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# Accelerated Return to Play Following Internal Brace Repair of combined MCL and MPFL Injury

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## Abstract

**Background:** Combined grade III midsubstance medial collateral ligament (MCL) tears with concomitant medial patellofemoral ligament (MPFL) injury and capsular avulsion are uncommon in athletes, and limited evidence exists regarding primary MCL repair with internal brace augmentation and accelerated rehabilitation. This case describes the surgical management and rehabilitation of a collegiate football player with this complex injury pattern.

**Patient:** A 25-year-old male collegiate football player sustained a valgus injury to his left knee during football practice, resulting in immediate medial knee pain, swelling, and instability. Magnetic resonance imaging confirmed a grade III midsubstance MCL tear with distal capsular avulsion, complete MPFL tear, and associated patellofemoral cartilage pathology.

**Intervention:** The patient underwent primary MCL repair with internal brace augmentation and capsular repair, while the MPFL was managed nonoperatively. A criterion-based rehabilitation program emphasizing early range of motion, progressive strengthening, blood flow restriction training, aquatic therapy, anti-gravity treadmill progression, and gradual return to football-specific activities was implemented.

**Outcomes:** Full knee extension and 150° of knee flexion were achieved by three weeks postoperatively. The patient progressed to football-specific drills by nine weeks while maintaining medial knee stability. Persistent anterior knee pain prompted repeat magnetic resonance imaging, which confirmed an intact MCL repair and progressive MPFL healing without recurrent instability but demonstrated advanced patellofemoral cartilage pathology and persistent edema. Subsequent management focused on symptom modification and continued rehabilitation.

**Conclusions:** Primary MCL repair with internal brace augmentation restored medial knee stability and permitted accelerated functional progression despite concomitant MPFL injury. Persistent postoperative symptoms were attributable to associated articular pathology rather than failure of the ligament repair.

**Clinical Bottom Line:** Primary repair with internal brace augmentation may represent a viable alternative to reconstruction for appropriately selected athletes with complex medial knee injuries. Criterion-based rehabilitation may facilitate accelerated functional progression, while persistent postoperative pain should prompt evaluation for concomitant intra-articular pathology rather than immediate concern for ligament repair failure.

## Background

The knee is a complex joint that depends on multiple ligamentous structures to maintain stability during dynamic activities. The medial collateral ligament (MCL) serves as the primary restraint to valgus stress and contributes substantially to rotational stability of the knee. It consists of superficial and deep components that work together to resist valgus loading and tibial external rotation throughout the range of knee motion [1]. The superficial MCL extends from the medial femoral epicondyle to the posteromedial tibia and provides the greatest resistance to valgus forces, whereas the deep MCL, located adjacent to the joint capsule, primarily resists tibial external rotation from 90° of knee flexion through full extension [1].

The location of an MCL injury may influence both treatment and prognosis. A recent study reported that approximately 66% of MCL tears involve the proximal superficial MCL, whereas midsubstance and distal tears account for only 14% of injuries [2]. Distal injuries may include a capsular avulsion, in which the ligament and associated joint capsule are avulsed from their tibial attachment rather than torn within the ligament substance [3]. These injuries typically result

from high valgus loading combined with tibial external rotation and may be associated with greater medial instability and healing challenges than more proximal tears [3-4]. In addition to the MCL, the medial patellofemoral ligament (MPFL) functions as the primary restraint to lateral patellar translation [5]. Injury to either structure can result in pain, instability, and functional impairment of the knee [5-6].

Medial collateral ligament injuries are among the most common ligamentous injuries in athletes, accounting for approximately 7–9% of all athletic knee injuries [6]. Injury severity is commonly classified using a three-grade sprain classification system. Grade I injuries involve minimal fiber disruption without instability, grade II injuries represent partial ligament disruption with increased pain and mild valgus laxity, and grade III injuries consist of complete ligament rupture with significant medial instability [6]. Because of the MCL's robust vascular supply, most isolated and proximal injuries heal successfully with nonoperative management. In contrast, MPFL injuries most commonly occur in conjunction with lateral patellar dislocation and have been reported in up to 90% of first-time patellar dislocations [6]. Although isolated MCL and MPFL injuries have been extensively investigated, the concurrent presentation of a grade III midsubstance MCL tear with tibial capsular avulsion and associated MPFL injury is rarely described in the literature, resulting in limited evidence to guide optimal surgical management and rehabilitation.

Historically, multiligament knee injuries involving the MCL have been managed with ligament reconstruction to restore stability and minimize residual valgus laxity [7]. Traditional postoperative rehabilitation often includes approximately six weeks of protected weight bearing, followed by progressive strengthening, restoration of normal gait mechanics, and return-to-sport testing beginning around 20 weeks postoperatively.8 More recently, primary MCL repair augmented with an internal brace has emerged as an alternative to reconstruction in appropriately selected patients. This technique provides additional biomechanical support during ligament healing, potentially permitting earlier mobilization while maintaining joint stability [9-10]. Early clinical evidence has demonstrated favorable patient-reported outcomes following internal brace augmentation, although the literature remains limited [10-11].

The purpose of this case report is to describe the surgical management and accelerated rehabilitation of a collegiate football player with a grade III midsubstance MCL tear, tibial capsular avulsion, and concomitant MPFL injury treated with primary MCL repair augmented by an internal brace and nonoperative management of the MPFL. This report highlights the rehabilitation progression, functional outcomes, and potential clinical implications of an accelerated rehabilitation approach following internal brace augmentation of a complex medial knee injury.

## Case Report

The patient was a 25-year-old male Division I collegiate football player with no history of significant injury, surgery, or chronic musculoskeletal pathology involving the left knee. His medical history was notable for anterior cruciate ligament (ACL) reconstruction of the contralateral knee three years prior. Before the injury, he was healthy, fully participating in all team practices and strength and conditioning activities without limitations.

The injury occurred during a contact blocking drill when the patient sustained a direct valgus force to the lateral aspect of his left knee while engaging an opposing player. He immediately experienced sharp medial knee pain, swelling, and a sensation of instability that prevented him from continuing participation.

On-field examination demonstrated visible knee effusion with tenderness over the medial joint line and anterior aspect of the knee. Lachman testing revealed a soft endpoint, while valgus stress testing at both 0° and 30° of knee flexion demonstrated marked medial laxity without a firm endpoint, consistent with significant medial ligament injury. Active knee range of motion was limited by pain, and the patient was unable to bear weight comfortably immediately following the injury. Based on the injury mechanism and physical examination findings, the initial differential diagnosis included a grade III MCL injury, ACL rupture, and medial meniscal injury.

Magnetic resonance imaging (MRI) confirmed a grade III midsubstance MCL tear with distal capsular avulsion and a complete femoral-sided tear of the medial patellofemoral ligament (MPFL). All other major ligamentous stabilizers of the knee were intact. Additional imaging findings included a shallow femoral trochlear groove, an elevated tibial tubercle–trochlear groove (TT–TG) distance of 1.6 cm, and grade IV patellar chondromalacia. The MCL demonstrated diffuse redundancy with the most pronounced injury distally, whereas the MPFL injury was localized primarily to its femoral attachment.

Given the severity of the combined ligamentous injury, associated capsular avulsion, and the patient's goal of returning to collegiate football, operative management was recommended. Intraoperatively, the native MCL tissue demonstrated sufficient quality to allow primary repair with internal brace augmentation, which was selected in place of ligament reconstruction.

### Treatment

The patient underwent surgical intervention eight days following injury. Examination under anesthesia demonstrated full knee range of motion (0°-150°), stability to valgus stress at 0° of knee flexion, and grade III valgus laxity at 30° of knee flexion, consistent with complete disruption of the medial collateral ligament (MCL).

Diagnostic arthroscopy identified diffuse synovitis, multiple intra-articular loose bodies, and advanced chondral degeneration involving the central patella and lateral trochlea (Outerbridge grade IV). Arthroscopic synovectomy, loose body removal, and patellar chondroplasty were performed before addressing the medial-sided ligamentous injury.

Open primary repair of the MCL and medial capsule was subsequently completed using suture anchor fixation and nonabsorbable sutures, followed by internal brace augmentation with suture tape to reinforce the repair. Intraoperative assessment demonstrated adequate native tissue quality for primary repair, eliminating the need for ligament reconstruction. Following repair, valgus stress testing demonstrated grade I laxity with a firm endpoint, indicating restoration of medial stability.

Rehabilitation was initiated two days postoperatively under the direct supervision of the athletic training staff, with ongoing communication among the orthopedic surgeon, sports medicine physician, and strength and conditioning staff. The primary rehabilitation goals were to protect the surgical repair, restore knee range of motion, re-establish quadriceps activation, progressively improve lower extremity strength and neuromuscular control, and facilitate a safe return to collegiate football while minimizing excessive valgus stress across the healing ligament. Secondary goals included maintaining cardiovascular fitness and upper extremity strength throughout recovery.

Progression through rehabilitation was criterion-based rather than solely time-based and was guided by objective clinical milestones (Table 1).

| Rehabilitation Phase | Primary Goals | Clinical Progression Criteria | Milestones Achieved |
|---|---|---|---|
| **Phase I (Weeks 0–2)** | Protect repaired medial structures; control pain and effusion; restore full extension; initiate quadriceps activation | Minimal effusion; full knee extension; independent straight-leg raise without extensor lag; normalized quadriceps activation | Full extension achieved; aquatic gait progression initiated at postoperative week 2 |
| **Phase II (Weeks 3–6)** | Restore full knee flexion; improve lower extremity strength; normalize gait; initiate controlled loading | Knee flexion ≥150°; minimal pain and swelling; normalized gait mechanics; adequate quadriceps control | 150° knee flexion by week 3; Anti-gravity progression initiated; transitioned to functional MCL brace |
| **Phase III (Weeks 7–9)** | Develop dynamic stability; initiate running, plyometrics, and football-specific activities | Symmetrical movement quality; adequate single-leg control; tolerance of linear running without symptom exacerbation | Progressed to ground running, multidirectional drills, and non-contact football activities |
| **Phase IV (>9 Weeks)** | Return to unrestricted football participation | Physician clearance; stable valgus examination; successful completion of football-specific progression | Temporary rehabilitation modification due to persistent pain despite intact repair |

Table 1. Criterion-Based Rehabilitation Progression Following Primary MCL Repair with Internal Brace Augmentation

Representative rehabilitation interventions for each phase are summarized in Table 2, while the graded return-to-running progression and overall clinical outcomes are presented in Tables 3 and 4.

| Phase | Representative Interventions | Precautions |
|---|---|---|
| **Weeks 0–2** | Ankle pumps; heel slides; patellar mobility; quadriceps sets with Russian stimulation; glute bridges; clamshells; Aquatic gait training | Hinged knee brace; avoid valgus stress; progress ROM per surgeon protocol |
| **Weeks 3–4** | BFR-assisted strengthening; shuttle press (≤90° knee flexion); terminal knee extension; calf raises; step-ups; Anti-gravity gait progression | Limit loaded flexion to 90°; monitor pain and swelling; avoid valgus loading |
| **Weeks 5–6** | Progressive unilateral strengthening; split squats; hamstring strengthening; balance training; landing mechanics | Functional MCL brace; patellar strap; monitor symptoms |
| **Weeks 7–9** | Ground-based running; plyometrics; multidirectional drills; slideboard; football-specific drills; limited non-contact practice | Continue functional bracing; monitor pain, swelling, and movement quality |

Table 2. Representative Rehabilitation Intervention Progression

**Abbreviations:** BFR = blood flow restriction; ROM = range of motion; MCL = medial collateral ligament.

| Postoperative Time | Environment | Loading | Primary Objective |
|---|---|---|---|
| **Weeks 2–3** | Aquatic treadmill | Buoyancy-assisted | Restore gait mechanics while minimizing joint loading |
| **Weeks 3–4** | Aquatic and Anti-Gravity treadmill | 30–40% body weight | Increase walking tolerance and normalize gait |
| **Weeks 4–5** | Anti-Gravity treadmill | 50–65% body weight | Progress to fast walking and light jogging |
| **Weeks 5–6** | Anti-Gravity treadmill | 70–75% body weight | Interval running progression |
| **Weeks 6–7** | Anti-Gravity treadmill | 85–95% body weight | Continuous running |
| **Weeks 7–9** | Ground-based running | 100% body weight | Progress from linear running to multidirectional movement, cutting, and football-specific drills based on symptom response and movement quality |

Table 3. Criterion-Based Return-to-Running Progression

**Phase I: Protection and Early Mobility (Postoperative Weeks 0–2)**

During the initial postoperative phase, rehabilitation emphasized protection of the repaired medial structures while controlling pain and joint effusion, restoring full knee extension, and progressively increasing knee flexion within surgeon-directed guidelines. A hinged knee brace was utilized throughout this phase to protect the repair while allowing controlled motion. Early therapeutic exercise emphasized quadriceps activation, patellar mobility, edema management, and restoration of normal joint mobility.

At two weeks postoperatively, gait retraining was initiated using an aquatic treadmill to permit early weight bearing in a reduced-gravity environment while reinforcing normal gait mechanics. Progression of gait activities was based on pain, swelling, movement quality, and quadriceps control rather than postoperative time alone.

**Phase II: Progressive Strengthening (Postoperative Weeks 3–6)**

By postoperative week three, the patient demonstrated full knee extension and 150° of knee flexion, permitting progression to controlled strengthening activities. Low-load resistance exercises were initiated while limiting loaded knee flexion to 90°. Blood flow restriction (BFR) training was incorporated two to three times weekly to facilitate quadriceps hypertrophy and strength while minimizing mechanical stress across the healing ligament.

The hinged knee brace remained in place through postoperative week three. At week four, knee flexion restrictions were removed, and gait progression advanced using an anti-gravity treadmill. Body weight support was gradually reduced according to clinical response and movement quality. Once the patient successfully tolerated 50% body weight support without increased pain, swelling, or gait deviations, the hinged brace was discontinued and replaced with a functional MCL brace and patellar strap.

Following orthopedic clearance at postoperative week four, rehabilitation progressed to more advanced strengthening emphasizing the quadriceps, posterior chain, hip musculature, and trunk stabilizers. Closed kinetic chain exercises advanced from bilateral to unilateral loading patterns while maintaining appropriate lower extremity alignment and minimizing valgus stress.

**Phase III: Running and Return-to-Sport Progression (Postoperative Weeks 7–9)**

At seven weeks postoperatively, restoration of strength, neuromuscular control, and movement quality allowed progression to full-weight-bearing running activities. A graded running progression was initiated beginning with linear acceleration before advancing to continuous running, multidirectional movement, plyometric training, and football-specific drills. Progression was determined by objective movement quality, absence of reactive swelling, and patient tolerance.

By postoperative week nine, the patient had progressed to individual football drills and limited team practice. During this phase, he reported increasing superolateral knee pain during activities of daily living and a subjective sensation of instability. Clinical examination demonstrated a firm endpoint with valgus stress testing at both 0° and 30° of knee flexion, indicating maintenance of medial stability. Repeat magnetic resonance imaging confirmed an intact MCL repair with expected postoperative MPFL scarring and persistent soft tissue edema without evidence of repair failure.

Given the absence of structural compromise, football participation was temporarily suspended. Rehabilitation was modified to emphasize symptom management, activity modification, maintenance of lower extremity strength, and reduction of postoperative inflammation before resuming sport-specific progression.

Throughout rehabilitation, the patient participated in a modified strength and conditioning program to maintain upper extremity strength, trunk stability, and cardiovascular fitness. A platelet-rich plasma (PRP) combined with hyaluronic acid injection was administered at six weeks postoperatively to assist with symptom management related to persistent patellofemoral chondral pathology. This injection was an adjunctive treatment that was not included in the original postoperative rehabilitation plan and was not intended to facilitate healing of the repaired MCL and MPFL. The patient reported symptomatic improvement following the initial injection, supporting administration of the second injection at 16 weeks postoperative. The rehabilitation program continued without interruption or changes to the progression following either injection.

| Time Point | Knee ROM | Valgus Stability | Clinical Status | Rehabilitation Milestone |
|---|---|---|---|---|
| **Preoperative** | 0°–135° | Grade III laxity at 30° | Pain, swelling, instability; unable to participate | Surgical repair recommended |
| **2 Weeks** | Full extension progressing flexion | Protected in hinged brace | Pain and effusion improving; quadriceps activation restored | Aquatic gait progression initiated |
| **3 Weeks** | 0°–150° | Stable in brace | Improved ROM and neuromuscular control | Progressive strengthening and BFR initiated |
| **4 Weeks** | Full ROM | Stable | Normalized gait mechanics | Anti-gravity progression; transitioned to functional MCL brace |
| **7 Weeks** | Full ROM | Stable with firm endpoint | Improved strength and movement quality | Ground running, plyometrics, and football-specific drills initiated |
| **9 Weeks** | Full ROM | Stable with firm endpoint | Developed superolateral knee pain despite intact repair | Rehabilitation modified; football participation temporarily suspended |
| **Following Symptom Resolution** | Full ROM | Stable | Progressive symptom improvement | Return-to-sport progression resumed |

Table 4. Clinical Outcomes and Rehabilitation Milestones

## Discussion

This case describes the successful surgical management and accelerated rehabilitation of a collegiate football player with a complex medial knee injury consisting of a grade III midsubstance MCL tear, distal capsular avulsion, and concomitant MPFL tear. To our knowledge, reports describing this specific injury pattern and postoperative rehabilitation are limited, particularly in collegiate athletes treated with primary MCL repair augmented by an internal brace. The patient's recovery demonstrates that restoration of medial stability through internal brace augmentation, combined with a criterion-based rehabilitation program, may facilitate an accelerated return to functional activity while maintaining ligament integrity.

The injury pattern observed in this case is clinically significant because midsubstance MCL tears and distal capsular avulsions are encountered less frequently than proximal MCL injuries. Previous studies have reported that most surgically treated MCL injuries involve the proximal or distal portions of the ligament, with midsubstance injuries representing a relatively uncommon presentation [2]. Distal capsular avulsion further complicates treatment because disruption of the deep medial structures can contribute to persistent valgus instability and often warrants operative intervention when instability is present [3]. In the present case, restoration of the superficial MCL, deep capsular structures, and overall medial stability allowed progression through rehabilitation without recurrent valgus laxity.

In addition to the acute ligamentous injury, the patient demonstrated several preexisting anatomical characteristics, including a shallow trochlear groove, an increased tibial tubercle–trochlear groove (TT–TG) distance, and advanced patellofemoral chondral degeneration. These factors have been associated with abnormal patellar tracking, increased patellofemoral joint stress, and progressive cartilage degeneration [5, 14]. Although it is not possible to determine the precise contribution of these anatomical characteristics to the injury, they likely influenced both the severity of the initial trauma and the patient's postoperative symptom presentation.

Historically, high-grade MCL injuries associated with additional ligamentous pathology have frequently been managed with ligament reconstruction to restore medial stability and minimize residual laxity [6-7]. More recently, primary repair augmented with an internal brace has emerged as an alternative treatment strategy for appropriately selected patients. Internal brace augmentation provides immediate biomechanical support to the repaired ligament while protecting the repair during early rehabilitation, potentially allowing earlier mobilization and progressive loading [10-11, 15]. Following surgery, the patient demonstrated only grade I valgus laxity with a firm endpoint, consistent with restoration of medial stability. Previous systematic reviews have reported favorable patient-reported outcomes and lower complication rates following internal brace augmentation compared with traditional reconstruction techniques [15]. Similarly, Hanley et al. (2017) reported significantly higher Lysholm and International Knee Documentation Committee (IKDC) scores in patients undergoing MCL repair compared with reconstruction following multiligament knee injuries [9].

The accelerated functional progression observed in this case compares favorably with previously published rehabilitation timelines. The patient progressed to football-specific functional drills within nine weeks following surgery, compared with approximately 17 weeks before noncontact football activities reported in collegiate athletes with grade III distal MCL injuries and 12–16 weeks reported in professional soccer players following operative management [13, 16]. Although a direct causal relationship cannot be established from a single case, the accelerated progression may reflect the combined effects of internal brace augmentation, criterion-based rehabilitation, close interdisciplinary communication, the patient's high level of athletic conditioning, and adjunctive symptom-management interventions, including PRP combined with hyaluronic acid injections.

A notable feature of this case was the decision to manage the concomitant MPFL injury nonoperatively. The MPFL functions as the primary restraint to lateral patellar translation during early knee flexion and is commonly injured following valgus loading mechanisms [5]. Magnetic resonance imaging studies have demonstrated that MPFL abnormalities frequently accompany MCL injuries without resulting in clinically significant patellar instability [17]. Collins et al. (2021) reported MPFL abnormalities in approximately 83% of patients with confirmed MCL injuries, yet none demonstrated recurrent patellar instability or required surgical intervention for the MPFL [17]. Consistent with these findings, the present patient demonstrated progressive MPFL healing without recurrent patellar instability, suggesting that restoration of the primary medial stabilizers may eliminate the need for operative treatment of secondary medial restraints in appropriately selected patients.

An important clinical finding in this case was the persistence of anterior and superolateral knee pain despite successful restoration of ligament stability. Repeat clinical examination demonstrated a stable valgus examination, and follow-up magnetic resonance imaging confirmed an intact MCL repair without evidence of structural failure. Subsequent arthroscopy identified an additional loose body and advanced patellofemoral cartilage pathology, indicating that the patient's persistent symptoms were more likely attributable to intra-articular pathology than recurrent ligament instability. This finding highlights an important clinical consideration: persistent postoperative pain following successful ligament repair should not automatically be interpreted as repair failure. Careful reassessment, including advanced imaging when indicated, is essential to identify alternative sources of symptoms that may require additional intervention. Criterion-based rehabilitation was central to the patient's successful recovery. Rather than progressing solely according to postoperative timelines, advancement through each rehabilitation phase was based on objective clinical milestones, including restoration of knee range of motion, quadriceps activation, lower extremity strength, movement quality, and resolution of joint effusion. This approach is consistent with contemporary recommendations for rehabilitation following multiligament knee injuries [9]. Additional interventions, including aquatic treadmill training and blood flow restriction (BFR) therapy were incorporated to facilitate recovery while minimizing excessive mechanical loading. In particular, BFR training allowed progressive strengthening using lower external loads, reducing stress across the healing ligament while promoting quadriceps hypertrophy and neuromuscular recovery. PRP and hyaluronic acid injections were also added during the rehabilitation progression to manage symptoms associated with the patient’s patellofemoral chondral pathology and were not components of the original ligament protocol. Due to the patient’s improvement in symptoms, tolerance of rehabilitation activities, including ground-based running and football-specific activities, may have increased. Therefore, specific effects of the injections cannot be identified separate from the effects of the patient’s rehabilitation progression and natural recovery.

Compared with previously published reports, this case contributes several clinically relevant findings. First, it describes the management of a rare injury pattern consisting of a midsubstance grade III MCL tear with distal capsular avulsion and concomitant MPFL injury. Second, it demonstrates successful primary MCL repair with internal brace augmentation followed by an accelerated, criterion-based rehabilitation program that permitted early progression to

football-specific activities while maintaining ligament stability. Finally, it illustrates that persistent postoperative symptoms may arise from concomitant articular pathology rather than failure of the ligament repair, emphasizing the importance of comprehensive clinical reassessment throughout rehabilitation.

This case has several limitations. As a single case report, the findings may not be generalizable to all patients with multiligament knee injuries. In addition, preexisting anatomical variations and advanced patellofemoral cartilage degeneration likely influenced both the patient's symptoms and rehabilitation progression. Objective strength testing, including isokinetic dynamometry, was not completed because the patient was unable to complete the testing protocol, limiting quantitative assessment of limb symmetry and readiness for return to sport. The administration of PRP combined with hyaluronic acid injections at six and 16 weeks postoperatively represents an additional limitation. These injections were adjunctive treatments and not included in the original rehabilitation plan. These additional treatments may have independently influenced pain, activity tolerance, and functional progression. Therefore, the accelerated functional progression observed in this case cannot be attributed solely to internal brace augmentation or the planned criterion-based rehabilitation program. Future investigations involving larger cohorts are needed to evaluate the effectiveness of internal brace augmentation combined with criterion-based rehabilitation and to establish evidence-based return-to-sport guidelines for athletes with complex medial knee injuries.

## Conclusion

This case demonstrates that primary repair of a grade III midsubstance medial collateral ligament tear with internal brace augmentation, combined with capsular repair and nonoperative management of a concomitant medial patellofemoral ligament injury, was associated with favorable structural and functional outcomes in a collegiate football player. Restoration of medial knee stability allowed progression through a criterion-based rehabilitation program and return to football-specific activities within nine weeks, representing a faster functional progression than has been reported in comparable athletic populations.

An important clinical finding was that persistent postoperative pain was ultimately attributed to underlying articular pathology rather than failure of the ligament repair. This highlights the importance of comprehensive clinical reassessment throughout rehabilitation and emphasizes that associated cartilage pathology, anatomical variations, and patient-specific factors should be considered when evaluating recovery and return-to-sport readiness. Although this report describes a single patient, it suggests that primary MCL repair with internal brace augmentation may represent an effective treatment option for appropriately selected athletes with complex medial knee injuries. Furthermore, criterion-based rehabilitation, rather than progression based solely on postoperative timelines, may facilitate safe advancement through rehabilitation while preserving ligament integrity.

Future research should evaluate the long-term outcomes of internal brace augmentation combined with criterion-based rehabilitation in larger patient cohorts and compare this approach with traditional reconstruction techniques. Additional studies incorporating objective strength assessments, patient-reported outcome measures, and return-to-sport outcomes are needed to further guide clinical decision-making for athletes with complex medial knee injuries.

## Declarations

### Funding

Private and/or institutional funding was not sought after for this research project.

## Conflicts of interest/competing interests

There are no relevant financial or non-financial interests to disclose.

### Patient Consent

The patient in this case signed the consent form and was advised on their rights to withdraw the paper at any time. All information collected was anonymized and the patient cannot be identified through the manuscript.

## Author Contributions

**Brittany A. Clason:** Substantial contributions to concept or design, interpretation of data collected, drafting of original manuscript, review and editing of subsequent drafts.

**Jessica Garrett:** Substantial contributions to concept or design, acquisition of information, and literature review.

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