

# A Case Report on the Hidden Lesion of the Knee: Ramp Lesion

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## Learning Point of the Article:

Ramp lesions are complex and challenging to diagnose due to their hidden nature in standard imaging procedures, necessitating advanced magnetic resonance imaging techniques or arthroscopic intervention for accurate detection.

## Abstract

**Introduction:** Ramp lesions, often associated with anterior cruciate ligament (ACL) injuries, exhibit a varied incidence rate of 9–42%, increasing with delayed ACL reconstruction. These lesions, resulting from abnormal tibial movements and semimembranosus muscle contraction, are challenging to diagnose due to their hidden nature in standard magnetic resonance imaging and arthroscopy procedures.

**Case Report:** This report examines the case of a ramp lesion in the context of a multi-ligament injured knee of a 34-year-old male. The patient had a complete ACL, medial collateral ligament, and avulsion of the posterior cruciate ligament with a type 1 ramp lesion. These findings were confirmed by arthroscopy and were treated with arthroscopic reconstruction of the ligament and all inside repair of the ramp lesion. We report the pertinent imaging findings relevant to the ramp lesions.

**Conclusion:** Ramp lesions present a significant diagnostic and treatment challenge in orthopedic practice. Enhanced imaging techniques and a deeper understanding of their pathophysiology are crucial for an accurate diagnosis.

**Keywords:** Ramp, hidden lesion, magnetic resonance imaging, arthroscopy.

## Introduction

The posteromedial knee ramp lesions, likened to ramps for their shape, have been known since 1983 but have gained recent attention due to their association with ACL injuries. These lesions, first termed “Ramp lesions” by Michael J. Strobel, involve the peripheral attachment of the posterior horn of the medial meniscus. For years, these injuries were often overlooked in magnetic resonance imaging (MRIs) and arthroscopies, primarily because standard MRI procedures, conducted with the knee fully extended, obscured the posteromedial space. In addition, specific examination techniques, like the trans-notch view and assessment of the medial meniscus posterior horn mobility, are necessary for their diagnosis, leading to them being

termed “hidden lesions.”

Their significance has risen in line with the quest to perfect ACL reconstructions, as ramp lesions affect both anterior and rotational knee stability. In the literature, ramp lesions are typically defined as longitudinal or oblique superior meniscocapsular junction tears or meniscotibial ligament tears, often <2 cm, and usually accompanying ACL tears. In this report, we present the imaging findings associated with a ramp tear in a young male with multiple ligamentous injuries to the knee.

## Case Report

Here, we report a 34-year-old male presented with knee injury

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## Author's Photo Gallery



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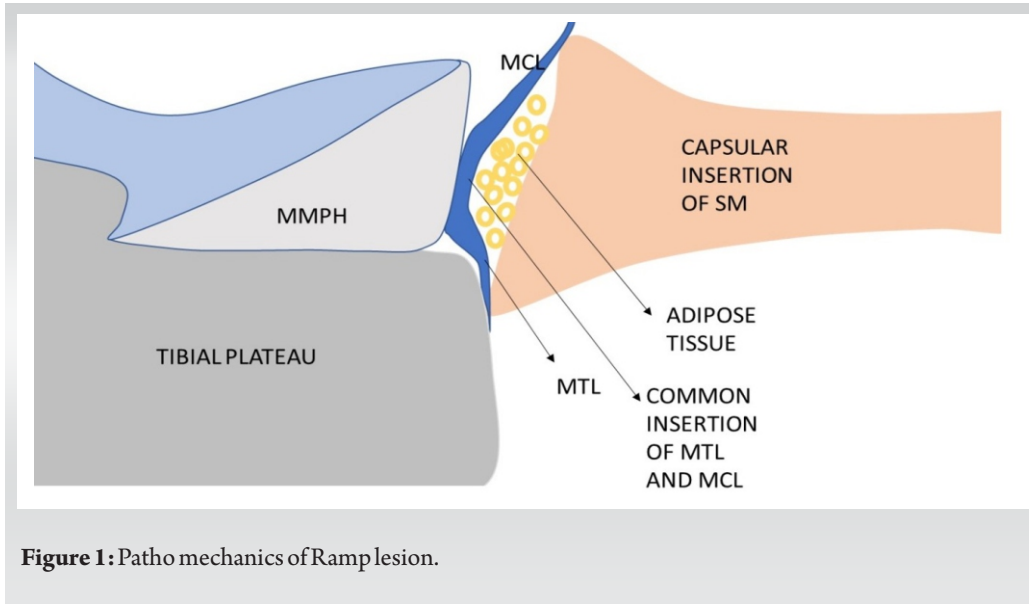
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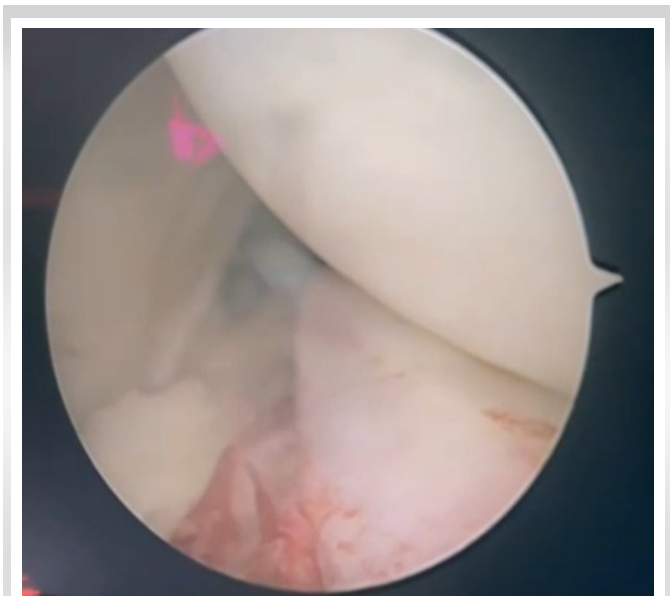
irregularity in the posterior margin of the menisco-capsular junction with fluid filling, and this could be attributed to the ramp lesion (Fig. 2). Subsequently, he was taken up for arthroscopic surgery, which confirmed the presence of a ramp tear (Fig. 3). The order of reconstruction was ACL reconstruction, medial and lateral meniscal repair, ramp repair, and finally, medial collateral ligament repair was performed. The PCL was left to conservative management.

**Figure 1:** Patho mechanics of Ramp lesion.

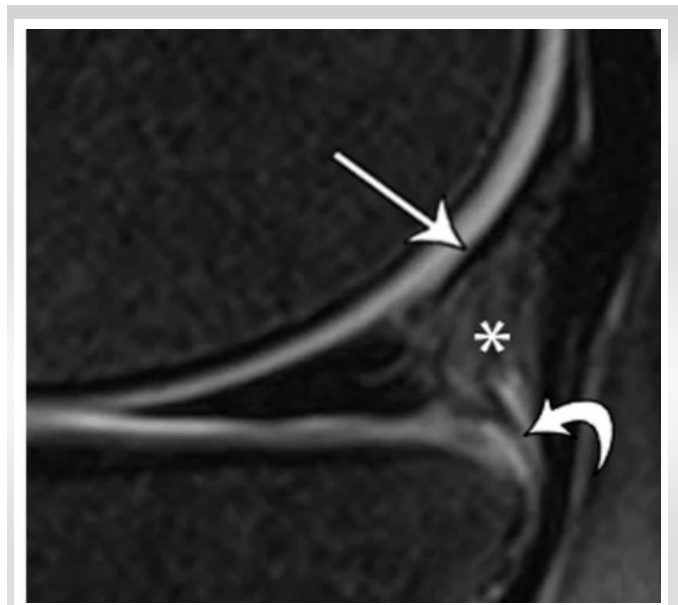
**Discussion**

following a collision injury with a moped. He was unable to weight bear and walk following the injury and was subjected to an imaging assessment after preliminary management of the acute knee injury. Plain radiographs of the knee were obtained and demonstrated an increased valgus opening, indicating a medial collateral ligament (MCL) injury (Fig. 1). On the MRI, complete disruption of the mid substance of the ACL and a minimally displaced posterior cruciate ligament injury were observed. The lateral collateral ligament was intact; however, the MCL was torn on the tibial side and found to be retracted. Regarding the menisci, the Lateral menisci had a complex posterior horn tear, and the medial meniscus had a horizontal cleavage tear of the posterior horn. Strikingly, there was an

Ramp lesions, often associated with ACL tears, vary in incidence from 9% to 42%, increasing when ACL reconstruction is delayed beyond 3 months. Jiang et al. [1] found 20 cases of ramp lesions without complete ACL tears, linked instead to ACL longitudinal splits, suggesting minimal anterior instability and semimembranosus contraction as potential causes (Fig. 1). The true prevalence of ramp lesions, either alone or with ACL tears, is unclear due to difficulties in detection through MRI and arthroscopy. Notably, their incidence is consistent across adult and pediatric populations, contrasting with the higher prevalence of other meniscal



**Figure 2:** Arthroscopic view of the posterior joint, depicting the ramp lesion (separated capsule from the posterior meniscal attachment).



**Figure 3:** T2 weighted magnetic resonance imaging demonstrating the posterior irregularity at the meniscocapsular junction.



	MRI findings pointing to the existence of a meniscal ramp lesion	MRI results indicating an absence of a meniscal ramp lesion
Primary findings	1. High T2 fluid signal intensity along the longitudinal, mediolateral, vertical, and/or oblique axes, extending anteriorly, inferiorly, or to both articular surfaces between the posterior horns of the medial meniscus and the posteromedial capsule.	1. Intact ACL.
	2. Meniscocapsular attachment defects, which manifest as a localised discontinuity or a step-like contour distortion in the back of the knee, are caused by irregularities along the posterior margin of the medial meniscus.	2. When the red-red zone in the medial meniscus's posterior horn and the meniscotibial ligaments are present, the posteromedial meniscocapsular attachment is regarded as complete.
	3. Perimeniscal fluid's posteromedial corner of the knee's signal strength.	3. Medial and lateral meniscus linear T2 rips that do not impact the meniscotibial ligaments or attachments or extend past the red-red zone.
	4. Soft tissue has grown between the medial meniscus and the medial collateral ligament.	
Secondary findings	1. Findings that indicate to simultaneous ACL damage: Tibial bone marrow edema with a posterior-medial distribution, consistent with a simultaneous contrecoup injury.	1. No evidence of an associated ACL damage was found.
	· Transchondral fracture is found	
	· The posterior cruciate ligament is harmed as a consequence of the lateral meniscus's back being exposed.	
	· Utilizing a single coronal image to visualise the fibular collateral ligament	
	· In relation to the lateral femoral condyle, the lateral tibial plateau grows forward.	
MRI: Magnetic Resonance imaging, ACL: Anterior cruciate ligament		

**Table 1: Summary of positive and negative findings for ramp lesions.**

injuries in younger age groups [2, 3].

Ramp lesions after an ACL tear are mainly due to excessive anterior tibia movement, causing semimembranosus muscle contraction and stressing the surrounding ligaments. This stress, coupled with the medial meniscus being compressed between the articular surfaces, leads to these lesions. They can also result from valgus injuries involving internal tibia rotation and axial loading or as a contrecoup injury from pivoting movements causing varus strain and femur rotation on the tibia, leading to meniscus trapping and tearing.

The sensitivity of 3.0-T MRI (83.3%) was superior to 1.5-T MRI (67.6%), according to Hatayama et al. [4]. Irregularity at the posterior margin and complete fluid filling were the most sensitive findings for detecting ramp lesions on MRI, according to Yeo et al. [5] and Laurens et al. [6]. Consecutive sagittal images serve to determine which regions of the meniscocapsular junction and posterior horn are torn. Axial images help to assess the mediolateral dimensions of the same lesions. Salient features on MRI [7] are detailed in Table 1.

Meniscal ramp lesions have no consented treatment at the

present time. Research has shown that ramp lesions in the context of acute ACLR may recover without surgical intervention if the surrounding biological conditions are appropriate. Some have suggested that ramp lesions should be surgically addressed rather than being let to heal on its own due to the hypermobility of the separated meniscocapsular component. There are data to suggest that individuals with similar longitudinal meniscal tear patterns who have ACLR without first having surgery may benefit from nonsurgical treatment. This is against the general view that ramp lesions should be addressed when there is chronic ACL insufficiency [8-10].

**Conclusion**

These lesions result from abnormal tibia movement and semimembranosus contraction, often undetected due to diagnostic challenges. They occur consistently across all age groups, unlike other meniscal injuries. Advanced MRI techniques offer improved detection, with specific imaging features aiding in their identification. Treatment approaches for



ramp lesions remain debated, with some cases responding to nonsurgical methods, particularly in acute ACLR contexts, while others advocate for surgical intervention, especially in chronic ACL insufficiency.

### Clinical Message

A suspicious irregularity in the posterior meniscocapsular junction should raise suspicion of ramp lesions, and it is imperative to confirm this during knee arthroscopy by probing the meniscocapsular junction posteriorly.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Conflict of interest:** Nil **Source of support:** None

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