ISSN 2689-8268| Volume 8

American Journal of Surgery and Clinical Case Reports

Review Article Open Access

Simultaneous Surgery for an Elite Athlete, Proximal Tibiofibular Joint Reconstruction and Minced Cartilage Repair, Case Report and Literature Review

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Received: 02 Jan 2025
Accepted: 28 Jan 2025
Published: 03 Feb 2025
J Short Name: AJSCCR

Citation:

Bruno Capurro-Soler. Simultaneous Surgery for an Elite Athlete, Proximal Tibiofemoral Joint Reconstruction and Minced Cartilage Repair, Case Report and Literature Review. Ame J Surg Clin Case Rep. 2025; 8(4): 1-8

1. Abstract

Introduction. Proximal tibiofibular joint (PTFJ) instability and knee chondral damage are distinct conditions that individually pose significant challenges to athletes, often impairing performance and delaying return to sport. The simultaneous occurrence of both injuries is rare and poses unique diagnostic and therapeutic challenges. Case presentation. This case report describes a 28-year-old professional rugby player presenting with PTFJ instability and Grade IV chondral damage in the medial femoral condyle. Following six months of unsuccessful conservative treatment, the patient underwent surgical intervention, including anatomical ligament reconstruction using a semitendinosus autograft and a minced cartilage procedure. Post-operative rehabilitation focused on progressive recovery of strength and neuromuscular control, enabling the patient to achieve pain-free function and successfully return to high-performance rugby. Functional tests at six months revealed mild strength asymmetries and deficits in lateral stability, which improved significantly by 12 months post-surgery, reflecting sustained recovery and joint stability. Conclusion. This case highlights the effective combination of ligament reconstruction and minced cartilage procedures in treating concurrent PTFJ instability and chondral damage in elite athletes. The approach facilitated joint stability, improved functional outcomes, and enabled a successful return to sport.

2. Introduction

The proximal tibiofibular joint (PTFJ) has been called the “forgotten joint” in the literature [1].This joint is stabilized by thick and strong anterior ligaments and by thinner posterior ligaments [2]. PTFJ instability encompasses a wide range of clinical presentations, from acute dislocations to chronic instability [3]. Dislocation of the PTFJ is a rare occurrence, accounting for less than 1% of sports-related injuries, and typically results from significant knee flexion combined with rotational forces during athletic activities [4]. Furthermore, PTFJ dislocations are observed in approximately 9% of multiligament knee injuries [5].PTFJ instability is a rare yet often underdiagnosed injury that presents with a variety of symptoms [6]. Common clinical manifestations include lateral knee pain, discomfort during physical activity, and symptoms associated with peroneal nerve irritation [6]. Treatment approaches vary and range from closed reduction to surgical reconstruction [7]. Several techniques have been described for managing PTFJ instability, including temporary screw stabilisation, allograft reconstruction, split biceps femoris reconstruction, dynamic suture button fixation, fibular head excision, arthrodesis, and direct repair [5,7,8].Cartilage damage in the knee is a condition that causes significant pain and disability and, if left untreated, can result in progressive degenerative changes. Although the incidence of knee cartilage lesions is on the rise, their treatment remains a topic of debate [9]. The minced cartilage procedure has recently gained popularity as a treatment for cartilage damage. In this technique, autologous cartilage is harvested, minced into small fragments, and re-implanted into the damaged area [10]. Fibrin glue, a membrane, or platelet-rich plasma (PRP) can be utilised during the procedure to fixate the re-implanted cartilage fragments [11].To date, the simultaneous occurrence of these conditions in a single patient remains undocumented in the literature, particularly regarding the concurrent management of proximal tibiofibular instability with neuropathic symptoms and extensive chondral injury in a single surgical procedure. The aim of this study is to report the application of this modern techniques, each of which has independently demonstrated favourable functional outcomes.

3. Case Presentation

A 28-year-old male professional rugby player, with no prior history of comorbidities or injuries, presented to our clinic in December 2022 with severe pain and a sensation of instability in his left knee following direct posterior trauma during sports. Physical examination revealed minimal instability on the posterior drawer test, painful paraesthesia in the peroneal nerve distribution, proximal tibiofibular joint instability (assessed by comparing fibular head movement with the contralateral side), and a positive McMurray test on external rotation. Knee X-rays showed reduced coverage of the proximal tibiofibular joint (Figure 1). MRI findings included a Grade III–IV chondral injury of the medial femoral condyle (16 × 11 mm) with subchondral oedema and instability of the proximal tibiofibular ligament (Figure 2). After the initial examination, a conservative treatment approach was chosen, consisting of immobilisation, physical therapy, and two ultrasound-guided corticosteroid injections to the PTFJ. While these measures partially alleviated the athlete's symptoms, at the six-month follow-up, he reported persistent pain in his left knee, particularly on the lateral side during sprinting. After six months of unsuccessful conservative treatment, the patient was scheduled for surgery. The surgical plan included a minced cartilage procedure to address the chondral damage in the medial femoral condyle, ligament reconstruction using a semitendinosus autograft for PTFJ instability, and repair of the lateral meniscus tear.

4. Surgical Technique

Surgical intervention consisted of three stages. The patient received surgical prophylaxis with cefazolin sodium and was placed under general anaesthesia with a pneumatic tourniquet applied. The procedure was performed with the patient in the supine position. Before beginning, surgical landmarks, including Gerdy's tubercle, the fibular head, the lateral joint line, the lateral epicondyle of the femur, and the posterior apex of the lateral femoral condyle, were marked. PTFJ examination was re-evaluated under anaesthesia, confirming significant instability, which was documented. Diagnostic arthroscopy was then performed through anterolateral and anteromedial portals. A chondral loose body was identified and removed, and the size and grading of the chondral lesion were determined. The medial femoral condyle showed a Grade IV chondral lesion measuring 1.6 × 1.2 cm (Figure 3), with an adjacent continuous Grade II lesion measuring 0.8 × 0.5 cm on the load-bearing surface. A lateral meniscus tear was observed but was stable and did not require intervention. All intra-articular structures were systematically evaluated arthroscopically, and no additional injuries requiring treatment were identified.The second stage of the surgical intervention involved PTFJ ligament reconstruction, utilising the technique previously described by Kerzner et al. for chronic PTFJ instability [12]. A curved longitudinal incision was made between Gerdy's tubercle, the lateral epicondyle of the femur, and the fibular head on the lateral side of the knee. Superficial dissection was carried out until the iliotibial band (ITB) fibres were exposed, creating adequate anterior and posterior skin flaps. Peroneal nerve neurolysis was performed to prevent intraoperative injury and postoperative entrapment. Exploration revealed mild laxity of the lateral collateral ligament (LCL) and instability of the PTFJ. An autologous semitendinosus graft was harvested for reconstruction. A retractor was positioned anterior to the lateral gastrocnemius tendon to protect the peroneal nerve and vascular structures during tunnel preparation. The fibular tunnel was drilled from the anterolateral entry point to the posteromedial exit point, just distal to the insertion of the popliteofibular ligament, using a 6 mm drill. A femoral tunnel for the LCL attachment was drilled at the anterior and proximal femoral epicondyle, and a tibial tunnel was prepared anteriorly between Gerdy's tubercle and the tibial tubercle. The tibial tunnel's entry point was located 1 cm medial and proximal to the fibular tunnel exit point, with its direction posteriorly adjacent to the medial PTFJ. Reduction of the PTFJ was maintained during tibial tunnel drilling.The semitendinosus autograft was passed posteriorly through the tibial tunnel using a passing stitch, then routed from posteromedial to anterolateral through the fibular tunnel. Fixation was achieved with three DePuy MILAGRO TCP/PLGA 7 × 23 mm screws (DePuy Synthes, Warsaw, IN, USA), verified under fluoroscopy. With the knee flexed at 70°, the graft was tensioned, achieving anatomical PTFJ reduction, and fixed to the tibial side with screws. Finally, the graft was directed through the femoral tunnel and secured with an additional DePuy MILAGRO screw (DePuy Synthes, Warsaw, IN, USA). Stability of the PTFJ was confirmed throughout the knee's range of motion and documented. Lateral dissection and graft harvesting are depicted in Figure 4. In the third stage of the surgical intervention, a minced cartilage procedure was performed to address the chondral damage in the medial femoral condyle. A mini-medial arthrotomy was carried out to access the affected area, which was exposed with the knee in flexion. The margins of the lesion were identified and marked, after which the damaged cartilage was harvested and microsectioned. To facilitate cartilage regeneration, nanofractures were created on the 0.8 mm lesion, followed by the application of a platelet-rich plasma (PRP) mesh combined with crushed cartilage (Figure 5).

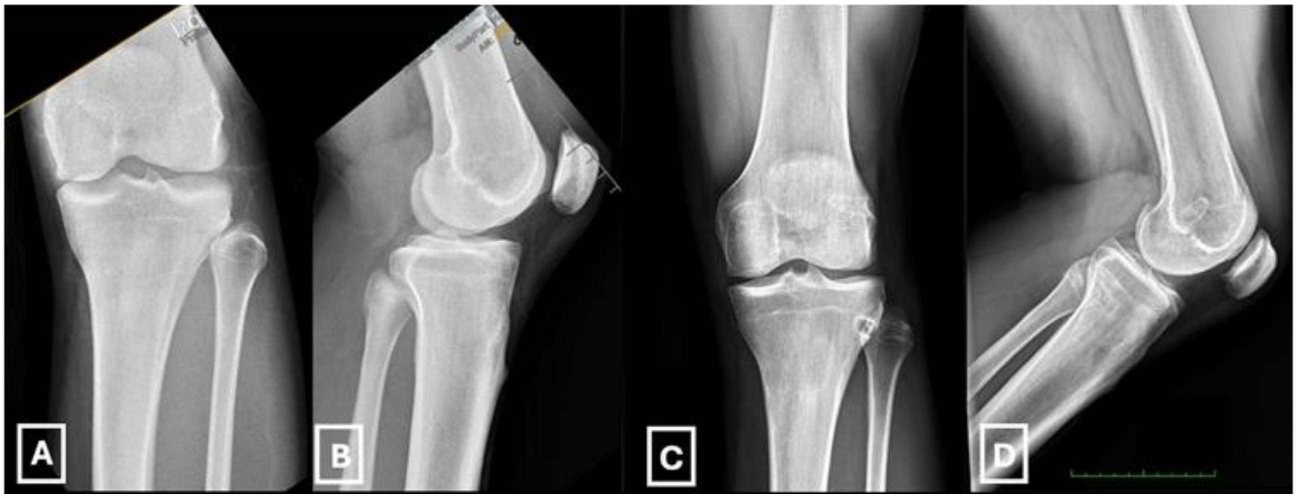

Figure 1: Pre- and post-operative anteroposterior (AP) and lateral knee X-rays. (A, B) Preoperative X-rays demonstrating reduced coverage of the proximal tibiofibular joint, indicative of joint instability. (C, D) Twelve-month postoperative X-rays showing stable proximal tibiofibular joint alignment with no signs of hardware complications or joint degeneration.

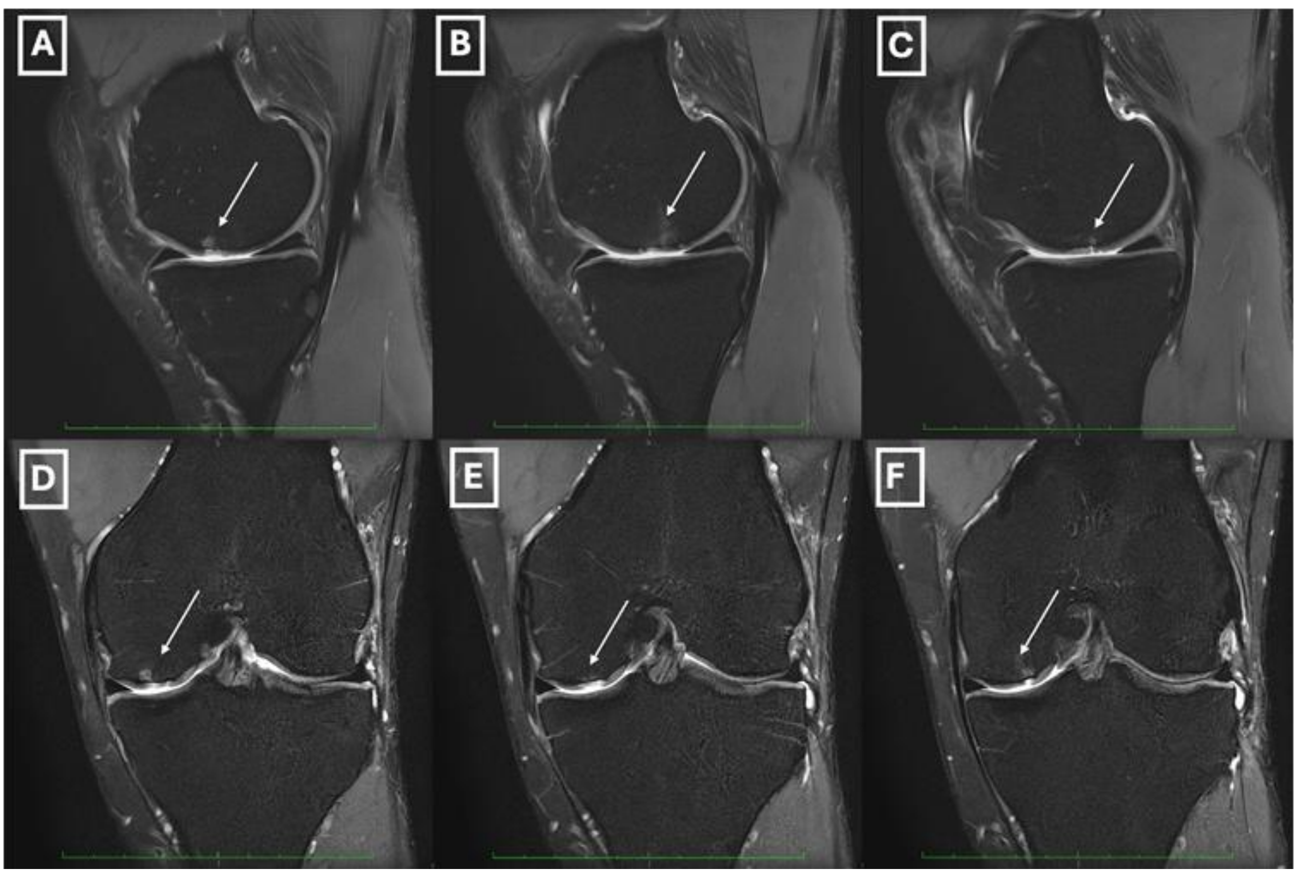

Figure 2: Pre-operative MRI demonstrating chondral damage and subchondral bone marrow oedema in the medial femoral condyle. Sagittal views are shown in panels A–C, while coronal views are presented in panels D–F.

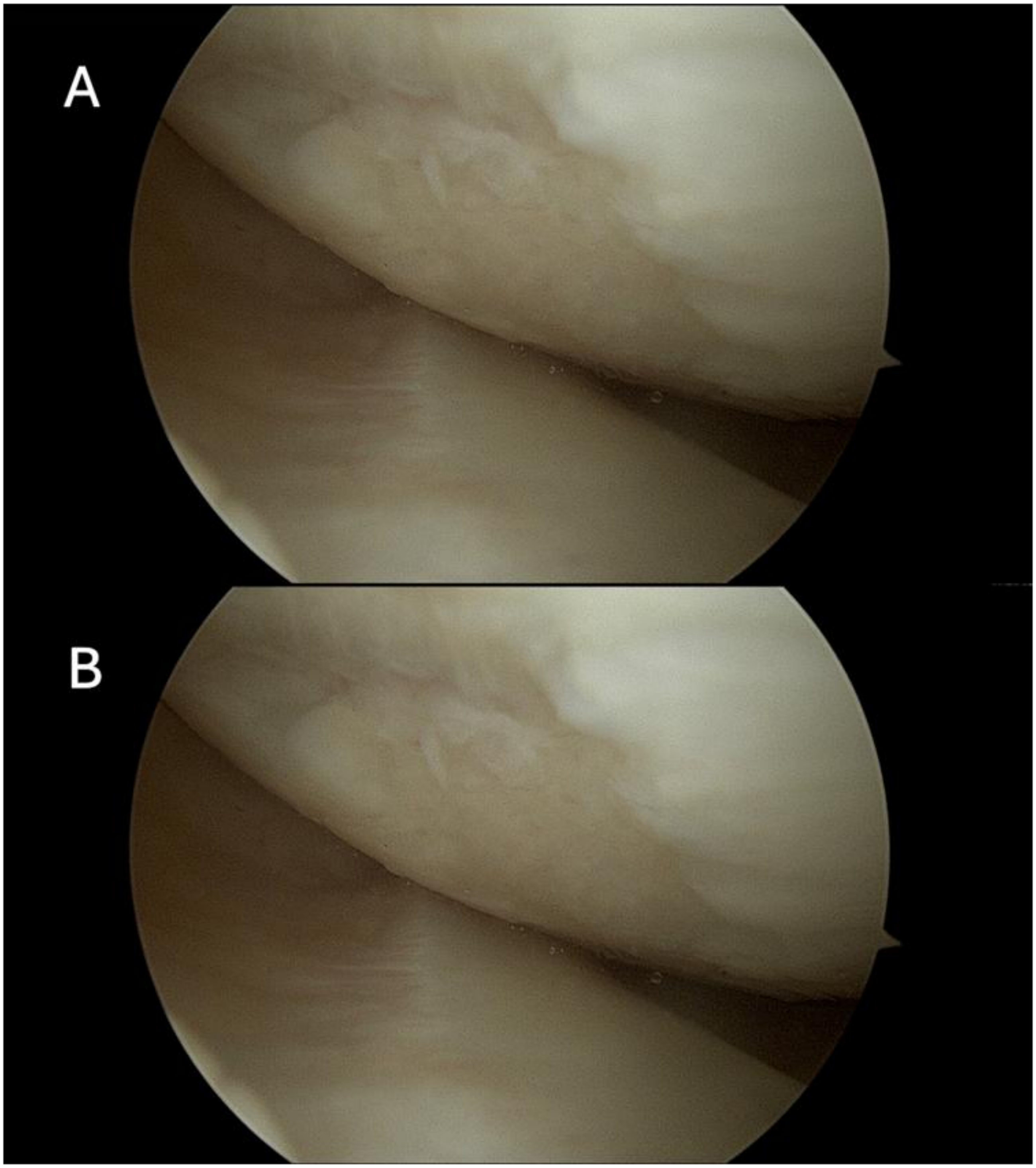

Figure 3: Arthroscopic view from the anterolateral portal of the medial femoral condyle chondral lesion: (A) superior-central portion; (B) inferior-central portion.

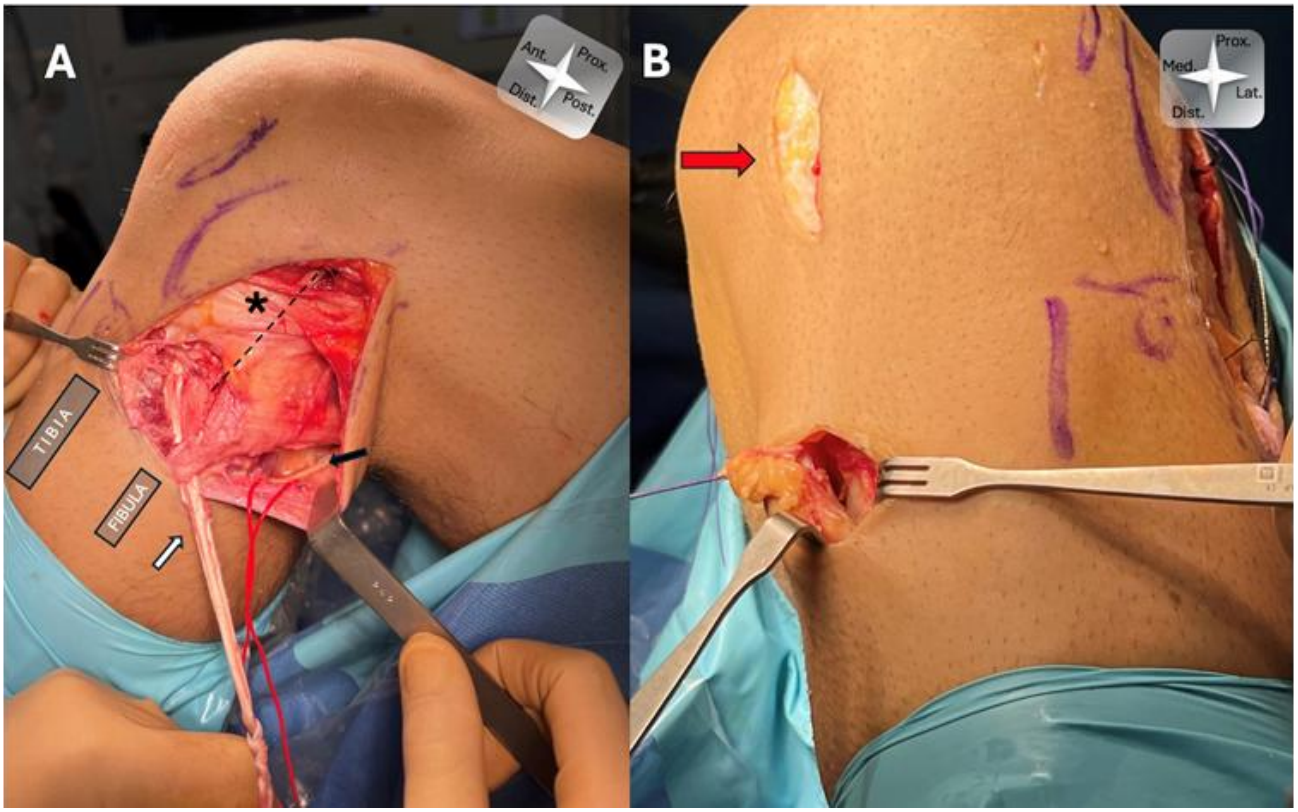

Figure 4: (A) Lateral dissection showing the semitendinosus autograft [white arrow], iliotibial (IT) band [*], and dissected common peroneal nerve [black arrow]. The dashed line represents the lateral collateral ligament (LCL) reconstruction trajectory. (B) Anterior projection of the knee highlighting the semitendinosus graft harvesting site and the mini-open incision for chondral repair [red arrow].

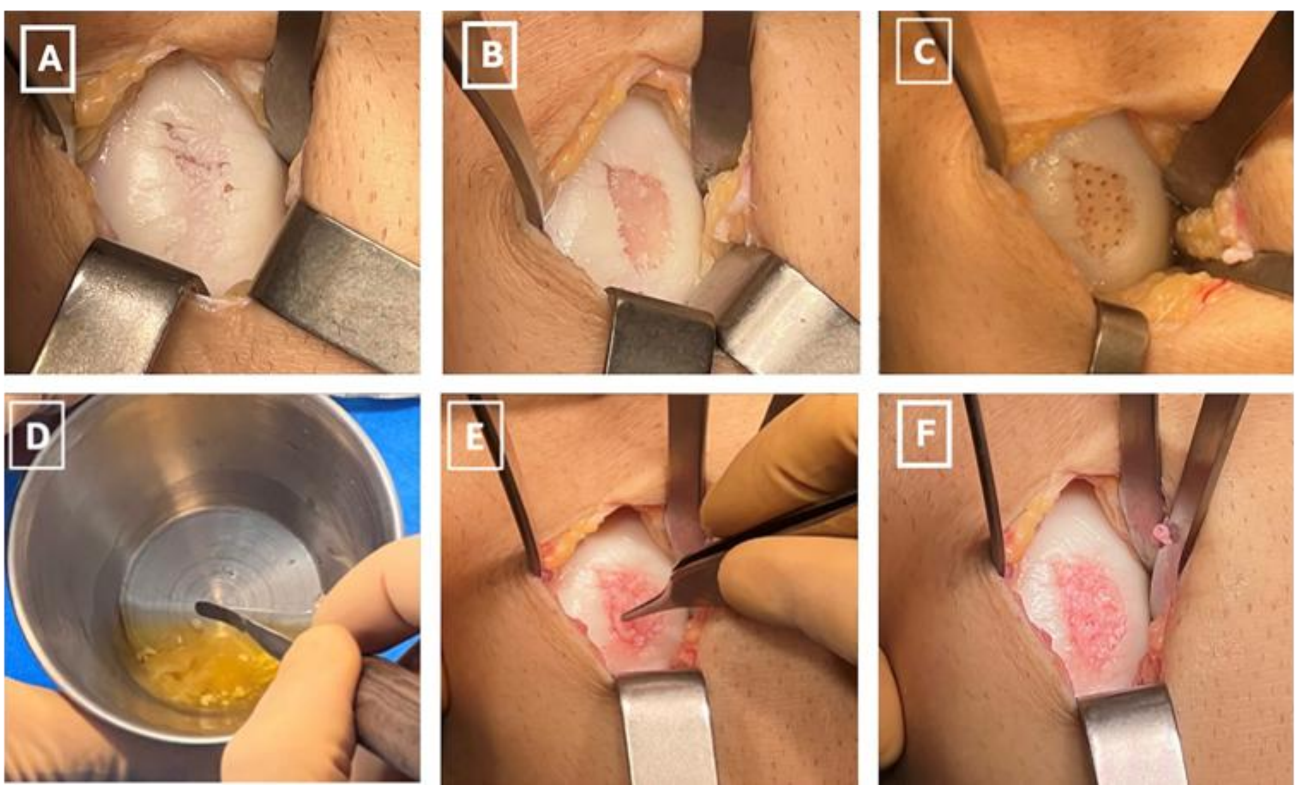

Figure 5: (A) Chondral damage in the medial femoral condyle following medial parapatellar arthrotomy. (B) Debridement and cartilage harvesting from the damaged area. (C) Microfracture application to the chondral defect. (D) Preparation of minced cartilage by crushing harvested cartilage into small pieces and mixing with platelet-rich plasma (PRP). (E) Application of the prepared minced cartilage to the defect site. (F) Post-application view of the medial femoral condyle after minced cartilage implantation.

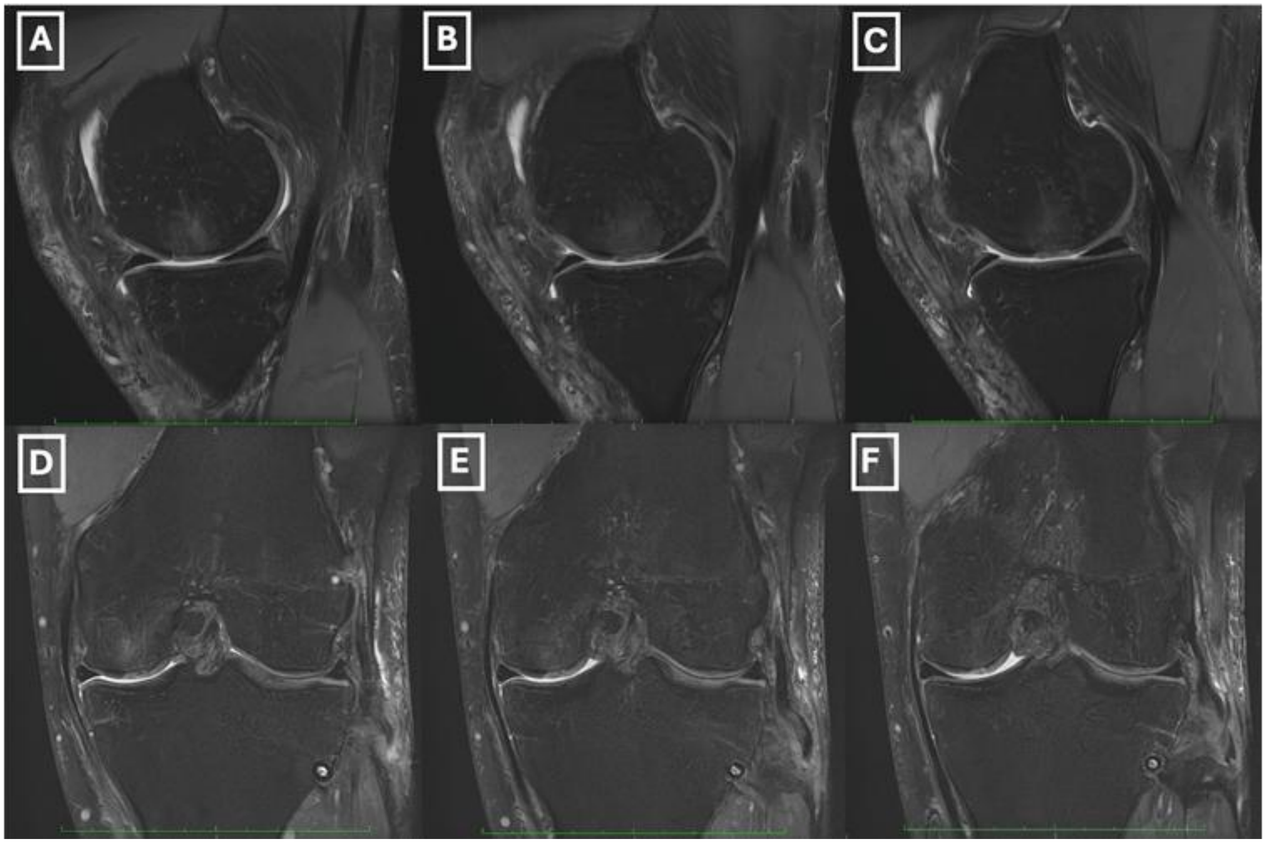

Figure 6: Three-month postoperative T2-weighted MRI of the medial femoral condyle showing regression of chondral damage and resolution of subchondral bone marrow oedema. Sagittal sections are displayed in panels A–C, while coronal sections are shown in panels D–F.

4.1. Post-Operative Rehabilitation and Follow-up

Following surgery, the patient was fitted with a brace and instructed to use cold applications and monitor the surgical wound. A progressive loading protocol was implemented, with restrictions on range of motion gradually adjusted over six weeks. During the first two weeks, the patient wore a fixed extension splint set at 0°. By the third week, controlled motion from 0° to 30° was permitted, increasing to 0° to 60° in the fourth week and 0° to 90° by the fifth week. The post-operative rehabilitation protocol focused on progressive recovery over three main phases. During the acute phase (0–6 weeks), the primary goals were pain control, reduction of swelling, and prevention of muscle atrophy, achieved through immobilization, cold application, and gradual passive range of motion exercises. The functional rehabilitation phase (6 weeks–3 months) aimed to restore neuromuscular control and increase strength to at least 80% of the contralateral limb through progressive loading, proprioceptive training, and low-impact exercises. In the return-to-sport phase (3–6 months), the focus shifted to regaining at least 90% strength symmetry and integrating sport-specific drills, including plyometric exercises and controlled sport simulations. A successful return to sport was contingent on meeting functional benchmarks, including strength symmetry, pain-free activity, and stability during high-intensity movements. An MRI was planned for control at 3 months postoperatively. In this MRI, it was seen that the PTFJ was stable and the minced cartilage in the chondral damaged area of the medial femoral condyle was organized. Post-operative 3th month MRI findings shown in Figure 5. At six months post-surgery, functional and performance tests were conducted to assess readiness for return to sports (Table 1): At the six-month follow-up, functional testing revealed mild discrepancies in knee extension strength (6.67%) and triple jump performance (5.34%), which are within acceptable limits for post-surgical recovery. However, significant deficits were observed in knee flexion strength (13.64%), triple cross-over test (20.71%), and side hop test (31.54%), reflecting ongoing weaknesses in unilateral strength, neuromuscular control, and lateral stability. These discrepancies align with findings in the literature, which highlight that asymmetry exceeding 10–15% increase the risk of re-injury and delayed return to sports. Additional rehabilitation focusing on proprioception, power, and stability is recommended before return to high-demand sports [13,14]. The patient was authorised to return to sport-specific rehabilitation at six months, starting with non-contact group training under a structured programme targeting proprioception, power, and stability. Competitive return to sports (RTS) was approved at 12 months post-surgery following progressive improvements in functional outcomes and strength symmetry.By the 12-month follow-up, these discrepancies had significantly diminished, reflecting successful rehabilitation and progressive recovery. A detailed summary of these results is provided in Table 1, highlighting the evolution of functional outcomes over time (Figure 1).

Table 1: Results of functional and performance tests conducted at 6- and 12-months post-surgery. Measurements include triple jump, triple cross-over test, maximum side hop test (all in centimeters, cm), knee extension and flexion strength (in kilograms, kg), and ACL-RSI scores (Anterior Cruciate Ligament-Return to Sport Index). Discrepancies (%) between the operated and healthy legs are also presented to assess recovery and symmetry over time.

Test	RightLeg (6 Months)	LeftLeg (6 Months)	Discrepancy (%) (6 Months)	Right Leg (12 Months)	Left Leg (12 Months)	Discrepancy (%) (12 Months)
Triple Jump (cm)	655	520.0	20.61	650.0	620.0	4.62
Triple Cross-Over Test$_{(cm)}$	565	448.0	20.71	560.0	538.0	3.93
Maximum Side Hop Test$_{(cm)}$	130	89.0	31.54	132.0	128.0	3.03
Knee Extension Strength$_{(kg)}$	30	28.0	6.67	54.2	57.15	5.3
Knee Flexion Strength$_{(kg)}$	22	19.0	13.64	39.51	37.14	6.18
ACL-RSI Score	770			780		

5. Discussion

PTFJ dislocation alters knee mechanics. A study simulating PTFJ dislocation demonstrated increased external rotation and anterior translation of the fibular head within the knee joint [15]. These pathological changes can often be corrected through appropriate reduction and fixation. For patients whose symptoms persist despite conservative treatment and who experience ongoing instability, surgical intervention becomes necessary. A systematic review [6] comparing surgical techniques found that PTFJ fixation and fibular head resection were associated with higher complication rates, increased ankle loading, pain, and reduced function. PTFJ fixation, in particular, was linked to implant-related complications and joint strain [6,16]. In elite athletes, reduction, ligament reconstruction, and fixation are preferred to ensure strong stabilization, restore the anatomical joint, and meet the demands of high-performance physical activity.Although limited, studies have demonstrated that proximal tibiofibular ligament reconstruction improves function and patient-reported outcomes in cases of PTFJ instability [6,16]. Horst and LaPrade [16] reported successful treatment in two patients using an anatomic reconstruction technique. Similarly, Kurckeberg et al. [6].Conducted a systematic review involving 22 patients (mean age: 24 years; mean follow-up: 21.1 months), including 10 with chronic dislocations and three with acute cases. They found that 18 patients showed significant improvements in patient-reported outcomes, restored full knee range of motion, and absence of pain or instability. Complications were rare, with symptomatic heterotopic ossification, distal deep infection, and wound dehiscence reported in one case each. Despite its technical challenges, this review, the largest of its kind, highlights the effectiveness of anatomic reconstruction, with low complication rates. While anatomical reconstruction is recognised as a successful method for treating PTFJ dislocation, no studies specifically address its use in athletes. In our case, anatomical reconstruction with a semitendinosus autograft was performed for PTFJ instability in an elite athlete. Post-operatively, the patient reported no pain or instability, demonstrated improvements in patient-reported outcomes, and, most importantly, achieved a successful return to sports. Our findings suggest that anatomic PTFJ reconstruction using a semitendinosus autograft is a viable option for treating PTFJ instabilities in elite athletes, facilitating successful outcomes and return to high-performance activities. Promising short-term results of the minced cartilage procedure have been reported in the literature; however, its medium- and long-term outcomes remain uncertain [17,18]. Runer et al. [11’. Conducted a study involving 34 patients, evaluating the minimum five-year outcomes of the minced cartilage procedure for knee chondral lesions. Their findings indicated improved patient-reported outcomes and a low re-operation rate. However, neither this study nor others in the literature provide information regarding return to sports following the minced cartilage procedure. The only available case report is by Leyder et al. [19].Who described the use of the minced cartilage procedure in a 17-year-old athlete with a sports-related osteochondral injury. The patient returned to sports in the fourth postoperative month, demonstrating that this procedure can be a viable option for athletes.In our case, the minced cartilage procedure was applied to treat the chondral lesion in the medial femoral condyle of an elite athlete. Postoperative results were satisfactory, with improvements in both patient-reported outcomes and MRI findings. Although further comparative studies with long-term follow-up are required, early evidence suggests that the minced cartilage procedure is a promising option for the treatment of chondral lesions in athletes.

6. Conclusion

Complex knee injuries are common in athletes and require a tailored approach to ensure successful outcomes. This case highlights the effective combination of ligament reconstruction and minced cartilage procedures in treating concurrent PTFJ instability and chondral damage in elite athletes. The approach facilitated joint stability, improved functional outcomes, and enabled a successful return to sport.

References

1. Anavian J, Marchetti DC, Moatshe G, Slette EL, Chahla J, Brady AW. The forgotten joint: quantifying the anatomy of the proximal tibiofibular joint. Knee Surg Sports Traumatol Arthrosc Off J ESSKA. abril de. 2018;26(4):1096-103.
2. Marchetti DC, Moatshe G, Phelps BM, Dahl KD, Ferrari MB, Chahla J. The Proximal Tibiofibular Joint: A Biomechanical Analysis of the Anterior and Posterior Ligamentous Complexes. Am J Sports Med. julio de. 2017;45(8):1888-92.
3. Burke CJ, Grimm LJ, Boyle MJ, Moorman CT, Hash TW. Imaging of Proximal Tibiofibular Joint Instability: A 10year retrospective case series. Clin Imaging. 2016;40(3):470-6.
4. Milankov M, Kecojević V, Gvozdenović N, Obradović M. Dislocation of the proximal tibiofibular joint. Med Pregl. 2013;66(9-10):387-91.
5. Jabara M, Bradley J, Merrick M. Is stability of the proximal tibiofibular joint important in the multiligament-injured knee? Clin Orthop. septiembre de. 2014;472(9):2691-7.
6. Kruckeberg BM, Cinque ME, Moatshe G, Marchetti D, DePhillipo NN. Proximal Tibiofibular Joint Instability and Treatment Approaches: A Systematic Review of the Literature. Arthrosc J Arthrosc Relat Surg Off Publ Arthrosc Assoc N Am Int Arthrosc Assoc. septiembre de . 2017;33(9):1743-51.
7. McNamara WJ, Matson AP, Mickelson DT, Moorman CT. Surgical Management of Proximal Tibiofibular Joint Instability Using an Adjustable Loop, Cortical Fixation Device. Arthrosc Tech. marzo de. 2018;7(3):e271-7.
8. Ernat JJ, Peebles AM, Provencher MT. Lateral Collateral Ligament and Proximal Tibiofibular Joint Reconstruction for Tibiofibular Instability. Arthrosc Tech. 1 de febrero de. 2022;11(2):e251-6.
9. Dekker TJ, Aman ZS, DePhillipo NN, Dickens JF, Anz AW, LaPrade RF. Chondral Lesions of the Knee: An Evidence-Based Approach. J Bone Joint Surg Am. 7 de abril de. 2021;103(7):629-45.
10. Salzmann GM, Ossendorff R, Gilat R, Cole BJ. Autologous Minced Cartilage Implantation for Treatment of Chondral and Osteochondral Lesions in the Knee Joint: An Overview. Cartilage. diciembre de. 2021;13(1_suppl):1124S-1136S.
11. Runer A, Ossendorff R, Öttl F, Stadelmann VA, Schneider S, Preiss S. Autologous minced cartilage repair for chondral and osteochondral lesions of the knee joint demonstrates good postoperative outcomes and low reoperation rates at minimum five-year follow-up. Knee Surg Sports Traumatol Arthrosc Off J ESSKA. noviembre de. 2023;31(11):4977-87.
12. Kerzner B, Mameri ES, Jackson GR, Casanova F, Boero I, Verdejo FG. Proximal Tibiofibular Joint Reconstruction with a Semitendinosus Allograft for Chronic Instability. Arthrosc Tech. enero de. 2023;12(1):e17-23.
13. Ardern CL, Webster KE, Taylor NF, Feller JA. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. Br J Sports Med. junio de. 2011;45(7):596-606.
14. Grindem H, Snyder-Mackler L, Moksnes H, Engebretsen L, Risberg MA. Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study. Br J Sports Med. 1 de julio de. 2016;50(13):804-8.
15. Magnusson EA, Githens MF, Barei DP, Firoozabadi R. Reduction and fixation of high-energy proximal tibiofibular joint dislocations: a technical trick. Eur J Orthop Surg Traumatol Orthop Traumatol. febrero de. 2022;32(2):377-80.
16. Horst PK, LaPrade RF. Anatomic reconstruction of chronic symptomatic anterolateral proximal tibiofibular joint instability. Knee Surg Sports Traumatol Arthrosc Off J ESSKA. noviembre de. 2010;18(11):1452-5.
17. Massen FK, Inauen CR, Harder LP, Runer A, Preiss S, Salzmann GM. One-Step Autologous Minced Cartilage Procedure for the Treatment of Knee Joint Chondral and Osteochondral Lesions: A Series of 27 Patients With 2-Year Follow-up. Orthop J Sports Med. junio de . 2019;7(6):2325967119853773.
18. Cole BJ, Farr J, Winalski CS, Hosea T, Richmond J, Mandelbaum B, et al. Outcomes after a single-stage procedure for cell-based cartilage repair: a prospective clinical safety trial with 2-year follow-up. Am J Sports Med. junio de. 2011;39(6):1170-9.
19. Leyder D, Konrads C, Ziegler P, Döbele S. Minced Cartilage in Combination with Autologous Bone Grafting for One-Step Osteochondral Defect Reconstruction in an Athlete’s Knee. Case Rep Orthop. 2021;2021:9501039.