

# Editorial Commentary: Ramp Lesion: The Eye Sees Only What the Mind Is Prepared to Comprehend



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**Abstract:** If our consciousness is not prepared, it is difficult to identify a ramp lesion on preoperative magnetic resonance imaging due to its low sensitivity. In clinical practice, the prevalence of ramp lesion in the anterior cruciate ligament (ACL)-injured knee can be up to 30%, with an increased frequency in chronic ACL injuries and in revision ACL. To identify the ramp lesion, routine arthroscopic exploration of the posteromedial portion of knee using a trans-notch view during ACL reconstruction therefore seems essential. A decrease in reoperation rate for secondary meniscectomy from 25% to 7% since 2013 was published by our department, after the adoption of a systematic repair through a posteromedial portal with a suture hook device for ramp lesions identified at the time of ACL reconstruction.

See related article on page 2921

I read with great interest and congratulate the authors of the recent study entitled “Examining Techniques for Treatment of Medial Meniscal Ramp Lesions During Anterior Cruciate Ligament Reconstruction: A Systematic Review”<sup>1</sup> by Acosta, Ravaei, Brown, and Mulcahey, predominantly because of the importance of the medial meniscus identified as the second stabilizer of the knee.<sup>2</sup> The topic is particularly relevant and interesting due to the ongoing debate regarding whether these lesions should be repaired and what is the best repair technique.

Reading this article refreshes my memories of the shock I experienced when I first heard Romain Seil’s talk on ramp lesions. At that time, I already had performed several thousand anterior cruciate ligament (ACL) reconstructions and therefore had considerable experience in repairing medial meniscus with the all-inside suture device and co-incidentally was also in charge of the French Arthroscopic Society symposium on meniscal repair concomitant to ACL reconstructions. My second shock came when I discovered that my own rate of

secondary meniscectomy after medial meniscus repair was 25% in a young population group, in whom we all understand the importance of preserving the meniscus to decrease the risk of developing osteoarthritis in mid-to long term.<sup>3</sup> The last eye-opener was when I visited my Korean friends Jin Goo Kim, Sang Hak Lee, Kyoung Ho Yoo, and Joon Ho Wang who, under the influence of their mentor, Jin Hwan Ahn, repaired all meniscal lesions with a hook and a polydioxanone suture for more than 20 years!<sup>4</sup> Their technical advancement is phenomenal, and I certainly encourage all those interested in meniscal preservation to visit them.

Quite incredibly, some of our colleagues still doubt the prevalence of ramp lesions concomitant to an ACL rupture and even more of their major role in the knee instability.<sup>5</sup> Indeed, “the eye sees only what the mind is prepared to comprehend!” Thus, once again, it is necessary to refresh in our minds that these ramp lesions are simply part of a posteromedial instability in association with an ACL rupture. It is interesting to note that these meniscocapsular lesions of the posterior horn of the medial meniscus were described in the last century, long before they were called ramp lesions.<sup>6-8</sup> Ramp lesions develop as a result of excessive forces directed through the posteromedial capsule during valgus strain and internal rotation of the tibia, and axial loading at the time of an ACL injury.<sup>9</sup> Many authors since Kaplan<sup>10</sup> in 1962 have reported the relationship between a lesion of the posterior horn of medial meniscus with active reflex contraction of the semimembranosus following the excessive anterior translation of the tibia during an ACL

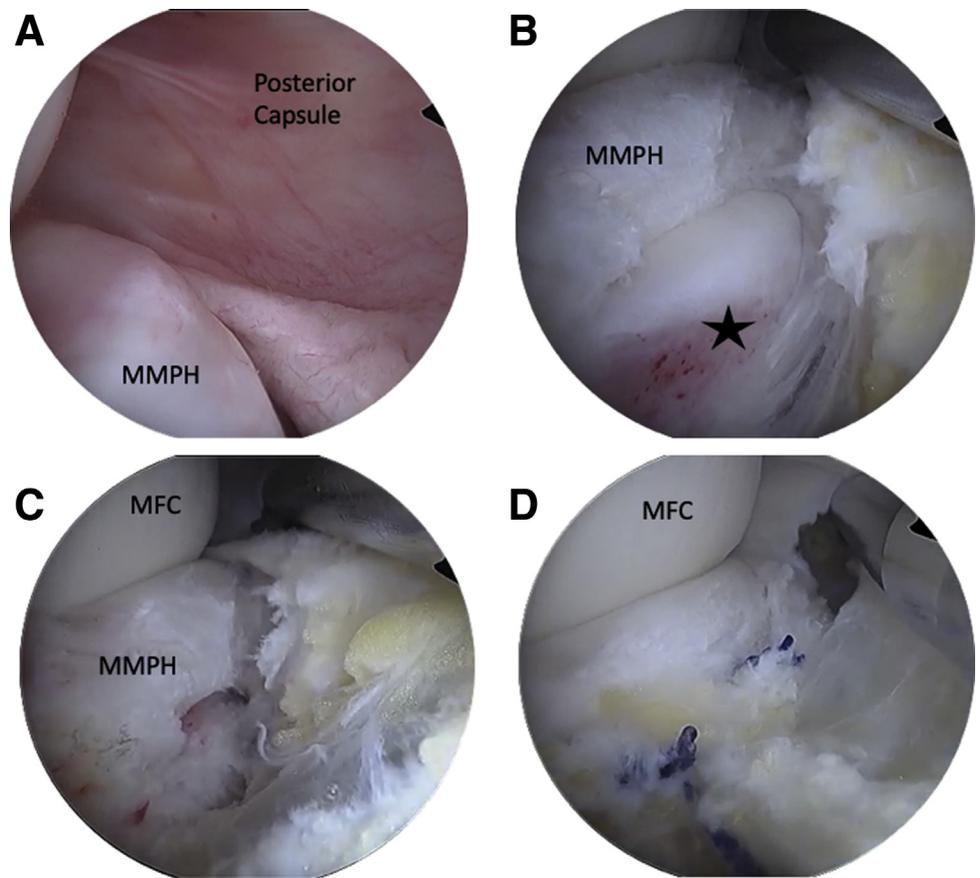
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**Fig 1.** Chronic ramp lesion (left knee). ACL graft rupture 2 years after an ACL reconstruction with a neglected chronic ramp lesion. Arthroscopic view showing the rotational instability in internal (B) and external rotation (C). (A) Transnotch view of the posteromedial compartment (anterolateral portal). (B) Transeptal view of the posteromedial compartment with the knee in internal rotation and medial tibial plateau exposed (black star). (C) Transeptal view of the posteromedial compartment with the knee in external rotation closing the ramp lesion. (D) Transeptal view of the medial compartment after ramp repair (B–D, Posterolateral portal). (ACL, anterior cruciate ligament; MFC, medial femoral condyle MMPH, medial meniscus posterior horn.)



rupture.<sup>11-17</sup> In this regard, we have just finished a gross and microscopic analysis of the posteromedial aspect of the knee and confirmed a capsular branch of the semimembranosus tendon insertion behind the posterior horn of the medial meniscus. Moreover, our analysis also revealed that the meniscotibial ligament insertion differs from that previously described in the literature. This finding emphasizes the major biomechanical consequences of ramp lesions on the knee and could explain the variable success and failures of the different ramp repair techniques proposed. It also potentially explores the reason for the failure of spontaneous healing of ramp lesions.<sup>18-20</sup>

In clinical practice, the rate of ramp lesions in ACL-injured knees has been reported to vary between 10% and 30%<sup>21-24</sup> with an increased frequency in chronic ACL injuries and in revision ACL reconstruction.<sup>21-25</sup> These findings contribute to the hypothesis that ramp lesions do not heal spontaneously and also raises questions about whether it is the failed graft that leads to a new ramp lesion or vice versa. Thus, I would again like to press upon the readers the importance of systematic exploration of the posteromedial compartment of the knee during arthroscopic ACL reconstruction (Fig 1), even if the initial probing from anterior of the posterior horn of the medial meniscus is normal. This addition to

your arthroscopic examination will definitely make your mind aware of the true prevalence of ramp lesions.<sup>26,27</sup>

A lack of consensus remains on whether ramp lesions should be repaired and what is the best technique. The present systematic review aims to evaluate clinical outcomes and adverse events of different published techniques of ramp lesion repair performed in conjunction with ACL reconstruction.<sup>1</sup> One of the limitations of this very well-conducted systematic review is that it included the studies that reported on the clinical outcomes of surgical repair of ramp lesions using ACL scores (International Knee Documentation Committee, Lysholm). This excluded important studies without ACL scores, which evaluated meniscal repair failure rate and secondary meniscectomy after repair of ramp lesions.<sup>23,24,28</sup> Moreover, the incidence of secondary meniscectomy after ramp repair was only evaluated up to 2 years postoperatively; we feel this is insufficient time for follow-up, as we have shown that the failure of repaired meniscus continues up to 4 years.<sup>3,23,28</sup> The systematic review showed incomplete healing of ramp lesions in 12.1% to 12.9% of cases in which the tear was not repaired at the time of ACL reconstruction, 2.3% to 11.7% in cases using the suture-hook for repair, and 10.8% to 15% in the

all-inside meniscus repair device group. One randomized controlled trial also compared ramp repair versus abrasion and trephination of ramp lesion.<sup>29</sup> In this study, all ramp lesions were stable, measured 1.5 cm, and were treated surgically at the time of ACL reconstruction. The authors demonstrated no significant differences in subjective scores, knee stability, and meniscal healing status on magnetic resonance imaging between the ramp repair and abrasion and trephination group.<sup>29</sup> It is our opinion that if a posteromedial portal is being created for abrasion and trephination, then it is logical to also repair the ramp lesion. This view is supported by the recent study by Hatayama et al.,<sup>30</sup> who compared the postoperative outcomes for ramp lesions between patients treated with all-inside repair through the posteromedial portal and those whose ramp lesions were left in situ without repair during ACL reconstruction. The authors found that healing rates of ramp lesions were significantly better in the repaired group than in the non-repaired group. Ten of 25 stable ramp lesions (40%) were not healed on postoperative magnetic resonance imaging scans. They also found that anterior laxity was significantly greater in the knees with unhealed ramp lesions compared with the knees in which the ramp lesions had healed.<sup>30</sup> DePhillipo et al.<sup>24</sup> have shown that patients with combined ACL tear and ramp lesions have increased preoperative knee anteroposterior and rotational knee laxity, as demonstrated by grade 3 Lachman (44% vs 6%) and pivot-shift (38% vs 12%) tests when compared with ACL tear group without ramp lesion ( $P \leq .005$  for both). Thus, it makes more sense to repair the ramp lesion to restore the physiological knee stability and kinematics.

The repair of the ramp lesion not only restores the continuity between the posterior horn of the medial meniscus and the capsule but also reinstates the combined function of the posteromedial structures (posterior horn of the medial meniscus and meniscotibial ligament) in controlling the translation and external rotation of the tibia. Repair of ramp lesion is technically challenging, particularly for an exclusive knee surgeon, but these skills can be easily acquired after training with a suture hook device through a posteromedial portal. This approach allows the surgeon to sufficiently debride the ramp lesion to promote better healing and also enables the surgeon to mobilize and retrieve the meniscotibial ligament, which has often fallen down behind the tibia, particularly in chronic cases of ramp lesion, as illustrated in the images (Fig 1). Long-term good results with this approach have been demonstrated by our Korean colleagues.<sup>4</sup>

Finally, in their systematic review, the authors concluded that “prospective randomized trials are needed to determine the best management for meniscal RAMP lesions.” Personally, we have reported a decrease in the reoperation rate for secondary

meniscectomy from 25%<sup>3</sup> to 7%<sup>23</sup> at mean follow-up of 5 years for all types of medial meniscus repairs since 2013,<sup>3,23</sup> after the adoption of a systematic repair through a posteromedial portal with a suture hook device for ramp lesions identified at the time of ACL reconstruction. We attributed this finding to improved knee kinematics and stability following ramp repair. Thus, we are convinced of the benefits of ramp repair and we do not feel comfortable to consider such a randomized study for our patients. However, instead we encourage all our colleagues to analyze the success rate of their meniscal repairs particularly for ramp lesions. Once again, we congratulate the authors for their important systematic review and welcome further discussion regarding ramp lesions.

## References

1. Acosta J, Ravaei S, Brown SM, Mulcahey MK. Examining techniques for treatment of medial meniscal ramp lesions during anterior cruciate ligament reconstruction: A systematic review. *Arthroscopy* 2020;36:2921-2933.
2. Allen CR, Wong EK, Livesay GA, Sakane M, Fu FH, Woo SL. Importance of the medial meniscus in the anterior cruciate ligament-deficient knee. *J Orthop Res* 2000;18:109-115.
3. Rochcongar G, Cucurulo T, Ameline T, et al. Meniscal survival rate after anterior cruciate ligament reconstruction. *Orthop Traumatol Surg Res* 2015;101:S323-S326 (8 suppl).
4. Ahn JH, Kim S-H, Yoo JC, Wang JH. All-inside suture technique using two posteromedial portals in a medial meniscus posterior horn tear. *Arthroscopy* 2004;20:101-108.
5. Naendrup JH, Pfeiffer TR, Chan C, et al. Effect of meniscal ramp lesion repair on knee kinematics, bony contact forces, and in situ forces in the anterior cruciate ligament. *Am J Sports Med* 2019;47:3195-3202.
6. Strobel M. *Manual of arthroscopic surgery*. New York: Springer, 1988;171-178.
7. Hughston JC, Eilers AF. The role of the posterior oblique ligament in repairs of acute medial (collateral) ligament tears of the knee. *J Bone Joint Surg Am* 1973;55:923-940.
8. Hamberg P, Gillquist J, Lysholm J. Suture of new and old peripheral meniscus tears. *J Bone Joint Surg Am* 1983;65:193-197.
9. LaPrade RF, Arendt EA, Getgood A, Faucett SC. *The menisci: A comprehensive review of their anatomy, biomechanical function and surgical treatment*. Berlin: Springer, 2017.
10. Kaplan EB. Some aspects of functional anatomy of the human knee joint. *Clin Orthop* 1962;23:18-29.
11. Muller W. *The knee*. Berlin: Springer-Verlag, 1982.
12. Hughston JC. *Knee ligaments: Injury and repair*. Saint Louis, MO: Mosby, 1993.
13. Sims WF, Jacobson KE. The posteromedial corner of the knee medial-sided injury patterns revisited. *Am J Sports Med* 2004;32:337-345.
14. Smith JP, Barrett GR. Medial and lateral meniscal tear patterns in anterior cruciate ligament-deficient knees: a prospective analysis of 575 tears. *Am J Sports Med* 2001;29:415-419.

15. DePhillipo NN, Moatshe G, Chahla J, et al. Quantitative and qualitative assessment of the posterior medial meniscus anatomy: defining meniscal ramp lesions. *Am J Sports Med* 2019;47:372-378.
16. Sonnery-Cottet B, Serra Cruz R, Vieira TD, Goes RA, Saithna A. Ramp lesions: An unrecognized posteromedial instability? *Clin Sports Med* 2020;39:69-81.
17. Yoon KH, Yoo JH, Kim K-I. Bone contusion and associated meniscal and medial collateral ligament injury in patients with anterior cruciate ligament rupture. *J Bone Joint Surg Am* 2011;93:1510-1518.
18. Peltier A, Lording T, Maubisson L, Ballis R, Neyret P, Lustig S. The role of the meniscotibial ligament in posteromedial rotational knee stability. *Knee Surg Sports Traumatol Arthrosc* 2015;23:2967-2973.
19. Stephen JM, Halewood C, Kittl C, Bollen SR, Williams A, Amis AA. Posteromedial meniscocapsular lesions increase tibiofemoral joint laxity with anterior cruciate ligament deficiency, and their repair reduces laxity. *Am J Sports Med* 2016;44:400-408.
20. DePhillipo NN, Moatshe G, Brady A, et al. Effect of meniscocapsular and meniscotibial lesions in ACL-deficient and ACL-reconstructed knees: A biomechanical study. *Am J Sports Med* 2018;46:2422-2431.
21. Liu X, Feng H, Zhang H, Hong L, Wang XS, Zhang J. Arthroscopic prevalence of ramp lesion in 868 patients with anterior cruciate ligament injury. *Am J Sports Med* 2011;39:832-837.
22. Seil R, Mouton C, Coquay J, et al. Ramp lesions associated with ACL injuries are more likely to be present in contact injuries and complete ACL tears. *Knee Surg Sports Traumatol Arthrosc* 2018;26:1080-1085.
23. Sonnery-Cottet B, Praz C, Rosenstiel N, et al. Epidemiological evaluation of meniscal ramp lesions in 3214 anterior cruciate ligament-injured knees from the SANTI Study Group database: A risk factor analysis and study of secondary meniscectomy rates following 769 ramp repairs. *Am J Sports Med* 2018;46:3189-3197.
24. DePhillipo NN, Dornan GJ, Dekker TJ, Aman ZS, Engebretsen L, LaPrade RF. Clinical characteristics and outcomes after primary ACL reconstruction and meniscus ramp repair. *Orthop J Sports Med* 2020;8:2325967120912427.
25. Kim SH, Seo HJ, Seo DW, Kim KI, Lee SH. Analysis of risk factors for ramp lesions associated with anterior cruciate ligament injury. *Am J Sports Med* 2020;48:1673-1681.
26. DePhillipo NN, Cinque ME, Chahla J, Geeslin AG, Engebretsen L, LaPrade RF. Incidence and detection of meniscal ramp lesions on magnetic resonance imaging in patients with anterior cruciate ligament reconstruction. *Am J Sports Med* 2017;45:2233-2237.
27. Sonnery-Cottet B, Conteduca J, Thaunat M, Gunepin FX, Seil R. Hidden lesions of the posterior horn of the medial meniscus: A systematic arthroscopic exploration of the concealed portion of the knee. *Am J Sports Med* 2014;42:921-926.
28. Sonnery-Cottet B, Saithna A, Blakeney WG, et al. Anterolateral ligament reconstruction protects the repaired medial meniscus: A comparative study of 383 anterior cruciate ligament reconstructions from the SANTI Study Group with a minimum follow-up of 2 years. *Am J Sports Med* 2018;46:1819-1826.
29. Liu X, Zhang H, Feng H, Hong L, Wang XS, Song GY. Is it necessary to repair stable ramp lesions of the medial meniscus during anterior cruciate ligament reconstruction? A prospective randomized controlled trial. *Am J Sports Med* 2017;45:1004-1011.
30. Hatayama K, Terauchi M, Saito K, Takase R, Higuchi H. Healing status of meniscal ramp lesion affects anterior knee stability after ACL reconstruction. *Orthop J Sports Med* 2020;8:2325967120917674.