



# Short-Term Outcomes of Meniscus Repair are Not Clinically Worse than Arthroscopic Partial Meniscectomy: A Retrospective Cohort Study of 219 Patients

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# Conflicts of Interest

The authors declare no conflict of interest.

# Introduction

- ACL injuries and meniscus injuries occur together frequently, with up to 61% of ACL injuries occurring with a meniscus injury.<sup>1</sup>
- Many orthopaedic surgeons will have to address both issues concurrently
- However, current literature shows differing results when comparing short-term outcomes of meniscus repair (MR) and arthroscopic partial meniscectomy (APM) concurrent to ACL reconstruction (ACLR).<sup>2,3,4,5</sup>

## Aims

1. Evaluate the short-term outcomes of ACLR+MR and ACLR+APM at 2-year follow-up
2. Compare MR and APM groups to see if there is a statistically and clinically significantly better improvement in one group over the other

# Clinical Significance → MCID

- Minimally clinically important difference (MCID), is defined as the **smallest difference before and after a procedure** that the patient perceives as beneficial in a patient reported outcome measure (PROM).<sup>6</sup>
- The MCID accounts for the subjective experiences of individual patients. Using both clinical and statistical significance allows us to evaluate procedures more holistically.
- MCID was implemented using Lysholm Score and Knee Osteoarthritis Outcome Score (KOOS) collected in this study
- MCID threshold values were taken from a local study from the same institution with similar population, and was calculated using distribution method, which is  $\frac{1}{2}$  of the standard deviation, as recommended by Engel et al.<sup>7</sup>

Table 1: MCID Values Used In This Study

Score	MCID Values	
	MR	APM
Lysholm score	9.73	9.23
KOOS Symptoms	10.86	9.41
KOOS Pain	9.98	8.18
KOOS ADL	9.21	8.40
KOOS Sports	17.54	15.91
KOOS QoL	15.63	15.13

# How we implemented MCID

**Aim 1**: Evaluation of 2-year outcomes of both procedures → Determined through percentage population that achieves MCID<sup>8</sup>

**Aim 2**: Comparison of MR vs APM outcomes → Determined through comparing the percentage population that achieves MCID in both groups<sup>9</sup>

**Conclusions:** This study shows an increasing trend in the use of clinically significant outcome metrics, such as MCID, for interpretation of patient-reported outcomes; however, these individual metrics are often not being used on the individual level and subsequently not reported accurately. We recommend determining whether the specific metric met the threshold per individual patient and then reporting those as a percentage of the sample population to achieve the full potential of these metrics and translate them accurately across various studies.

## The MCID Can be Used as a Basis for Planning Studies

This is not so much a misconception as a potential caveat. Before the current work, a compendium of outcome scores was assembled by Katz et al. [11], who reviewed painful orthopaedic conditions. They found, as we have, that there is a range of MCIDs for the same condition, and that some scores depend on the initial condition of the patient. Their concern was that averaging across groups could be misleading, if only a few patients change substantially, and most patients change only slightly, if at all. They recommended that in clinical trials comparing two treatments, studies should compare the percentages of patients achieving the MCID.

# Methodology

- Retrospective study involving a consecutive series of patients from a tertiary hospital between 2009 and 2022
- Surgeries were performed by surgeons of at least Associate Consultant level
- Statistical significance ( $p < 0.05$ ) was determined through Wilcoxon signed-rank test and Mann-Whitney U test
- Clinical significance was measured through the MCID

## Results: Demographics

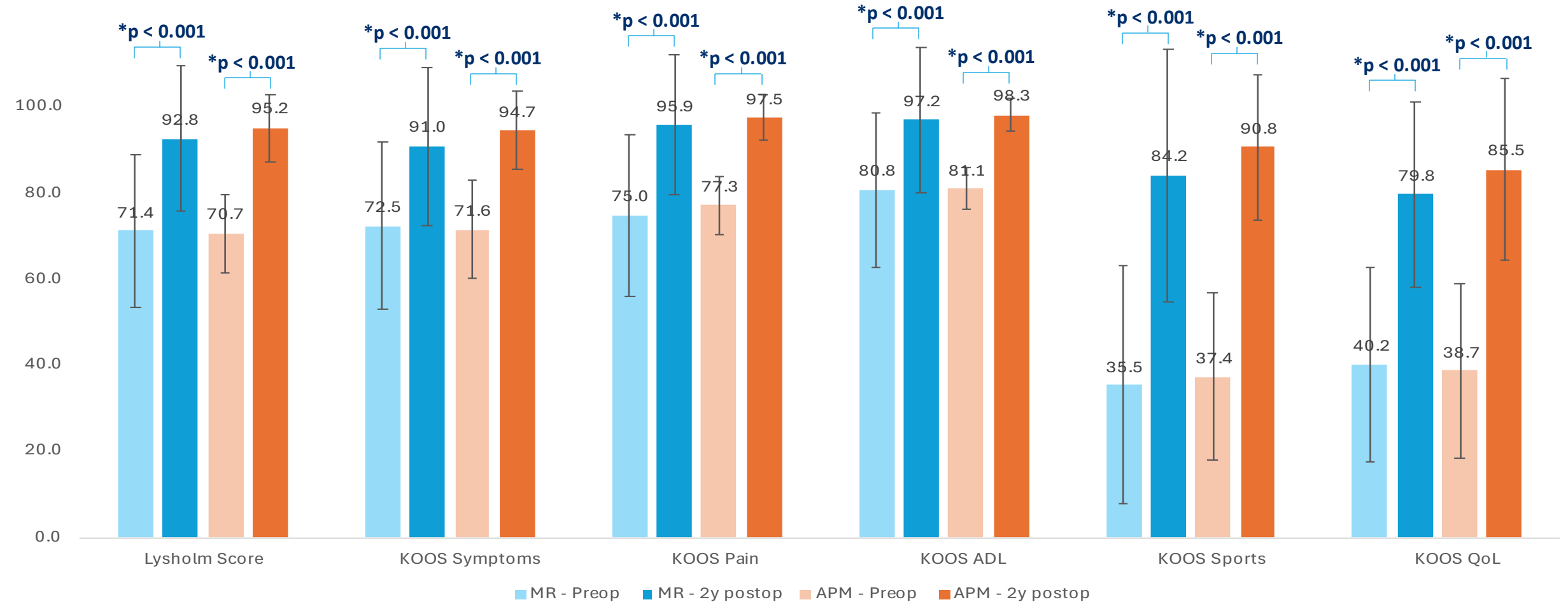
- 219 patients, with 127 ACLR+MR and 92 ACLR+APM
- Demographics show no confounders

Table 2: Demographics of 219 patients

Patient Demographic	MR (Mean, 95% CI), n=127	APM (Mean, 95% CI), n=92	p-value
Age	26.2 (24.7, 27.8)	27.2 (25.5, 28.9)	0.092
Gender (M:F)	107:38	74:18	0.241
BMI (kg m <sup>-2</sup> )	24.1 (23.5, 24.7)	24.9 (24.1, 25.8)	0.082

# Results: Statistical Significance

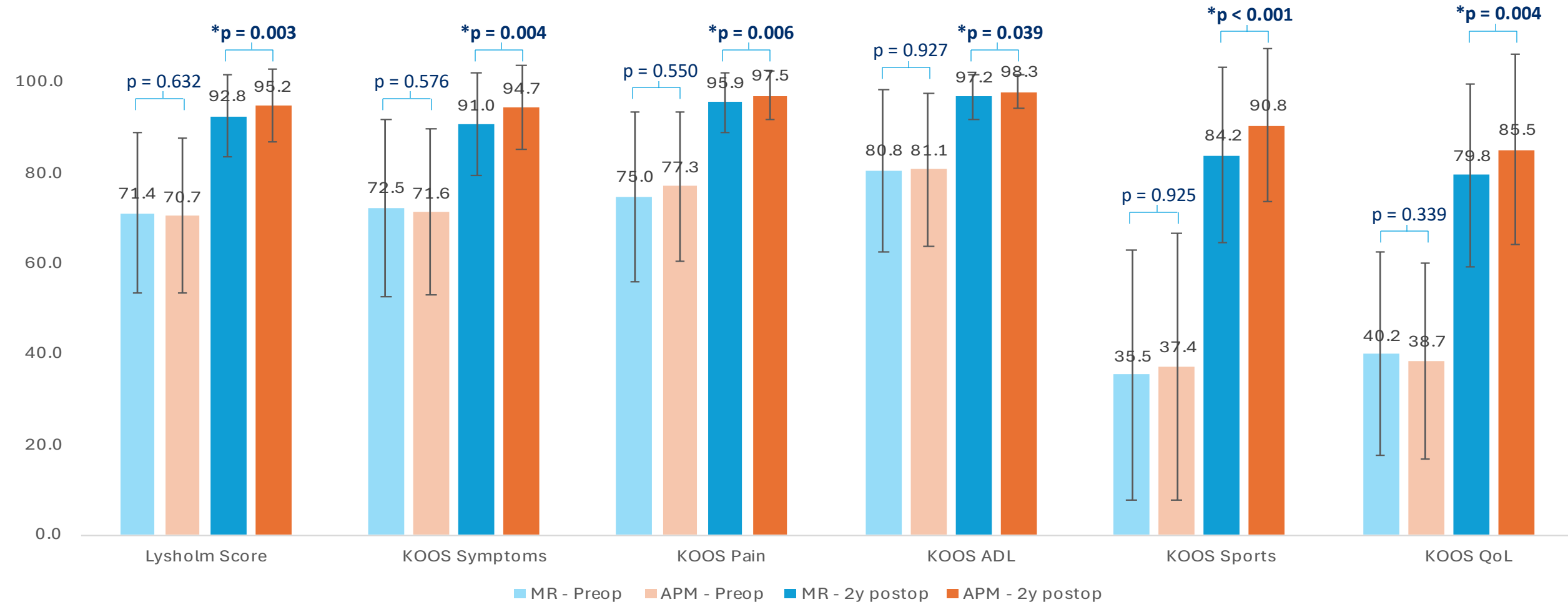
Fig. 1: Preoperative and 2-year postoperative PROM values of MR and APM groups



**Statistically significant improvement ( $p < 0.001$ ) in PROMs from preop to 2y for both MR and APM**

# Results: Statistical Significance (cont.)

Fig. 2: Comparing MR and APM groups preoperatively and 2-year postoperatively



APM has statistically significantly better PROMs ( $p < 0.05$ ) compared to MR at 2y follow-up



# Results: Statistical Significance (cont.)

Table 3: Rates of improvement from preop to 2y in MR and APM

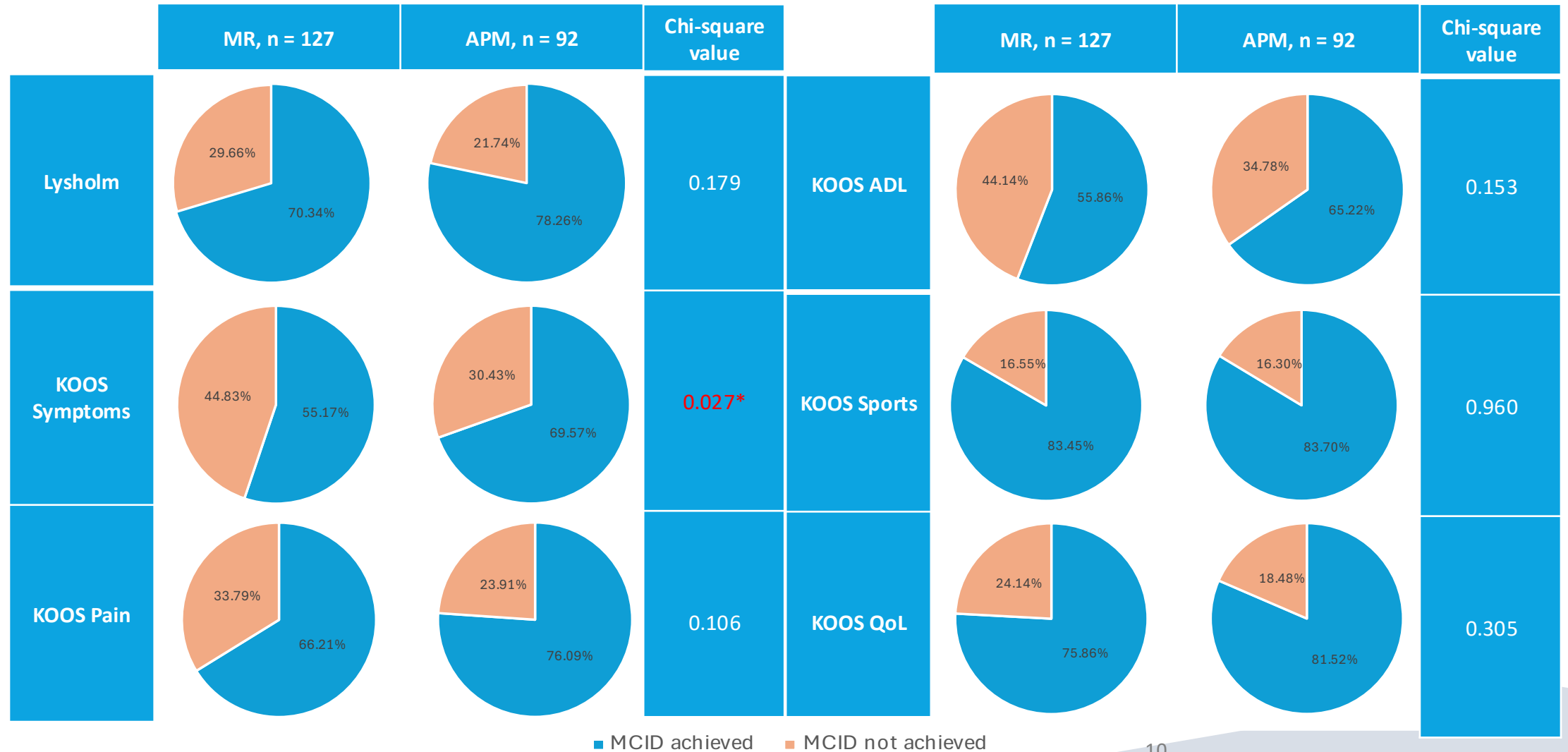
PROM	MR (Mean, 95% CI), n=127	APM (Mean, 95% CI), n=92	P-value
Lysholm score	21.4 (18.2, 24.6)	24.6 (20.7, 28.5)	0.175
KOOS Symptoms	18.5 (14.9, 22.1)	23.1 (19.1, 27.1)	0.088
KOOS Pain	20.9 (17.6, 24.1)	20.3 (16.7, 23.9)	1.000
KOOS ADL	16.3 (13.3, 19.4)	17.2 (13.5, 20.8)	0.665
KOOS Sports	48.7 (43.0, 54.4)	53.4 (46.7, 60.1)	0.280
KOOS QoL	39.6 (34.6, 44.6)	46.8 (40.4, 53.1)	0.022*

**APM does not show better rates of improvement over MR in all PROMs except in KOOS QoL (p=0.022)**

# Results: Clinical Significance

MCID values have comparable levels of achievement in both MR and APM except for in **KOOS Symptoms** ( $p=0.027$ )

Fig. 3: MCID Achievement Rates



# Discussion

When comparing preop and 2y postop values,

- Statistically, MR and APM groups have **significant improvement (p<0.001) at 2 years** for all PROMs.
- Cristani et al.<sup>4</sup>, Phillip et al.<sup>5</sup>, LaPrade et al.<sup>10</sup>, Lee et al.<sup>11</sup> support these results.
- Clinically, all PROMs have >50% achievement of MCID, and **most have >70% achievement** for both MR and APM.
- Westermann et al.<sup>12</sup> showed significantly improved results of ACLR+MR at 2y and 6y follow-up using MCID.

When comparing MR and APM,

- Statistically, APM has better absolute PROMs (p<0.05) at 2-year follow-up compared to MR, which is supported by Svantesson et al.<sup>2</sup> and Sarraj et al.<sup>3</sup>
- But when comparing differences **APM does not have a better rate of improvement than MR**, apart from in KOOS QoL (p=0.022).
- Results from Phillip et al.<sup>4</sup> and Cristani et al.<sup>5</sup> and Lee et. Al<sup>11</sup> show that APM does not have superior short-term outcomes over MR
- Clinically, there is **no significant difference in PROM achievement rates**, apart from KOOS Symptoms (p=0.027)

# Conclusion

- This is the first paper that utilizes both statistical and clinical significance to evaluate outcomes of ACLR concurrent to meniscal procedures.
- We conclude that MR is not clinically worse than APM and recommend the use of MR over APM whenever feasible due to better long-term outcomes in MR.

# Limitations

- Selection bias due to retrospective nature of paper
- Surgical factors such as difference in operators, surgical techniques in ACLRs, APM and MR, meniscus tear configuration, and duration between injury and surgery could have affected results
- Due to subjectivity of patient interpretation of pain and function, there could be variability and response bias when collecting PROMs

# References

1. Kilcoyne KG, Dickens JF, Haniuk E, et al. Epidemiology of meniscal injury associated with ACL tears in young athletes. *Orthopedics* 2012;35:208-12.
2. Svantesson E, Cristiani R, Hamrin Senorski E, Forssblad M, Samuelsson K, Stålmán A. Meniscal repair results in inferior short-term outcomes compared with meniscal resection: a cohort study of 6398 patients with primary anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2018;26(8):2251-8.
3. Sarraj M, Coughlin RP, Solow M, Ekhtiari S, Simunovic N, Krych AJ, et al. Anterior cruciate ligament reconstruction with concomitant meniscal surgery: a systematic review and meta-analysis of outcomes. *Knee Surg Sports Traumatol Arthrosc.* 2019;27(11):3441-52.
4. Cristiani R, Parling A, Forssblad M, Edman G, Engström B, Stålmán A. Meniscus Repair Does Not Result in an Inferior Short-term Outcome Compared With Meniscus Resection: An Analysis of 5,378 Patients With Primary Anterior Cruciate Ligament Reconstruction. *Arthroscopy.* 2020;36(4):1145-53.
5. Phillips M, Rönnblad E, Lopez-Rengstig L, Svantesson E, Stålmán A, Eriksson K, et al. Meniscus repair with simultaneous ACL reconstruction demonstrated similar clinical outcomes as isolated ACL repair: a result not seen with meniscus resection. *Knee Surg Sports Traumatol Arthrosc.* 2018;26(8):2270-7.
6. Harris JD, Brand JC, Cote MP, Faucett SC, Dhawan A. Research pearls: The significance of statistics and perils of pooling. Part 1: Clinical versus statistical significance. *Arthroscopy* 2017;33:1102-1112.
7. Engel L, Beaton DE, Touma Z. Minimal Clinically Important Difference: A Review of Outcome Measure Score Interpretation. *Rheum Dis Clin North Am.* May 2018;44(2):177-188. doi:10.1016/j.rdc.2018.01.011
8. Son MM, Abbas M, Tatusko M, Winkel T, Barton D, Manoharan A, et al. Clinically Significant Outcome Scores in Orthopaedic Sports Medicine Shoulder and Knee Surgery Are Increasing in Prevalence but Often Reported Incorrectly. *Arthroscopy.* 2024;40(4):1108-16.
9. Maltenfort M, Díaz-Ledezma C. Statistics In Brief: Minimum Clinically Important Difference—Availability of Reliable Estimates. *Clinical Orthopaedics and Related Research®.* 2017;475(4):933-46.
10. LaPrade CM, Dornan GJ, Granan LP, LaPrade RF, Engebretsen L. Outcomes After Anterior Cruciate Ligament Reconstruction Using the Norwegian Knee Ligament Registry of 4691 Patients: How Does Meniscal Repair or Resection Affect Short-term Outcomes? *Am J Sports Med.* 2015;43(7):1591-7.
11. Lee WQ, Gan JZW, Lie DTT. Save the meniscus – Clinical outcomes of meniscectomy versus meniscal repair. *Journal of Orthopaedic Surgery.* 2019 May;27(2):230949901984981.
12. Westermann RW, Wright RW, Spindler KP, Huston LJ, Wolf BR, Cox CL, et al. Meniscal Repair With Concurrent Anterior Cruciate Ligament Reconstruction. *The American Journal of Sports Medicine [Internet].* 2014 Jul 14;42(9):2184–92.