# Ideal Combination of Anatomic Tibial and Femoral Tunnel Positions for Single-Bundle ACL Reconstruction

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# Disclosure

**No conflicts of interest**

# Introduction

**Recently anatomic ACL reconstruction is preferred to non-anatomic (isometric) ACL reconstruction.**

**Proper positioning of the anteromedial (AM) and posterolateral (PL) ACL bundles of the tibial and femoral tunnels is important for successful ACLR.**

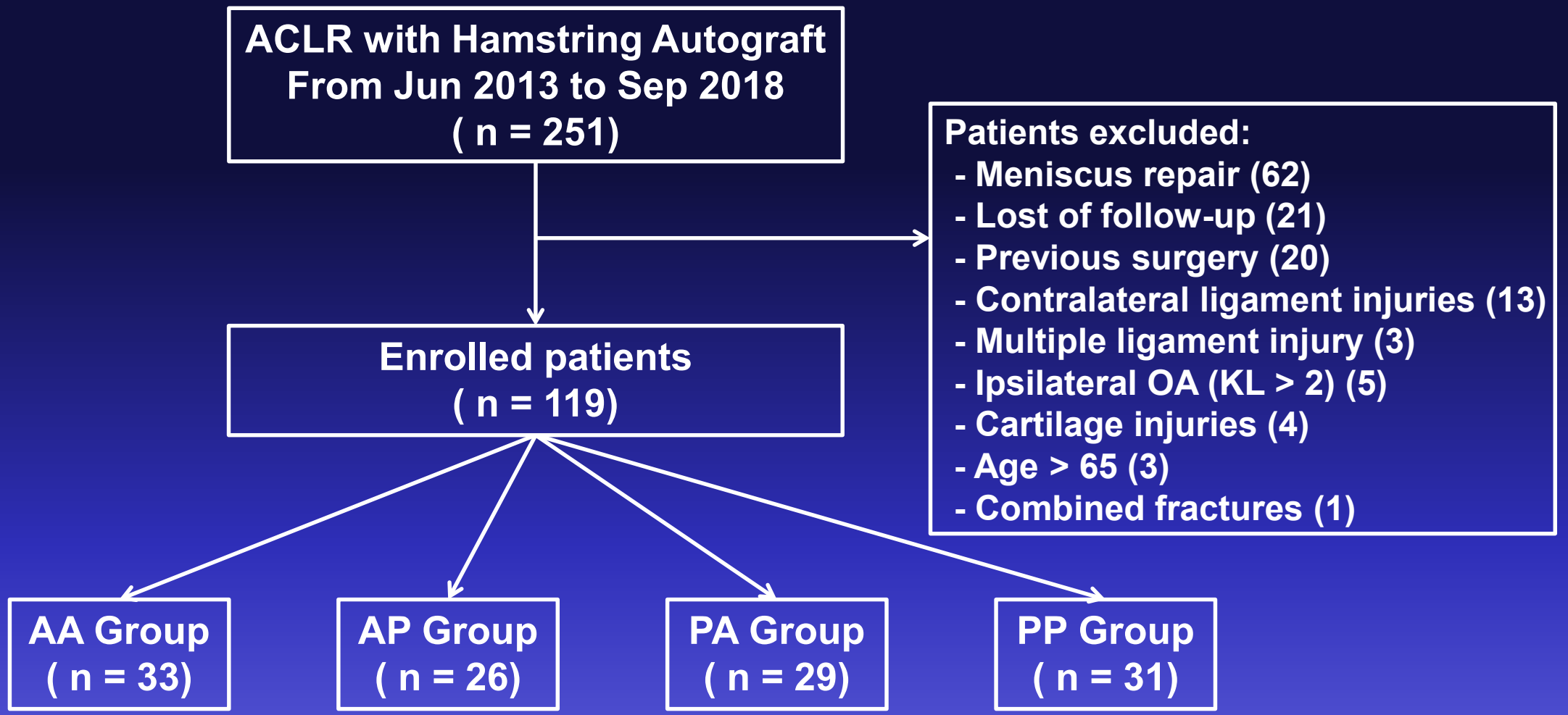
**However, there is no consensus on which point the tunnels should be positioned among the broad anatomic footprints.**

# Purpose / Hypothesis

**To find a clinically ideal combination of anatomic ACL tunnel positions.**

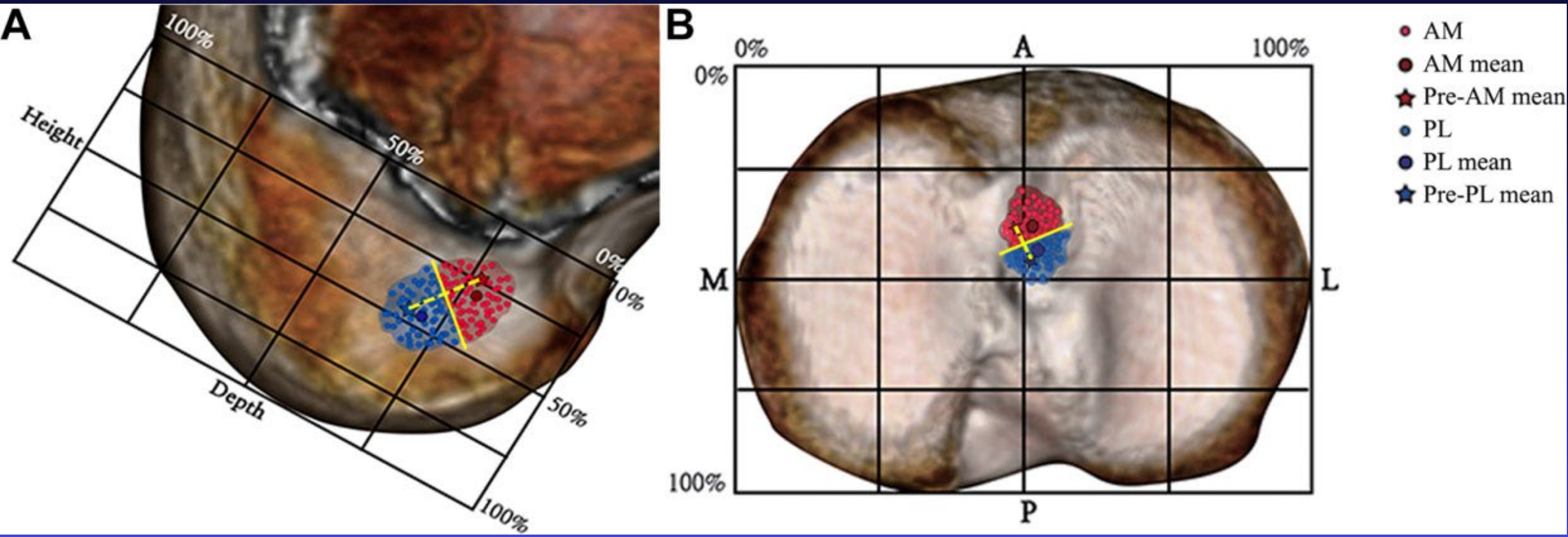
**AM positioned tunnels would have better clinical scores, knee joint stability, and graft signal intensity on follow-up MRI than those with PL positioned tunnels.**

# Patient Selection and Study Design




AA: tibial & femoral tunnels near AM
AP: tibial tunnel near AM, femoral tunnel near PL
PA: tibial tunnel near PL, femoral tunnel near AM
PP: tibial & femoral tunnels near PL

# AM and PL Tunnel Positions



# Evaluation

**Clinical scores**

- Lysholm, Tegner activity, and International Knee Documentation Committee (IKDC) subjective score

**Stability function tests**

- Anterior drawer, Lachman test, Pivot-shift test, and Side-to-side difference (STSD) in anterior tibial translation on Telos stress

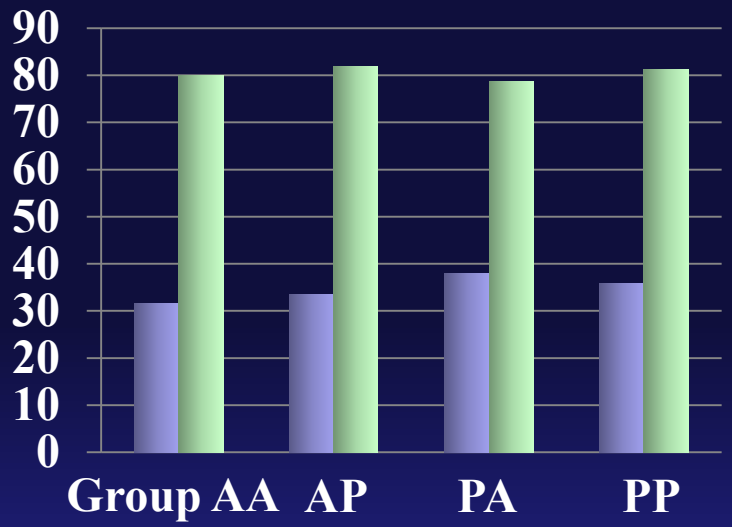
**MRI evaluation**

- MRI signal intensity measurement of the intra-articular region of reconstructed ACL were performed on T2-weighted imagines at 1-year follow-up.

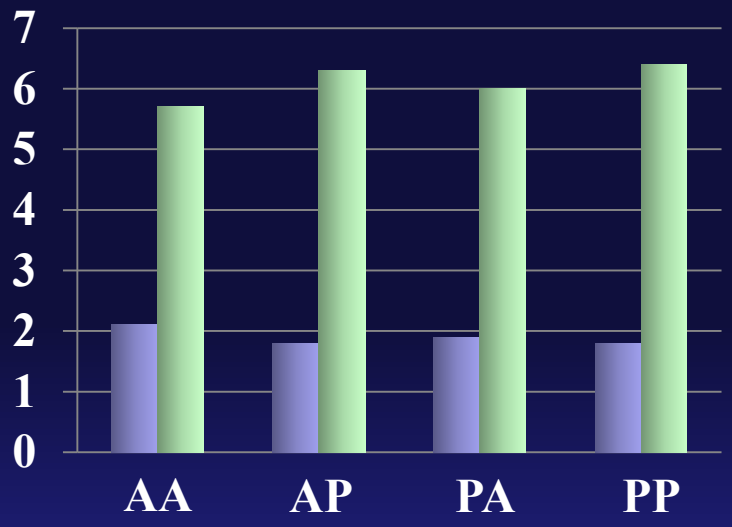
# Demographics

| | Mean ± SD or No. of Patients[b] | | | | |
|---|---|---|---|---|---|
| | AA | AP | PA | PP | *P* Value |
| Age, y | 29.7 ± 12.6 | 29.9 ± 11.9 | 28.3 ± 10.8 | 27.1 ± 10.4 | .411[c] |
| Sex | | | | | .609[d] |
| Male | 28 | 22 | 24 | 29 | |
| Female | 5 | 4 | 5 | 2 | |
| Injury side | | | | | .670[d] |
| Right | 17 | 17 | 15 | 16 | |
| Left | 16 | 9 | 14 | 15 | |
| Follow-up, mo | 33.1 ± 12.8 | 39.2 ± 16.6 | 40.3 ± 13.8 | 34.2 ± 9.8 | .057[c] |
| Score | | | | | |
| Lysholm | 31.5 ± 21.9 | 33.5 ± 23.6 | 38.0 ± 18.4 | 35.8 ± 23.9 | .569[c] |
| Tegner | 2.1 ± 1.2 | 1.8 ± 1.2 | 1.9 ± 1.1 | 1.8 ± 1.5 | .659[c] |
| IKDC | 41.1 ± 15.2 | 38.6 ± 13.2 | 36.2 ± 14.2 | 37.1 ± 14.2 | .555[c] |
| Test, grade 0/1/2/3 | | | | | |
| Anterior draw | 2/12/18/0 | 2/7/16/1 | 1/7/20/1 | 0/10/19/2 | .764[d] |
| Lachman | 1/11/19/1 | 1/6/17/2 | 0/9/17/3 | 2/5/20/4 | .695[d] |
| Pivot shift | 0/14/18/1 | 1/10/12/3 | 1/9/16/3 | 1/6/20/4 | .505[d] |

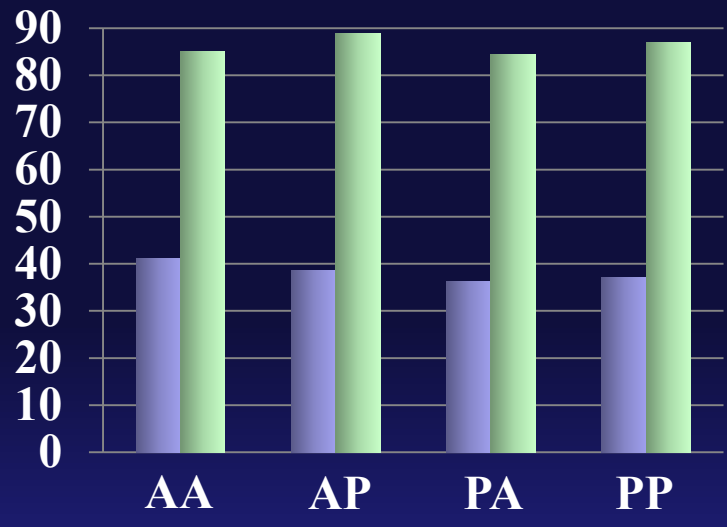
## Lysholm




## Tegner




## IKDC

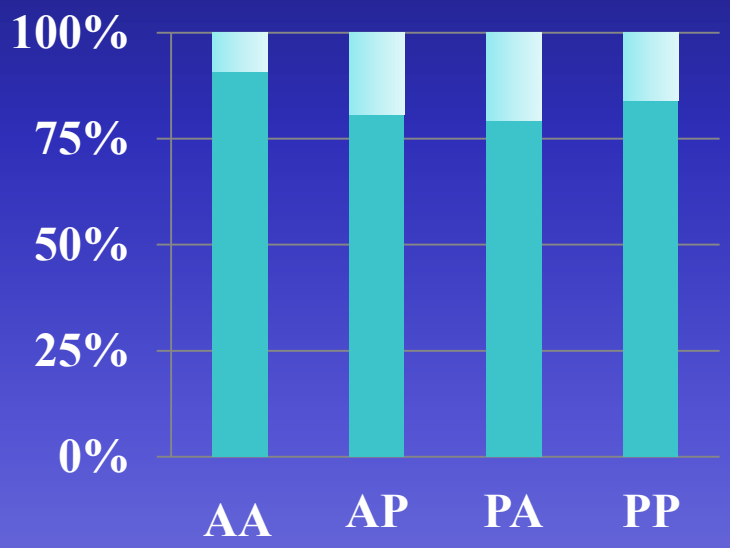



Preop

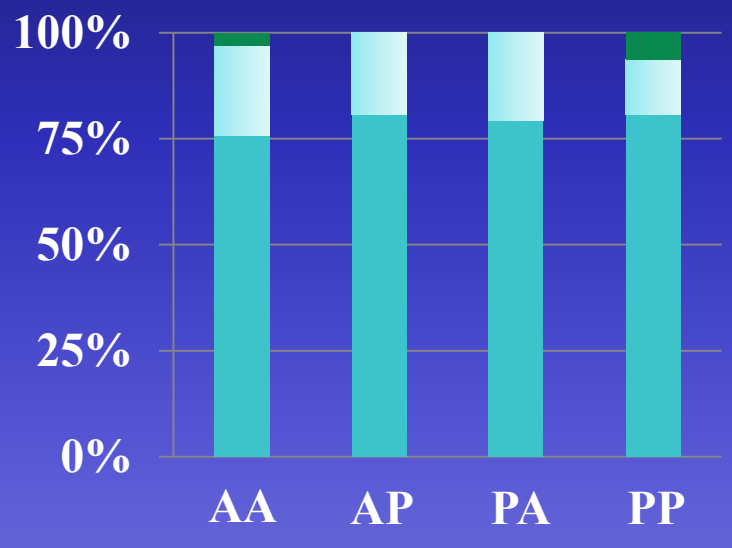
Last F/U

P > 0.05

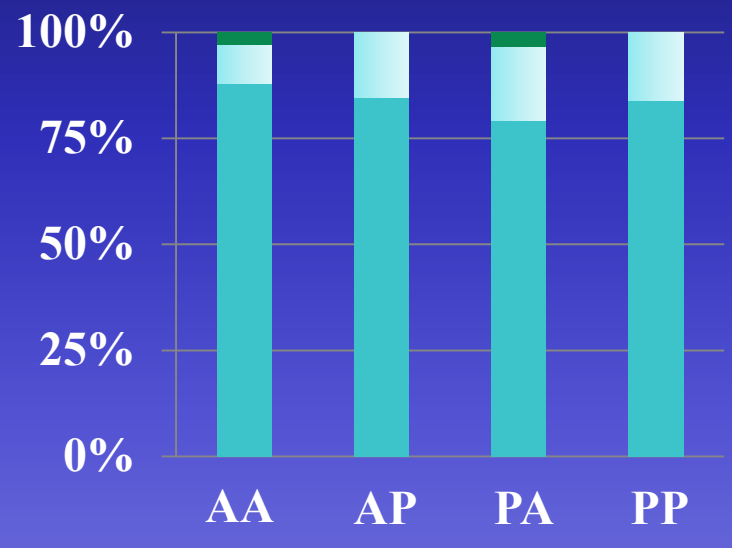
## Ant drawer




## Lachman




## Pivot shift




Grade 3

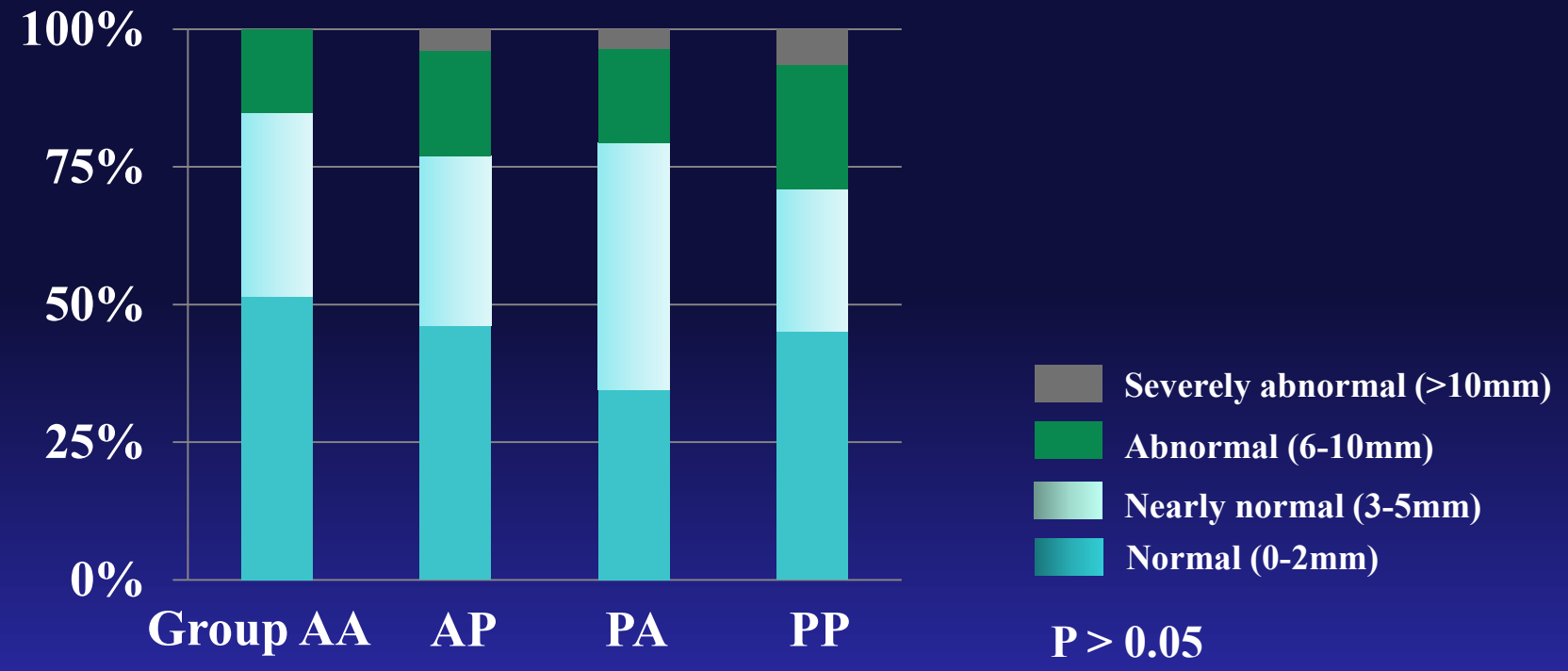
Grade 2

Grade 1

Negative

P > 0.05

## Anterior stress X-ray by Telos at last F/U




P > 0.05

## MRI signal intensity

| MRI signal intensity | Group AA | Group AP | Group PA | Group PP |
|---|---|---|---|---|
| Low | 16 | 8 | 18 | 12 |
| Intermediate | 11 | 10 | 8 | 14 |
| High | 6 | 8 | 3 | 5 |

P > 0.05

# Limitations

**Retrospective study**

**Small sample size**

**→ Many femoral tunnels were located near the central position, but we could not categorize them into an additional group**

**Remnant-preservation technique was not considered**

**→ Femoral tunnel to a rather PL position**

# Conclusion

**No significant differences in clinical scores, knee joint stability, or graft signal intensity on follow-up MRI were identified between the patients with anteromedially and posterolaterally positioned tunnels.**

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