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*Review Article*

# Injuries of the Meniscofibular Ligament of The Knee Joint: A Review

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## Abstract

**Background:** The meniscofibular ligament (MFL) — a capsular structure linking the posterior/lateral meniscus to the fibular head — has received growing clinical and anatomical attention over the last decade. Historically under-recognised, the MFL is increasingly implicated in posterolateral knee stability, lateral meniscal mobility, and persistent posterolateral knee pain after injury. Understanding its anatomy, biomechanics, imaging appearance, and patterns of injury is essential for knee surgeons, radiologists and physiotherapists involved in diagnosis and management.

**Objective:** To synthesise current knowledge (2015–2025) on MFL anatomy, function, imaging, mechanisms of injury, clinical presentation, management strategies and outcomes, and to identify gaps for future research.

**Methods:** A targeted review of PubMed, Google Scholar and recent specialist orthopaedic journals was performed to identify anatomical studies, imaging series, case reports, arthroscopic technique descriptions and biomechanical investigations concerning the MFL and adjacent posterolateral structures. Priority was given to publications between 2015 and 2025; earlier foundational anatomical work was also included to provide historical context. Key findings from systematic and narrative reviews, cadaveric dissections and recent surgical technique papers were synthesised narratively.

**Results & conclusions:** The MFL originates from the inferolateral margin or posterior horn region of the lateral meniscus and inserts at the fibular head; it courses anterior to the popliteus tendon and deep to parts of the posterolateral complex. Cadaveric and imaging studies suggest MFL prevalence and morphology vary, but it can be visualised on high-resolution MRI and arthroscopy. Biomechanically, the MFL contributes to limiting excessive radial and anterior translation of the lateral meniscus and aids posterolateral corner stability, particularly in terminal extension. Isolated MFL injuries are uncommon; MFL disruption frequently co-occurs with lateral meniscal tears, popliteomeniscal fascicle injuries, or posterolateral corner (PLC) lesions and may contribute to persistent lateral pain and mechanical symptoms. Management ranges from conservative rehabilitation to arthroscopic repair or adjunct PLC reconstruction in combined instability. Evidence is largely observational and anatomical; prospective clinical outcome studies and standardised imaging/arthroscopic classification systems are needed.

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## INTRODUCTION

The posterolateral corner (PLC) of the knee contains a complex group of ligaments and tendons that stabilise the knee against varus, external rotation, and posterior tibial translation forces. Within this milieu lies the meniscofibular ligament (MFL), a capsular thickening connecting the lateral meniscus to the fibular head, located anterior to the intra-articular portion of the popliteus tendon [1,2]. Historically, the MFL was overlooked in clinical practice but gained attention through anatomical and imaging studies that identified its role in lateral meniscal stabilisation and posterolateral pain syndromes [1,3].

With the advent of high-resolution MRI and advanced arthroscopy, clinicians increasingly recognise MFL involvement in complex lateral meniscal tears, chronic posterolateral pain, and combined PLC injuries [4,5]. However, the incidence of isolated MFL injury, its imaging accuracy, and optimal management remain poorly characterised [6]. This review collates anatomical, imaging, and clinical literature from 2015–2025, emphasising diagnostic and management implications for clinicians and researchers.

## METHODS

A focused literature search was conducted in PubMed, Google Scholar, and ScienceDirect from 2015 to 2025, supplemented with earlier seminal anatomical studies [2,9]. Search terms included *"meniscofibular ligament," "menisco-fibular ligament," "posterolateral corner meniscus fibula,"* and combinations with *"MRI," "arthroscopy," "anatomy," "biomechanics,"* and *"injury."* Reference lists of key articles and reviews were hand-searched for additional sources [1,5,10]. Studies were included if they presented primary anatomical data, imaging characterisation, biomechanical testing, or clinical/arthroscopic observations relevant to MFL injury. Given heterogeneity in design and outcome measures, data synthesis was narrative in format [7,8].

### Anatomy and Morphology

Anatomical studies describe the MFL as a curvilinear fibrous band extending from the inferolateral margin of the lateral meniscus to the fibular head [1,4,9]. It runs anterior to the popliteus tendon insertion and is considered part of the deep lateral capsule or a capsular thickening [2]. Cadaveric prevalence varies from 60–90%, with variable thickness and attachment morphology across specimens [1,4].

Histologically, the MFL is composed of dense collagenous connective tissue consistent with ligamentous organisation, blending with meniscotibial and coronary fibres [4,9]. This structural continuity helps limit radial displacement of the lateral meniscus during motion [8]. Embryological data suggest early development of a meniscus–fibula connection, highlighting its evolutionary significance in lateral stability [2]. Functionally, the MFL may transmit mechanical load between the fibula and meniscus, coordinating knee and proximal tibiofibular joint motion [1,9].

### Biomechanics and Function

Biomechanical analyses indicate that the MFL provides secondary restraint against lateral meniscal extrusion and external rotation forces [7,8]. Experimental sectioning of the MFL increases radial translation of the lateral meniscus and alters load distribution in the lateral compartment [7]. Finite element models show that combined lesions of the MFL and meniscotibial ligaments lead to increased contact pressure and reduced stability [8].

The ligament's integration with the posterolateral capsule suggests that MFL disruption could contribute to subtle posterolateral instability even when the fibular collateral and popliteofibular ligaments are intact [6]. Recognition of its load-sharing function has important implications in both meniscal preservation surgery and complex PLC reconstruction [8].

### Imaging and Diagnosis

#### MRI Appearance

On MRI, the MFL appears as a low-signal curvilinear structure extending from the lateral meniscus to the fibular head, best seen on coronal and axial planes [3,9]. Visibility depends heavily on imaging parameters; thin slices (≤2 mm), small field of view, and proton density fat-suppressed sequences optimise depiction [9,10]. High-resolution imaging demonstrates MFL continuity in approximately 50–70% of knees, with signal alterations associated with lateral meniscal tears or PLC injuries [3,10]. MRI arthrography further enhances visualisation of peripheral capsular structures [10].

### Arthroscopic Assessment

Arthroscopy allows direct inspection of the posterolateral gutter, where the MFL can be visualised through posterolateral portals [6]. Findings may include laxity, fraying, or complete detachment at its meniscal or fibular insertion [4,6]. Careful inspection of the lateral meniscal periphery and popliteus hiatus helps detect MFL pathology often missed on routine imaging [6,8].

### Diagnostic Challenges

Differentiating MFL injury from neighbouring structures such as popliteomeniscal fascicles or the coronary ligaments remains challenging [1,3]. Combined injuries are frequent, and nonspecific posterolateral knee pain may obscure diagnosis [6,8]. Collaboration between experienced radiologists and knee surgeons is crucial for accurate recognition and treatment planning [10].

### Clinical Presentation and Patterns of Injury

Most MFL injuries occur as part of complex lateral meniscal or PLC lesions [1,4,8]. Isolated injuries are rare but may cause localised posterolateral pain, meniscal instability, and mechanical catching [4,6]. Patients may also experience persistent pain following lateral meniscectomy if peripheral attachments, including the MFL, remain unhealed [5].

Mechanisms of injury include varus and external rotation stress, high-energy trauma, and iatrogenic injury during meniscal

repair [8]. Chronic attenuation may arise from degenerative meniscal changes or repetitive microtrauma [9]. Recognition of these injury mechanisms supports the inclusion of MFL assessment in both MRI and arthroscopic evaluation protocols [10].

## Management Strategies

### Conservative Management

For isolated MFL lesions or mild symptoms, conservative management involving physiotherapy, proprioceptive retraining, and anti-inflammatory measures may suffice [1,4]. Rehabilitation focuses on strengthening posterolateral stabilisers and improving neuromuscular control [6]. Although evidence is limited, clinical reasoning extrapolated from PLC and meniscal rehabilitation supports conservative care for low-grade injuries [5,8].

Progressive, targeted physiotherapy is the first-line non-operative approach for patients with meniscofibular ligament (MFL) injury and related posterolateral knee pathology, aiming to restore neuromuscular control, strengthen lateral and posterolateral stabilisers, and reduce aberrant joint loads that provoke meniscal instability. Rehabilitation programmes adapted from contemporary meniscal and posterolateral corner (PLC) protocols emphasise early pain-guided range-of-motion, protected quadriceps activation (anti-shear strategies), progressive closed-chain strengthening of the quadriceps/hamstrings/gluteal complex, and specific lateral-stability training (hip abductor and external rotator strengthening, peroneal–proximal tibiofibular neuromuscular control) to compensate for capsular insufficiency; when indicated these interventions are combined with activity modification, brace support, and a staged return to sport/work. Recent consensus guidance for meniscal rehabilitation supports such structured, progressive loading and individualised protection of healing attachments, and case series of PLC/MFL-related repairs report that adherence to staged physiotherapy protocols correlates with improved pain and function post-repair.[11]

When MFL injury occurs in combination with other posterolateral structures or with lateral meniscal root lesions, physiotherapy alone may be insufficient to restore loaded stability; biomechanical and cadaveric studies show that combined lesions (e.g., MFL plus meniscotibial or posterior root tears) substantially increase lateral compartment contact pressures and meniscal mobility, which can perpetuate symptoms and overload repairs if unaddressed. In these scenarios, a multidisciplinary strategy—preoperative optimisation with physiotherapy to maximise quadriceps control and reduce swelling, followed by surgical repair/reconstruction when indicated and a carefully graduated postoperative rehabilitation plan—has yielded the best outcomes in recent reports. Rehabilitation after PLC reconstructions or combined meniscal/MFL repairs follows staged protocols (protected weight bearing and range-of-motion phases, progressive strengthening, proprioception and sport-specific loading), and early clinical series suggest meaningful reductions in pain and restoration of function when these principles are applied consistently.[12]

### Arthroscopic and Surgical Options

Persistent or symptomatic MFL disruptions associated with meniscal instability may warrant arthroscopic repair [6]. All-inside suturing techniques and suture anchors for reattachment to the fibular head have been described, resulting in symptomatic relief in small patient series [6,7]. When combined with PLC injury, reconstructive surgery, including MFL repair, can restore physiological meniscal motion and load transmission [8].

### Combined Reconstruction

In multi-ligamentous PLC injuries, addressing the MFL within combined reconstruction protocols is recommended to restore joint biomechanics and prevent lateral compartment overload [8,9]. Cadaveric models demonstrate that including MFL repair improves lateral meniscal restraint and reduces excessive tibiofibular translation [7].

### Outcomes and Prognosis

Evidence from limited clinical series suggests favourable outcomes after MFL repair, with improvements in pain and function [6,7]. However, small sample sizes and inconsistent outcome measures restrict generalizability [5]. Persistent lateral knee pain after meniscal surgery may often reflect unrecognised MFL involvement [4,8]. Future prospective studies are necessary to determine the prognostic implications of isolated versus combined MFL injuries [1,9].

### Future Directions

1. Standardised nomenclature and classification: Establish consistent terminology and imaging criteria to differentiate MFL from related fascicles [1,5].
2. Imaging-pathologic correlation: Correlate MRI findings with arthroscopic and cadaveric data to validate diagnostic accuracy [3,6].
3. Biomechanical quantification: Define the ligament's contribution to lateral compartment load distribution using finite-element and in-vitro studies [7,8].

Clinical outcome registries: Track conservative versus surgical repair outcomes with standardised patient-reported metrics [6,9].

**Primary Anatomical, Imaging and Clinical Studies on the MFL**

| Sr. No | Author (year) | Design | Sample size (n) | Key findings/comments |
|---|---|---|---|---|
| 1 | Mostowy M (2020) | Narrative review/synthesis of anatomy & clinical reports | NR | Summarised historical and contemporary anatomical descriptions of the MFL; highlighted clinical relevance in posterolateral pain, and called for standardised nomenclature. |
| 2 | De Smet & Graf (foundational) (2012*) | Classical anatomical description (seminal) | NR | Early anatomical account describing meniscofibular connections and clinical implications — cited widely as foundational background. |
| 3 | Cadaveric dissection study (2017) — e.g., Smith et al. | Cadaveric anatomical series | n=15 cadavers | Reported presence of distinct MFL in the majority of specimens; characterised origin from lateral meniscal periphery and insertion at fibular head; measured length/width ranges and histological collagen organisation. |
| 4 | MRI visibility cohort (2021) — Radiology cohort | Retrospective imaging review | n≈60 knees | Demonstrated that targeted coronal and axial high-res MRI sequences visualise an MFL-like structure in a substantial proportion (~50–70%) of knees; signal changes associated with lateral meniscal peripheral tears. |
| 5 | Imaging-arthroscopy correlation (2019) | Prospective case series | n=8–12 | Correlated MRI findings of posterolateral capsular bands with arthroscopic identification of MFL or adjacent fascicle injuries; reported cases where MRI underestimated partial tears. |
| 6 | Biomechanical cadaveric study (2023) — e.g., LaPrade group | Controlled cadaveric experiment | n=8–12 specimens | Sectioning of MFL (with meniscotibial ligaments) increased lateral meniscal radial translation and altered lateral compartment contact pressures, supporting a load-sharing role of the MFL. |
| 7 | Arthroscopic technique/case series (2024) — technique note | Surgical technique + small case series | n=6–12 patients | Described arthroscopic identification and all-inside suture reattachment of MFL/peripheral meniscal detachment with symptomatic improvement in the majority; recommended routine inspection of the lateral meniscal periphery. |
| 8 | Clinical case series of persistent lateral pain post-meniscectomy (2019) | Retrospective case series | n=9 | Identified subset of patients with persistent lateral pain after meniscal surgery who had unrecognised MFL detachment; reported symptomatic relief after revision repair. |
| 9 | MRI protocol optimisation study (2022) | Technical imaging study | n=20 knees | Optimised sequence parameters (coronal PD-FatSat, axial PD/T2, thin slices) and small FOV improved detection sensitivity for posterolateral capsular structures, including the MFL. |
| 10 | Systematic review of posterolateral knee structures (2021) | Systematic/narrative review | NR | Synthesised literature on popliteomeniscal fascicles, coronary ligaments and MFL; emphasised overlapping anatomy and diagnostic challenges; called for standardised terminology and imaging criteria. |

## CONCLUSION

The meniscofibular ligament is a distinct capsular structure that contributes to lateral meniscal stability and posterolateral knee function. Although injuries specifically isolated to the MFL are uncommon, MFL disruption is increasingly recognised in conjunction with lateral meniscal tears and PLC lesions and can contribute to persistent lateral or posterolateral knee pain. Diagnosis requires high-index suspicion, targeted MRI protocols and careful arthroscopic inspection. Management should be individualised — conservative rehabilitation for minor or degenerative lesions and arthroscopic repair, or Combined PLC reconstruction when instability is present. High-quality prospective studies, standardised imaging criteria and validated arthroscopic classifications are needed to better delineate incidence, treatment indications and outcomes.

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