J Orthop Spine Trauma. 2026 August; 12(4): 215-9.
DOI: 10.18502/jost.v12i4.22586
Case Report

Revision Anterior Cruciate Ligament Reconstruction in a Patient with Generalized Joint Laxity and Previously Undiagnosed Medial Collateral Ligament Injury: A Case Report Highlighting Surgical Strategies

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Received: 11 April 2026; **Revised:** 13 June 2026; **Accepted:** 14 July 2026

Abstract

Background: Revision anterior cruciate ligament reconstruction (rACLR) remains one of the most technically demanding procedures in orthopedic sports medicine, particularly in patients with generalized joint laxity (GJL), unrecognized medial collateral ligament (MCL) injuries, and meniscal pathology. Successful outcomes require meticulous diagnostic assessment, individualized graft selection, and simultaneous management of associated ligamentous and meniscal injuries.
Case Report: We report the case of a 23-year-old man with a history of failed primary anterior cruciate ligament reconstruction (ACLR), who presented with recurrent instability, medial knee pain, and episodes of giving way. Clinical and imaging evaluation revealed GJL, a previously unrecognized MCL rupture, meniscal tears, and tibial tunnel widening. A single-stage rACLR using a quadriceps tendon (QT) autograft, combined with concurrent MCL reconstruction and meniscal repair, was performed.
Conclusion: This case highlights the importance of comprehensive evaluation of medial laxity, GJL, and meniscal pathology in all anterior cruciate ligament (ACL) injuries. rACLR in such complex cases requires anatomy-based, patient-specific planning, careful graft selection, and concurrent management of associated injuries to optimize stability and functional outcomes. Hamstring autografts should be used with caution in patients with joint laxity, and double hamstring harvest is discouraged in combined ACL-MCL reconstruction.

Keywords: Revision Surgery; Collateral Ligaments; Joint Instability; Tendons; Autografts

Citation: Vosoughi F, Zolghadr H, Akhoondi A, Sherafatvaziri A. **Revision Anterior Cruciate Ligament Reconstruction in a Patient with Generalized Joint Laxity and Previously Undiagnosed Medial Collateral Ligament Injury: A Case Report Highlighting Surgical Strategies.** *J Orthop Spine Trauma* 2026; 12(4): 215-9.

Background

Anterior cruciate ligament reconstruction (ACLR) has become a routinely performed procedure for restoring knee stability and enabling return to sports following ACL injury. Nevertheless, failure of reconstruction remains a clinically relevant problem, particularly in young and highly active individuals. The causes of failure are often complex and multifactorial, ranging from patient-related anatomical factors to technical errors and overlooked concomitant injuries. In recent years, increasing attention has been directed toward identifying modifiable risk factors that may compromise graft survival and necessitate revision surgery. Among these, abnormal posterior tibial slope has emerged as an important contributor to excessive graft loading and recurrent instability, with corrective osteotomy demonstrating favorable outcomes in selected revision cases (1).

Accurate restoration of native ACL anatomy is fundamental to successful reconstruction. Technical factors, particularly femoral and tibial tunnel positioning, continue to represent one of the most common causes of persistent instability after surgery. Malpositioned tunnels may alter graft biomechanics, restrict normal knee kinematics, and ultimately lead to graft stretching or failure. Consequently, precise tunnel placement remains a cornerstone of both primary and revision ACL reconstruction procedures (2).

Despite advances in surgical techniques, a substantial number of patients require additional surgical intervention following ACLR. Large cohort studies and registry-based analyses have demonstrated that recurrent instability, graft rupture, and associated intra-articular pathology remain important causes of reoperation after reconstruction (3, 4). These findings highlight the necessity of comprehensive preoperative assessment and meticulous identification of all factors contributing to knee instability.

Successful management of ACL-deficient knees extends beyond graft reconstruction alone. Associated injuries involving secondary stabilizers, including the collateral ligaments and menisci, may significantly influence postoperative stability and functional outcomes. Failure to recognize and appropriately address these lesions can result in persistent rotational or valgus laxity despite technically satisfactory graft placement. Furthermore, accurate assessment of concomitant chondral damage is essential during surgical planning, and imaging modalities such as ultrasonography have demonstrated considerable diagnostic value in detecting cartilage pathology around the knee joint (5).

Another important consideration in the setting of failed ACLR is the progressive degenerative change that may develop within the knee. Persistent instability has been associated with accelerated cartilage deterioration affecting multiple compartments, potentially compromising long-term joint preservation and patient outcomes. This risk becomes increasingly relevant in revision cases, where prolonged abnormal joint mechanics may already have initiated degenerative processes (6).

Case Report

A 23-year-old clothing salesman sustained a non-contact twisting injury to his right knee while playing soccer in 2021. Six months later, he underwent ACLR, with uncertain medial meniscus involvement, at another center. The patient reported:

"I was never well after surgery, couldn't bend my knee, and always had pain in my medial knee, especially after working. I couldn't play soccer without a knee brace due to a sense of instability."

Approximately two years after the primary ACL reconstruction, the patient sustained another twisting injury to the same knee while playing soccer. He experienced a sudden locking episode followed by giving-way sensations, pain, and worsening instability. Six months after this reinjury, he presented to our institution for further evaluation.

On examination, the patient's height was 183 cm. During walking, the knee did not exhibit any thrust. Valgus stress testing showed significant medial opening in both full extension and at 30° of flexion. The supine dial test was positive, indicating rotational laxity. Lachman test was positive, and the posterior drawer test was negative. The medial joint line demonstrated gross instability with a 3+ opening, and GJL was noted.

Radiographic evaluation revealed the following alignment parameters:

Lateral distal femoral angle (LDFA) 87°, medial proximal tibial angle (MPTA) 86°, joint line convergence angle (JLCA) 3°, mechanical femoral mechanical tibial angle (MFMTA) 6°, and intermetatarsal angle (IMA) 6° varus (Figure 1). The posterior tibial slope measured 11°.

Computed tomography (CT) scan showed mild ectasia of the previous femoral tunnel but significant widening of the tibial tunnel measuring approximately 16 mm (Figure 2). Magnetic resonance imaging (MRI) demonstrated complete failure of the ACL graft, a full-thickness MCL rupture, and tears of both the medial and lateral menisci (Figure 3).

Based on these findings, a one-stage revision ACL and MCL reconstruction combined with meniscal repair was planned. The previous femoral tunnel was deemed adequate and was reused, while a new tibial tunnel was created more medially to avoid overlap with the widened previous tunnel and to achieve optimal graft positioning.

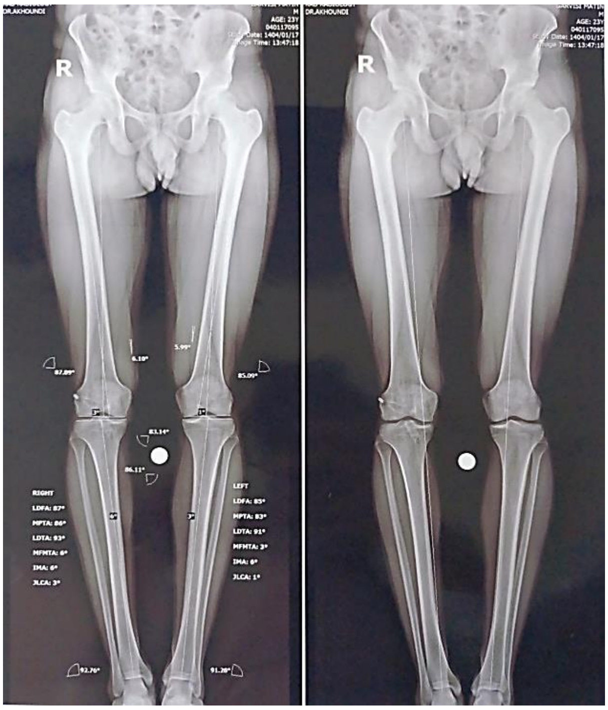

Figure 1. Preoperative radiographic evaluation of lower limb alignment. Standing long-leg radiographs demonstrating the measured alignment parameters: lateral distal femoral angle (LDFA) 87°, medial proximal tibial angle (MPTA) 86°, joint line convergence angle (JLCA) 3°, mechanical femoral-tibial angle (MFMTA) 6°, and intermalleolar angle (IMA) 6° of varus

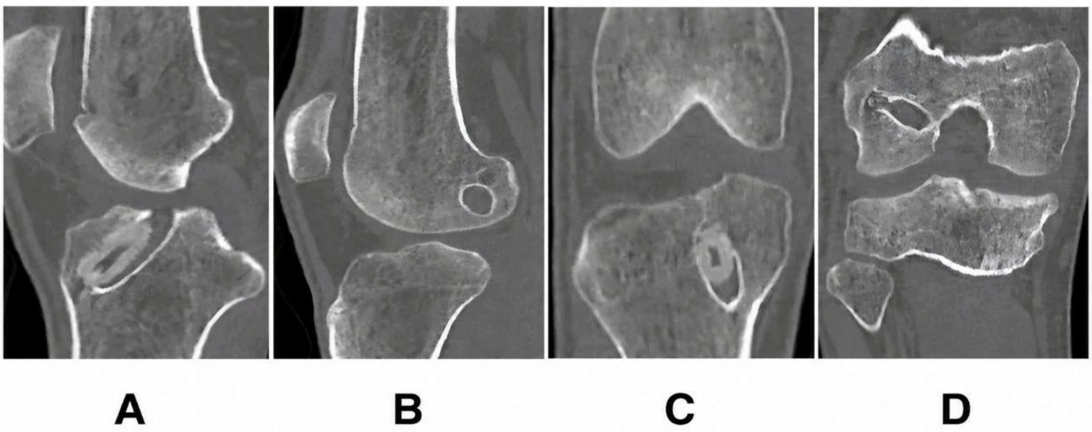

Figure 2. Preoperative computed tomography (CT) evaluation of the previous ACL reconstruction tunnels. A) Sagittal CT image demonstrating the previous tibial tunnel; B) Sagittal CT image demonstrating the previous femoral tunnel; C) Coronal CT image demonstrating the previous tibial tunnel; D) Coronal CT image demonstrating the previous femoral tunnel

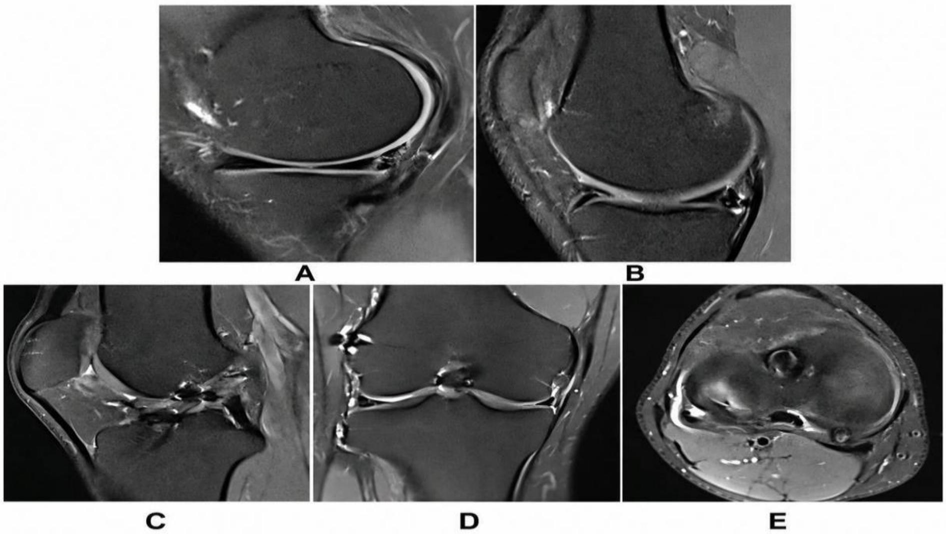

Figure 3. Preoperative magnetic resonance imaging (MRI) of the affected knee. A-C) Sagittal images demonstrating the status of the previous ACL graft; D) Coronal image; E) axial image demonstrating associated intra-articular findings

During arthroscopic evaluation, a hypertrophic superomedial plica was identified and excised. The ACL graft was found to be completely ruptured. The medial meniscus revealed a longitudinal tear involving the posterior horn extending into the body, with an intact ramp region. The lateral meniscus demonstrated a flap tear in the white-white zone of the posterior horn; after excision of the unstable portion, an oblique radial component consistent with a lateral meniscus oblique radial tear (LMORT) was identified and repaired. Both menisci were addressed appropriately; the medial meniscus was repaired using an inside-out technique, while the lateral meniscus was repaired following careful debridement of the unstable edges.

rACLR was performed using a QT autograft, as the HTs had already been utilized in the primary procedure. Given the patient's GJL, it was presumed that the use of a hamstring graft in the previous reconstruction may have contributed to residual laxity or increased susceptibility to graft failure. The MCL reconstruction was carried out concurrently to restore both valgus and rotational stability. Intraoperative examination following graft fixation demonstrated satisfactory stability in all planes. Early postoperative radiographs confirmed satisfactory tunnel and implant position (Figure 4).

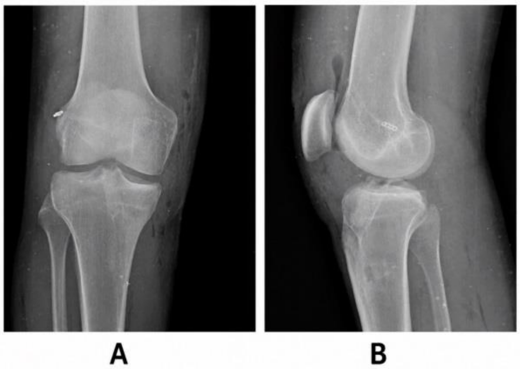

Figure 4. Early postoperative radiographs confirming satisfactory tunnel and implant position after revision ACL reconstruction with quadriceps tendon autograft and concurrent MCL reconstruction. A) Anteroposterior view; B) Lateral view

The postoperative course was uneventful. The patient followed a structured rehabilitation protocol, with gradual restoration of range of motion (ROM) and progressive weight-bearing. At the most recent follow-up, he reported no pain, instability, or restriction of motion, and was able to walk comfortably with full weight-bearing. Long-term follow-up is ongoing, but early clinical and functional outcomes have been satisfactory.

Discussion

rACLR remains one of the more challenging procedures in sports knee surgery, largely due to the multifactorial nature of primary graft failure, altered joint anatomy following previous interventions, and the technical demands of securing reliable fixation in compromised soft tissue and bone environments (1). A thorough assessment of the underlying causes of failure in the primary ACLR and careful preoperative planning are fundamental to optimizing clinical outcomes.

Multiple factors have been implicated in primary reconstruction failure, including femoral or tibial tunnel malposition, tunnel dilation, inadequate graft size or placement, biological failure of graft incorporation, recurrent traumatic events, and overlooked concomitant injury such as meniscal insufficiency or anterolateral complex involvement (2-4). Therefore, the preoperative evaluation for rACLR should extend beyond standard clinical assessment and MRI, incorporating CT or 3-dimensional (3D) imaging to accurately assess tunnel position, bone stock quality, limb alignment, and prior surgical configuration (5). The recent ESSKA consensus on ACL revision emphasizes that although structured algorithms exist to guide management, the current body of evidence remains limited, with only a minority of recommendations achieving grade B support (7, 8).

The choice between a single-stage or staged revision approach primarily depends on whether it is feasible to achieve stable graft fixation with appropriately positioned tunnels. Significant tunnel enlargement, malalignment, or inadequate bone stock often necessitates a staged procedure with bone grafting prior to definitive reconstruction, whereas well-preserved and appropriately oriented tunnels may allow safe and effective single-stage revision staged approaches against the increased risk of graft failure when stable fixation cannot be guaranteed in a single-stage reconstruction (7, 8). This decision requires balancing the prolonged rehabilitation and delay associated with autograft remains the preferred graft source in the revision setting due to superior biological incorporation and lower failure rates compared with allograft, particularly in younger and more physically active individuals (9-11). Comparative studies and meta-analyses have shown lower re-rupture rates with BPTB and QT autografts compared with HT autografts in rACLR (12-14). The tendency toward greater residual laxity with HT is of particular concern in patients with generalized joint hyperlaxity or combined ligament insufficiency (10). Additionally, multiple systematic reviews have demonstrated higher re-failure rates with allograft in revision settings (11), though allograft may still be appropriate for older, lower-demand individuals when accompanied by appropriate patient counseling (15).

In situations involving combined ligament injury, such as concomitant ACL and MCL insufficiency, current evidence supports the use of BPTB autograft for improved stability and functional outcomes relative to HT autograft (16). In selected high-demand patients, hybrid graft strategies may also be considered to minimize donor-site morbidity while preserving mechanical integrity (9).

Concomitant pathology plays a decisive role in final clinical outcomes. Knees undergoing rACLR frequently demonstrate meniscal deficiency, chondral deterioration, or mechanical malalignment, each of which may negatively impact long-term joint preservation (2, 4, 17). As such, comprehensive revision planning should include meniscal repair or transplantation when indicated, cartilage repair strategies, realignment osteotomy in cases of malalignment, and consideration of lateral extra-articular augmentation in the presence of a high-grade pivot shift (3, 18, 19).

While clinical results of rACLR have improved over recent years, they generally remain inferior to those of primary ACLR with regard to return to sport, graft survival, and long-term joint health (20, 21). Therefore, clear and realistic preoperative counseling is essential in establishing appropriate patient expectations and achieving satisfactory outcomes.

Conclusion

This case illustrates the complexity of rACLR and reinforces the need for a systematic and individualized approach. Achieving a successful outcome in revision surgery relies not only on surgical expertise and precise tunnel placement but also on recognizing and addressing the underlying causes of primary graft failure, including unrecognized concomitant injuries and patient-specific biological and biomechanical factors.

Medial instability remains one of the most overlooked contributors to suboptimal results after ACLR. Every patient presenting with an ACL rupture should be assumed to have an associated MCL injury until proven otherwise –both during clinical assessment and under anesthesia. Failure to identify and treat medial laxity can compromise graft function and predispose to early failure.

Equally important is the evaluation of GJL, which plays a decisive role in graft choice. Patients with increased laxity are at higher risk of failure when hamstring autografts are used, whereas BPTB and QT autografts provide superior stability and graft incorporation in this subgroup. In the presented case, the decision to utilize a QT autograft, together with concurrent MCL reconstruction, restored both valgus and rotational stability and yielded excellent early clinical outcomes.

From a broader perspective, comprehensive assessment for medial laxity, GJL, and meniscal pathology must be an integral part of every ACLR work-up. The use of hamstring autografts in patients with joint laxity should be approached with caution, and double hamstring harvest is discouraged, particularly in combined ACL-MCL reconstructions.

In conclusion, rACLR demands an anatomy-based, patient-specific strategy. Careful preoperative planning, thoughtful graft selection, and simultaneous management of associated ligamentous and meniscal injuries are essential to restore knee stability, optimize function, and reduce the risk of re-failure over time.

Conflict of Interest

The authors declare no conflict of interest in this study.

Acknowledgements

The authors would like to sincerely thank Dr. Mohammad Hossein Nabian, founder of the Center for Orthopedic Trans-Disciplinary Applied Research, Tehran University of Medical Sciences, Tehran, Iran, for his invaluable support and guidance, which were instrumental in the successful completion of this study. The authors also gratefully acknowledge the Center for Orthopedic Trans-Disciplinary Applied Research for providing a supportive and intellectually enriching academic environment that greatly contributed to the development of this study.

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