

A Chronic Posterolateral Knee and Patella Dislocation: Case Report

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Summary: Knee dislocations are uncommon as isolated orthopaedic injuries, but their prevalence is increased in the setting of high-energy multiple trauma. In these circumstances, it is important for the orthopaedic clinician to recognize and appropriately treat the knee dislocation in parallel with other significant injuries. We report the case of an 18-year-old woman who was involved in a motor vehicle collision and sustained multiple injuries in addition to a posterolateral knee dislocation. An attempt at reduction was made in the initial trauma setting, and the patient was medically stabilized. She was discharged from the hospital in a splint with orthopaedic follow-up and presented 3 months after injury with an unreduced posterolateral dislocation. A single-stage operation was performed with reduction and stabilization of the knee. Postoperatively, the patient has done well and regained significant range of motion.

Key Words: posterolateral, knee dislocation, chronic, multiple ligament reconstruction, patella dislocation

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INTRODUCTION

Knee dislocations are a rare occurrence, representing approximately 0.2% of orthopaedic injuries.¹ In 14%–44% of cases, they are associated with high-energy multiple trauma, therefore complicating the initial management.^{1–3} Preliminary treatment consists of closed reduction and immobilization until range of motion or definitive repair/reconstruction of any associated injuries is deemed appropriate. Occasionally, a dislocated knee will be irreducible by closed methods in the initial trauma setting. This can represent a difficult situation that mandates urgent orthopaedic attention and intervention that supersedes other non-life-threatening injuries. In most cases, an irreducible knee has dislocated posterolaterally with interposition of medial soft tissue. This requires either an urgent open or an arthroscopic reduction.^{4–15} However, an unrecognized or unreduced dislocation can lead to a significant increase in the complexity of definitive operative management with extensive scar tissue and decreased mobility

of injured structures. Patient disability may also be severely influenced through permanently limited range of motion. In this study, we report a novel case of an unreduced posterolateral knee dislocation with an associated lateral patellar dislocation in an 18-year-old woman who presented 3 months after injury. The patient has agreed to the publication of her information.

CASE REPORT

The patient is a healthy 18-year-old woman who was involved in a severe motor vehicle accident. She sustained multiple injuries including a closed head injury, sternal fracture, 2 rib fractures, unilateral pneumothorax, cervical spinous process fracture, a large open wound on the medial aspect of her left leg distal to the knee, and a left knee closed dislocation. She was initially brought to a local hospital where she was intubated, had a chest tube placed, and had an initial “reduction” of her knee. The patient was hospitalized for 2 weeks to stabilize thoracic and closed head injuries, and her knee remained splinted. She was discharged with orthopaedic follow-up but was not seen for 4 weeks. Further imaging at that time revealed persistent tibial femoral subluxation. She was then referred to a tertiary center for further care.

Upon presentation 3 months after the initial insult, her other injuries, including the soft tissue wound on her left leg, had healed and she was maintained in a hinged knee brace locked in slight flexion. She noted significant instability anytime the knee was removed from the brace and moderate pain with weight-bearing in the brace. However, she was able to ambulate with crutches. On physical examination, her left lower extremity revealed a mildly swollen left knee with a 1+ effusion and a tibia that was slightly translated posterolaterally. She was extremely apprehensive about any movement of her knee, but examination revealed a grade 2 positive Lachman. True posterior or posterolateral drawer tests could not be obtained due to limited range of motion from 10 to 35 degrees, but there was a 1+ posterior subluxation at 35 degrees. With varus and valgus stress, she had 1+ laxity both medially and laterally at both 10 and 30 degrees. She had significant apprehension with patellar movement, and the patella was dislocated laterally. She had extremely limited active range of motion secondary to pain and could be passively ranged from 10 to 35 degrees. Peroneal nerve function was intact and she had 2+ dorsalis pedis and posterior tibial pulses.

x-Rays taken in the office showed a posterolateral knee dislocation with a lateral patellar dislocation (Fig. 1). Magnetic resonance imaging revealed a complete lateral dislocation of the patella with no disruption of the patellar or quadriceps tendon, complete tear of the anterior cruciate ligament (ACL), high-grade partial tear of the posterior cruciate ligament (PCL), tears of the medial and lateral collateral ligaments, and a posterolateral translation of the tibia. The diagnosis was reinforced as a chronic unreduced posterolateral knee dislocation with concurrent patella dislocation from an injury that occurred 3 months prior.

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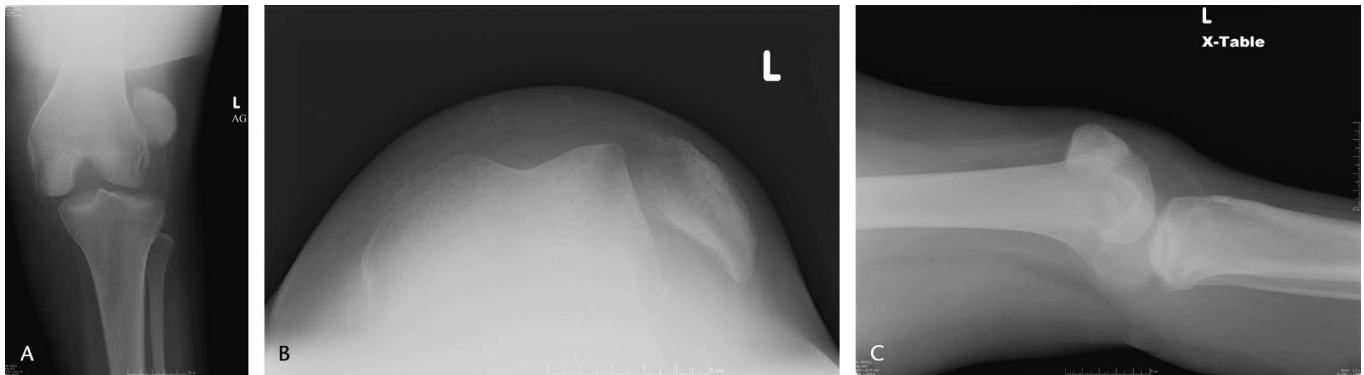


FIGURE 1. A, Anteroposterior radiograph 3 months after injury. B, Patellar view 3 months after injury. C, Lateral view 3 months after injury.

One week later, the patient was taken to the operating room for an open reduction and reconstruction. A long midline incision was made with extensive flaps created both medially and laterally (Fig. 2). A complete lateral dislocation of the patella was found, and the femur had button-holed through the medial retinaculum. Extensive soft tissue releases were necessary to achieve tibiofemoral and patella-femoral reduction (Fig. 3). Peroneal nerve decompression, lateral gastrocnemius recession, and iliotibial band release were necessary to regain proper length and alignment. After reduction, the PCL was reconstructed with half of an Achilles allograft and the lateral collateral complex was reconstructed with the other half of the Achilles allograft (Fig. 4). A patellar tendon allograft was used to recreate the ACL, and a primary soft tissue repair was used for the medial side. After ligament reconstruction, the knee was stable through a range of motion of 0–90 degrees, an external fixator was not deemed necessary, and the patient was placed in a long leg splint.

The patient was splinted for 10 days to allow soft tissue healing. The splint was then taken down and a range of motion program initiated. At the 6-week postoperative mark, the patient had 0–45 degrees of active motion with 0–80 degrees of assisted passive motion. She was pain free with a stable knee and was ambulating with an antalgic gait. x-Rays at that time showed a well-aligned knee (Fig. 5). At this point, the knee brace was discontinued. The 6-month follow-up revealed a satisfied patient with an active range of motion

from 0 to 85 degrees and a pain-free level gait with a minimal limp. She continued physical therapy, and at the 1-year mark, the patient had a free active range of motion from 0 to 100 degrees with a stable knee. At that point, she discontinued physical therapy, and the 1.5-year follow-up revealed a patient with an active range of motion from 0 to 90 degrees that was very satisfied with the result of her surgery (Fig. 6).



FIGURE 2. Landmarks (only the midline incision was used).



FIGURE 3. Extensive soft tissue releases.



FIGURE 4. Reconstruction of lateral collateral ligament.

DISCUSSION

Knee dislocations are a rare occurrence. They are most commonly associated with high-energy multiple trauma and have significant concomitant injuries including vascular, nerve, and ligament damage. It is absolutely essential to make a timely diagnosis and facilitate proper management,

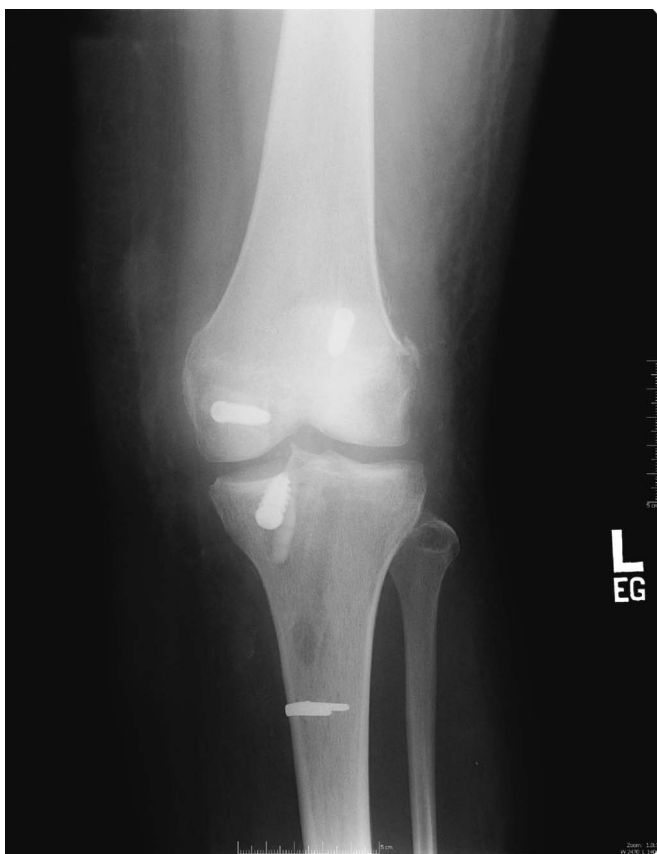


FIGURE 5. Postoperative anteroposterior x-ray.

especially in the context of the patient with multiple injuries.^{13,14} Failure to do so can lead to a permanent reduction in tibiofemoral range of motion and a significant disability.^{16,17} Fortunately, the majority of these knee dislocations either will spontaneously reduce or can be reduced in a closed fashion with relative ease in the acute trauma setting. However, occasionally a dislocated knee cannot be reduced. This is most common in posterolateral knee dislocations when the femur is translated anteromedially on the tibia. The interposition of the medial soft tissues into the joint space as the femur “button holes” through the retinaculum makes posterolateral dislocations notoriously difficult to reduce, which often require an open reduction.⁷

The proposed mechanism of injury for a posterolateral dislocation is a valgus stress applied to a flexed knee with a rotational component.¹⁵ The literature purports either an internal¹⁴ or an external^{9,12,15} rotation to the tibia, with most contemporary studies supporting an external rotation. An external rotation mechanism is also supported by our case as evidenced by the lateral dislocation of the patella. In these cases of posterolateral dislocation, the tibia dislocates posterolaterally and the medial femoral condyle herniates through the medial collateral ligament (MCL) and the medial capsule. These structures are then retracted into the joint by the immediate partial reduction of the femur, effectively blocking a complete reduction. Silverberg and Acus⁴ have also reported a case of the vastus medialis muscle belly blocking the reduction by its displaced position in the intercondylar notch. The invagination of the medial structures frequently produces a cutaneous indentation at the medial joint line referred to as the “dimple sign,” which has been described by Wand as pathognomonic for a posterolateral dislocation that requires an open reduction.^{18,19}

Once an irreducible posterolateral dislocation is recognized, it must be urgently reduced in order to preserve knee function.^{2,4,6-10,12,13,15,20} In our case, the delay in recognition ultimately affected the available treatment options and potentially the eventual outcome.²¹ If a posterolateral dislocation is addressed immediately, an arthroscopic^{9,6,22} and an open approach for reduction have been described. With an open reduction, primary repair of damaged structures may be feasible if they are in the operative field^{21,23}; however, further dissection or incisions should be avoided until the soft tissues become more amenable to intervention. Then, once the knee has been reduced, a subsequent arthroscopic or open reconstruction/repair of damaged ligaments can take place at an appropriate future time.²⁴

In chronically dislocated knees, the treatment becomes more complicated, and the literature does not support a particular approach. Henshaw et al¹⁶ described a case of an unreduced posterior knee dislocation in a 17-year-old male who had sustained multiple injuries including an ipsilateral femur fracture with lower extremity compartment syndrome. The patient presented 24 weeks after injury with a dislocated knee after femoral nailing and what appeared to be an attempted MCL repair. An extensive open approach was used to remove all scar tissue. No repair of any ligamentous structures was undertaken, and the case was complicated by a tibial plateau fracture that was reduced and bone grafted.



FIGURE 6. Flexion and extension at 1.5-year follow-up.

After reduction of the plateau fracture, the knee was stable and Steinmann pins were placed across the knee joint. The patient was maintained in a cylindrical cast for 12 weeks. Final range of motion was 5–40 degrees. Simonian et al²⁵ then reported on 2 chronically dislocated knees. In both cases, the knee was initially reduced and immobilized. In the first case, the ACL was repaired at 2 weeks at an outside institution and immobilized for 5 weeks. At the end of this period, the knee was found to be fixed and dislocated posteriorly. The second case was initially reduced and casted but presented 5 months after injury to an outside institution with a fixed posterior dislocation. An arthroscopic debridement was then undertaken by the referring surgeon. At 7 months, the patient continued to have a posterior dislocation and was referred to the author. Both knees underwent extensive ligamentous reconstructions and were placed in a hinged external fixator for 6 weeks with resultant range of motion from approximately 0 to 120 degrees. Furthermore, an arthroscopic approach has been proposed by Said and Learmonth²⁶ in the report of an unreduced knee in a 14-year-old patient who presented 14 months after injury after extensive conservative management. Arthroscopic debridement was used to facilitate reduction followed by immediate MCL repair to regain stability. The author then returned 3 months later to reconstruct the ACL and PCL. No final range of motion or outcome is reported. In our case, an open approach provided the best mobilization of tissues and produced the necessary visibility for a successful reconstruction of injured ligaments.¹⁸

The reported case was also complicated by a chronically dislocated patella. There is no literature that specifically addresses a chronically dislocated knee and patella, but Mills and Nowinski²⁷ described 4 cases of combined lateral patellar and knee dislocations. None of these were irreducible posterolateral dislocations, and they were all managed operatively within 21 days. Although the specifics of each procedure were not included, the authors did state that patellar reduction must be maintained at the expense of early knee motion to avoid contracture of the lateral structures. This was accomplished with a knee immobilizer and lateral bolstering if necessary. Wilson and Johnson²⁸ also reported a case of an

irreducible posterolateral dislocation with a concomitant patellar subluxation. The patient was managed with an open reduction and repair of an avulsed medial patellofemoral ligament 4 days after the injury followed by an ACL/PCL repair 2 months after injury. Final range of motion was 0–130 degrees with normal patellar tracking. Both of these case reports provide useful information; however, neither of them specifically addresses a chronically dislocated knee and patella.

In our case, a posterolateral dislocation of the knee and a lateral dislocation of the patella went unreduced and were not addressed in a timely manner. Thus, a chronic tibiofemoral and a patellar dislocation created a difficult and complex operative problem due to soft tissue scarring and immobility.¹ An open approach was chosen, and the patella and knee still required extensive soft tissue releases in order to perform a reduction. Once reduced, the ligament reconstructions provided sufficient stability to the joint and the patient continues to do well.

This is not an isolated case; concurrent dislocation of the patella has been reported to occur in 16% of knee dislocations.²⁷ However, there is an absence of literature that focuses on the management and outcome of a chronically unreduced knee dislocation with patellar involvement. Therefore, this case report provides vital information for treating surgeons and trauma specialists with regard to knee dislocations. Furthermore, the single-stage open reconstruction of the ACL/PCL and posterolateral corner with repair of the MCL produced excellent results and can be recommended for future management.

CONCLUSIONS

Knee dislocation can occur in the context of multiple trauma and must not be overlooked by the orthopaedic clinician or trauma specialist. Most commonly, these dislocations can be reduced closed in the trauma setting; however, the posterolateral knee dislocation is notoriously difficult to reduce and an open approach is often necessary. This should be done on an urgent basis dictated by the medical stability of the patient. Failure to recognize a posterolateral dislocation and perform an adequate reduction has significant

consequences for the patient with regard to possible permanent range of motion deficits.

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