

**Posterior displacement of the detached
meniscocapsular ligament of ramp lesion in ACL injured
knee observed on MRI in flexed knee position is
associated with greater preoperative anterior knee laxity**

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Financial Disclosure Statement

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I have no financial conflicts to disclose.

Background

- Ramp lesion:

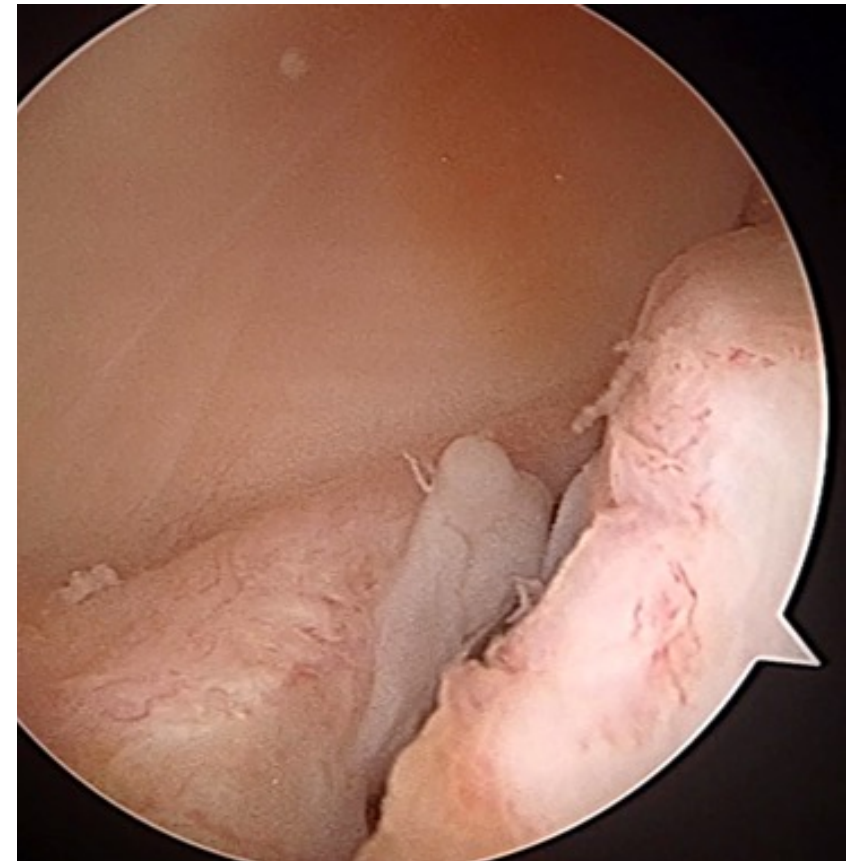
Longitudinal peripheral tear of the highly vascular zone of medial meniscus posterior horn (MMPH) in ACL injured knee.

³⁾Thaunat et al. AJSM. 2021

In ramp lesion, the posterior meniscocapsular structure (PMS) displaces posteriorly and distally during knee flexion on arthroscopy.

¹⁾Bollen et al. JBJS Br. 2010

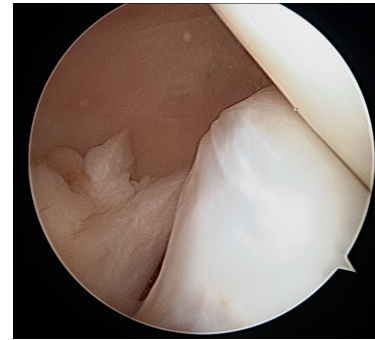
There have been no report graphically evaluating the instability of ramp lesion in knee flexion position.



Purpose

- To confirm displacement of PMS in ramp lesion on MRI at knee flexion position
- To clarify whether this displacement on MRI is related to anterior knee translation (ATT) and/or other factors.

Hypothesis



What does it look like on MRI at knee flexion ?

- The displacement gap of PMS in ramp lesion can be observed and quantitatively evaluated on MRI in a flexed knee position.
- This displacement contribute to greater anterior knee laxity.

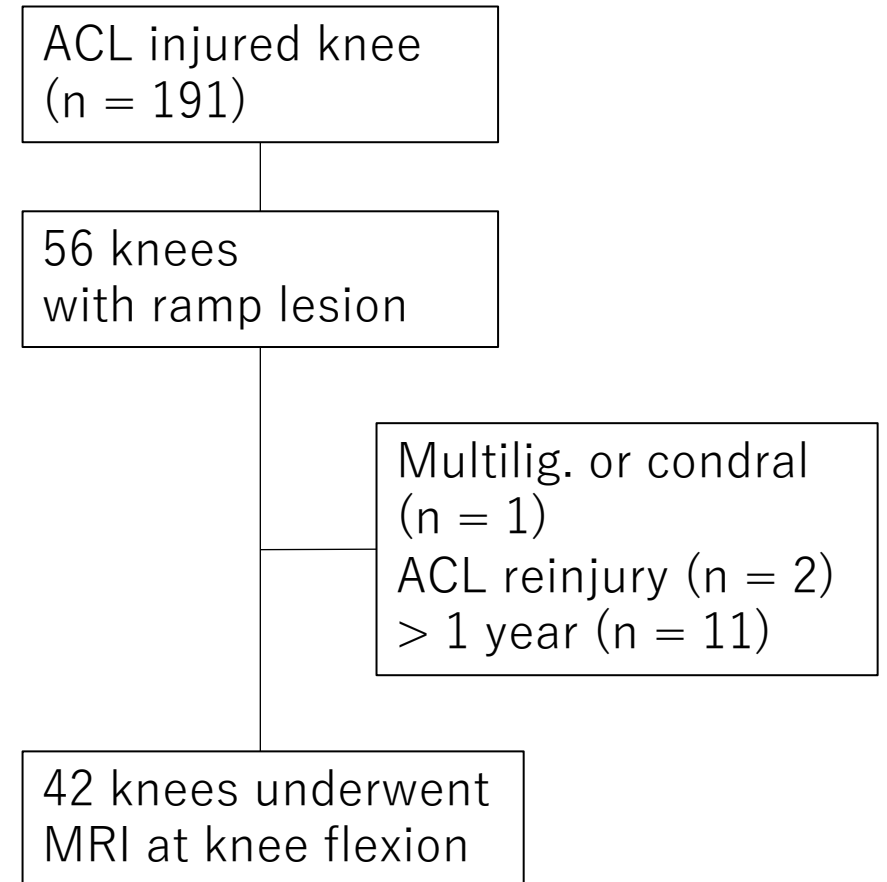
Study participants

- August 2018 ~ January 2023.
- 56 of 191 ACL injured knees had ramp lesion

Exclusion:

- Multiligamentous injury or chondral lesion
- ACL reinjury
- More than 1 year passed after injury

42 knees were included.



Measurement

3T-MRI at knee flexion (sagittal view)

- Flexion angle (°)
- Gap in ramp lesion (the largest distance between MMPH to PMS; mm)
- Joint effusion (Area of the largest joint fluid of posterior recess; mm²)

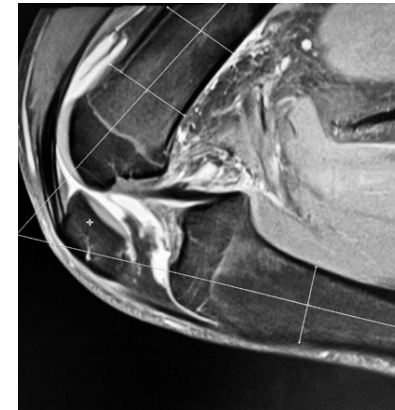
Anterior drawer stress radiographs (Teros SE 2000)

- Side-to-side difference (SSD) in anterior tibial translation (ATT) (mm)

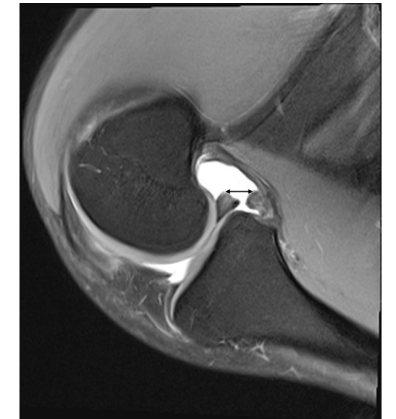
Arthroscopy during ACL reconstruction

- Ramp lesion classification (Thaunat classification)
- Size of ramp lesion (mm)

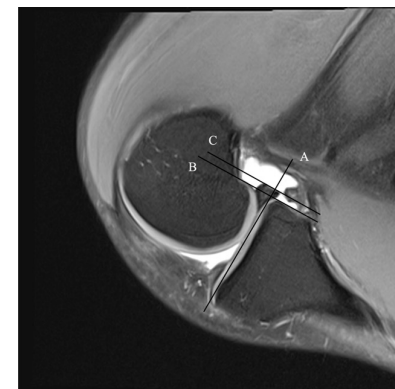
Flexion angle



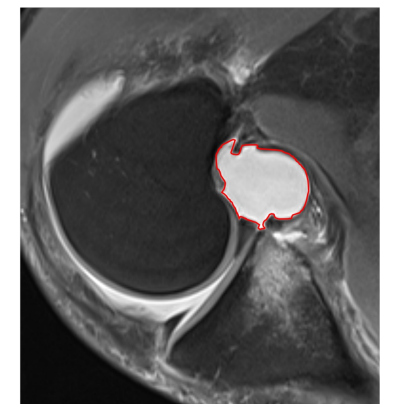
Gap of ramp lesion



Position of MMPH

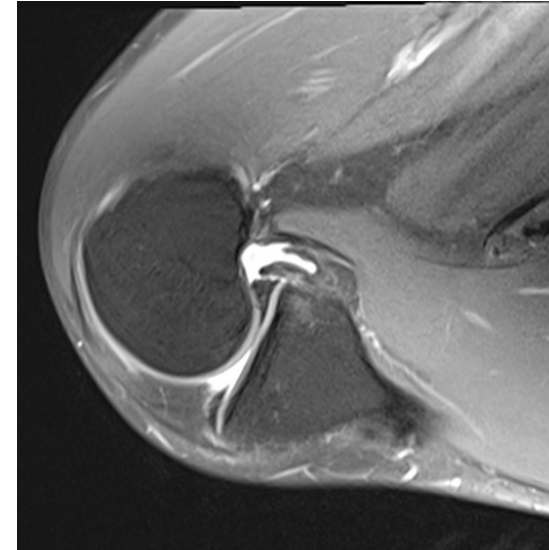


Area of joint effusion



Comparison & Analysis

- A gap distance ≥ 1 mm : gap-positive group (G+), < 1 mm : gap-negative group (G-)



Each measurement was compared between two groups.

**Student's unpaired t-test, Mann-Whitney U-test, Chi-square test or Fisher's exact test was used.*

p < 0.05 as significant

Result: demographic data

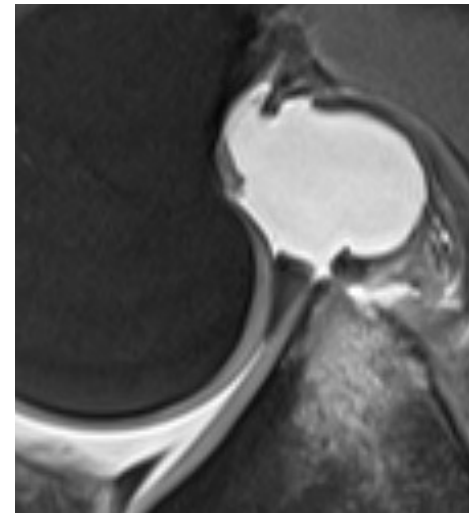
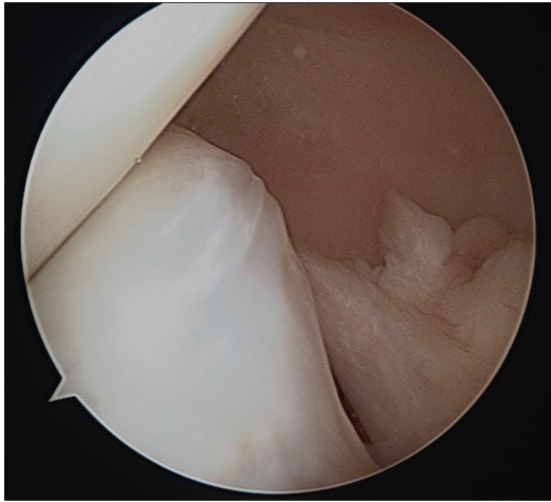
| | Gap-positive (n = 25) | Gap-negative (n = 17) | p value |
|------------------------|-----------------------|-----------------------|---------|
| Age, years | 25.2 ± 10.9 | 25.0 ± 9.6 | .964 |
| Sex | | | .348 |
| Male | 16 | 8 | |
| Female | 9 | 9 | |
| BMI, kg/m ² | 24.2 ± 2.3 | 23.8 ± 3.9 | .743 |
| Time from injury, days | 74.3 ± 63.9 | 81.2 ± 102.0 | .929 |

Comparison of measurement

| | Gap-positive (25) | Gap-negative (17) | p value |
|---|--------------------|-------------------|---------|
| Thaunat classification | | | |
| Subtype 1/2/3/4/5, n | 14 / 3 / 2 / 2 / 4 | 9 / 0 / 6 / 1 / 1 | |
| Ramp lesion length, mm | 15.8 ± 5.0 | 11.2 ± 3.6 | .001 |
| Area of Joint effusion, mm ² | 174.1 ± 103.8 | 49.5 ± 55.2 | <.001 |
| SSD in ATT, mm | 9.4 ± 3.7 | 5.1 ± 2.9 | <.001 |

Discussion

- This study is the **first** to demonstrate **instability of the detached PMS in ramp lesions** using MRI in a flexed knee position.



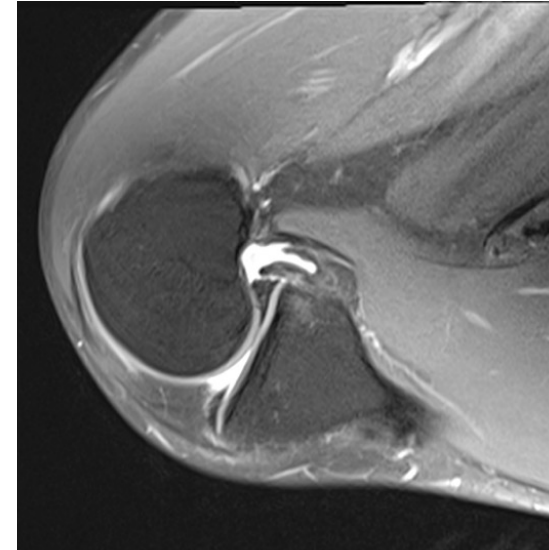
MRI in knee flexion may be useful for confirming presence of instability of ramp lesion.

Discussion

- Gap in ramp lesion ≥ 1 mm was associated with ATT, size of lamp lesion, joint effusion.



- Contrary to the report of Liu et al.²⁾, it was considered to need to suture for reducing stress of ACL graft in presence of ramp instability.



- It may be necessary to restrict knee flexion until joint effusion decreases if not repair.

Conclusion

- Twenty-five of 42 knees with ramp lesions were observed to have ramp lesion **gaps >1 mm** on MRI at 120° of knee flexion.
- Lesion gap was associated with **greater anterior knee laxity, ramp lesion size, and joint effusion.**
- These results may be one factor supporting that unstable ramp lesions need to be treated.
- The necessity for suture repair of ramp lesions should be judged by lesion size as well as the instability of the PMS in knee flexion to avoid residual knee instability.

Reference

- 1) Bollen SR. Posteromedial meniscocapsular injury associated with rupture of the anterior cruciate ligament: A previously unrecognized association. *J Bone Joint Surg Br.* 2010;92(2):222-223.
- 2) Liu X, Zhang H, Feng H, 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(5):1004-1011.
- 3) Thaunat M, Ingale P, Penet A, et al. Ramp Lesion Subtypes Prevalence, Imaging, and Arthroscopic Findings in 2156 Anterior Cruciate Ligament Reconstructions. *Am J Sports Med.* 2021;49(7):1813-1821.