



Patellar Dislocation after Total Knee Arthroplasty for Neglected Chronic Post-traumatic Patellar Dislocation: A Case Report

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Abstract

Chronic post-traumatic patellar dislocation is a rare condition that presents a therapeutic challenge to the treating physician. The authors present the case of a 72-year-old female with a greater than 30-year history of neglected chronic post-traumatic patellar dislocation and resulting severe osteoarthritis who underwent total knee arthroplasty (TKA) and subsequently sustained a patellar dislocation after a fall. The patient was successfully treated with a revision soft-tissue procedure with post-operative immobilization in a cast and subsequently regained full range of motion.

This case highlights the importance of an adequate lateral retinacular release, the use of pants-over-vest imbrication as a technique to improve patellar tracking, post-operative immobilization, and the conservative course of rehabilitation to prevent recurrent patellar dislocation.

Level of Evidence: V

Keywords: total knee arthroplasty, chronic patellar dislocation

Introduction

Chronic post-traumatic dislocation of the patella is rare and results in persistent dislocation throughout the arc of motion of the knee.¹ Whereas newborns with trochlear dysplasia may exhibit congenital patellar dislocation, typical delayed presentation in adults is often due to trauma and can progress to painful motion and secondary osteoarthritis. Although rare, recurrent dislocation is most commonly seen in females of late adolescence, is often familial, and approximately one-third are bilateral.² Recurrent dislocation has been attributed to factors including inappropriate care following acute trauma, familial and/or anatomic predisposition, and ligamentous laxity.³ Miller et al. suggest that unilaterality, dislocation after adolescence, or adaptive changes could explain the delay in presentation and lack of significant functional changes.³ Treatment for chronic patellar dislocation focuses on restoration of native anatomic alignment and correction of any secondary destabilizing pathology, such as meniscal tears or loose bodies. Traditionally, treatment has included non-operative management with physical therapy, patellar realignment, or patellectomy.⁴ In the presence of osteoarthritis, a patellofemoral or total knee arthroplasty may be performed.^{5,6,7} We present a case of a patient with chronic post-traumatic patellar dislocation treated with total knee arthroplasty, who subsequently required a

secondary soft tissue procedure for recurrent patellar dislocation.

Case Report

A 72-year-old-female presented to the clinic with right knee pain for over 30 years after sustaining an injury in 1977 and undergoing a procedure unknown to her at the time of presentation. She had been able to function reasonably well without limitation, but over the preceding months the pain had become more disabling. The patient ambulated with a cane at baseline but had difficulty with walking distances greater than one city block and ascending stairs. Her pain was primarily in the lateral compartment but was present in all three compartments. On inspection of her right knee she had a scar from a previous medial incision and her patella was dislocated laterally. Examination demonstrated an eight degree valgus deformity with passive range of motion from 10 to 90 degrees of flexion. She had a 45-degree extensor lag associated with 3/5 quadriceps strength and 4/5 strength of her extensor hallucis longus, flexor hallucis longus, and tibialis anterior. In addition to the lateral patellar dislocation, radiographs also demonstrated severe tricompartmental osteoarthritis and lateral subluxation of the tibia on the femur (Fig. 1).

After an in-depth discussion of the risks, benefits, and alternatives to surgical treatment, the patient elected to proceed with TKA. She

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Figure 1. Pre-operative anteroposterior and lateral radiographs demonstrating lateral patellar dislocation, lateral tibial subluxation, and severe tricompartmental osteoarthritis.

underwent a right TKA using a standard midline incision and medial parapatellar approach with a posterior-stabilized, fixed-bearing prosthesis (Fig. 2). A lateral release of the patella was performed to allow for medialization of the patella and proper patellar tracking. After surgery she was permitted full weight bearing and she was not immobilized. Continuous passive motion was also not instituted due to risk of re-dislocation.

Three weeks post-operatively, the patient returned to clinic with limited range of motion and visible deformity of the patella, though unaware of a possible dislocation (Fig. 3). She stated that she had a fall at her rehabilitation facility one week prior to her visit but with no resulting limitation in her progress. Examination revealed a lateral dislocation of the patella with passive range of motion from 10 to 110 degrees and a 50-degree extensor lag.

The patient was readmitted to the hospital and brought to the operating room. The recent midline incision, which was well-healed at the time of revision, was utilized. Following the medial parapatellar arthrotomy, the positioning of the femoral, tibial, and patellar components was carefully inspected. It was determined that the components were appropriately positioned. The previous lateral release was identified and reopened using blunt digital dissection. After this maneuver, the patella was easily relocated into the trochlear groove, and proper patellar tracking was confirmed with range of motion from 0 to 110 degrees using the no thumbs technique. A pants-over-vest imbrication of the medial retinaculum was then performed to further stabilize the patella. Prior to closure, adequate patellar tracking and positioning of the total knee components were once again confirmed. Post-operatively, a cylinder cast was applied to reduce the risk of recurrent patellar dislocation. Post-operative radiographs demonstrated



Figure 2. Post-operative anteroposterior and lateral radiographs of the right knee demonstrating well-aligned components.

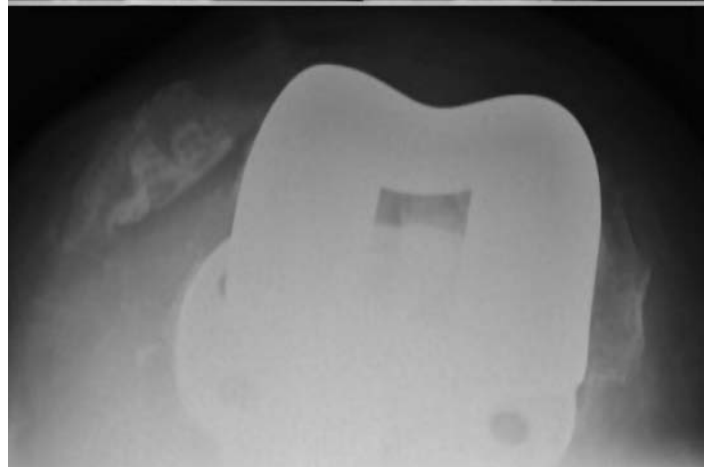


Figure 3. Anteroposterior, lateral, and sunrise views of the right knee one month post-operatively, demonstrating patellar component dislocation after a traumatic fall.

acceptable alignment of the patella and positioning of the prosthetic components (Fig. 4).

The patient returned to clinic two weeks post-operatively. Radiographs demonstrated sustained location of the patella with no radiolucent lines or evidence of osteolysis. A new cylinder cast was applied. At one month post-operatively, the patient's range of motion was 5-70 degrees, and she was able to ambulate with a walker. At this time, she was transitioned to a hinged knee brace locked in extension for four weeks, with the potential side effect of knee stiffness outweighing the risk of recurrent patellar dislocation. Two months post-operatively, the patient continued to do well. Her brace was discontinued and she began gentle range of motion and physical therapy. Four months post-operatively, the patient had full flexion and extension of her knee.

Discussion

Chronic, irreducible dislocations of the patella are rare and are seen most often in association with valgus knees deformities.^{6,8} Whether congenital or traumatic in etiology, patients may have considerable functional limitations in range of motion and mobility.⁵ For patients who undergo TKA to correct extensor mechanism insufficiency combined with osteoarthritis, special consideration should be given to ensure proper component alignment and stable patellar tracking.

Patellar complications have been cited as the most common complication after TKA, occurring at a rate of approximately 0.5-30%.^{9,10,11,12} Potential risk factors for instability include pre-operative valgus alignment, medial retinacular insufficiency, vastus medialis obliquus weakness, component malalignment, and trauma. Specifically, internal rotation of the femoral and tibial components is a common risk factor for dislocation. This configuration increases the Q angle, leading to patellar instability.⁹ Instability of the patella and altered patellar tracking due to femoral component misalignment and eccentric stresses can lead to increased polyethylene wear or aseptic loosening.¹³ If patellar dislocation occurs following total knee arthroplasty, additional revision procedures that

lateralize the femoral component, medialize the patellar button, externally rotate the tibial and/or femoral components, or adjust the soft tissue balancing of the extensor mechanism can help to restore normal patellar tracking.^{14,15}

While a lateral retinacular release has been shown to improve the tracking of the patellar component, no significant difference was found in rates of subluxation after this procedure alone.^{16,17} Additionally, this technique can be complicated by patellar osteonecrosis or fracture and wound healing problems.^{16,18,19,20} Therefore, several other techniques including proximal and distal realignment procedures as well as revision TKA have been attempted to improve outcomes.²¹ Kirk et al. performed a lateral release with a medializing tibial tubercle osteotomy, a modification of the Trillat procedure.¹⁰ In their case series of fifteen knees, they observed no recurrent patellar dislocations.¹⁰ Similarly, Nakajima et al. presented a case of recurrent patellar subluxation with well aligned components following TKA managed with the Elmslie-Trillat procedure.²² This procedure involves a lateral retinacular release and plication of the medial retinaculum, followed by a medializing tibial tubercle osteotomy. At one year post-operatively, the patient had no subluxation events and no patellar apprehension.²² In a retrospective review of five patients with subluxation following TKA, Price et al. performed a Fulkerson osteotomy in addition to lateral release and medial soft tissue imbrication. Patients had improved knee scores at one year post-operatively and had no dislocation/subluxation events.²¹ Despite the effectiveness of an osteotomy in improving recurrent dislocation due to its role in patellar lateralization restraint, Piedade et al. have described an increased incidence of skin necrosis and tibial tubercle fracture following such procedures.²³ Therefore, tibial tubercle osteotomies should be reserved for recalcitrant cases where other soft tissue procedures have been ineffective.

Limited data are available regarding medial patellofemoral ligament (MPFL) reconstruction following TKA for a chronically dislocated patella. Gennip et al. showed that in nine patients, reconstruction and lateral release following patellar subluxation is an effective option to improve patellar tracking with or without tibial tubercle osteotomy.²⁴ In their case report evaluation, Matsushita et al. also reported that MPFL reconstruction is a suitable surgical option for chronic patellar dislocation following TKA.⁸

Conclusion

We present the case of a 72-year-old female with chronic patellar dislocation who traumatically re-dislocated her patella following TKA. This case demonstrates the utilization of soft tissue imbrication and careful attention to patellar tracking to recreate a properly tensioned extensor mechanism. The pants-over-vest technique identifies another alternative for surgical stabilization of chronic post-traumatic patellar dislocation combined with post-operative immobilization. It illustrates that despite adequate component alignment and patellar tracking, patients with prior patellar dislocation may be at higher risk for further dislocation following arthroplasty. Patients at higher risk should be managed with a hinged knee



Figure 4. Post-operative anteroposterior and lateral views of the right knee after soft tissue imbrication procedure demonstrating reduction of the patella and satisfactory alignment of the tibial and femoral components.

brace locked in extension or a cylinder cast for 6 weeks post-operatively to ensure adequate scar formation and extensor mechanism healing.

References

- 1. Purushothaman, B, Agarwal, A, Dawson, M.** Posttraumatic chronic patellar dislocation treated by distal femoral osteotomy and medial patellofemoral ligament reconstruction. *Orthopedics*, 35(11):e1668 (2012).
- 2. Floyd, A, Phillips, P, Khan, MR, et al.** Recurrent dislocation of the patella: histochemical and electromyographic evidence of primary muscle pathology. *The Journal of Bone and Joint Surgery*, 69B(5):790 (1987).
- 3. Miller, MD, Hausman, M, Jokl, P, et al.** Permanent post-traumatic patellar dislocation. *The Journal of Trauma*, 28(9):1389 (1988).
- 4. Heywood, AW.** Recurrent dislocation of the patella: A study of its pathology and treatments in 106 knees. *Journal of Bone and Joint Surgery*, 43B:508 (1961).
- 5. Bullek, DD, Scuderi, GR, Insall, JN.** Management of the chronic irreducible patellar dislocation in total knee arthroplasty. *The Journal of Arthroplasty*, 11(3):339 (1996).
- 6. Hanssen, AD, Rand, JA.** Management of the chronically dislocated patella during total knee arthroplasty. *Techniques in Orthopaedics*, 3(2):49 (1988).
- 7. Hudson, J, Reddy, VR, Krikler, SJ.** Total knee arthroplasty for neglected permanent post-traumatic patellar dislocation: case report. *The Knee*, 10(2):207 (2003).
- 8. Matsushita, T, Kuroda, R, Kubo, S, et al.** Total knee arthroplasty combined with medial patellofemoral ligament reconstruction for osteoarthritic knee with preoperative valgus deformity and chronic patellar dislocation. *The Journal of Arthroplasty*, 26(3):505.e17 (2011).
- 9. Chin, KR, Bae, DS, Lonner, JH, et al.** Revision surgery for patellar dislocation after primary total knee arthroplasty. *The Journal of Arthroplasty*, 19(8):956 (2004).
- 10. Kirk, P, Rorabeck, CH, Bourne, RB, et al.** Management of recurrent dislocation of the patella following total knee arthroplasty. *The Journal of Arthroplasty*, 7(3):220 (1992).
- 11. Mochizuki, RM, Schurman, DJ.** Patellar complications following total knee arthroplasty. *Journal of Bone and Joint Surgery*, 61(6A):879 (1979).
- 12. Merkow, RL, Soundry, M, Insall, JN.** Patellar dislocation following total knee replacement. *Journal of Bone and Joint Surgery*, 67(9):1321 (1985).
- 13. Armstrong, AD, Brien, H, Dunning, CE, et al.** Patellar position after total knee arthroplasty: influence of femoral component malposition. *The Journal of Arthroplasty*, 18(4):458 (2003).
- 14. Rhoades, DP, Noble, PC, Reuben, JD, et al.** The effect of femoral component position on the kinematics of total knee arthroplasty. *Clinical Orthopaedics and Related Research*, 286:122 (1993).
- 15. Rhoades, DP, Noble, PC, Reuben, JD, et al.** The effect of femoral component position on patellar tracking after total knee arthroplasty. *Clinical Orthopaedics and Related Research*, 260:43 (1990).
- 16. Kusuma, SK, Puri, N, Lotke, PA.** Lateral retinacular release during primary total knee arthroplasty. *The Journal of Arthroplasty*, 24(3):383 (2009).
- 17. Clayton, ML, Thirupathi, R.** Patellar complications after total condylar arthroplasty. *Clinical Orthopaedics and Related Research*, 170:152 (1982).
- 18. Boyd, AD, Ewald, FC, Thomas, WH, et al.** Long-term complications after total knee arthroplasty with or without resurfacing of the patella. *Journal of Bone and Joint Surgery*, 75(5):674 (1993).
- 19. Scuderi, GR, Scharf, SC, Meltzer, LP, et al.** The relationship of lateral releases to patella viability in total knee arthroplasty. *Journal of Arthroplasty*, 2(3):209 (1987).
- 20. Kong, CG, Cho, HM, Suh, KH, et al.** Patellar tracking after total knee arthroplasty performed without lateral release. *The Knee*, 19(5):692 (2012).
- 21. Price, M, Malkani, AL, Baker, D.** Fulkerson procedure for chronic patella component dislocation after total knee arthroplasty. *The Journal of Arthroplasty*, 24(6):914 (2009).
- 22. Nakajima, A, Watanabe, H, Rokkaku, T, et al.** The Elmslie-Trillat procedure for recurrent patellar subluxation after total knee arthroplasty. *Journal of Arthroplasty*, 25(7):1170.e1 (2010).
- 23. Piedade, SR, Pinaroli, A, Servien, E, et al.** Tibial tubercle osteotomy in primary total knee arthroplasty: a safe procedure or not? *Knee*, 15(6):439 (2008).
- 24. vanGennip, S, Schimmel, JJP, vanHellemond, GG, et al.** Medial patellofemoral ligament reconstruction for patellar maltracking following total knee arthroplasty is effective. *Knee Surgery, Sports Traumatology, Arthroscopy* (2012).