

General

Research Progress on Return to Sport After Surgery for Lateral Patellar Dislocation

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Lateral patellar dislocation (LPD) is a common knee joint sports injury in adolescents, with an incidence increasing year by year. Medial patellofemoral ligament reconstruction (MPFLR), as the mainstream surgical method for treating LPD, achieves favorable clinical efficacy and significantly reduces the redislocation rate. However, controversies remain regarding patients' return to sport (RTS) level, especially when combined with complex bony surgeries, where RTS outcomes are poorer. This review systematically evaluates the impact of different surgical strategies (isolated MPFLR and MPFLR combined with various bony surgeries) on RTS levels and explores the key role of psychological factors in RTS. It aims to provide references for optimizing clinical treatment strategies and formulating individualized RTS protocols.

INTRODUCTION

Lateral patellar dislocation (LPD) is one of the most prevalent knee sports injuries in children and adolescents, with an annual incidence of approximately 43 cases per 100,000 people. It is more common in females aged 10–19 years, and its incidence has been rising steadily.^{1–4} The medial patellofemoral ligament (MPFL) is the primary soft-tissue structure that stabilizes the patellar trajectory during the early phase of knee flexion (0–30°), providing approximately 60% of the medial constraint to prevent lateral patellar displacement.⁵ Injuries to the MPFL are present in 90% of acute patellar dislocation and all recurrent patellar dislocation.⁶ Although surgical repair of the MPFL has shown promising outcomes, MPFL reconstruction (MPFLR) is widely regarded as the “gold standard” for treating LPD by most researchers.^{7–10}

Sports participation is crucial for physical and mental health, as it significantly enhances well-being and reduces the risk of depression.¹¹ LPD often forces patients to cease sports participation due to unavoidable knee pain, weakness, or instability. Long-term activity restriction not only impairs physical function but also may cause psychological harm. Return to sport (RTS), as the ultimate goal of LPD treatment, aims not only to restore dynamic knee function but also to rebuild patients' confidence, making its importance undeniable. While MPFLR typically yields good clinical outcomes and patient satisfaction, controversies persist regarding RTS levels—especially the recovery of pre-injury sports intensity or competitive performance. These controversies are more pronounced when MPFLR is combined with bony surgeries to address anatomical abnormalities.^{12–17}

This review synthesizes current evidence on the impact of different surgical strategies on RTS outcomes in LPD patients and analyzes the role of psychological factors in RTS. It intends to provide a basis for clinicians and patients to jointly decide on surgical plans and guide clinical practice.

SURGICAL STRATEGIES AND THEIR IMPACT ON RETURN TO SPORT

Surgical management of LPD primarily includes two strategies: isolated MPFLR and MPFLR combined with bony surgeries. These strategies differ significantly in their effects on RTS levels.

ISOLATED MEDIAL PATELLOFEMORAL LIGAMENT RECONSTRUCTION (MPFLR)

Biomechanical studies confirm that the MPFL provides approximately 60% of medial constraint to limit lateral patellar displacement during knee flexion (0–30°).⁵ Given that 90% of acute LPD cases and all recurrent LPD cases involve MPFL injury, MPFLR—as the mainstream surgical approach—not only effectively restores patellofemoral alignment and reduces redislocation risk but also enables most patients to RTS without compromising pre-injury performance.^{6,13}

Several studies have reported high RTS rates following isolated MPFLR ([Table 1](#)). Huo et al.¹⁸ documented 130 LPD patients, with 92% returning to sport at approximately 7 months postoperatively and 78% regaining their pre-injury sports level. Similar high RTS rates were reported by Dennis et al.¹⁹ (84%). However, in-

Table 1. The rates and level of RTS after isolated MPFLR.

Author	RTS rates	Pre-injury sport level or higher
Huo et al. ¹⁸	92%	78%
Dennis et al. ¹⁶	89%	not mentioned
Xu et al. ¹⁹	84%	not mentioned
Meynard et al. ¹³	91%	67%
Manjunath et al. ²⁰	85.1%	68.3%
Marigi et al. ¹⁵	69.6%	52.2%

consistencies exist. Meynard et al.¹³ found that while 91% of patients returned to sport at a mean follow-up of 10 months, only 67% recovered to their pre-injury level or higher. A systematic review of 800 patients showed an overall RTS rate of 85.1%, but among 638 patients with recorded pre-injury recovery data, only 68.3% regained their pre-injury sport level.²⁰

Key factors influencing RTS levels after isolated MPFLR include:

Sport type and intensity: Low-level athletes are more likely to return to their pre-injury level or higher than high-level athletes.¹² Marigi et al.¹⁵ reported that only ~50% of professional wrestlers could return to competitive matches. A systematic review by Ryan et al.²¹ showed that volleyball/handball players had the lowest rate of returning to pre-injury levels (18.2%–50%), indicating that sport-specific demands on knee function significantly affect RTS outcomes.

Age: Older age has been negatively correlated with post-operative outcomes of MPFLR, potentially reducing the likelihood of recovering high-intensity sports performance.²²

Rehabilitation progress: The impact of early mobilization (e.g., at 3 months postoperatively) versus actual RTS timing (e.g., a mean of 10.4 months) on final sport levels remains unclear, requiring further prospective studies.¹³

In summary, isolated MPFLR enables a high RTS rate, and most studies support its ability to help patients regain satisfactory sports performance. However, sport type, intensity, age, and rehabilitation progress are critical variables affecting the recovery of high-level sports function.

MPFLR COMBINED WITH BONY SURGERIES

Controversies persist regarding whether to combine MPFLR with bony surgeries for LPD patients with significant anatomical abnormalities, such as trochlear dysplasia (TD), patella alta, increased tibial tuberosity-trochlear groove (TT-TG) distance, or increased femoral anteversion angle (FAA).^{12,14,16,17} Nevertheless, multivariate analyses have confirmed that TD, increased TT-TG distance, patella alta, and increased FAA are independent risk factors for RTS failure after MPFLR.²³ Clarifying the impact of various bony

Table 2. The rates and level of RTS after MPFLR combined with trochleoplasty.

Author	RTS rates	Pre-injury sport level or higher
Mengis et al. ¹²	97%	42%
Carstensen et al. ²⁵	84.8%	43.2%
Damayanthi et al. ²⁶	not mentioned	not mentioned
Montagna et al. ²⁷	100%	100%

surgeries on RTS is therefore essential for guiding clinical decision-making.

MPFLR COMBINED WITH TROCHLEOPLASTY

The patellofemoral joint consists of the patellar surface and the trochlear surface of the distal femur. Under normal conditions, the trochlea guides the patella during knee flexion and extension. In patients with TD, the abnormally convex or flat trochlear “groove” significantly reduces the contact area between the patella and trochlea during knee flexion. This poor congruence increases joint pressure (causing pain) and weakens the forces required to maintain normal patellar trajectory. Almost all LPD patients have varying degrees of TD, which is a confirmed risk factor for recurrent patellar instability.²⁴

Studies have reported relatively high RTS rates after MPFLR combined with trochleoplasty ([Table 2](#)). Mengis et al.¹² reported that 97% of patients resumed training, and Carstensen et al.²⁵ documented an 84.8% RTS rates. However, the rate of recovering pre-injury sports levels is generally low: Mengis et al.¹² found that only 42% of patients regained their pre-injury level, while Carstensen et al.²⁵ reported that only 43.2% returned to professional/competitive levels. Although a systematic review by Damayanthi et al.²⁶ and a small-sample study by Montagna et al.²⁷ showed more optimistic results, the former did not analyze RTS levels in detail, and the latter requires larger-sample, longer-term follow-up to validate its findings.

Current evidence suggests that the rate of returning to high-intensity/competitive sports after trochleoplasty may be lower than that after isolated MPFLR. This highlights the need for strict adherence to surgical indications when treating patients with TD.

MPFLR COMBINED WITH TIBIAL TUBERCLE OSTEOTOMY (TTO)

Patella alta and increased TT-TG distance are established anatomical risk factors for LPD. Previous studies have shown that TTO—whether used to correct patella alta (by distalizing the tibial tubercle), treat increased TT-TG distance (by medializing the tubercle), or combine both pro-

Table 3. The rates and level of RTS after MPFLR combined with TTO.

Author	RTS rates	Pre-injury sport level or higher
Li et al. ¹⁷	73%	40.5%
Platt et al. ²⁹	86.9%	not mentioned
Vivekanantha et al. ³⁰	92%	75%

cedures—significantly improves patient satisfaction and reduces the risk of recurrent dislocation.^{17,28}

Reported RTS rates after MPFLR combined with TTO vary (Table 3). Li et al.¹⁷ reported that 73% of patients returned to sport, but only 40.5% recovered to their pre-injury level or higher, with particular difficulty in sports demanding high knee function (e.g., basketball, football). A systematic review by Platt et al.²⁹ documented an 86.9% RTS rate, which was not statistically different from that of isolated MPFLR (95.4%). A meta-analysis by Vivekanantha et al.³⁰ reported a 92% RTS rate and noted that 75% of patients regained their pre-injury level or higher—though this finding was based on only 2% of the included studies.

Controversies regarding RTS levels after MPFLR combined with TTO include:

Small sample sizes and high heterogeneity in existing studies, making it difficult to confirm the true impact of TTO on sports recovery.

Significant variations in postoperative rehabilitation protocols (e.g., range of motion, weight-bearing progression, recommended RTS timing) between isolated MPFLR and MPFLR combined with TTO. TTO patients typically require longer rehabilitation periods to address quadriceps weakness.³¹

Lack of a unified RTS standard, which greatly affects the assessment of sports function recovery.³²

MPFLR COMBINED WITH DEROTATIONAL DISTAL FEMORAL OSTEOTOMY (DDFO)

Studies have shown that an increased FAA is associated with a higher risk of reoperation due to redislocation after MPFLR—a concern for sports-active patients. Hao et al.¹⁴ compared isolated MPFLR with MPFLR combined with DDFO in patients with increased FAA. At final follow-up, the DDFO group had a 90.3% RTS rate and a 67.7% rate of returning to pre-injury or higher sports levels, which was not significantly different from the isolated MPFLR group. However, the DDFO group required a longer RTS time (8.5 months vs. 7.6 months in the isolated MPFLR group), possibly due to longer brace immobilization leading to poorer postoperative knee range of motion and higher pain rates.

While some studies have reported better clinical and radiological outcomes with DDFO combined with MPFLR,¹⁴ other studies have found no significant difference in efficacy between isolated MPFLR and MPFLR combined with DDFO for patients with increased FAA.³³ Thus, prospective

Table 4. The rates and level of RTS after MPFLR combined with DDFO.

Author	RTS rates	Pre-injury sport level or higher
Hao et al. ¹⁴	90.3%	67.7%
Maximilian et al. ³⁴	not mentioned	40.7%

studies are needed to confirm whether DDFO is necessary for patients with increased FAA undergoing MPFLR. Controversies also exist regarding RTS outcomes: Maximilian et al.³⁴ reported that only 24 patients (40.7%) in their DDFO group recovered to pre-injury sports levels. (Table 4)

In general, patients undergoing MPFLR combined with bony surgeries may achieve similar overall RTS rates to those undergoing isolated MPFLR at final follow-up. However, their rate of recovering pre-injury sports levels—especially high-intensity/competitive levels—is often lower. This is attributed to more complex rehabilitation requirements, inconsistent postoperative protocols, and increased risks of complications. Bony surgeries require longer bone healing time and more cautious rehabilitation, leading to slower recovery of muscle strength (especially quadriceps strength). Significant variations in rehabilitation protocols across institutions and the lack of evidence-based RTS standards further hinder consistent outcomes. Additionally, bony surgeries themselves increase the risk of complications and reoperation, undermining patients' confidence in rehabilitation and final functional recovery. Optimizing perioperative management—especially rehabilitation—for patients undergoing combined surgeries to safely and efficiently restore their sports function remains a major clinical challenge.

PSYCHOLOGICAL READINESS: A KEY FACTOR IN RETURN TO SPORT

Beyond physical factors, psychological barriers are among the primary obstacles to RTS in LPD patients.²¹ Factors such as fear of reinjury or lack of confidence (referred to as “psychological factors”), lifestyle changes, loss of interest, pain, and concerns about recurrent instability have all been reported, with psychological factors being the most dominant.²¹ Assessing and intervening in patients' psychological recovery is therefore critical for reducing reinjury risk and promoting successful RTS.

ASSESSMENT OF PSYCHOLOGICAL READINESS (MPFL-RSI) SCALE

The anterior cruciate ligament-return to sport after injury (ACL-RSI) scale is a validated tool for measuring psychological readiness for RTS after ACL reconstruction.³⁵ Recently, an increasing number of studies have adapted this scale for LPD patients, naming it the medial patellofemoral liga-

ment-return to sport after injury (MPFL-RSI) scale to assess psychological readiness for RTS after MPFLR.³⁴

The MPFL-RSI scale has been shown to accurately predict patients' psychological readiness for RTS, with a critical cutoff score of 55. This score can identify whether patients have recovered to their pre-injury sports level with excellent sensitivity and specificity.³⁴ Psychological readiness has also been identified as a key indicator of successful RTS: higher MPFL-RSI scores are significantly associated with increased odds of returning to sport and regaining pre-injury sports level.¹⁷ Greater attention to psychological recovery during rehabilitation may therefore improve the probability of successful RTS.

CURRENT STATUS OF PSYCHOLOGICAL READINESS IN POSTOPERATIVE PATIENTS

Multiple studies have shown that psychological readiness for RTS is generally suboptimal in postoperative LPD patients. Patients who fail to return to sports have significantly lower mean MPFL-RSI scores: Hurley et al.³⁶ followed 35 patients who could not return to sport after MPFLR for a mean of 38 months and found their average MPFL-RSI score was only 44.2, with only 9 patients (25.7%) scoring above the cutoff (≥ 55). Even among patients who successfully returned to sport, the pass rate for MPFL-RSI (≥ 55) remains low, ranging from 38% to 57.1%.^{17,37,38}

Limited research has focused on patients who fail to return to sport, restricting in-depth understanding of their psychological characteristics. When asked about their barriers, most patients report a lack of confidence, possibly due to long-term struggles with patellar instability making them more cautious about resuming sports.³⁹ Straume-Næsheim et al.³⁹ found that LPD patients experience similar knee dysfunction to ACL-deficient patients but wait five times longer for treatment. Prolonged illness may burden patients psychologically, suggesting that early psychological intervention could potentially improve RTS levels—a topic worthy of further investigation. Additionally, differences in sports participation levels and psychosocial characteristics may contribute to uneven psychological readiness.⁴⁰

PSYCHOLOGICAL INTERVENTION STRATEGIES

Studies have shown that psychosocial interventions—such as guided imagery, positive self-talk, goal setting, emotional written disclosure, rehabilitation model videos, and counseling—improve rehabilitation adherence, pain management, exercise compliance, and emotional states in patients with musculoskeletal injuries.⁴⁰ Better training compliance and a positive rehabilitation attitude are expected to yield better psychological outcomes for RTS. Integrating these interventions into perioperative care may help rebuild patients' confidence in sports and overcome psychological barriers to RTS.

DISCUSSION

This review synthesizes current evidence on RTS outcomes after LPD surgery, focusing on surgical strategies and psychological factors. Key findings include:

Isolated MPFLR yields a relatively high RTS rates and enables most patients to regain their pre-injury sports levels. However, high-level athletes and older patients face greater challenges in recovering competitive performance. These variations highlight the need for individualized preoperative assessments of sports type, intensity, and age to set realistic RTS goals.

MPFLR combined with bony surgeries improves stability but may compromise RTS levels: For patients with significant bony abnormalities, combined surgeries reduce recurrent instability risk but result in lower rates of recovering pre-injury sports levels. This is likely due to longer bone healing times, slower quadriceps strength recovery, and more complex rehabilitation. Controversies persist regarding the necessity of combined surgeries, emphasizing the need for prospective studies with standardized rehabilitation protocols to validate their efficacy.

Psychological readiness is a critical unmet need: Postoperative LPD patients exhibit poor psychological readiness for RTS. Long waiting times for treatment and fear of reinjury are major psychological burdens. The MPFL-RSI scale shows promise for predicting RTS outcomes, but few studies have tested psychological interventions—representing a significant gap in current care.

Future research should focus on: Conducting large-sample, prospective studies to validate the efficacy of combined bony surgeries for specific anatomical abnormalities. For patients without significant bony abnormalities, isolated MPFLR is preferred to maximize RTS potential. For patients with severe TD, patella alta, or increased TT-TG distance, combined surgeries should be considered—but patients should be counseled on the potential for slower RTS and lower recovery of high-intensity sports. Developing unified RTS standards and evidence-based rehabilitation protocols for LPD patients. Testing the efficacy of psychological interventions in improving RTS outcomes. Psychological assessment (using the MPFL-RSI scale) should be integrated into routine follow-up, and early psychological interventions should be provided to patients with low readiness scores.

There were several limitations in this review as well. First, Study design biases: Most studies are retrospective with small sample sizes and high heterogeneity, limiting the generalizability of results. Second, Lack of unified RTS standards: Definitions of "RTS" vary across studies, making cross-study comparisons difficult. Third, Inconsistent rehabilitation protocols: Rehabilitation timelines and intensity differ widely between institutions, especially for combined bony surgeries. This variability confounds the assessment of surgical impact on RTS. Finally, Insufficient focus on psychological factors: Few studies have investigated the efficacy of psychological interventions for improving RTS outcomes.

CONCLUSION

For most LPD patients, isolated MPFLR achieves satisfactory RTS rates and pre-injury sports recovery. For patients with significant bony abnormalities, combined surgeries improve stability but require careful consideration of potential impacts on RTS levels and more intensive rehabilitation. Psychological readiness is a key non-organic factor for successful RTS. Through multidisciplinary collaboration—combining precise surgical treatment, systematic rehabilitation management, and personalized psychological intervention—a more comprehensive “physical-psychological-social” rehabilitation model can be established for LPD patients, significantly increasing their chances of successfully returning to sports and regaining ideal performance levels.

AUTHOR CONTRIBUTIONS

Rongtao, Yang, (Author 1, Corresponding Author): Conceived and designed the review framework, conducted comprehensive literature retrieval across multiple databases (including PubMed, Embase, and Web of Science) and extracted key data. Drafted the initial manuscript and took

primary responsibility for revising the manuscript in accordance with peer review comments.

Yiqun, Wang, (Author 2): Participated in refining the review’s research questions and inclusion/exclusion criteria, verified the accuracy and completeness of the extracted data through cross-checking, and assisted in analyzing the literature. Contributed to drafting the “Discussion” section, particularly in interpreting the clinical implications of the review results, and reviewed the manuscript for logical consistency and academic rigor.

Bin, Tian, (Author 3): Supervised the overall review process, provided guidance on methodological design, and critically evaluated the validity of the included studies. Advised on addressing major revisions from editors and reviewers, and approved the final version of the manuscript before submission.

Jiang, Zheng, (Author 4): Assisted in literature retrieval and supplementary screening of gray literature to reduce publication bias. Contributed to formatting the manuscript and proofreading the manuscript for language accuracy and adherence to journal guidelines.

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