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Review

Meniscal Ramp Lesions: A Narrative Review of Anatomy, Diagnosis, Treatment, and Outcomes

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Abstract: Meniscal ramp lesions are a distinct and clinically significant pathology, frequently associated with anterior cruciate ligament (ACL) injury, particularly with high-energy rotational trauma. Epidemiological findings indicate that ramp lesions occur in 9% to 41% of ACL-injured patients, with enhanced detection when meticulous posteromedial arthroscopic evaluation is performed. While common and clinically relevant, these lesions are underdiagnosed because conventional magnetic resonance imaging (MRI) is not highly sensitive, particularly in standard sagittal and coronal planes. Consequently, arthroscopic evaluation, specifically through systematic posteromedial compartment examination, remains the gold standard for proper identification. Biomechanically, knee joint stability is compromised by ramp lesions, tibiofemoral laxity is elevated, and anterior tibial translation is increased, significantly raising the risk of progressive chondral damage and graft ACL failure. Lesion morphology, chronicity, and associated intra-articular pathology dictate treatment, with small stable tears sometimes receiving conservative treatment and larger or unstable lesions undergoing surgery. Evolution of all-inside and inside-out meniscal repair, particularly with bioabsorbable devices for fixation, has offered superior biomechanical stability and improved healing rates, with resultant decreases in postoperative instability and secondary meniscal failure. Emerging evidence points to the potential for biologic augmentation techniques, such as vascular endothelial growth factor (VEGF) injection, platelet-rich plasma (PRP), and cell-based therapies, in the enhancement of meniscal healing, particularly in avascular regions. This narrative review integrates current evidence from ramp lesion pathophysiology, epidemiology, diagnosis, treatment strategies, and long-term follow-up outcomes, pointing toward the necessity of early detection, standardized management protocols, and further research in regenerative treatments for maximizing joint preservation and functional restoration.

Keywords: meniscal ramp lesion; anterior cruciate ligament (ACL) injury; meniscocapsular separation; arthroscopic diagnosis; meniscal repair techniques; knee joint stability; rotational trauma; chondral damage; graft ACL failure

1. Introduction

Given the growing clinical attention to these lesions, this article aims to provide a comprehensive narrative review of the current literature, summarizing anatomical, diagnostic, and therapeutic aspects.

Anterior cruciate ligament (ACL) injuries are frequently linked with intra-articular pathologies, namely meniscal tears, which are central to load transmission, shock absorption, and knee joint stability [1–3]. Of these, meniscal ramp lesions have been identified with increasing recognition as a unique and clinically relevant entity because of their link with knee instability and late degenerative changes [4–7]. First described by Strobel in 1988, ramp lesions are defined as tears at the meniscocapsular or meniscotibial junction of the posterior horn of the medial meniscus, a zone that plays a pivotal role in resisting anterior tibial translation and maintaining knee kinematics [1,5–7].

Although clinically significant, ramp lesions remain underdiagnosed owing to their posteromedial position, situated in the "blind spot" of standard arthroscopic examination [6,8,9]. As many as 41% of patients with ACL injury have been found to have ramp lesions in epidemiological reports, but detection rates vary significantly based on diagnostic method and chronicity of the injury [4,8,10,11]. While MRI is the first imaging test of choice for meniscal injuries, its poor sensitivity and frequent false negatives necessitate alternative diagnostic strategies, including high-resolution imaging sequences and complete posteromedial arthroscopic evaluation [6,11–13].

The biomechanical consequences of untreated ramp lesions are considerable, as they compromise joint stability, increase tibiofemoral laxity, and expose patients to chondral breakdown and ACL graft failure [5,7,14]. With such clinical impact, early identification and appropriate treatment of ramp lesions are essential to optimize functional outcomes and reduce secondary degenerative changes [6,7,15,16]. This comprehensive narrative review gives a critical appraisal of the published literature, exploring the epidemiology, biomechanics, diagnostic challenges, and evolving treatment trends for meniscal ramp lesions, and calls for formalized treatment standards and advances in biologic enhancement techniques to achieve long-term preservation of the joint [3,6,17–21]

2. Anatomy and Biomechanics

2.1. Anatomical Considerations

The medial meniscus, a crescent-shaped fibrocartilaginous structure, plays a key role in knee joint biomechanics, including load distribution, shock absorption, and joint stabilization [1–3]. Structurally, it is anchored to the tibial plateau via its anterior and posterior roots, with peripheral stabilization provided by the meniscocapsular and meniscotibial ligaments [1,6,22]. Compared to the lateral meniscus, the posterior horn of the medial meniscus is considerably less mobile due to its firm attachment to the deep medial collateral ligament (MCL) and expansions of the semimembranosus tendon [5,6,14]. This mechanical constraint renders the posterior horn highly susceptible to shear and tensile forces, particularly during rotational or hyperflexion injuries—mechanisms commonly implicated in anterior cruciate ligament (ACL) ruptures [5,7,14].

Ramp lesions consist of a disruption of the meniscocapsular or meniscotibial attachments of the posterior horn of the medial meniscus, which compromises its load transmission capacity and its contribution to resisting anterior tibial translation [6,7,14]. Chronic ramp lesions in ACL-deficient knees have been associated with chondral degeneration, progressive meniscal breakdown, and an increased risk of ACL graft failure, emphasizing the importance of early identification and timely surgical intervention [5–7,16].

2.2. Biomechanical Implications

The biomechanical consequences of meniscal ramp lesions extend beyond localized meniscal disruption, exerting a profound effect on knee joint stability, load distribution, and ACL graft viability [5,7,14]. The meniscocapsular junction serves as a key secondary stabilizer, contributing to shock absorption and even load transfer across the tibiofemoral articulation [5,6]. When this junction is disrupted, the medial meniscus loses its ability to effectively dissipate axial and shear loads, resulting in increased stress on the articular cartilage, altered joint kinematics, and abnormal anterior tibial translation [6,7,14].

Biomechanical studies have shown that ACL-deficient knees with untreated ramp lesions display heightened anterior tibial translation and rotational instability, worsening knee laxity and impairing functional outcomes [6,7,14]. Bollen (2010) highlighted ramp lesions as a notable cause of residual instability following ACL reconstruction (ACLR), leading to graft overload and potential failure if not addressed [9]. This underscores the clinical necessity of systematically assessing and repairing ramp lesions during ACLR, as failure to do so may lead to persistent joint instability, accelerated chondral wear, and premature onset of osteoarthritis [6,7,9,14,16].

3. Epidemiology

Meniscal ramp lesions are a common but frequently underdiagnosed pathology associated with both acute and chronic anterior cruciate ligament (ACL) injuries. Their occurrence is influenced by patient demographics, injury chronicity, and underlying biomechanical stressors [4,6,10,14]. Epidemiologic investigations have reported ramp lesions in a significant proportion of ACL-injured patients. In a landmark study, Liu et al. (2011) identified a 16.6% prevalence in a cohort of 868 patients undergoing ACL reconstruction, emphasizing the clinical relevance of these lesions and their contribution to knee instability [4]. However, reported sensitivity varies widely, reaching up to 41% in studies employing systematic arthroscopic evaluation of the posteromedial compartment [6,8,10]. This heterogeneity reflects the ongoing diagnostic challenges, particularly when relying solely on standard arthroscopy or preoperative imaging modalities.

Several risk factors have been associated with the presence of ramp lesions, including younger age, male sex, and delays in surgical intervention [4,6,10,14]. High-energy pivoting sports such as soccer, basketball, and skiing—activities that involve repetitive twisting motions and valgus loading—are implicated in chronic meniscocapsular strain and damage [5,7,14]. Additionally, chronic ACL-deficient states predispose the knee to mechanical derangement, resulting in recurrent laxity episodes that subject the meniscocapsular junction to progressive weakening and secondary detachment [6,7,14]. The incidence of ramp lesions has been shown to increase in chronic ACL injuries due to long-standing biomechanical alterations and elevated posteromedial shear forces [6,7].

Epidemiologic studies also report that ramp lesions are more frequently identified intraoperatively than on preoperative magnetic resonance imaging (MRI), reinforcing the limitations of MRI in detecting these injuries [6,11,12]. Research emphasizes that systematic posteromedial compartment exploration during arthroscopy markedly improves detection rates [6,8,10]. Furthermore, a chronic ACL-deficient condition not only elevates the risk of developing ramp lesions but also appears to diminish the likelihood of successful healing, underlining the importance of timely surgical repair [7,14,16].

Ramp lesions often coexist with other intra-articular pathologies such as lateral meniscal tears and chondral defects, which may complicate treatment strategies and negatively influence long-term outcomes [6,7,14]. These findings support the clinical imperative for maintaining a high index of suspicion in ACL-injured patients—particularly those with chronic instability or participation in high-risk sports [4,6,14].

Recent national trends in orthopedic practice reflect an evolving understanding of meniscal pathology. A 15-year retrospective study by Longo et al. (2025) reported a 50.4% reduction in meniscectomy procedures in Italy, from 166 per 100,000 people in 2001 to 82.4 in 2016, accompanied by a 43.5% decrease in associated healthcare costs [2]. This shift underscores a broader movement toward biologically favorable and cost-effective interventions, including meniscal repair and regenerative techniques. The authors attribute these trends to increased recognition of the deleterious long-term effects of meniscectomy—particularly in younger, active individuals at risk for early-onset osteoarthritis [2,3,20]. These findings further support early diagnosis and surgical management of ramp lesions in ACL-deficient knees, in line with modern orthopedic strategies emphasizing joint preservation, functional restoration, and value-based healthcare delivery [2,6,16].

Ultimately, early identification and repair of meniscal ramp lesions are critical to preventing irreversible joint deterioration and optimizing functional recovery in this vulnerable patient population [6,7,9,14].

4. Diagnosis

4.1. Imaging Modalities

Magnetic resonance imaging (MRI) is the primary diagnostic tool for meniscal injuries; however, its sensitivity for ramp lesions remains suboptimal, particularly in standard imaging planes [1,12]. Characteristic MRI findings include fluid interposition between the posterior horn and capsule and high signal irregularity on T2-weighted images. Despite these indicators, false negatives are common, necessitating alternative imaging strategies to improve diagnostic accuracy. Studies have reported that conventional MRI sequences often fail to visualize ramp lesions adequately, leading to a diagnostic sensitivity ranging between 48% and 76% [4,8]. The use of oblique sagittal MRI sequences and high-resolution three-dimensional (3D) imaging has demonstrated improved detection rates, particularly in patients with chronic ACL deficiency [6,11]. Nevertheless, standard MRI remains an insufficient standalone modality, as it fails to identify up to 24% of ramp lesions subsequently confirmed via arthroscopy [9,15].

Recent investigations into MRI-based diagnostic approaches have emphasized the importance of optimized imaging sequences, particularly when assessing the posteromedial meniscocapsular junction. Yeo et al. (2018) highlighted that T2-weighted fat-suppressed imaging and proton density-weighted (PDW) sequences provide enhanced contrast resolution, improving the visualization of meniscal ramp lesions in cases where standard sequences may be inconclusive [11]. Additionally, fluid-sensitive fat-suppressed sequences, such as short tau inversion recovery (STIR) and T2 mapping, have been shown to increase diagnostic specificity by detecting subtle capsular edema and early meniscocapsular separation [3,12].

A key limitation is the inconsistency in MRI sensitivity depending on lesion chronicity. Acute ramp lesions, particularly those associated with recent ACL tears, tend to exhibit more conspicuous peri-meniscal edema, which is readily identified on MRI. Conversely, chronic ramp lesions often present fibrotic changes and reduced inflammation, making them less discernible in standard sequences. This underscores the importance of combining MRI with systematic arthroscopic evaluation to prevent missed diagnoses [5,14].

Advanced imaging techniques, including 3D double-echo steady-state sequences and ultra-high-field 7-Tesla MRI, have shown promise in improving diagnostic accuracy. Studies suggest that combining these modalities with diffusion-weighted imaging and T2 mapping can enhance the visualization of meniscocapsular detachment, offering a more comprehensive assessment of ramp lesions [13,17]. Additionally, Yeo et al. suggest that high-resolution isotropic imaging with thin-slice reconstructions may further improve detection of subtle meniscocapsular injuries [11]. However, these advanced imaging techniques are not yet widely available and require further validation before being integrated into routine clinical practice [16].

4.2. Arthroscopic Evaluation

Arthroscopy remains the gold standard for diagnosing ramp lesions. Systematic exploration of the posteromedial compartment, as described by Sonnery-Cottet et al., is essential for identifying these concealed injuries [8]. Techniques include probing through standard and accessory portals to assess the integrity of the meniscocapsular junction. Minimal debridement of superficial soft tissues may be required to visualize the lesion fully. The use of trans-septal portal techniques has been recommended to enhance visualization of the posteromedial compartment, improving the detection of subtle meniscocapsular injuries that might otherwise be overlooked [23]. Additionally, studies have highlighted that systematic probing through the intercondylar notch and posterior medial compartment significantly increases the detection rate of ramp lesions [9,14]. The medial collateral ligament (MCL) pie-crusting technique, which involves controlled release of the MCL to improve joint visualization, has been described as a valuable adjunct for diagnosing and treating ramp lesions, particularly in patients with restricted medial compartment mobility [13,24]. However, it is worth acknowledging the paradoxical nature of this technique. While it is widely regarded as a safe and effective method to enhance visualization of the posterior horn of the medial meniscus, the biomechanical implications of temporarily destabilizing the MCL—and thereby potentially altering medial compartment stability—remain incompletely understood. Emerging evidence suggests that the deep fibers of the MCL play a key role in medial joint stability and may influence anterior cruciate ligament (ACL) graft survivorship While arthroscopy offers superior diagnostic accuracy, intraoperative fluoroscopy-assisted arthroscopic techniques have been proposed to further refine real-time assessment of meniscal ramp lesions [10]. Future advancements in arthroscopic imaging, including optical coherence tomography and intraoperative ultrasound, may further enhance lesion detection and characterization, particularly in cases where direct visualization remains challenging [7,18].

5. Treatment Strategies

5.1. Nonsurgical Management

Nonsurgical management is reserved for stable ramp lesions in well-vascularized regions, particularly in the acute setting. It relies on the natural healing potential of the meniscus, provided knee stability is maintained and there is no concomitant ligamentous insufficiency. Small, non-displaced ramp lesions, particularly those discovered incidentally during ACL reconstruction, may be managed with activity modification, supervised physiotherapy, and bracing [6,14]. However, the untreated natural history of ramp lesions remains an issue, as chronic microinstability and joint kinematic changes potentially lead to a predisposition toward progressive chondral injury and secondary meniscal degeneration [5,6]. Accounts show that high percentages of conservatively managed ramp lesions subsequently develop chronic instability and must eventually be surgically treated [9,14]. Considering these findings, early surgical intervention is increasingly favored, particularly in young, high-demand patients where biomechanical integrity must be preserved [7,10]. Nevertheless, it is important to recognize that not all ramp lesions necessarily require repair. Small, stable, and well-vascularized tears may demonstrate spontaneous healing potential, and the decision to suture should therefore be individualized based on lesion stability, chronicity, and vascular supply rather than a purely systematic approach.

5.2. Surgical Repair Techniques

5.2.1. Inside-Out Repair

The inside-out technique remains the gold standard for the repair of ramp lesions, given its increased construct strength, biomechanical strength, and accurate suture placement [15]. It is a posteromedial incision that opens the meniscocapsular junction for precise suture placement with fewer neurovascular risks. Excellent healing rates and long-term functional outcomes, particularly in acute ramp lesions, have been described [5,9]. The technique permits rigid fixation, with less chance of disrupting and recurrent instability [8]. However, inside-out repair requires careful management of neurovascular structures and a skilled surgical team to prevent these risks. To bypass these risks, modifications such as the posteromedial safety window technique have been proposed to enhance surgical efficiency and minimize complications [23]. Moreover, care must be taken to preserve the physiological mobility of the posterior horn, as excessive tensioning or over-constraining the meniscocapsular junction may alter load distribution and predispose the meniscus to secondary degeneration.

5.2.2. All-Inside Repair

All-inside techniques provide a less invasive alternative to inside-out repair with reduced surgical morbidity and shorter rehabilitation times. The procedures employ self-retrieving suture-based anchors or bioabsorbable fixation devices to stabilize the meniscocapsular junction. Clinical reports have shown satisfactory clinical outcomes, particularly in smaller and localized ramp tears, where the procedure effectively restores meniscal integrity and joint stability [24]. However, all-inside repair has some drawbacks. Potential complications include failure of the implant, pullout of the suture, irritation of the anchor, and increased risk of meniscal extrusion [16,17]. Furthermore, all-inside fixation has been noted to have a lesser suture holding capacity than inside-out repair, especially for larger and more extensive ramp lesions [16]. Subsequent advances in meniscal scaffolding material and bioabsorbable anchor technology have attempted to overcome these issues, but further long-term comparative studies are needed to establish optimal indications [10,18].

5.3. Combined ACL Reconstruction and Ramp Repair

Combined ACL reconstruction (ACLR) and repair of ramp lesions are indicated to restore knee stability, protect the ACL graft from excessive stress, and achieve maximum biomechanical function. Persistent instability and a higher risk of graft failure have been attributed to untreated ramp lesions in ACL-reconstructed knees [6,7]. Systematic arthroscopic examination of the posteromedial compartment during ACLR is henceforth recommended to enable early detection and treatment [5,14]. Comparative studies have demonstrated that combined ACLR and ramp repair together optimize postoperative knee stability considerably more than isolated ACLR alone [10,11]. Ramp lesion evaluation and repair must, therefore, be highly recommended as a routine procedure in patients with ACL injuries, particularly when accompanied by high-grade rotational instability or chronic ligament insufficiency [9,14]. It may also be worth considering the timing of the medial meniscus repair during the ACLR workflow. In cases where femoral tunnel drilling is performed through the anteromedial (AM) portal in deep knee flexion, it is advisable to complete the meniscal repair after femoral tunnel creation, to prevent accidental damage to the newly repaired meniscus during hyperflexion maneuvers. This procedural sequence minimizes the risk of suture disruption and ensures optimal integrity of both the meniscal and ligamentous repairs.

6. Comparative Outcomes of Repair Techniques

Comparative biomechanical analyses demonstrate that inside-out meniscal repair techniques possess superior tensile strength, higher fixation stability, and improved load distribution in comparison to all-inside devices, particularly in the case of ramp lesions and larger meniscocapsular tears [15]. Inside-out technique enjoys more stable suture placement, thus more effectively preventing gapping at the repair site and maximizing meniscal healing potential. But more recent advances in bioabsorbable anchor technology and modern all-inside fixation implants have yielded promising clinical and biomechanical outcomes, particularly in smaller contained ramp tears where less invasiveness can result in faster rehabilitation and reduced neurovascular risk. While both techniques can effectively restore meniscal integrity and aid postoperative knee stability, the optimal selection of repair should be made based on tear morphology, chronicity, likelihood of vascularization, and associated ligamentous pathology to achieve maximum functional recovery and long-term joint preservation.

7. Role of Biologic Augmentation

The application of biologic augmentation methods in the repair of meniscal ramp lesions has been an emerging area for enhancing healing potential, augmenting tissue integration, and optimizing functional recovery. Among these methods, platelet-rich plasma (PRP) has been extensively contemplated due to the high concentration of growth factors it possesses. PRP is injected directly into the injured area of the meniscus within the knee joint, under ultrasound guidance to ensure precision. The platelet gel is delivered specifically to the affected portion of the meniscus, targeting the tear site to maximize biological healing potential. Preclinical and clinical studies demonstrate that PRP application during ramp lesion repair can accelerate meniscal healing by enhancing fibrocartilage remodeling, vascular ingrowth, and reducing the activity of inflammatory cytokines, thereby eliminating the possibility of repair failure [17,19].

8. Rehabilitation Protocols

Rehabilitation following repair of the meniscal ramp lesion must be specially constructed to optimize tissue healing, functional restoration, and final joint stability. Rehabilitation is customized to the concomitant surgeries performed to ensure that the biomechanical integrity of the meniscocapsular junction is preserved while allowing for gradual restoration of function.

8.1. Isolated Ramp Lesion Repair

In isolated ramp lesion repairs, early rehabilitation protocols emphasize restricted weight-bearing and controlled range-of-motion (ROM) exercises to minimize excessive shear forces and mechanical loading on the repair. The patients are usually advised to stay non-weight-bearing for the initial two weeks, partial weight-bearing using crutches as tolerated, and gradually progress to full weight-bearing at 4 to 6 weeks depending on the repair's strength. During this period, passive and active-assisted ROM exercises should be initiated within a protective range (0°–90° flexion) to prevent joint stiffness without placing excessive stress on the healing meniscocapsular tissue. Progressive quadriceps activation exercises are added early to oppose muscle atrophy and optimize neuromuscular control, which is essential in preventing compensatory movement patterns that can undermine repair integrity. Closed kinetic chain exercises gradually introduce after 6 weeks with emphasis on proprioceptive training and controlled shifting of weight to recover normal joint biomechanics [9,13].

8.2. Rehabilitation Following Combined ACL Reconstruction and Ramp Lesion Repair

When ramp lesion repair is added to ACL reconstruction (ACLR), rehabilitation protocol follows closely standard ACL protocols but with modification to avoid compromising meniscal repair. Because ramp lesions are a causative factor in residual knee instability, rehabilitation protocol needs to emphasize early mobilization without excessive posteromedial meniscal shear stress. During the first six weeks, rehabilitation is directed to limit deep flexion (>90°) to reduce posterior tibial translation and avoid pivoting or cutting motions that can disrupt healing. Non-weight-bearing or partial weight-bearing ambulation is recommended initially, progressing to full weight-bearing by week 6–8, depending on clinical assessment and imaging findings [24]. Closed-chain quadriceps and stationary bicycle exercises can be introduced by weeks 4–6 in the absence of evidence of compromise of meniscal repair. Progressive strength training, balance exercises, and low-impact neuromuscular training are performed between weeks 8–12 to increase dynamic stability and prevent compensatory movement deficit. Plyometric training and progressive RTS criteria-based testing must be initiated no earlier than 6 months post-operation, if the ACL graft and meniscal repair are deemed mechanically sound [10,24].

8.3. Long-Term Considerations and RTS

The RTS decision following ramp lesion repair is based on quantifiable assessments of strength, stability, and neuromuscular control, rather than an arbitrary time period. Isokinetic strength examination, single leg hop testing, and proprioceptive examination are necessary milestones in ascertaining functional readiness. The literature suggests that systematically rehabbed patients who successfully pass developed RTS criteria have significantly lower rates of re-injury when progressive loading, sport drills, and neuromuscular retraining are emphasized. Despite these developments, long-term follow-up studies are still needed to determine the optimal rehabilitation time and to evaluate the effect of biologic augmentation on tissue healing [12,18].

9. Outcomes and Long-Term Prognosis

Short-term series documentation revealed improvements in patient-rated outcomes following ramp lesion repair with increased Lysholm and International Knee Documentation Committee (IKDC) scores. There are no long-term data, and more studies are required. Early diagnosis and treatment are required to optimize results and prevent secondary complications such as osteoarthritis [1,4].

10. Future Directions

Meniscal ramp lesion treatment is an evolving field, with ongoing research directed at improving diagnostic precision, maximizing repair methods, and refining biologic augmentation methods. The development of advanced imaging modalities, such as high-resolution three-dimensional magnetic resonance imaging (3D MRI) and arthroscopic visualization systems with high-definition cameras, has the potential to significantly improve early detection and preoperative planning. These advances hold the promise of reducing residual knee instability and missed diagnoses and enhancing post-ACL reconstruction patient outcomes. Optimization of MRI-based diagnostic criteria, standardization of imaging protocols, and the use of artificial intelligence-augmented analysis would be key objectives for future research seeking to maximize detection rates and optimize preoperative planning. The establishment of firm MRI-to-arthroscopy correlations will remain central to ongoing growth in imaging application for meniscal ramp lesions treatment [11,12].

11. Conclusions

Meniscal ramp lesions are a significant but frequently underdiagnosed finding in anterior cruciate ligament (ACL)-deficient knees, having significant effects on joint biomechanics, surgical outcomes, and long-term functional integrity [4,5,14]. While technical innovations in arthroscopic visualization and meniscal repair have improved detection sensitivity and clinical outcomes, variability in detection rates and surgical decision-making emphasize the importance of standardized intraoperative examination protocols [6,8,16].

Meniscal repair techniques, including inside-out, all-inside, and hybrid techniques, have been demonstrated to possess robust biomechanical and clinical efficacy [15,16]. Of specific note, all-inside ramp lesion repairs did not demonstrate inferior healing rates compared to inside-out techniques, suggesting possible utility in the clinic [16]. Long-term durability and relative effectiveness of these techniques will still need to be assessed using high-quality longitudinal studies [21].

Biologic augmentation methods such as vascular endothelial growth factor (VEGF) therapy, platelet-rich plasma (PRP), and stem cell therapies, may offer promising adjuvants to enhance meniscal healing, particularly within the avascular meniscocapsular zone [17–19,25]. These treatments may have the potential to confer better integration and biomechanical recovery with reduced risk of residual instability and post-traumatic osteoarthritis [5,7,20].

Future studies can focus on refining patient-specific treatment protocols by the addition of newer imaging modalities, such as high-definition arthroscopy and three-dimensional magnetic resonance imaging (3D MRI), and possibly improve earlier detection and preoperative planning [11,12]. Additionally, high-quality longitudinal studies to ascertain structural and functional outcomes to better understand the long-term impact on joint health are needed for meniscal ramp lesion repair [21].

A multidisciplinary, evidence-based approach integrating biomechanical principles, surgical innovation, and regenerative medicine will be critical in preventing recurrent instability, optimizing surgical success, and preventing degenerative joint disease in this high-risk patient population [3,17].

Author Contributions

U.G.L.: conceptualization, supervision, methodology, critical revision of the manuscript. B.M.: data curation, writing—original draft preparation, literature review. A.C. (Alessandra Corradini): visualization, investigation, data collection. A.C. (Alice Ceccaroli): writing—reviewing and editing, methodological support. A.d.S.: validation, intellectual content review, clinical expertise contribution. P.D'H.: supervision, resources, critical reviewing for important intellectual content. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

Given the role as editor in chief, Prof. Umile Giuseppe Longo was not involved in the peer review of this paper and had no access to information regarding its peer-review process. Full responsibility for the editorial process of this paper was delegated to another editor of the journal.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for the preparation of this manuscript.

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