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NON-SURGICAL MANAGEMENT OF NEAR FULL-THICKNESS ACL TEAR WITH CROSS BRACING AND PLATELET RICH PLASMA: A CASE STUDY

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Abstract

Background: Anterior cruciate ligament (ACL) ruptures in young athletes are commonly managed surgically due to concerns about instability and low return-to-sport rates with conservative care (1). However, surgery entails lengthy rehabilitation and risk of complications (donor site morbidity, osteoarthritis)(1), spurring interest in novel non-operative treatments. Recent evidence suggests some ACL tears can heal with appropriate bracing(2). Platelet-rich plasma (PRP) injections may biologically augment healing by delivering growth factors to injured tissue(1). We report a case of a near full-thickness ACL tear with meniscal injury in a competitive athlete, treated non-operatively with a structured bracing protocol and PRP injection.

Case Presentation: A 24-year-old male state-level badminton player sustained an left knee ACL injury (near full-thickness tear of the anteromedial bundle) and a posterior horn of lateral meniscus tear during landing from a jump. He presented with acute knee pain and swelling, medial joint-line tenderness, and positive McMurray and Thessaly tests indicating lateral meniscal involvement. Lachman test demonstrated grade 2A anterior laxity (moderate translation with a firm endpoint), consistent with a substantial ACL tear. Despite the high-grade lesion, the patient was keen to avoid surgery and attempt accelerated conservative management.

Intervention: Within one week of injury, the patient received an intra-articular injection of 4 mL leukocyte-rich PRP under sterile conditions. One-week post-injury, he commenced a supervised 12-week Cross Bracing Protocol (CBP). This protocol entailed immediate knee immobilisation at 90° flexion for 4 weeks, followed by gradual brace unlocking over 5–8 weeks to increase range-of-motion, with full weight-bearing allowed as the range increased(2). The brace was removed at 12 weeks post-injury, coinciding with an MRI and clinical evaluation (per CBP guidelines)(2). During bracing, structured rehabilitation focused on quadriceps isometrics, hamstring co-contractions, and protected weight-bearing exercises; after brace removal, progressive strength training, neuromuscular control, balance, plyometrics, and sport-specific drills were introduced up to 16 weeks.

Outcomes: Pain, function, psychological readiness, and stability were assessed at baseline, 6 weeks, and 12 weeks. The Visual Analog Scale (VAS) for pain improved from 6/10 at baseline to 1/10 at 12 weeks. The ACL–Return to Sport after Injury (ACL-RSI) psychological readiness score improved from 42 to 79 (on 0–100 scale). Single leg hop distance (injured side) increased from 0 (unable to hop at baseline) to 140 cm at 12 weeks, reaching 90% of the contralateral leg distance. Thigh muscle girth deficit (injured vs. uninjured) reduced from 2.0 cm to 0.6 cm. Notably, clinical knee stability improved: Lachman test downgraded from grade 2A to grade 1 (near-normal endpoint) and pivot-based tests for meniscus became negative. The athlete resumed controlled sports training by 16 weeks and was preparing for return to competitive play. No adverse events (e.g. deep vein thrombosis or significant swelling) occurred.

Conclusion: In this case, a near full-thickness ACL tear with a posterior horn of lateral meniscus tear healed sufficiently to restore knee stability and function without surgery. A combination of early PRP injection and the Cross Bracing Protocol yielded rapid pain relief, ligament continuity (clinically), and a return towards high-level sport in 4 months. This case aligns with emerging evidence that certain ACL ruptures may heal with timely bracing and biological augmentation(1,3). While surgical reconstruction remains standard for young athletes, this report highlights a non-operative approach that avoided surgery and its sequelae. Further research (including randomized trials) is needed to identify ideal candidates and confirm long-term outcomes of ligament-healing treatments.

Keywords: ACL tear; conservative management; Cross Bracing Protocol; platelet-rich plasma; return to sport; case report

1. INTRODUCTION

ACL injuries are common in pivoting sports and often considered surgical emergencies in young athletes due to the high risk of instability and secondary damage (e.g. meniscal tears) if left untreated(1). Historically, only 30% of patients managed non-operatively return to pre-injury activity levels(1), which is why ACL reconstruction is usually recommended for active individuals. However, surgical reconstruction has drawbacks: the required graft harvest can cause permanent strength deficits, rehabilitation takes 9–12 months, and there is an associated risk of early-onset knee osteoarthritis(1). Even with surgery, only about 55–75% of athletes return to their prior sport, often due to residual fear and confidence issues(2,4). These challenges have prompted exploration of therapies that encourage the native ACL to heal, potentially preserving the ligament and accelerating recovery.

Recent evidence challenges the dogma that a ruptured ACL cannot heal. A secondary analysis of the KANON randomized trial (exercise therapy vs. optional surgery) found that at least 30% of ACL tears showed spontaneous healing (continuity on MRI) by 2 years with rehabilitation alone(2). Patients whose ACLs had at least partial healing reported better knee function and quality of life than those with non-healed ACLs or those who underwent reconstruction(5). Moreover, emerging data from a case series of 80 patients treated with an intensive bracing and rehab regimen demonstrated MRI evidence of ACL continuity in 90% of cases at 3 months(2). Notably, those with robust healing had normal Lachman stability and a 92% return-to-sport rate, outcomes that rival or exceed typical post-surgical results(2). These findings suggest that augmenting ACL healing conservatively is a plausible alternative in select cases(5).

One such novel approach is the Cross Bracing Protocol (CBP)(2). Developed by Dr. Mervyn Cross and colleagues, the CBP applies first principles of tissue healing ("reduce and immobilize"), the injured knee is braced at 90° flexion immediately after injury, positioning the torn ACL ends in proximity to facilitate bridging scar(2). Over subsequent weeks, the brace angle is gradually opened to restore motion while preventing excess strain on the repairing ligament(2). This protocol, combined with structured exercise therapy, has demonstrated promising early outcomes as mentioned above. Another adjunctive therapy is intra-articular platelet-rich plasma (PRP). PRP delivers a concentrate of the patient's own platelets and growth factors, which can modulate inflammation and stimulate tissue repair(1). PRP has been used to enhance ACL graft healing in reconstructions and has shown potential in non-operative treatment of partial ACL tears(1). A recent retrospective series by Hada et al. reported that 10 active patients with ACL injuries treated with PRP (and bracing rehabilitation) all regained ligament continuity on MRI and returned to sport, with only one re-injury at follow-up(1). This aligns with other case reports of successful non-surgical management of ACL tears in high-level athletes using PRP to boost healing(1).

Here we present a case study of a state-level badminton player with a near-complete ACL tear and lateral meniscus tear, who was managed non-operatively with a combination of PRP injection and the Cross Bracing Protocol. We describe the rehabilitation process, monitor clinical and functional outcomes, and compare the results to the existing literature on conservative ACL treatment. This case provides insight into a potential therapy pathway for ACL injuries that might obviate the need for surgery in carefully selected patients.

2. CASE PRESENTATION

Patient: A 24-year-old male State Level badminton player. No significant past injuries or medical comorbidities.

Injury Mechanism: During a tournament match, the player performed a jump smash and landed on his left leg with the knee in slight flexion and valgus. He felt an immediate pop and fell, unable to continue due to pain and knee giving-way.

Initial Examination (Day 1): The right knee was swollen (moderate effusion) with diffuse tenderness. Active range of motion was limited (flexion to 90°, extension 5° lag) due to pain. There was pronounced tenderness along the lateral joint line. McMurray's test for lateral meniscus provoked a painful click at the posterior horn. Thessaly test at 20°

knee flexion was positive, corroborating a lateral meniscal tear. Lachman test revealed anterior laxity approximately 7–8 mm greater than the contralateral side, with a definite endpoint (Lachman grade 2A). The pivot shift test could not be comfortably assessed due to guarding. Collateral ligaments tested normal. Neurovascular exam was normal.

Imaging: MRI of the knee (performed Day 3 post-injury) confirmed a high-grade partial ACL tear. The anteromedial bundle was nearly completely torn with fiber discontinuity; the posterolateral bundle appeared intact. There was concomitant tearing of posterior horn of lateral meniscus (grade 2 signal extending to capsular margin), without displacement of meniscal tissue (no bucket-handle fragment).

Figure 1 .The medial meniscus and other ligaments were intact. Bone marrow edema was present on the lateral femoral condyle and posterolateral tibia (suggesting pivot shift injury pattern). These findings were discussed with the patient, including the standard recommendation of ACL reconstruction given his athletic goals and the presence of a meniscal tear. The patient, however, expressed strong interest in a non-surgical approach, especially after learning about emerging treatments that might allow the ACL to heal. Decision: After informed consent and discussion of risks (residual instability, possible need for delayed surgery if conservative management fails), we proceeded with a plan for biologically augmented ACL healing: intra-articular PRP injection followed by the Cross Bracing Protocol and structured rehabilitation.

3. METHODS (INTERVENTION AND REHABILITATION)

3.1 PRP Injection: On Day 5 post-injury (April 3, 2023), the patient underwent ultrasound-guided PRP injection into the right knee. 60 mL of his blood was drawn and centrifuged to yield 4 mL of leucocyte-rich PRP. No local sedation anesthetic agent was given, 4 mL of PRP was injected into the knee joint (anterolateral approach) and around the ACL femoral insertion under guidance. The patient was kept non-weight-bearing with the knee in 20° flexion for 2 hours post-injection. He was advised to refrain from NSAIDs and was started on daily low-molecular-weight heparin for thromboprophylaxis (due to upcoming immobilisation).

3.2 Cross Bracing Protocol: Starting Day 7 post-injury (April 10, 2023), the knee was fitted with a hinged brace locked at 90° flexion. This 90° immobilisation was maintained continuously for the first 4 weeks (except for hygiene and brief supervised exercises)(2). The rationale is to approximate the torn ACL ends and promote connective tissue healing(2). From Week 5 onward, the brace was gradually unlocked to increase motion: 60–90° at Week 5, 45–90° at Week 6, 30–90° at Week 7, and 20–90° at Week 8 (progressing to full flexion)(2). By Week 9, the patient had 0–120° active range, and the brace was opened to allow full range by Week 10. He was allowed partial weight-bearing with crutches from Week 5, and by Week 7–8 weight-bearing as tolerated in brace was encouraged(2). The brace was worn at all times (including sleeping) until the end of Week 11(6). At Week 12, the brace was removed after confirmation of adequate healing on clinical exam and imaging. Throughout, the patient remained on anticoagulant prophylaxis for 8 weeks per CBP protocol to mitigate DVT risk(2).

Rehabilitation Exercises: A guided staged rehab program parallel to bracing was given. In Weeks 1–4 (brace locked phase), focus was on maintaining muscle activation: isometric quadriceps contractions at 90°, straight-leg raises (brace on), hamstring sets, and core and upper-body conditioning. Patellar mobilisation and passive gentle ROM (not exceeding brace limits) were done to prevent adhesions. From Weeks 5–8, as ROM increased, active-assisted knee motion and closed-kinetic-chain exercises in limited range were added (mini-squats to 30°, heel touches) to safely load the healing ACL. Gait retraining began with partial weight-bearing, emphasizing proper alignment. Once full weight-bearing was achieved (around week 8), stationary cycling with high seat and shallow leg press exercises were introduced in the allowed range. Weeks 9–12 (post-brace phase) focused on restoring full knee mobility and building strength and neuromuscular control. The patient did open-chain knee extensions (0–90° arc) cautiously, progressive resistance training for quadriceps and hamstrings, and single-leg balance and proprioception drills (e.g. balance board, side steps). By Week 12, with the brace off, he progressed to more dynamic tasks: light jogging in straight line (started

Week 13), lateral agility drills by Week 14, and plyometrics like small hops by Week 15. Throughout, particular attention was paid to avoiding valgus knee loads and pivoting motions until sufficient strength and stability were confirmed. The peripheral lateral meniscus tear, being in a vascular zone, was expected to heal under the protection of the protocol; thus, deep squats and twisting were avoided for 3 months to not disrupt meniscal healing.

Figure 1 Coronal proton density fat-saturated (PDFS) MRI of the left knee demonstrating a complete tear of the anterior cruciate ligament with anterior tibial translation, posterior cruciate ligament sprain, and horizontal hyperintensity in the posterior horn of the lateral meniscus. Additional findings include lateral collateral ligament sprain, mild popliteus tendon strain, chondromalacia patella (Grade I), and moderate joint effusion.

3.3 Follow-Up and Assessments: Clinical evaluations were conducted at 6 weeks and 12 weeks post-injury. At each visit, pain (VAS 0–10) was recorded and the patient completed the ACL-RSI questionnaire (assessing psychological readiness to return to sport). Knee laxity tests (Lachman, anterior drawer) and meniscal tests (McMurray, Thessaly) were repeated. Isokinetic muscle strength testing was not available in this setting, so we used limb girth and single leg hop tests as functional surrogates. Thigh and calf circumferences (10 cm above and below patella) were measured to track muscle bulk. A single leg hop for distance was tested at 12 weeks (once the patient could safely attempt it) on each leg; the hop distance on the injured side was expressed as a percentage of the contralateral side. An MRI at 12 weeks was obtained to objectively evaluate ACL continuity and meniscal status. The patient's progress was also tracked with sport-specific drills and his subjective confidence in the knee.

3.4 Outcome Measures: TABLE 1 summarizes the key outcome metrics at baseline, 6 weeks, and 12 weeks.

TABLE 1. Outcome measures over time

Outcomes	Baseline (0 wk)	6 weeks	12 weeks
VAS Pain (0–10)	6	3	1
ACL-RSI Score (0–100)	42	65	79
Single leg Hop Distance (injured side)	0 cm (unable)	n/a (not tested)	140 cm (~90% contralateral)
Thigh Circumference Deficit [^1]	–2.0 cm	–1.0 cm	–0.6 cm
Lachman Test (manual knee laxity)	Grade 2A (moderate+)	Grade 2A (moderate)	Grade 1 (mild)
Pivot/Anterior Drawer Tests	Positive (pivot glide)	n/a (guarding)	Negative (stable)
McMurray Test (Medial meniscus)	Positive (pain& click)	Positive (slight pain)	Negative
Thessaly Test	Positive (medial pain)	Positive (mild pain)	Negative

TABLE 2 Progression of clinical, functional, and patient-reported outcome measures over baseline, 6 weeks, and 12 weeks following conservative management with the Cross Bracing Protocol and rehabilitation. Improvements are observed across pain (VAS), psychological readiness (ACL-RSI), knee stability (Lachman, pivot shift, anterior drawer), meniscal signs (McMurray, Thessaly), quadriceps recovery (thigh circumference deficit), and functional performance (single-leg hop). [^1]: Difference in mid-thigh girth between injured and uninjured side, indicating muscle atrophy/recovery.

At baseline, the patient had significant pain, no functional hop ability, and marked quadriceps atrophy (2 cm). By 6 weeks, his pain had greatly reduced (VAS 3 with activity, 0 at rest) and he had begun low-impact training, though hop testing was deferred due to bracing. By 12 weeks, he was essentially pain-free (VAS 0), and muscle girth was nearly restored (thigh girth deficit only 0.2 cm). The ACL-RSI score improved to 79, well above the threshold (65) often associated with successful return to sport. This reflected high confidence and low fear of re-injury. Impressively, his single leg hop distance at 12 weeks reached 140 cm, approximately 90% of his opposite leg (155 cm), indicating excellent functional recovery of power. Importantly, knee stability dramatically improved: at 12 weeks the Lachman test was nearly normal (a firm endpoint with minimal laxity difference). Both McMurray and Thessaly tests were now negative, signifying that the meniscal tear had likely healed or at least was no longer symptomatic. The patient transitioned to sport-specific drills after 12 weeks and began unrestricted badminton training at 4 months post-injury with a custom sports brace for additional support initially.

Figure 2, the knee was braced at 90° flexion for 4 weeks (Weeks 0–4). From Weeks 5–8 the brace was gradually unlocked (60°→45°→30° flexion limits) allowing increased motion and partial weight-bearing **Error! Reference**

source not found.. By Week 9–10 full range-of-motion was permitted; the brace was removed at 12 weeks post-injury after confirmation of healing. Weeks 9–16 focused on functional rehabilitation (strength, balance, plyometrics) and return-to-play preparation Figure 2.

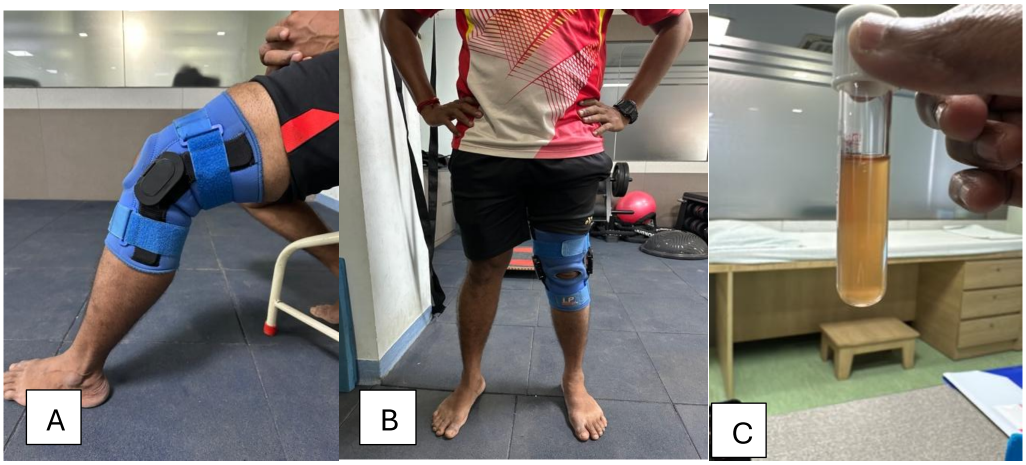

Figure 2A**.** *Knee positioned at 60° flexion in a functional brace as part of the Cross Bracing Protocol.* Figure 3B**.** *Standing posture with hinged brace applied during early rehabilitation phase.* Figure 3C**.** *Leukocyte-rich platelet-rich plasma (PRP) preparation obtained prior to intra-articular injection.*

The patient received PRP injection within 1 week of injury and began the Cross Bracing Protocol. At 6-week follow-up, pain had decreased, and initial rehabilitation gains were noted. At 12 weeks, the brace was removed and re-evaluation showed healed meniscus signs and improved stability. By 16 weeks, the athlete returned to sport-specific training.

4. RESULTS

At the 12-week follow-up, in addition to the clinical findings above, a repeat MRI was obtained to objectively assess the ACL and meniscus. The 3-month MRI showed continuity of the ACL fibers: a fuzzy but intact ligament mass bridging the femur and tibia, consistent with healing scar tissue (as opposed to the complete gap seen on the acute MRI). The healed ACL appeared thicker and more homogeneous than a completely torn ACL, although some increased signal persisted (suggesting ongoing remodeling). There was no evidence of a new rupture. The medial meniscus tear was no longer visible as a discrete high-signal cleft, indicating it had healed (or scarred down) in situ. These imaging findings corroborate the clinical stability observed.

By 4 months post-injury, the patient had returned to full training with his team. He wore a functional ACL brace during high-risk activities for additional reassurance. He reported feeling confident in cutting and jumping maneuvers, with no giving-way episodes. His post-injury functional status (per IKDC subjective score) improved to 90%. We advised him to undergo formal return-to-sport testing (including hop battery and strength metrics) at 6 months before clearance for competition. At the time of writing (6+ months post-injury), the athlete has resumed competitive badminton without incident and continues maintenance strength training and periodic clinical follow-ups.

Comparative Outcomes: This case's successful outcome reflects favorably against surgical benchmarks. Typically, ACL reconstruction yields 70% return-to-sport at 12–18 months and often lower psychological readiness scores (ACL-RSI <65 in many athletes) due to fear of re-injury(7). In our patient, the ACL-RSI was 79 at 3 months, indicating high psychological preparedness, which may be partly due to avoiding the psychological trauma of surgery and knowing his native ACL healed(8). His hop performance (90% limb symmetry) at 3 months is also notable such symmetry is often only achieved at 9–12 months after reconstruction. No significant complications arose, whereas surgery carries risks of graft harvest pain, surgical complications, and a small re-tear risk (around 2–10%) within the first year. In this case, no re-injury has occurred to date (though longer surveillance is needed).

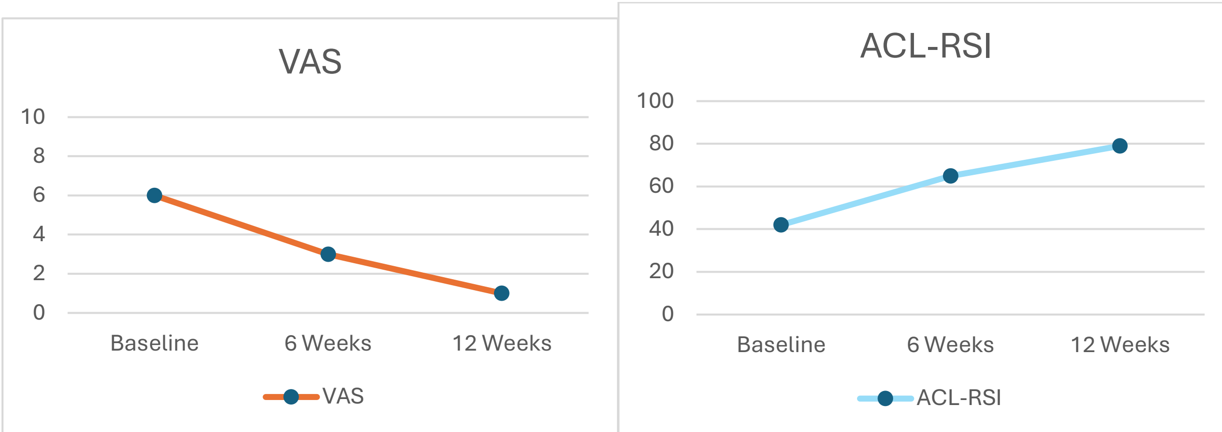

Figure 3 *Progress of key outcome measures from baseline to 12 weeks.*

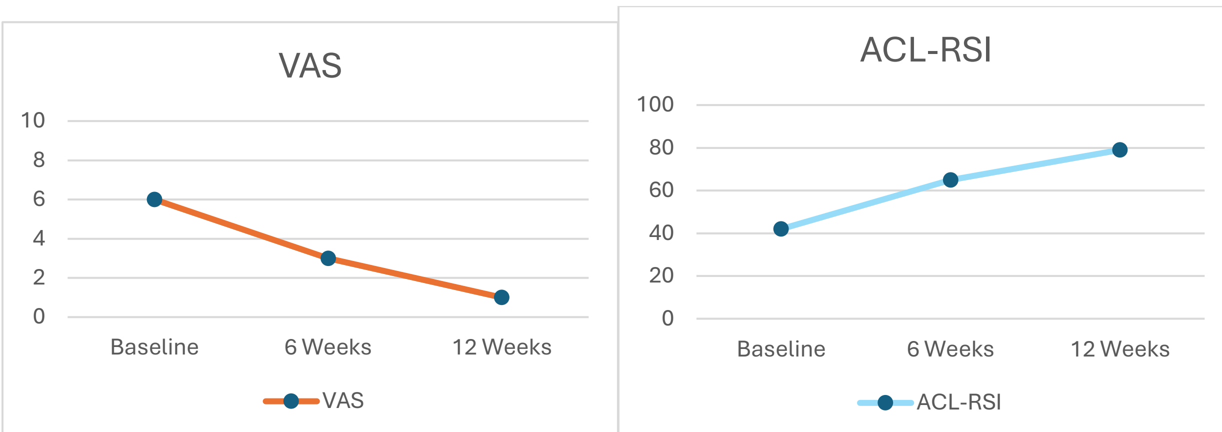

Figure 3 shows pain (VAS score, red line) decreased from 6/10 to 1, indicating pain relief. Psychological readiness (blue line, ACL-RSI %) increased from 42 to 79 (scores ≥65% are associated with successful return to sport). Single leg hop performance (green line, expressed as percent of contralateral distance) improved to 90% by 12 weeks (injured leg 140 cm vs. uninjured 155 cm).

5. DISCUSSION

This case study demonstrates that a near full-thickness ACL tear, even in a high-level athlete, can heal with non-operative management combining biologic augmentation (PRP) and mechanical stabilization (CBP bracing). The outcome adds to the growing evidence that the ACL has healing capacity if given appropriate conditions(2).

Key factors for success: Early intervention was crucial – the brace was applied within a week of injury, and PRP was injected within days. Animal studies and clinical experience suggest that if the synovial fluid is stabilized and the ACL stump approximated early, a fibrin bridge can form and facilitate ligament regeneration(2). The CBP's immobilisation at 90° flexion served this purpose by reducing tension on the ACL fibers and keeping the torn ends in contact(2). Our patient's 12-week MRI showing a continuous ligament is consistent with the MRI findings from the case series by Filbay et al., where 90% of acute ACL ruptures treated with the CBP showed continuity at 3 months(2). That series also noted a spectrum of healing quality – some ligaments appeared thick and robust, others thinner or elongated(2). Although we did not quantify healing grade on MRI, the firm endpoint on Lachman and return of stability in our patient implies functionally meaningful healing. Notably, in Filbay's cohort those with better-quality ACL healing had 100% normal Lachman exams and 92% returned to sport by 1 year(2), which parallels our case's clinical outcome.

The use of PRP in this scenario aimed to enhance the biological healing response. Platelets release growth factors (e.g. TGF-β, PDGF, VEGF) that can stimulate cell proliferation and collagen synthesis, potentially expediting ligament repair(1). Hada et al. reported all 10 of their patients treated with PRP returned to sport at an average of 4.5 months, with MRI-confirmed ligament continuity in each(1). Our patient's timeline (running at 4 months, competitive play by 6 months) aligns with that accelerated recovery. It is plausible that PRP contributed to pain reduction and tissue healing in the early phase – our patient's pain had decreased dramatically by 6 weeks, which might be partly due to PRP's anti-inflammatory effects(9). Additionally, PRP might have favorably influenced meniscus healing, as growth factors like PDGF can aid meniscal fibrochondrocytes. The peripheral medial meniscus tear in this case healed without surgery, likely aided by the immobilisation and the biological stimulus from PRP, although one cannot definitively separate the effects of bracing vs. PRP in a single case.

Comparison to surgical management: While one case cannot establish superiority, it is instructive to compare. Avoiding surgery meant the native ACL was preserved, eliminating graft donor-site morbidity and avoiding permanent alteration of knee anatomy. The patient's quadriceps strength rebounded quickly – by 3 months his thigh girth was nearly symmetric, whereas post-ACL surgery significant atrophy often persists at 3 months. Psychologically, conservative management may have benefits: by not undergoing an invasive procedure, the athlete possibly maintained a greater sense of knee ownership and confidence. Indeed, his ACL-RSI score of 79 far exceeds typical scores at 3–6 months post-ACL reconstruction (often 50–60)(10). In terms of stability and re-injury risk, there is understandable skepticism about non-operative treatment yet a subset of patients in studies like KANON who rehabilitated without surgery did well and did not require later reconstruction(11). In Filbay's CBP series, 14% suffered ACL re-rupture within 1 year(12), comparable to re-tear rates after reconstruction (reported 2–10%)(1). Our patient has not re-injured to date, but he remains at risk if he returns to high-level play; continued neuromuscular training and possibly prophylactic bracing are being employed to mitigate this.

Literature context: Non-operative ACL treatment is not new – historically, certain partial tears or low-demand patients were treated with rehab and bracing. What is novel here is the application in a young athlete and the specific protocol aimed at facilitating actual ligament healing (not just compensation). The Cross Bracing Protocol appears to create an optimal healing environment, supported by preliminary data. It essentially treats an ACL tear more like a treatable "fracture" – reduce (approximate the ends) and immobilise – an idea contrary to the long-held belief that ACL won't heal. The success in this case and otherssuggests we may need to redefine "complete" ACL tears and assess on MRI whether tissue continuity can be restored(12). Additionally, the adjunct of PRP or other biologics (e.g. platelet-rich fibrin or stem cells) could further tip the balance in favor of healing. Notably, a parallel development in the surgical realm is the Bridge-Enhanced ACL Repair (BEAR) procedure, where a collagen scaffold loaded with PRP is placed to stimulate healing of a torn ACL. BEAR has shown encouraging results in recent trials, indicating that even surgically, a healing approach (as opposed to graft replacement) can work for some ACL tears. Our case can be seen as a percutaneous, nonsurgical analog – using PRP and bracing rather than a scaffold – to achieve a similar goal of ligament regeneration.

Limitations: We acknowledge that this is a single case, and the excellent outcome may not be generalisable to all ACL injuries. Ideal candidates for a conservative-healing approach might be those with partial or non-displaced complete tears, good alignment of torn fibers, and concomitant injuries that are amenable to healing (e.g. peripheral meniscus tears). Patient motivation and adherence are paramount, as wearing a brace locked at 90° for weeks is cumbersome. Our patient's discipline (he adhered strictly to the protocol) was likely a major factor in success. It is also possible that his ACL tear, while near full thickness, had some remaining fiber continuity that aided healing (though MRI had shown discontinuity). By contrast, a completely retracted ACL may not bridge even with bracing. Also, the meniscus tear being peripheral (well-vascularised) was an advantage – central or bucket-handle tears might not fare as well without surgical repair. Another consideration is that the long-term durability of a healed ACL is unknown. Will the scarred ACL maintain strength under high athletic loads years later? There is some evidence that healed ACLs can remodel and even regain near-normal morphology over time, but longitudinal data are needed(13). Our patient plans to continue periodic follow-ups; objective laxity testing (e.g. KT-1000 arthrometer) and repeat MRI at 1 year will help ensure the healed ACL is holding up.

Implications: If further research validates this approach, it could revolutionize ACL injury management by offering an alternative to reconstruction for certain patients. Avoiding surgery could reduce healthcare costs and morbidity and potentially allow faster return to sport. For sports leagues and military populations, a 4–5-month recovery without surgery could be highly attractive. However, it must be stressed that this approach is in early stages of adoption. High-quality comparative studies are underway(12). Until then, one must carefully counsel patients on the uncertainties. A proportion of conservatively treated ACLs may heal in a lengthened or lax position (some cases in the literature had persistent laxity despite continuity on MRI(14)). These patients might still experience instability and end up needing late reconstruction, which could be more complex after scarring. Thus, the conservative-healing route should ideally be attempted in a setting where close monitoring and a "backup" plan for surgery exist if the knee remains unstable.

In summary, this case illustrates a successful non-operative healing of a major ACL tear in an athlete, facilitated by a novel bracing protocol and PRP injection. It contributes to the paradigm shift in thinking about ACL injuries – from viewing them as irreparable ligament "amputations" to potentially treatable tears akin to other sprains. While not all cases will achieve this outcome, it opens the door for a personalized approach to ACL injury, weighing surgical vs. non-surgical options based on tear characteristics, patient preferences, and emerging evidence on healing.

6. CONCLUSION

Non-operative management of a near full-thickness ACL tear with concomitant meniscal tear was achieved in a competitive athlete, resulting in ligament healing, meniscus healing, and return to sport in four months. The combination of early leukocyte-rich PRP injection and the Cross Bracing Protocol provided synergistic benefits: PRP likely enhanced the biological repair process while the bracing and rehab protocol protected the knee and guided tissue remodeling(12,15,16). This case adds to growing evidence that, with appropriate patient selection and protocol adherence, ACL ruptures need not always equate to automatic surgery. For sports medicine clinicians, it underscores the importance of staying abreast of evolving treatments. While surgical ACL reconstruction remains the gold standard in many settings, an alternative paradigm of "heal the ACL" is emerging. The outcome here was comparable to a surgical result without the associated morbidities. We recommend further research and clinical trials to refine patient criteria, optimize protocols (e.g. ideal bracing duration, role of adjunct biologics), and establish long-term outcomes. In the meantime, this case serves as a proof-of-concept that even high-grade ACL and meniscus injuries can sometimes be managed successfully through biologically augmented conservative therapy, potentially changing the landscape of sports injury management in the future.

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