Surgical Treatment for Permanent Dislocation of the Patella in Adults

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Abstract

Permanent dislocation of the patella in adults is a rare condition that presents with complete irreducible lateral dislocation of the patella, combined with secondary changes, such as valgus deformity and leg-length discrepancy. Because these secondary changes cannot heal spontaneously after skeletal maturation if left untreated, the patients frequently possess pathology not limited to the knee joint and extending to the whole lower extremity, such as malalignment or leg-length discrepancy, that can develop into osteoarthritis of the knee. However, to our knowledge, few surgeons advocate the significance of correcting the malalignment in treating adult patients.

We treated a 34-year-old woman with permanent dislocation of the patella in a 2-stage surgery, consisting of first-stage correction of valgus deformity and limb shortening using an Ilizarov external fixator and second-stage realignment of the dislocated patella over the trochlea. A follow-up examination conducted 3 years after the second operation revealed plantigrade gait with normal alignment of the lower extremity without limping and medial thrust. The patella was tracking centrally in the patellofemoral groove. Radiographs showed a neutral mechanical axis of the lower extremity, no evidence of patellar subluxation, and no deteriorating osteoarthritic changes at the tibiofemoral joint. This case highlights the importance of correcting secondary changes, such as valgus deformity and leg-length discrepancy, to reduce the risk of future osteoarthrosis and postoperative dislocation, especially when these deformities are substantial.

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Permanent dislocation of the patella, whether congenital or acquired, is a rare condition in which the patella lies laterally and is irreducible, regardless of the knee flexion angle. In young children, the agreed treatment is usually a soft tissue procedure. In contrast, treatment for adult patients in whom the condition has been neglected is controversial and includes observation, patellectomy, and patellar realignment. Whichever treatment is selected, secondary changes resultant from the patellar dislocation, such as valgus deformity and leg-length discrepancy, do not improve postoperatively because these factors cannot heal spontaneously once skeletal maturation has occurred.

As several authors have noted, some patients with neglected permanent dislocation of the patella require total knee arthroplasty in or after middle age due to osteoarthrosis at the lateral tibiofemoral joint. However, Gugenheim and Brinker proposed that correcting malalignment of the lower extremity could prevent or delay the onset of osteoarthrosis. From our observations, permanent dislocation of the patella in adults indicates that the disorder is not limited to the knee joint, but rather extends to the whole lower extremity, with valgus deformity or leg-length discrepancy occasionally present.

We hypothesized that treatment results for permanent dislocation of the patella would be improved if secondary changes, such as valgus deformity and leg-length discrepancy, were also corrected.

CASE REPORT
A 34-year-old woman presented with a permanently dislocated left patella and reported no particular episode of trauma. She had suffered from leg-length discrepancy since childhood and had undergone a Langenohl procedure for the left knee at 9 years of age and epiphysiodesis on the contralateral side 2 years later. As an adult, she usually moved by toe walking with medial thrust and reported difficulties in walking fast, which was required in her job as a nurse. The patient occasionally suffered from medial thrust gait that was aggravated by running and using the stairs, especially when descending.

Initial clinical examination of the left knee revealed a 15° valgus deformity, moderate instability to valgus stress, complete irreducible lateral dislocation of the patella, and absence of a palpable normal patellofemoral sulcus. The amount of shortening of the lower extremity was 4.5 cm compared with the contralateral side. Range of motion (ROM) was from 5° to full ROM. She could not actively extend the knee and had a medial thrust during ambulation.

Anteroposterior (AP) radiographs including the whole lower extremity showed severe valgus deformity with minimal osteoarthrosis in the lateral tibiofemoral compartment (Figure 1). A tangential axial view with the knee flexed at 45° revealed complete lateral dislocation of the patella and shallow trochlea classified as dysplasia type A according to Dejour and Le Courtre (Figure 2).

Our operative strategy consisted of a 2-stage surgery: the first stage for the valgus deformity and leg-length discrepancy and the second stage for patellar realignment. The reason for the 2-stage surgery lies in the influence of the external fixator’s application on patellar realignment.

The first stage of the surgery was performed in November 2007. Under general anesthesia, an Ilizarov external fixator consisting of 2 femoral arches and 2 rings was applied at the femur. A femoral supracondylar was osteotomized through a minimal lateral approach. Initially, gradual angular correction reduced the femoral valgus deformity according to measurements by Paley, although the leg-length discrepancy remained at 4 cm. Then, distraction was initiated at a rate of 1 mm per day. Complete correction of the valgus deformity and limb lengthening of 3.5 cm were achieved after application of the fixator for 5 months.

Follow-up examination 1 year postoperatively revealed that the patient could obtain plantigrade gait and a full ROM in the knee. An AP radiograph demonstrated a neutral mechanical axis (Figure 3). She sensed neither medial thrust nor shortening of the leg. However, she still could not actively extend the leg due to the permanent dislocation of the patella.

In the second stage of the surgery in November 2008, patellar realignment...
was performed. Under spinal anesthesia, patellar reduction was achieved through adequate release of the contracted lateral retinaculum, iliotibial tracts, capsule, and lateral intermuscular septa, performed through an anterior oblique incision.\textsuperscript{1} Intraoperative findings showed a shallow or incongruous femoral groove with thinning of the articular surface of the entire patellofemoral joint.

The medial patellofemoral ligament (MPFL) was reconstructed in a 2-strand hamstring tendon autograft from the medial edge of the proximal and distal one-third of the patella to the medial femoral epicondyle.\textsuperscript{9,10} After medial arthrotomy, the vastus medialis and medial retinaculum were advanced in a lateral direction and sutured to the surrounding soft tissue. This procedure resulted in markedly improved patellar tracking in the femoral groove. Two weeks postoperatively, leg raising and quadriceps setting exercises were begun. Range of motion >90° of flexion was controlled with a brace until 6 months postoperatively.

Follow-up examination approximately 3 years after the second stage of the surgery revealed that the patient was doing well and experiencing no pain, medial thrust, or limb walking. The Q-angle was 15°, matching the contralateral side. The patient noted that the muscle power of her knee had substantially improved, and she could attain full active extension. Range of motion was from 0° to 130° of flexion. The patella tracked centrally in the trochlear groove throughout the ROM, and tangential axial radiographs with the knee flexed at 45° showed no evidence of patellar subluxation or deteriorating osteoarthritis (Figure 4).

**DISCUSSION**

Satisfactory results for permanent dislocation of the patella present far greater surgical challenges in adults than in children. Meticulous preoperative planning is crucial. Careful examination needs to include the entire lower extremity and the knee joint. Nakagawa et al\textsuperscript{11} noted that malalignment at the ipsilateral lower extremity frequently combines with this disease. When these impairments are substantial enough to influence the functional results of patellar dislocation surgery or threaten future osteoarthritis, surgeons must take measures to correct them. In our patient, valgus knee, leg-length discrepancy, and dislocation of the patella were present.

Valgus knee is frequently reported among patients with permanent dislocation of the patella.\textsuperscript{11} We propose varus osteotomy in the valgus knee as treatment for patients with permanent dislocation of the patella for 3 reasons. First, it may help prevent osteoarthritis of the lateral compartment. This hypothesis cannot be verified by reviewing the previous literature because few reports detail permanent dislocation of the patella in adults treated with patellar realignment, and generally those reports that exist have a follow-up period too short to allow for examination of osteoarthritic changes.\textsuperscript{3,12-14} However, several articles have demonstrated that varus osteotomy can effectively control osteoarthrosis of the lateral compartment among patients without episodes of patellar dislocation.\textsuperscript{15,16} Thus, we speculate that correction of valgus deformity may also prevent future osteoarthrosis of the lateral tibiofemoral joint.

Second, varus osteotomy may help decrease the risk of patellar redislocation for the realigned patella because a valgus knee creates a strong lateral vector causing dislocation of the patella either permanently or intermittently.\textsuperscript{17,18} Third, patients can sense improved stability of the knee due to diminished valgus moment. This finding was also observed in our patient after the first stage of surgery correcting alignment of the lower extremity.

Considerable leg-length discrepancy should be treated because it disturbs physiological locomotion. In addition, it induces medial thrust that may also accelerate dislocation.\textsuperscript{17,18} The trochlear groove resisting lateral displacement of the patella remains shallow in adults even after the realigning procedure, which contrasts with the realigned young child in which development of the trochlear groove occurs during additional growth and development.\textsuperscript{18,19} Therefore, surgeons should minimize the risk of postoperative dislo-
cation to compensate for hypoplasia of the trochlear groove.

When patellar realignment is selected for permanent dislocation of the patella in adults, the gold standard of management has not yet been defined. Proximal realignment includes lateral release, reconstruction of the MPFL, and medial imbrication. Distal realignment comprises partial medialization of the ligamentum patella and tibial tuberosity transfer. Successful results require integration of these procedures, depending on clinical and intraoperative findings on an individual basis.

This study has 2 limitations. First, application of an external fixator requires lengthy restrictions of activities of daily living, and patients need to be aware of this prior to surgery. Second, the 3-year follow-up is insufficient to judge whether alignment correction of the lower extremity can halt further osteoarthrosis at the tibiofemoral joint. An additional study is necessary after a lengthier follow-up period.

Despite our limited experience with the method presented, we suggest that this 2-stage procedure is best performed with the cooperation of knee surgeons and surgeons experienced in limb lengthening and that a 2-stage surgery is not mandatory unless limb lengthening is attempted.

We suggest that the pathology of permanent dislocation of the patella in the adult population includes not only knee impairment, but also malalignment of the lower extremities or leg-length discrepancy that may lead to the development of osteoarthrosis at the lateral tibiofemoral joint. The surgery outlined in this article was reliable and provided improved stability and muscle control, reducing the risk of future osteoarthrosis at the tibiofemoral joint. Surgeons should consider this treatment option, especially when patients have severe malalignment at the lower extremity.

REFERENCES