Closed Reduction of “Irreducible” Posterolateral Knee Dislocation - A Case Report

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What to Learn from this Article?
Posterolateral rotary knee dislocation is a rare orthopedic injury that is considered to be irreducible by closed reduction. However, we experienced a case of posterolateral rotary knee dislocation reduced and reproduced by closed manipulation. We considered the mechanism of posterolateral knee dislocation as valgus and external rotation stress during knee flexion.

Abstract
Introduction: Posterolateral rotary knee dislocation is a rare orthopedic injury that is considered to be irreducible by closed reduction because of soft tissue incarceration. Here, we present a case of posterolateral rotary knee dislocation, which was reduced by closed manipulation.
Case report: The patient was a 33-year-old man who sustained a twisting injury to his right knee that was diagnosed as posterolateral rotary knee dislocation by plain radiographs and the characteristic physical finding known as a dimple sign. Under general anesthesia, the knee dislocation was reduced by closed manipulation with internal rotation of the lower leg at knee flexion and reproduced by valgus and external rotation stress. There were complete tear of posterior cruciate ligament, and partial tear of the anterior cruciate ligament which were not reconstructed. The medial collateral ligament that was detached from the femoral footprint was repaired. One year postoperatively, the range of motion was 0°–145°. There was no knee symptom and no ligament instability.
Conclusion: This is the first report of a successful closed reduction for posterolateral knee dislocation. The mechanism of dislocation was considered valgus and external rotation stress during knee flexion.
Keywords: Posterolateral knee dislocation, Closed reduction, Injury mechanism.
of the medial joint space and tibial posterolateral displacement (Fig. 2). The characteristic dimple sign was observed over the medial joint line (Fig. 3). On the medial aspect of the injured knee, the medial femoral condyle was palpable just beneath the skin.

Two days after the injury, closed reduction was attempted under general anesthesia. The knee was flexed to 120° and valgus stress and internal rotation of the lower thigh were applied. The dislocated knee was reduced and the dimple sign disappeared. The posterolateral dislocation could be reproduced by external rotation at 100–120° flexion. After reduction, ligament instability tests were positive for valgus stress, with signs of posterior sagging in the posterior drawer test, and negative for the Lachman test, pivot shift test, extension recurvatum test, and dial test. A subsequent arthroscopic examination also revealed a complete midsubstance tear of the posterior cruciate ligament (PCL) (Fig. 4A) and a partial tear of the posterolateral bundle of the anterior cruciate ligament (ACL), which were not reconstructed (Fig. 4B). A peripheral longitudinal tear of the lateral meniscus was repaired using the Fast Fix 360 Meniscal Repair System (Smith & Nephew, Andover, MA, USA) (Fig. 4C).

Thereafter, a 7-cm medial longitudinal incision was made to repair the medial collateral ligament (MCL). The medial retinaculum and capsule were torn along with the distal end of the vastusmedialis. The MCL was completely detached from the femoral footprint. Button holing of the medial femoral condyle through the medial retinaculum and the capsule could be reproduced by valgus stress and external rotation in the knee flexion position (Fig. 5). In addition, the dislocation could be reduced by internal rotation of the lower thigh. The MCL was fixed to the femoral footprint using Suture Anchors (Mitek Products, Johnson & Johnson Company, Westwood, MA, USA). The medial retinaculum and the capsule were also repaired. Postoperative radiographs showed normal alignment (Fig. 6).

Range of motion (ROM) exercises was started after 3 weeks of immobilization with a cylinder cast. Full weight bearing with a knee brace was allowed 4 weeks after surgery. One year postoperatively, no knee symptoms were observed and the ROM was 0–145°. There was no ligament instability except for the PCL at grade II.

**Discussions**

The most effective mechanism for posterolateral knee dislocation is considered valgus and rotational stress during knee flexion. However, the direction of rotational stress is reportedly internal rotation or external rotation. In the present case, the dislocation was reduced by internal rotation of the lower leg with knee flexion and reproduced by valgus and external rotation stress. In addition, lateral dislocation of the patella was observed at the initial visit. Therefore, valgus and external rotation stress during knee flexion may have been the cause of knee dislocation in our patient.

Reportedly, the MCL, ACL, and PCL are usually completely ruptured in posterolateral knee dislocation, whereas the posterolateral structures are usually left intact; however, some recent studies have shown that a posterolateral injury may occur in combination with this type of dislocation. Therefore, combined ligament injuries should be carefully assessed by magnetic resonance imaging (MRI) or physical examination after reduction. In the present case, complete tearing of the MCL and PCL was observed, which is consistent with the findings.
of previous reports. However, the ACL in our case was only partially torn and exhibited no instability. Only one report by Jeevannavar et al. has described a partial ACL tear associated with posterolateral knee dislocation. The remaining ACLs may prevent complete button holing of the medial femoral condyle through the medial retinaculum and produce reducibility. Posterolateral knee dislocation is rarely accompanied by meniscal injuries. Bistolfi et al. and Samini et al. reported cases of this type of dislocation with medial and lateral meniscal injuries. In the present case, the patient had a peripheral longitudinal tear of the lateral meniscus. However, meniscal tears can sometimes be misdiagnosed by MRI. Therefore, arthroscopic examination may be useful in treating patients with posterolateral knee dislocation.

The first-line therapeutic approach for posterolateral knee dislocation is conventionally considered immediate reduction by open surgery. However, as we demonstrated in the present case of posterolateral rotary dislocation, it may be possible to reduce this injury by closed manipulation. Closed manipulation by valgus stress and internal rotation could be tried as a first-line choice. Combined ligament injuries should be treated in consideration of patient age and activities of daily living. In the present case, MCL detachment was repaired using suture anchors and healed without any instability. The partial ACL tear did not cause any instability, where the PCL injury was left untreated and a posterior drawer test of grade II was identified at the final follow-up, although no clinical symptoms originated from this instability.

## Conclusion

We experienced the case of posterolateral rotary knee dislocation which was reduced by closed manipulation. This is the first report of a successful closed reduction for posterolateral knee dislocation. In the present case, the dislocation was reduced by internal rotation of the lower leg with knee flexion and reproduced by valgus and external rotation stress. The mechanism of posterolateral knee dislocation was considered valgus and external rotation stress during knee flexion.

**Clinical Message**

Posterolateral rotary knee dislocation is a rare orthopedic injury that is considered to be irreducible by closed reduction because of soft tissue incarceration. However, with the result of the presented case, the closed manipulation by valgus stress and internal rotation could be tried as a first-line choice.

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How to Cite this Article
Tateda S, Takahashi A, Aizawa T, Umehara J. Closed Reduction of “Irreducible” Posterolateral Knee Dislocation - A Case Report. Journal of Orthopaedic Case Reports2016 April–June;6(2): 20-23

Conflict of Interest: Nil
Source of Support: None