



Irreducible dislocation of the knee joint: two-stage treatment

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Closed reduction attempts may be unsuccessful after traumatic knee dislocations on rare occasions. The interposition of the soft tissues on the medial aspect of the joint into the femoral condyle and tibial plateau is shown to be the cause of an unsuccessful reduction. In such cases, open reduction is the recommended method of treatment. In our study, we presented a 16-year-old male with an open knee dislocation after a motorcycle accident. As our closed reduction attempt failed, open joint reduction and repair of the medial collateral ligament and retinaculum was performed in the first stage of treatment. In the second stage, arthroscopic anterior cruciate ligament and posterior cruciate ligament reconstructions were carried out.

Key words: Irreducible knee dislocation; knee ligament injury; open joint injury.

Dislocation of the knee joint is a rare injury, occurring most frequently with low energy trauma.^[1-4] The majority of the cases are posterolateral dislocations where the torn medial collateral ligament and capsule may be interposed in the tibiofemoral joint and prevent closed reduction.^[1,3,4] Furthermore, irreducible dislocation of the knee due to the interposition of the vastus medialis has also been reported.^[2,5] Neurovascular injury is uncommon with closed knee dislocations. However, open knee dislocations, which account for 5-17% of all knee dislocations, and dislocations associated with high energy traumas are more frequently accompanied by fractures and neurovascular and multiple ligament injuries compared to closed dislocations.^[6] The knee can easily be reduced by a closed manipulation in such high energy injuries.

We present a patient with an open knee dislocation, irreducible by closed manipulation. The patient was treated with open reduction and subsequent ligament reconstruction.

Case report

A 16-year-old man had an open dislocation of the left knee after a motorcycle accident. He first admitted to a nearby hospital, where the wounds were debrided and primarily repaired after the closed reduction of the dislocation. He was immobilized with an above knee plaster cast after the operation. However, the pain did not resolve, the follow-up radiograph showed an incomplete reduction and the patient was referred to our hospital on the third day of the injury.

Our radiological and physical examination confirmed a posterolateral subluxation of the knee. There was a wide dermabrasion on the patella and on the anterior aspect of the tibia and two horizontal lacerations of 5 cm on the anterior aspect of the knee (Fig. 1a). The medial femoral condyle was palpable under the ecchymotic skin on the medial part of the knee (Fig. 1b). Ligament stability could not be optimally evaluated because of the locked flexion position of

the knee. Arterial doppler examination did not reveal any pathology. On the anteroposterior and lateral radiographs, it was seen that the left knee medial joint space was opened and the tibia proximal was displaced toward the lateral and the posterior (Fig. 2a). Magnetic resonance examination suggested the interposition of the medial anatomic structures into the tibiofemoral joint, and of the medial retinaculum into the intercondylar space (Fig. 3).

The first surgical intervention was performed on the day following admission. First, a closed reduction was reattempted under anesthesia which failed. Then, the sutured wounds were opened and a second debridement was carried out. The wound opened to the joint space. A medial incision was made to expose the medial femoral condyle. The medial collateral ligament and the adductor longus muscle were completely dissected from their femoral insertion sites. The medial retinaculum and capsule were in the intercondylar notch area and the medial collateral ligament was interposed into the tibiofemoral space (Fig. 4). The joint was reduced after the removal of these trapped structures, although joint stability could not be obtained.

No chondral lesion was detected in the joint and the menisci were intact. The posterior capsule was torn to the posterior cruciate ligaments. The anterior cruciate ligament (ACL) was detached from its tibial attachment, while the posterior cruciate ligament (PCL) was detached from its femoral attachment.

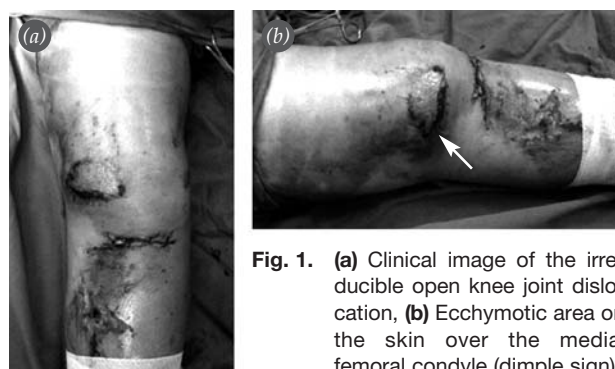


Fig. 1. (a) Clinical image of the irreducible open knee joint dislocation, (b) Ecchymotic area on the skin over the medial femoral condyle (dimple sign).

The medial collateral ligament was repaired with two anchors and the medial retinaculum was repaired (Fig. 2b). Posterolateral structures were intact. After the operation, the knee was immobilized with a hinged brace, locked at 30° of flexion. As the patient had no wound problems, passive range of motion exercises between 0 and 50 degrees were introduced in the second week. The patient was mobilized with the brace without any weight bearing for six weeks. The patient underwent a second closed manipulation which increased the flexion from 90° to 140° in the second month. By the 3rd month, the patient was able to walk with full weight bearing without the brace. Arthroscopic ACL and PCL reconstructions were performed as the second stage treatment after 5 months (Fig. 2c). The ACL was reconstructed with a hamstring autograft taken from the same side and the



Fig. 2. (a) Preoperative anteroposterior radiography of the knee, (b) anteroposterior radiography of the knee after the medial collateral ligament repair, (c) anteroposterior radiography of the knee one year after the second stage reconstruction.



Fig. 3. Preoperative MRI image of the patient showing the medial anatomical structures interposed into the tibiofemoral space.

PCL with a tibialis anterior allograft. The knee was immobilized in full extension for six weeks postoperatively. The patient's knee was stable with a flexion range of 130°, 18 months after the initial injury. (Figs. 5a and b).

Discussion

Irreducible dislocation of the knee joint as reported in the literature are usually posterolateral dislocations, due to low energy traumas.^[1,3,4] These studies attributed the valgus loading of the knee and internal rotation of the tibia as the mechanism of injury. Common pathological evidence given as the reason for the joint reduction failure was the interposition of the medial capsule and ligaments into the tibiofemoral joint space. Quinlan and Sharrard stated that the interposition of the medial retinaculum may further interfere with the reduction in the posterolateral knee dislocation.^[7] Clinically, ecchymosis (dimple sign) on the skin of the medial part of the knee is characteristic.^[1-5]



Fig. 4. Intraoperative image of the medial retinaculum and capsule interposed into the intercondylar space; medial collateral ligament is torn.

Open knee dislocations are quite rare. Motor vehicle accidents are the most common etiological cause. Knee dislocations due to high energy traumas are usually reduced with closed methods. In previous studies, open knee dislocations were usually classified as open joint injuries. Collins and Temple classified open joint injuries according to the damage to the extracapsular and intraarticular structures.^[8] In their study, they divided the open joint injuries into four groups and assigned the joint dislocations to the last group. King et al. graded joint injuries based on the Gustilo open fracture classification.^[6]

The degree of the injury that occurs in the soft tissue surrounding the knee is crucial in defining the treatment and prognosis. Acute treatment of the damage to extracapsular structures is important in order to protect the extremity and prevent infection. Therefore, debridement of necrotic tissue and irriga-



Fig. 5. (a) Flexion degree of the knee on the last follow-up of the patient, (b) clinical image of the patient squatting.

tion of the joint followed by the repair of damaged ligaments is suggested in the treatment of open joint dislocation. Irreducible knee dislocations must be immediately reduced with surgery.^[1-5] Ligament repair may usually be required to provide knee stabilization following the open reduction. Ürgüden et al. performed open reduction on their two cases with irreducible knee dislocation due to low energy trauma.^[1] The authors applied an external fixator to achieve stability after the initial surgery. In our case, joint stability could not be achieved in the first stage despite the removal of the medial collateral ligament and retinaculum from the joint. Stability was obtained after the repair of the medial capsule and collateral ligament.

There is still some controversy on the timing of ligament reconstruction. Owens et al. reported better results with primary ligament repair within the first 2 weeks of the closed knee dislocation.^[9] However, they also reported a joint stiffness complication of 18%, all in patients with early surgical treatment. Bin and Nam performed a two-stage treatment in closed knee dislocation with multiple ligament injury.^[10] In the first stage, they repaired the medial and lateral collateral ligaments and obtained a full knee range of motion within 3 months. In the second stage, they performed the arthroscopic cruciate ligament reconstruction. Similarly, we also performed the second stage ligament reconstruction after achieving complete knee range of motion.

The new trauma of an early surgery may further increase the risk of stiffness and infection. The infection rate in patients with open knee dislocation was reported as 43%.^[6] We applied a two-stage treatment to avoid infection and skin problems.

In conclusion, in irreducible traumatic knee dislocations, immediate open reduction should be con-

sidered. Repair of the medial collateral ligament and medial retinaculum is sufficient in the first stage treatment after open reduction. This serious pathology, with different degrees of soft tissue injury, may necessitate subsequent procedures to obtain a stable knee with an adequate range of motion.

Conflicts of Interest: No conflicts declared.

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