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A Novel Arthroscopic Measurement Technique for Precise Femoral Tunnel Drilling in Anterior Cruciate Ligament Reconstruction

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Faculty Disclosure Information

- Nothing to disclose



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Purpose

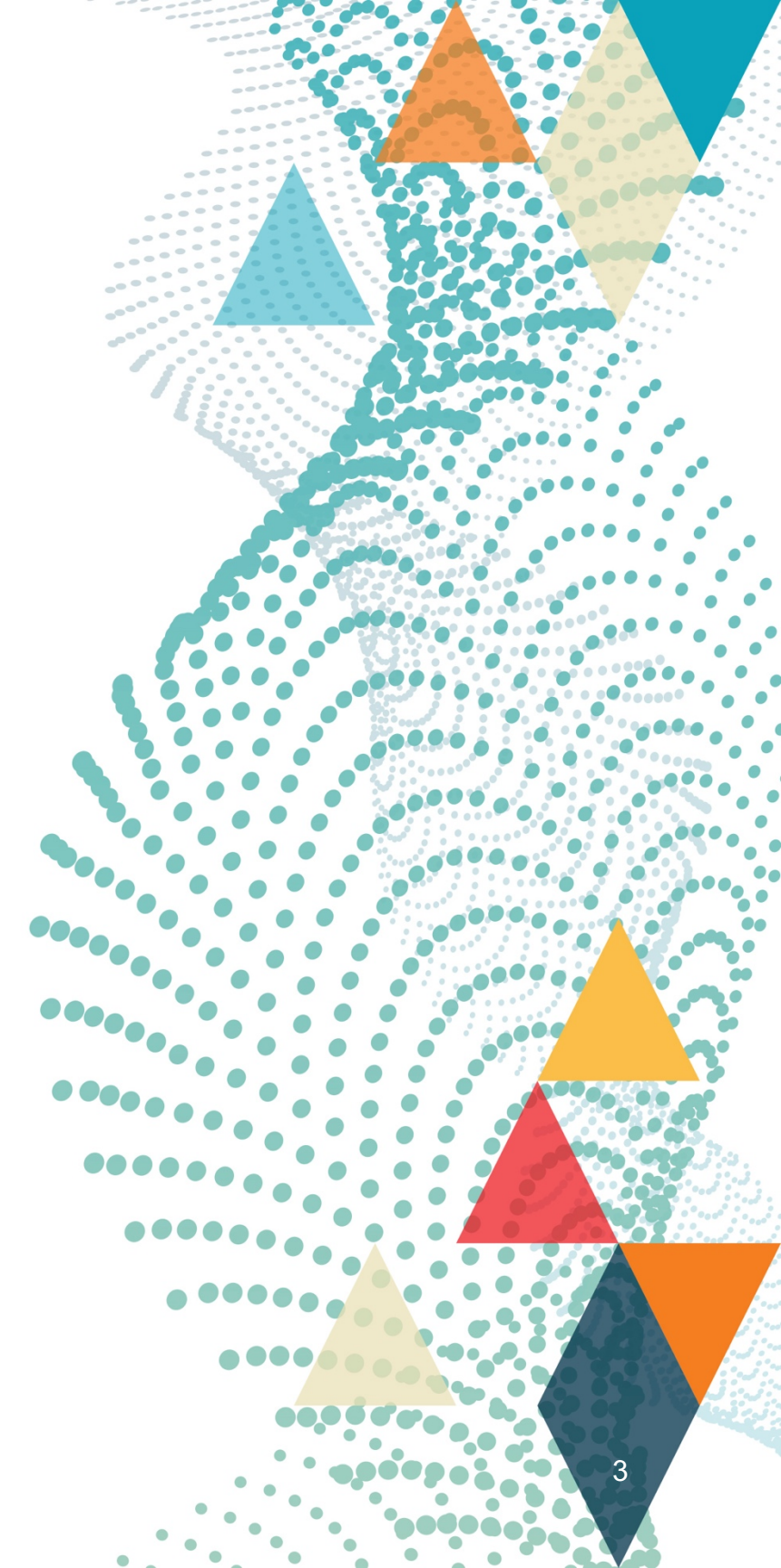
- **To introduce a new measurement technique for femoral tunnel placement in anterior cruciate ligament reconstruction (ACLR)**
- **The goal is to use the lateral femoral condyle medial wall cartilage margin diameter to determine the optimal placement of the ACL femoral tunnel.**



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Methods

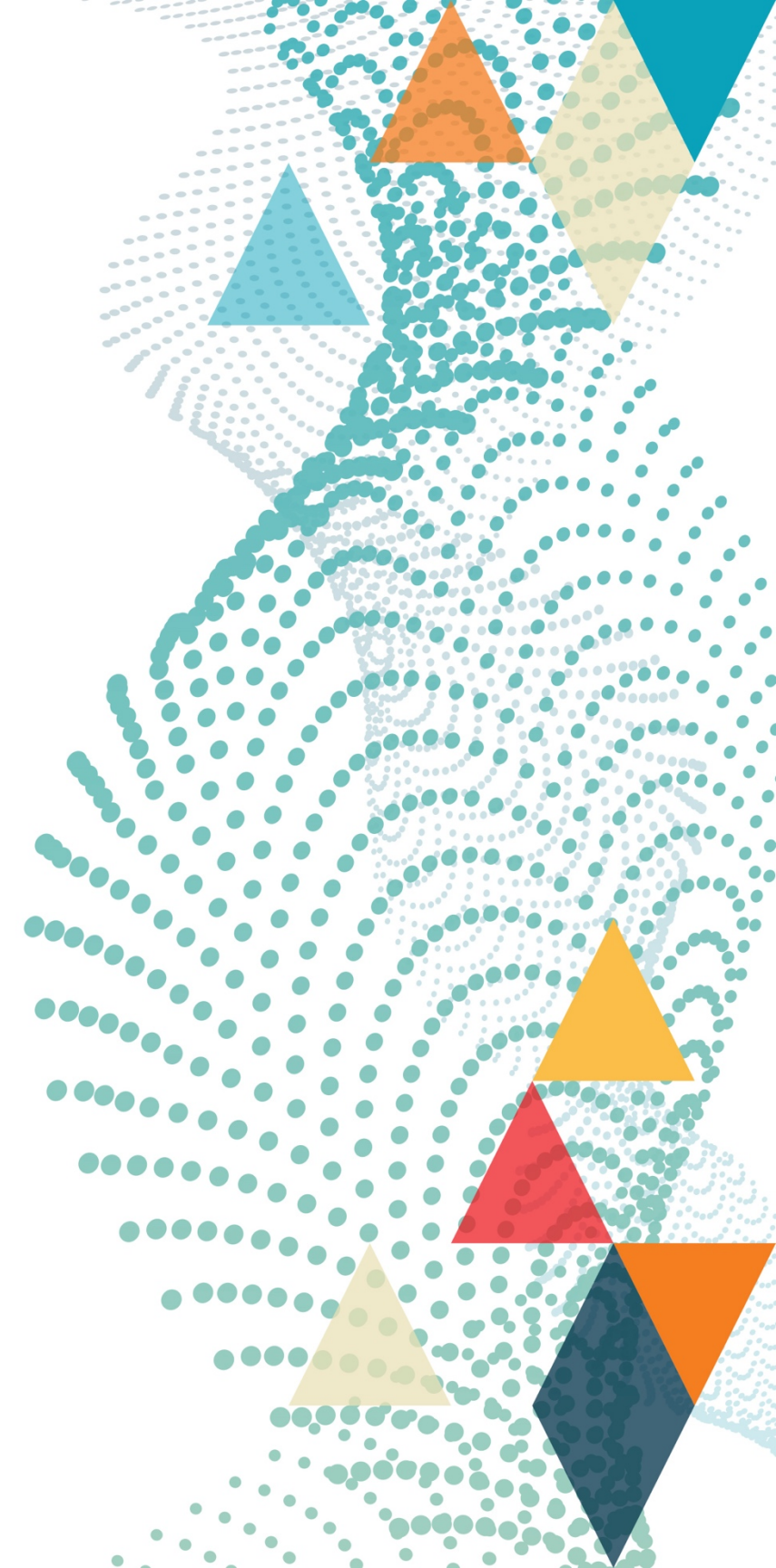
- Knee anatomic landmarks were visualized through a 30-degree arthroscope from a standard anterolateral portal.
- Anterior to posterior distance of the lateral femoral condyle medial wall cartilage margin was measured, and knees were categorized into three groups based on this measurement: less than 21 mm, 21 to 25 mm, and greater than 25 mm.



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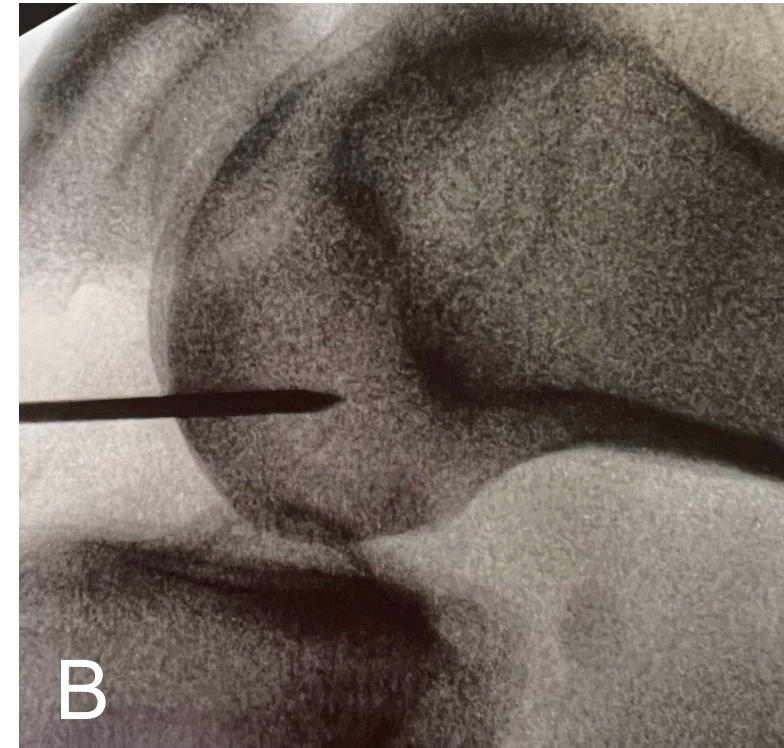
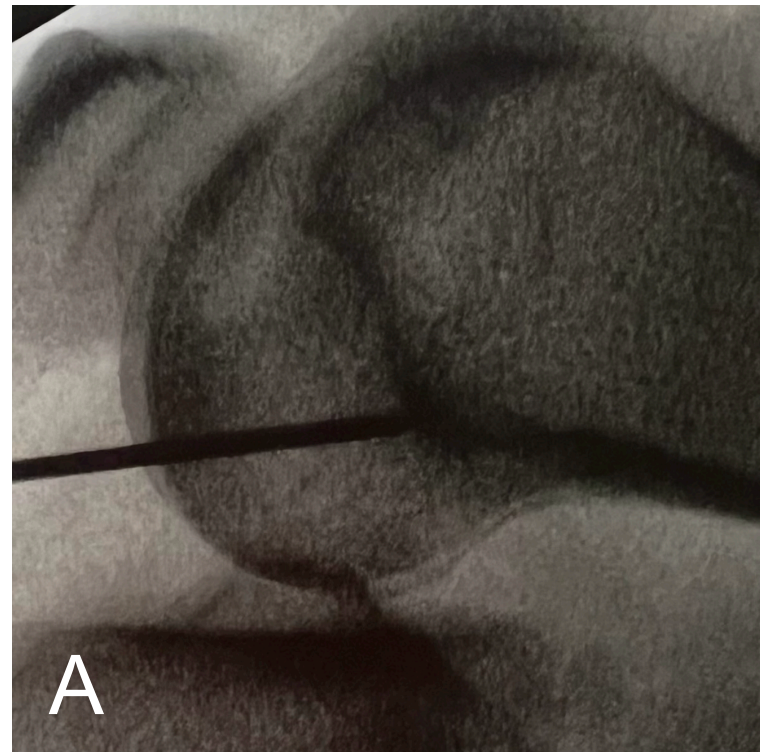


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Methods Cont.

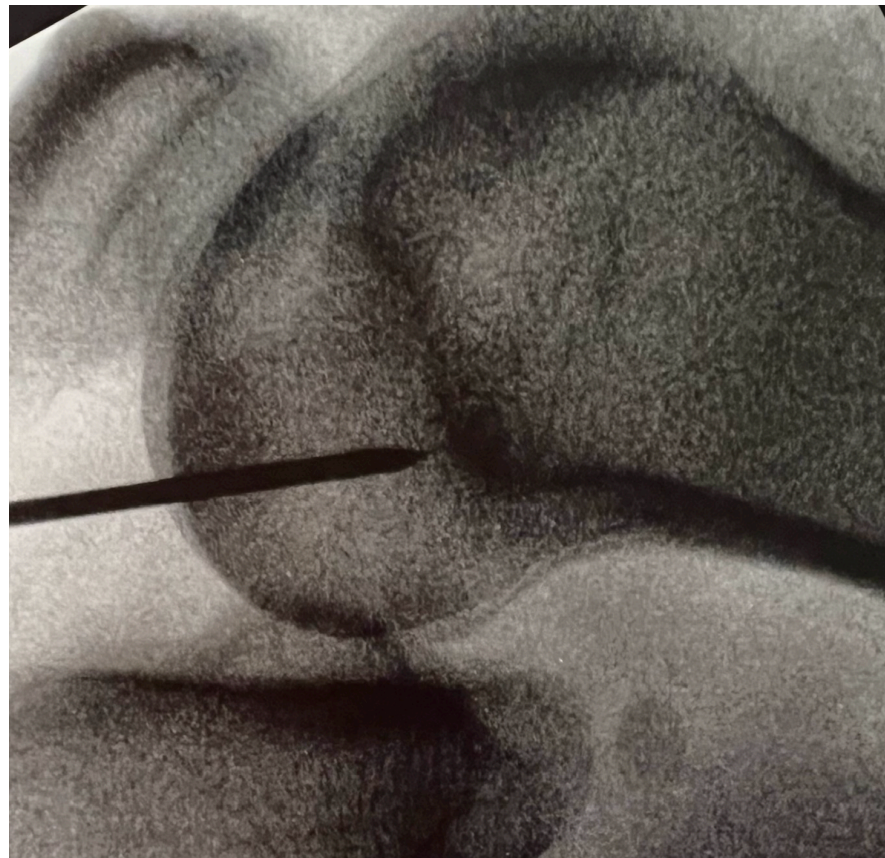
- The center of the anteromedial (AM) and posterolateral (PL) bundles were identified through previously published methods, using measurements based on the anterior to posterior cartilage margin size calibrated for the three cartilage margin diameter groups.



Intra-operative lateral knee fluoroscopic image demonstrating the ACL AM (A) and PL (B) bundle centers

Methods Cont.

- The anatomic center for ACL femoral tunnel placement was measured midway between the AM and PL centers, accuracy was validated using the Bernard-Hertel grid method



Intra-operative lateral knee fluoroscopic image demonstrating the femoral ACL center location

Methods Cont.

- Once the AM, PL, and ACL centers were located and marked, the distance from each center to the anterior, posterior, and inferior cartilage margins of the lateral femoral condyle medial wall were measured
- Correlation and linear regression analyses were performed to determine the correlation between the results and previously published anatomic values
- Clinical outcomes of a small cohort of patients were evaluated.
- Pre-operative and post-operative IKDC and Lysholm scores were obtained.
- A two-tailed distribution paired t-test was used to determine statistical significance ($p < 0.05$) between pre-operative and post-operative scores.



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Results

- 65 consecutive ACL deficient knees were included.
- There was a ***significant correlation between our findings and previously reported anatomic measurements***
- Linear regression analysis revealed the ACL center to be located at 38.5% of the anterior to posterior diameter of the medial wall of the lateral femoral condyle cartilage border.

Cartilage border	Our study: Mean distance from ACL Center	Literature: Mean distance from ACL Center	Pearson Correlation Coefficient
Anterior	11.97 ± 2.15	12.5 ± 2.1	0.860*
Posterior	9.29 ± 1.84	11.5 ± 1.3	0.812*
Inferior	9.55 ± 1.97	8.7 ± 0.6	0.462*

* Statistically significant

Results

- Clinical outcome scores were obtained for 21 patients with an average follow up of 2.8 years
- Significant improvement in IKDC and Lysholm scores pre-operative to post-operative

	Pre-op	Post-op	P-value
IKDC	48.43	91.54	<0.001*
Lysholm	57.86	89.57	<0.001*

* Statistically significant



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Conclusion

- **The femoral ACL footprint center can be accurately identified using arthroscopic measurements based on the size of the lateral femoral condyle medial wall cartilage margins.**
- **This new measurement technique could be used to precisely locate femoral tunnel placement in ACLR.**
- **A small cohort of patients demonstrated strong post-operative clinical outcome scores.**



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