination, the patient stood with a varus deformity bilaterally and ambulated with flexion contractures of both knees. Tenderness about the patellae was present bilaterally. Lateral patellar tracking with mild crepitation was also noted bilaterally. Her right knee had a 30° flexion contracture with maximum flexion to 120°. Her left knee had a 10° flexion contracture with maximum flexion to 110°.

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Standing anteroposterior radiographs of her knees revealed significant narrowing of the medial compartments bilaterally, worse on the right (Figure 1). A merchant view showed bilateral patellofemoral compartment arthritis, again worse on the right. In addition, very shallow to absent trochlear grooves were noted bilaterally with a dislocated left patella and a laterally deviated right patella (Figure 2).

Staged bilateral total knee arthroplasty was planned after consultation with the patient's internist. The right knee was scheduled first because of more severe symptoms in that knee.

A routine total knee arthroplasty was performed, consisting of combined spinal/epidural anesthesia, and a mid-vastus approach was used. Upon eversion of the patella, the patient's distal femur was noted to be dysplastic with a convexity replacing the normally concave trochlear groove. The patellar facets were similarly dysplastic. The patella, however, was not severely hypoplastic.

A cemented posterior cruciate-substituting femoral prosthesis with a cemented tibia tray (Exactech Inc, Gainesville, Florida) and standard cemented patellar button were used in this case. Anterior referencing was used for femoral component size, and the posterior condylar axis and the transepicondylar axis were used to determine femoral component rotation. After insertion of all components, the knee was felt to be stable with excellent range of motion from full extension to 100° of flexion, but the patella exhibited lateral subluxation with knee flexion. A lateral release subsequently resulted in excellent patellar tracking through a full range of motion. Closure was routine over a drain. The patient underwent our standard postoperative protocol (continuous passive motion begun in recovery room, discontinuation of the drain on postoperative day 1, and full weight-bearing ambulation on postoperative day 1) with no complications and was discharged to a rehabilitation institute on postoperative day 4.

The 6-week follow-up visit was unremarkable with a significant reduction in right knee pain and marked improvement in ambulation. The range of motion in the knee was full extension to 95° of flexion. Radiographs showed excellent prosthesis alignment and fixation (Figures 3 to 5). At 6 months postoperatively, the patient was doing well with no pain, excellent ambulation, and stable range of motion at 95° of flexion. The patient reported no episodes of patellar dislocations.



Figure 1. Preoperative standing anteroposterior radiograph of the right knee showing degenerative joint disease, especially of the medial compartment.



Figure 2. Preoperative merchant view of both knees showing dislocation of left patella and lateral deviation of right patella.



Figure 3. Postoperative anteroposterior radiograph showing right total knee arthroplasty.

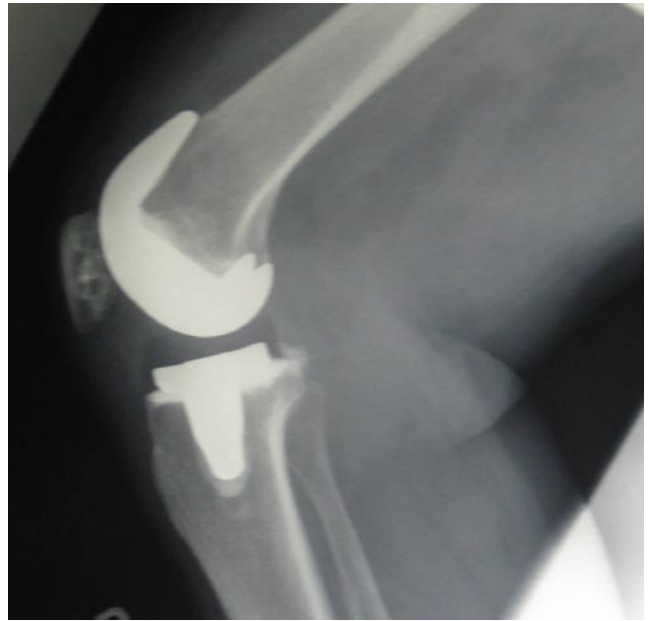


Figure 4. Postoperative lateral radiograph showing right total knee arthroplasty.



Figure 5. Postoperative merchant view radiograph showing right total knee arthroplasty and shallow trochlear groove of left femur.

DISCUSSION

Femoral trochlear dysplasia is characterized by a shallow to absent femoral trochlea with a hypoplastic lateral femoral condyle and is often associated with a hypoplastic patella with flattened articular facets.^{1,2} This syndrome exists in a continuum of anatomical deficiencies and may also be associated with a malaligned knee extensor mechanism that results in lateral deviation of the patella.¹ Femoral trochlear dysplasia is most commonly described as a cause of patellar instability and anterior knee pain usually presenting in midadolescence.² Long-standing dysplasia can lead to degenerative arthritis of patellofemoral compartment primarily because of recurrent dislocation of the patella.^{1,2} Patellofemoral dysplasia is a rare condition with a prevalence of 0.7% to 2.0% in patients with knee pain.^{3,4} However, the vast majority of congenital patellar dislocation cases are due to patellofemoral dysplasia.²

Merchant⁵ suggests that patellofemoral dysplasia is analogous to developmental dysplasia of the hip. The presence of an appropriately located patella on the distal femur is postulated to be essential for the proper development of the trochlear groove. Eilert¹ has shown that early surgical realignment of the patellar mechanism can result in proper development of the trochlea in patients who previously had an absent trochlear groove if performed in late infancy or early childhood.

Because of our patient's severe symptoms and radiographic evidence of arthritis in the patellofemoral and medial compartments, the only appropriate surgical treatment for her was total knee arthroplasty. Her patellofemoral compartment arthritis was likely due to the long-standing trochlear dysplasia and the resulting recurrent patellar dislocations. Because of her recurrent patellar dislocations and lateral tracking, the patient required a lateral release and medialization of the patellar component on the patella. In addition, the femoral component was placed in 3° of external rotation using the posterior condyles as a reference. Because of the trochlear dysplasia, we confirmed the proper amount of external rotation using the transepicondylar axis, and no further adjustment was required. Relying on the anteroposterior axis in cases of severe trochlear dysplasia can result in excessive external rotation of the femoral component.⁶

Successful total knee arthroplasty has been reported in 4 patients (7 knees) with patellofemoral dysplasia complicated by congenital dislocation of the patella and degenerative arthritis.⁷⁻⁹ These patients differed from our patient in that they had chronic, often irreducible, patellar dislocation associated with a valgus deformity. As a result, 6 knees required constrained knee prostheses. Marmor⁷ describes 1 case in which a nonconstrained, posterior-stabilized knee prosthesis was successfully used in conjunction with patella excision. To our knowledge, this patient is the first reported case using a nonconstrained prosthesis with patellar resurfacing in a patient with femoral trochlear dysplasia.

CONCLUSIONS

Long-standing trochlear dysplasia can lead to degenerative arthritis of the patellofemoral joint and may be found

in patients with tibiofemoral joint arthritis scheduled for total knee arthroplasty. We have presented a patient with trochlear dysplasia and degenerative arthritis who was successfully treated with a total knee replacement. This case has shown that a patient with femoral trochlear dysplasia can undergo successful total knee replacement with a non-constrained total knee prosthesis.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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