Surgical Outcome of 2-Stage Management of Multiple Knee Ligament Injuries After Knee Dislocation

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Purpose: The purpose of this study was to determine the effectiveness of a new 2-stage surgical treatment for acute traumatic knee dislocation. **Methods:** The study involved 15 knees in 14 patients treated between October 1997 and November 2001. The mean follow-up was 88.9 months (range, 35 to 110 months). In the first surgical stage, medial or lateral ligament complexes were repaired or reconstructed within 2 weeks of injury. In the second surgical stage, once full range of motion was obtained 3 to 6 months later, the anterior cruciate ligament (ACL) or posterior cruciate ligament (PCL) was reconstructed if significant laxity was present. The final outcomes were assessed based on stress radiographs, range of motion, Lysholm score, Tegner activity stage, and International Knee Documentation Committee rating. **Results:** There were 10 cases of medial collateral ligament (MCL) tear and 8 cases of lateral collateral ligament (LCL) tear. All MCL and LCL injuries were either repaired or reconstructed. All cases had both ACL and PCL tears. After the first stage of MCL/LCL complex surgery, the second-stage surgery involving ACL and PCL reconstruction was deemed necessary in 3 and 7 cases, respectively. Five cases did not require ACL or PCL reconstruction. On stress radiography at the last follow-up, MCL, LCL, ACL, and PCL instability was graded as 0 to 1 in 15, 14, 15, and 11 cases, respectively. PCL instability was graded as 2 in 4 cases. The mean postoperative Lysholm score was 87.6 points. **Conclusions:** The 2-stage surgical approach described resulted in good outcomes for acute knee dislocation patients in terms of range of motion and stability. **Level of Evidence:** Level IV, therapeutic case series. **Key Words:** Knee dislocation—Two-stage surgical treatment.

Traumatic dislocation of the knee confirmed by clinical and radiologic evidence of tibiofemoral disarticulation is a rare injury, although this definition of dislocation may underestimate the true incidence.[1,2] Although acute traumatic dislocation of the knee is uncommon, a rapid and accurate diagnosis is required to determine the extent of injury to soft tissues, ligaments, the popliteal artery, and the tibial and peroneal nerves.[3-5]

Surgical treatment has been recommended for multiple ligament injuries after knee dislocation. However, the most effective treatment for traumatic dislocation of the knee remains controversial. Reconstruction of anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL) tears and repair of collateral ligaments or PCL reconstruction and repair of the collateral ligaments are usually performed simultaneously.[6] Despite various methods of treating knee dislocation, complications such as instability, joint stiffness, and infection are common because of the severity of the initial soft-tissue damage and necessity for an additional operation and immobilization.[7,8]

Therefore, we used a 2-stage surgical approach. In the first stage the collateral ligament complex including the posterolateral and posteromedial structures

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was repaired or reconstructed, because we believe that treatment for these posteromedial and posterolateral structures is very important for stability of the knee joint. After the patient recovered full knee motion, the second surgical stage involving ACL or PCL reconstruction (or both) was performed, if necessary.

The purpose of this study was to evaluate the clinical results of this protocol. Our hypothesis was that good or excellent clinical results can be achieved with the use of a 2-stage surgical approach.

METHODS

Patients and Evaluation

Between October 1997 and November 2001, 14 patients (15 knees) presented with a dislocated knee that had spontaneously reduced or was grossly dislocated. Twelve knees had already spontaneously reduced, and three were still grossly dislocated. Patients were not included in this study because of confounding variables: vascular injury, open knee dislocation, supracondylar femoral fracture, and tibial plateau fracture. Of the 14 patients, 12 were men and 2 were women. The mean age at the time of surgery was 30.4 years (range, 20 to 51 years). With a minimum follow-up of 35 months (mean, 88.9 months; range, 35 to 110 months), all cases were diagnosed by physical examination and radiographic evidence. All patients also had magnetic resonance imaging. All grades were determined in comparison to those of the uninvolved knee. Grade 1+ laxity is a 3- to 5-mm side-to-side difference; grade 2+, 6 to 10 mm; and grade 3+, greater than 10 mm. By definition, a partial ligament injury is categorized as grade 1+ or 2+ and a complete tear is categorized as grade 3+.[9] The ACL was examined at 30° of flexion. The PCL was examined at 90° of flexion by use of the medial tibial step-off as a guide. Varus laxity and valgus laxity were evaluated at 0° and 30° of flexion. In addition, range of motion (ROM), Lysholm score, and Tegner activity stage were evaluated at the last follow-up.[10] The results were also graded according to the guidelines of the International Knee Documentation Committee (IKDC).[11] The overall final IKDC rating is based on a group rating for function, symptoms, ROM, and laxity. Each group rating is based on the 2 or more items that are rated as normal, nearly normal, abnormal, or severely abnormal. The worst rating for any item within a group determines the group rating. Thus the worst rating for any particular item determines the overall final rating.

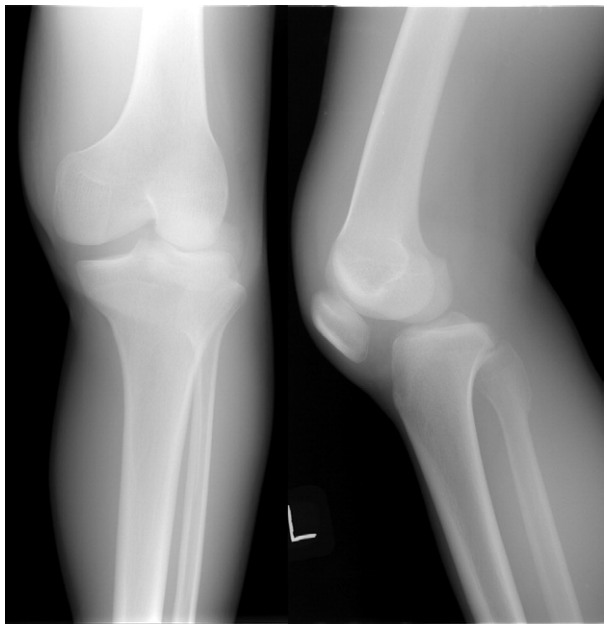

FIGURE 1. Anteroposterior and lateral radiographic views in a 29-year-old man (case 10) who presented with a reduced knee. Clinical and radiologic examination confirmed rupture of the ACL, PCL, and MCL.

Surgical Procedures and Rehabilitation

In the first surgical stage, repair or reconstruction of collateral ligaments was performed within 2 weeks of injury after swelling had subsided (Figs 1 and 2). Surgical management was based on preoperative findings and findings of the examination with the patient under anesthesia. An examination under anesthesia was performed by use of the contralateral knee as the control. In all knees either a medial or lateral curvilinear incision was used for exposure of the collateral and capsular structures. Regarding the MCL complex, injuries to the deep MCL, the superficial MCL, and the posteromedial structures of the posterior oblique ligament were repaired. If the firm endpoint was checked on the valgus stress test, we expected natural healing of the MCL through conservative treatment. Regarding the lateral collateral ligament (LCL) complex, injuries to the LCL, lateral capsule, popliteal tendon, and popliteofibular ligament were repaired if possible; otherwise, reconstruction was performed. The LCL was reconstructed via a modified Müller technique. First, a strip of biceps tendon left attached to the fibula was mobilized. The thickness of the strip was approximately three fourths that of the biceps tendon. Preparation was done with the strip of biceps tendon by use of Ethibond (Ethicon, Somerville, NJ)