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Is MRI sensitive in diagnosing medial meniscus RAMP lesion tears after ACL injury?

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Faculty Disclosure Information

- Nothing to disclose

Background

- Ramp lesions of the medial meniscus are frequently associated with anterior cruciate ligament (ACL) injuries. However, these lesions may be **missed on preoperative MRI**, leading to **false-negative findings**.
- Failure to identify and repair ramp lesions during ACL reconstruction may **compromise surgical outcomes** and contribute to **persistent knee instability**.
- To improve detection, **many authors advocate for routine use of the posteromedial (PM) portal** during arthroscopic ACL reconstruction, allowing for direct visualization and treatment of such lesions.

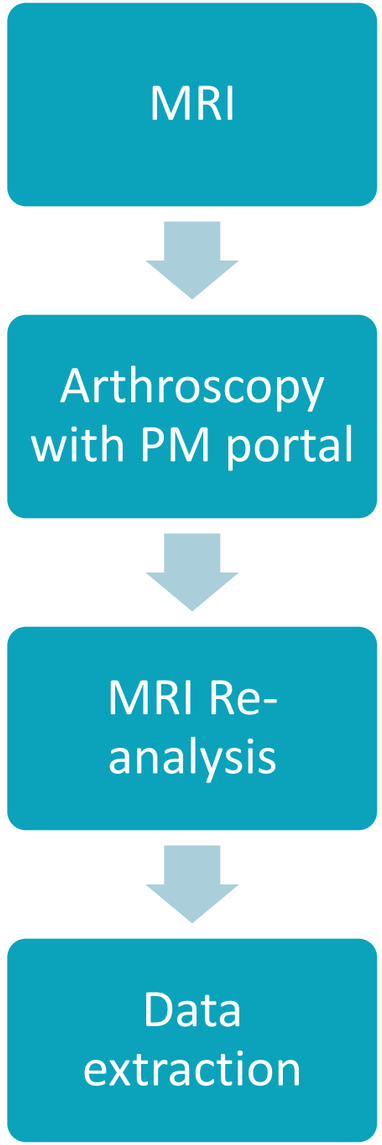
AIM - Can a donut of truth ever lie?

- To retrospectively assess sensitivity and specificity of MR imaging in diagnosing RAMP lesion compared to arthroscopy as a golden standard.

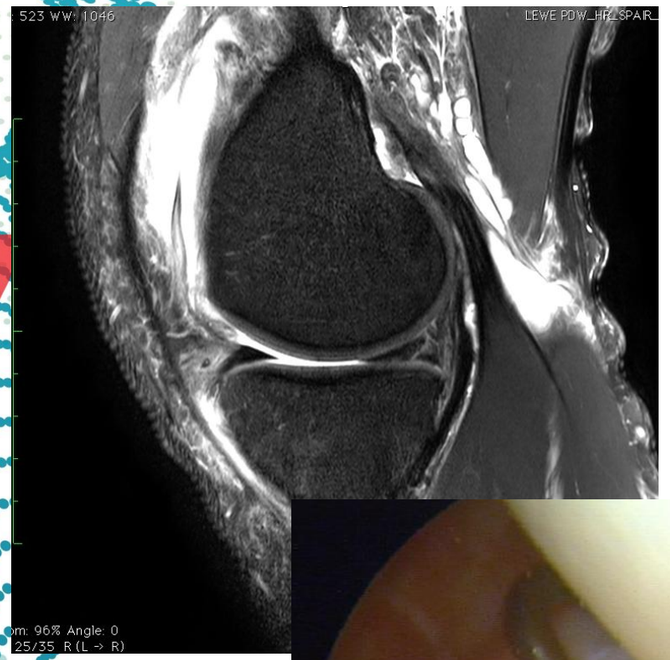
MRI	Arthroscopy
Non-invasive imaging modality	Direct intraoperative visualization
Sensitivity / Specificity assessed	Reference method

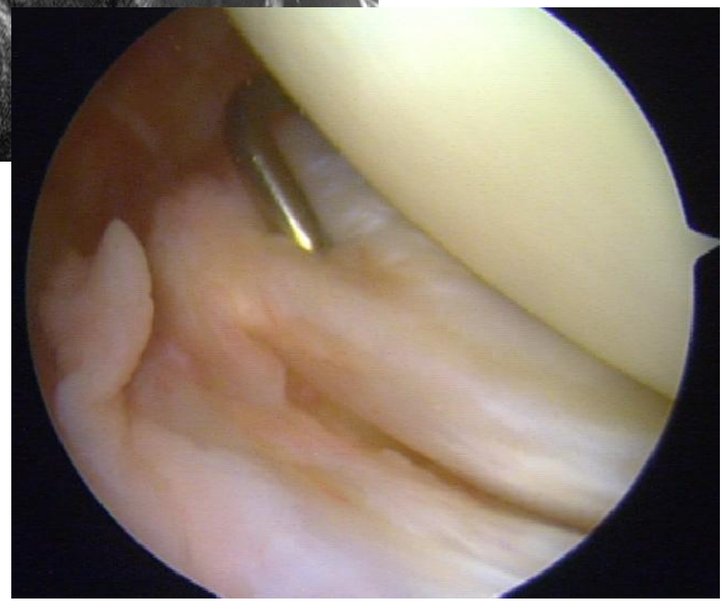
Material

- Between 2021 and 2023, 100 patients diagnosed with anterior cruciate ligament (ACL) tears on MRI were admitted to our clinic and underwent arthroscopic ACL reconstruction.
- Before the surgery knee MRI scans were analysed by two senior orthopedic surgeons (AM, MW).



Methods



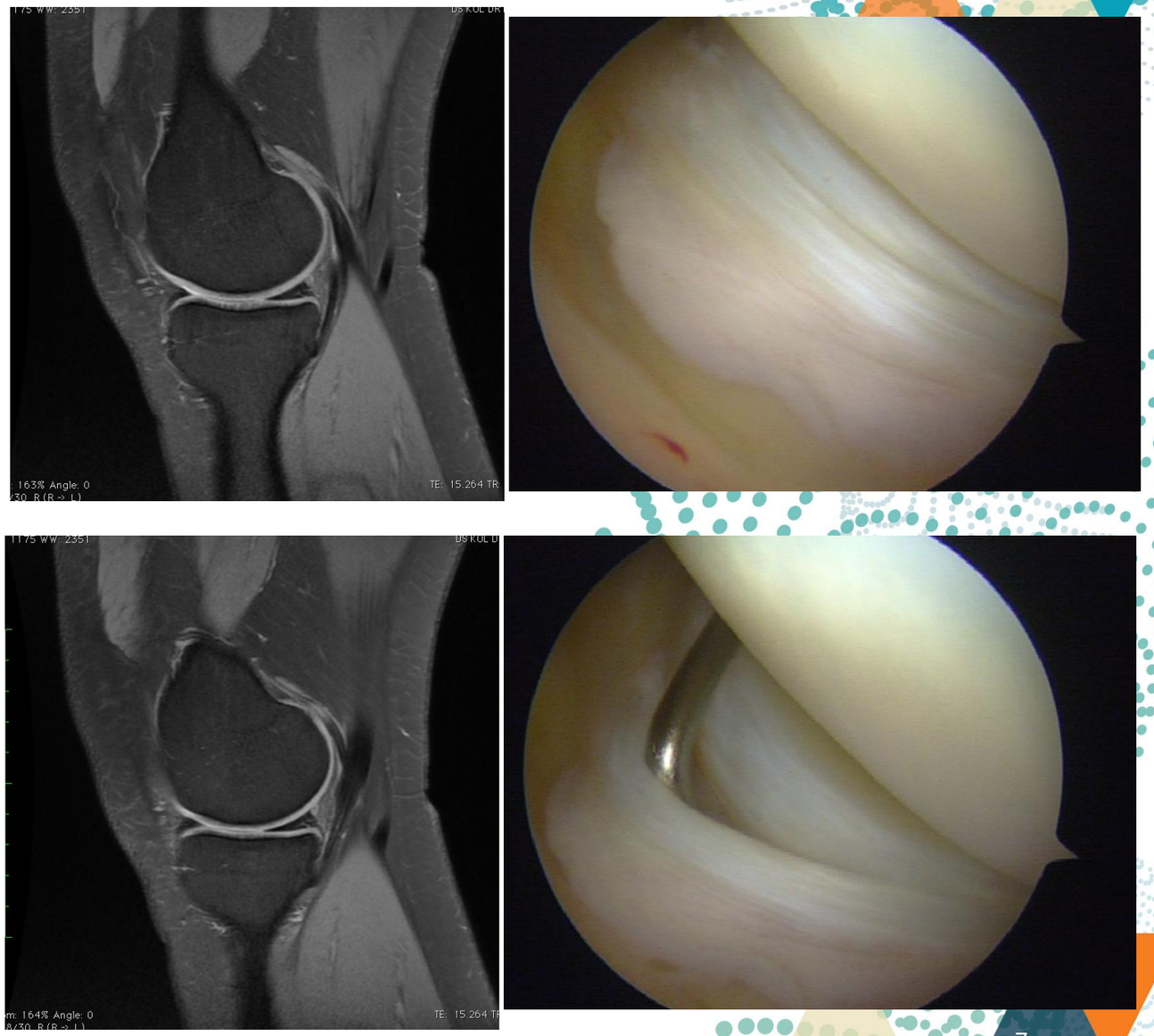


MR and corresponding arthroscopic image of the ramp lesion in the left knee

- As part of our standard surgical protocol, a posteromedial (PM) portal was routinely established in each case to assess the presence of a RAMP lesion.
- If a RAMP lesion was identified intraoperatively, it was sutured and documented in the surgical report.

Results

- **RAMP lesions** were identified in **20 out of 100 knees** (20%) during arthroscopic ACL reconstruction using an additional posteromedial (PM) portal.
- In these cases, the **preoperative MRI scans were retrospectively reanalyzed**. The lesions were detectable in **14 cases**, while in **6 cases** they remained **undetectable** on MRI.



False Negative MRI and corresponding arthroscopic image

Results

	Ramp Lesion Present (+)	Ramp Lesion Absent (-)	Total
MRI Postive	14	0	14
MRI Negative	6	80	86
Total	20	80	

70% = 14/20 = **Sensitivity**

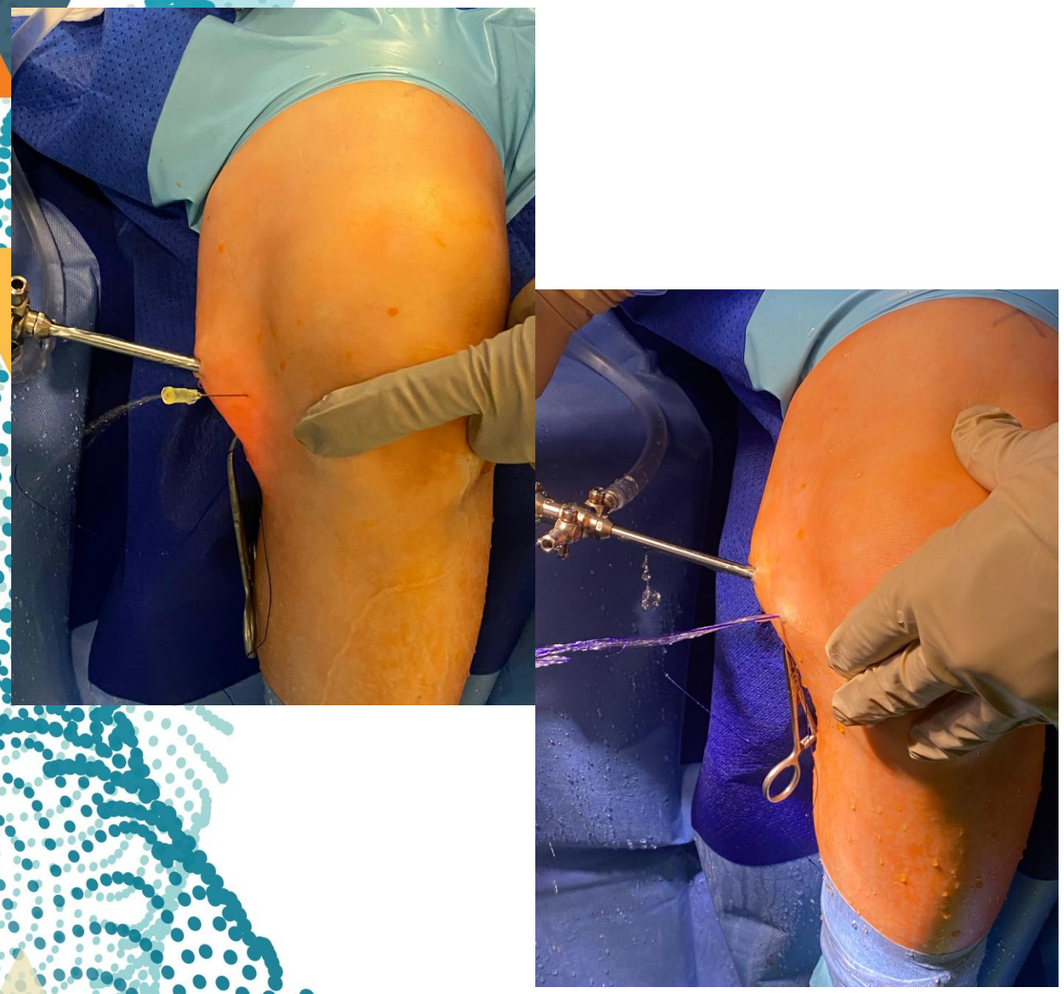
Specificity = 80/80 = 100%

Discussion

- In our cohort, when a **RAMP tear was visible** on MRI **it was consistently a true lesion** (absence of false positives; high; 100% specificity). The **missed 30% of tears** being false negative, highlight that a normal **MRI does not reliably exclude a RAMP lesion** (moderate; 70% sensitivity).
- Our findings align well with contemporary literature on RAMP lesion detection. A comprehensive 2024 meta-analysis evaluating 21 diagnostic performance comparisons from 19 studies with 2,149 patients reported:
  - **sensitivity** of 0.70 (95% CI, 0.66-0.73)
  - **specificity** of 0.88 (95% CI, 0.86-0.89)

  for MRI in diagnosing ramp lesions. [1]
- Reported incidence rates range around **15–20%** of ACL tears, and some series have found even higher rates when thorough arthroscopic inspection is performed. [2]

Discussion



- A notable limitation of our study is its retrospective design and modest sample size.
- Future research should focus on developing specialized MRI protocols to enhance RAMP lesion detection.
- Direct visualization of medial meniscus during arthroscopy should involve RAMP inspection with PM portal.

Conclusion

- **Routine posteromedial (PM) portal assessment** of the medial meniscus during ACL reconstruction is **strongly recommended for accurate diagnosing and treatment RAMP lesions** during ACL reconstruction, as it significantly improves intraoperative detection of ramp lesions.

Bibliography

- [1] Moteshakereh SM, Zarei H, Nosratpour M, Zaker Moshfegh M, Shirvani P, Mirahmadi A, Mahdavi M, Minaei Noshahr R, Farrokhi M, Kazemi SM. Evaluating the Diagnostic Performance of MRI for Identification of Meniscal Ramp Lesions in ACL-Deficient Knees: A Systematic Review and Meta-Analysis. J Bone Joint Surg Am. 2024 Jun 19;106(12):1117-1127. doi: 10.2106/JBJS.23.00501. Epub 2024 Apr 9. PMID: 38595146.
- [2] Taneja, A.K., Miranda, F.C., Rosemberg, L.A. *et al.* Meniscal ramp lesions: an illustrated review. *Insights Imaging* **12**, 134 (2021). https://doi.org/10.1186/s13244-021-01080-9

Thank You for Your time!

Take-home: MRI alone is not sufficient — intraoperative PM evaluation is essential.

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