CASE REPORT

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Treatment of Acute Anterior Cruciate Ligament Tear in a Patient with Unicompartmental Knee Prosthesis

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ABSTRACT Anterior cruciate ligament (ACL) is among the most important ligaments in medial unicompartmental knee replacement (UKR) indication and postoperative survival. There is no consensus regarding the treatment options of acute ACL rupture after UKR. The debate whether total knee replacement or ACL reconstruction should be performed if the patient has an instability complaint is still open. In this case report, we aimed to report the surgical technique and clinical outcomes after a follow-up period of 24 months for a 50-year-old woman who underwent arthroscopic ACL reconstruction due to a traumatic acute ACL rupture that has developed 32 months after medial UKR and to investigate the feasibility of ACL reconstruction in a patient who had undergone UKR. Also we aimed to discuss the surgical technique of arthroscopic ACL reconstruction on the patient who has medial unicompartmental knee protheses.

Keywords: Anterior cruciate ligament tear; unicompartmental knee prosthesis; anterior cruciate ligament reconstruction

Unicompartmental knee replacement (UKR) is one of the most commonly performed surgical treatments in osteoarthritis of the medial compartment, with high clinical success.[1] Successful results with the simultaneous performance of UKR and anterior cruciate ligament (ACL) reconstruction have been reported in patients with an chronic ACL rupture.[2] However, the knee should possess its normal kinematics and the ACL should be intact for the formation of anteromedial osteoarthritis, which is an indication for UKR.[3] ACL is also an essential structure for extended implant survival. The absence of ACL has been shown to lead to loosening of the tibial component in the early term and shorten the implant survival time.[4] In addition, a recent biomechanical study has shown that the contact stress on the insert and lateral articular cartilage increases in medial UKR if there is a failure of ACL or medial collateral ligament (MCL), and that poor outcomes could be expected in such cases.[5]

There is no suggestion regarding the treatment approach for acute ACL rupture that develops after medial UKR.

In this case report, we aimed to investigate the 24-month outcomes of arthroscopic ACL reconstruction in a patient who underwent UKR and discuss the feasibility of ACL reconstruction in patients who developed acute traumatic ACL tear after UKR.

CASE REPORT

The instutitional review board is not required for this case report. Necessary permissions were obtained from the patient. On February 26, 2015, a 50-year-old female patient underwent bilateral cemented medial UKR using a Zimmer Unicompartmental High Flex Knee System (Zimmer Biomet Inc., Warsaw, IN, USA), following the diagnosis of bilateral osteoarthritis in the medial compartment, due to the failure of conservative treatment. The patient returned to her normal daily life 3 months after surgery.

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In September 2017, the patient revisited our emergency department and said that her right knee rotated due to a fall when getting off the bus. Initial radiographic examination revealed hemarthrosis in the knee while the patella was in place. No implant failure was observed, therefore, the patient was given a brace. One month later, hemarthrosis has regressed and the range of motion of the knee joint was improved. However, the patient reported sudden and frequent knee give outs during her visit at the outpatient clinic after 3 months from falling. In the 3rd month follow-up examination, the Lachman test was (+++), while the pivot-shift test was not applied. No pathologies were detected on plain radiographs. Magnetic resonance was avoided with the thought that it may present wrong results due to the presence of knee prosthesis. The anterior tibial translation was measured as 11 mm with a KT-1000 arthrometer. Our suspicion of ACL rupture was confirmed with diagnostic arthroscopy. The patient was told that ACL reconstruction could be performed in the same session, and after getting her written informed consent, arthroscopic ACL reconstruction was performed on January 15, 2018 (Figure 1, Figure 2).

In a patient with a medial UKR, ACL reconstruction presents technical challenges for a surgeon. First, portals are difficult to open due to adhesions and synovitis in the medial compartment. Second, the tibial component may prevent adjustment of the intra-articular exit site of the tibial tunnel. We overcame this obstacle by shifting the intra-articular exit of the tibial tunnel more lateral to the ACL stump. Third, there may be friction between the ACL autograft and the lateral femoral condyle due to displacement of the tibial tunnel. To prevent this, we had to perform notchplasty surgery on the lateral femoral condyle. Preoperative knee flexion was 130° and extension was 0°, and the Oxford score was 41, while these values were 134°, 0° and 40, respectively, one year after the operation (Figure 3, Figure 4, Figure 5). Meas-

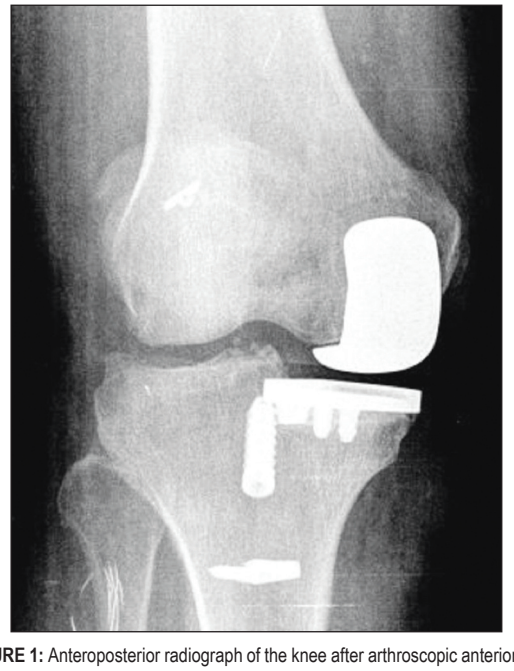

FIGURE 1: Anteroposterior radiograph of the knee after arthroscopic anterior cruciate ligament reconstruction.

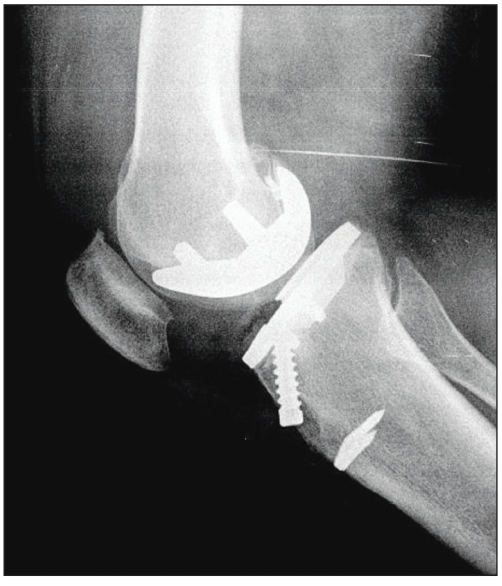

FIGURE 2: Lateral radiograph of the knee after arthroscopic anterior cruciate ligament reconstruction.

FIGURE 3: Knee flexion of the patient 1 year after surgery.

FIGURE 4: Knee extension of the patient 1 year after surgery.

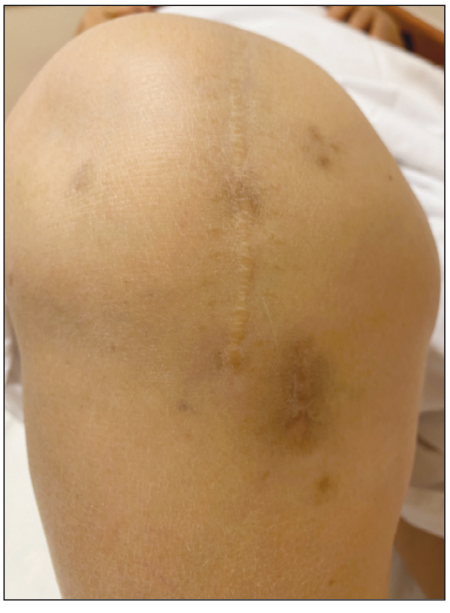

FIGURE 5: Incision scars of anterior cruciate ligament surgery 1 year after the operation of the patient.

urement with the KT-1000 arthrometer showed 1.2 mm anterior translation in the right knee. The patient's Oxford Knee Score was 43 in the first year after surgery.

DISCUSSION

The most critical finding of this case report is that arthroscopic ACL reconstruction using a hamstring autograft due to development of a traumatic acute ACL rupture after UKR is an effective treatment strategy.

Medial UKR is a surgical treatment option for patients with advanced osteoarthritis in a single medial compartment. UKR is commonly indicated for stable, functionally intact lateral and femoropatellar compartments for correctable intraarticular varus deformities. UKR sugery have been especially contraindicated in ACL failures, while higher rates of tibial component loosening and revision surgeries have been reported in knees with no ACL.[3] Goodfellow et al. reported a revision rate of 16.2% in UKR cases with an ACL rupture after 3 years of follow-up in their study that involved 103 cases, whereas the revision rate was 4.8% in patients with an intact ACL.[2] In another study, Goodfellow and O'Connor followed 101 patients for nine years and reported that the implant survival rate was 95% in patients with an intact ACL and 81% in patients with an ACL tear.[4] Based on a recent biomechanical study by Kwon et al. the loading on the lateral compartment and polyethylene insert were higher in the absence of ACL and MCL when compared to those with an intact ligament.[5] The authors also reported that poor clinical outcomes and early loosening could be predicted, especially in the absence of ACL in varus knees. Consistent with the literature, it was learned that the case reported here did not have any complaints in the knee until acute traumatic ACL tear after UKR surgery (preoperative oxford score: 41). After this trauma, the patient complained of instability.

The number of studies reporting patients with a symptomatic ACL rupture associated with traumatic causes after UKR is very limited. In selected cases with chronic ACL insufficiency and osteoarthritis, UKR combined with ACL reconstruction has yielded successful outcomes.[6] Kennedy et al. reported excellent outcomes in 76 patients (mean age: 52 years) who underwent ACL reconstruction and UKR simultaneously, after a follow-up period of 6 years.[6] While all these studies were performed in patients osteoarthritis of the medial compartment and chronic ACL insufficiency, the literature holds no study involving a case with acute traumatic ACL rupture after UKR.

Considering the above-mentioned information, we can conclude that the treatment protocol for medial UKR in patients with ACL tear is not clear. It is controversial whether ACL reconstruction is a viable

treatment in such cases. In order to contribute to the literature, we presented a patient who underwent arthroscopic ACL reconstruction with hamstring autograft following traumatic ACL rupture. As a result of our 48-month follow-up, the lateral and patellofemoral compartments were intact in patients with ACL tear after UKR, suggesting that ACL reconstruction may be an appropriate treatment if the patient does not have any complaints until ACL occurs. Otherwise, total knee replacement may be a more suitable option. However, the success of our case does not reflect a general result. Therefore, future studies with more cases and larger numbers of patients are needed to confirm the results reported here.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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