MIDWEST ORTHOPAEDICS AT RUSH

Tendon Center is Offset From Native Footprint and Tunnel Center in Bone-Patellar Tendon-Bone Grafts

Daniel J Kaplan MD, Zeeshan A Khan BS, Johnathon McCormick MD, Brian Forsythe MD, Brian J Cole MD, MBA, Jorge Chahla MD, Nikhil Verma MD

DISCLOSURES

I (and/or my co-authors) have something to disclose.

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Printed Final Agenda
or

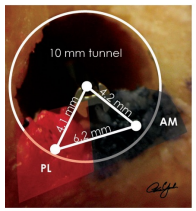
AAOS Orthopaedic Disclosure Program on the AAOS website at:
http://www.aaos.org/disclosure

How we got here...

Femoral Tunnel Placement in Single-Bundle Anterior Cruciate Ligament Reconstruction

A Cadaveric Study Relating Transtibial Lateralized Femoral Tunnel Position to the Anteromedial and Posterolateral Bundle Femoral Origins of the Anterior Cruciate Ligament

John-Paul H. Rue,* MD, LCDR, MC, USN, Neil Ghodadra,† MD, and Bernard R. Bach Jr,† MD

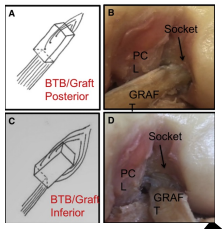


AJSM, 2008

Future study needed to eval graft rotation

Does Bone Plug and Graft Orientation (Inferior Versus Posterior) Alter Native Femoral Footprint Coverage in Bone Patellar Tendon Bone Anterior Cruciate Ligament Reconstruction?

Asheesh Bedi, MD, Alexander E. Weber, MD, Nicholas A. Trasolini, MD, Eric N. Mayer, MD, Ioanna K. Bolia, MD, MS, John Higgins, BA, Jason Hamamoto, MD, Brian J. Cole, MD, Bernard R. Bach, MD, and Nikhil N. Verma, MD



Arthroscopy, 2011

Future study needed to eval collagen centroid

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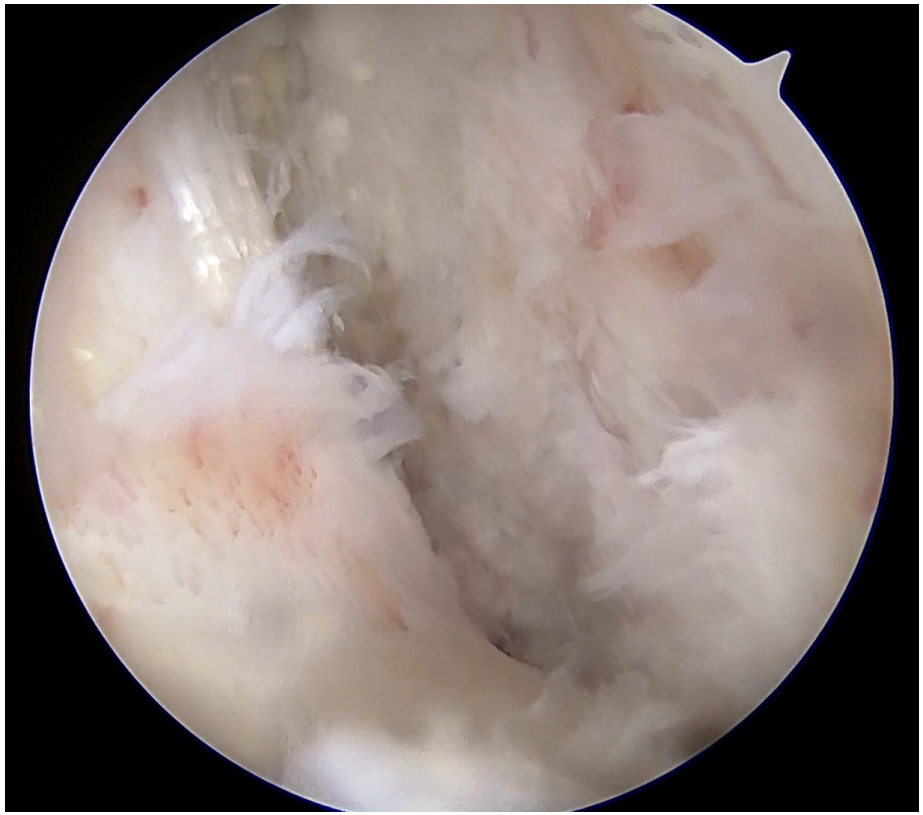
Background

1. Restoration of anatomic footprint critical to optimize outcomes and avoid failure

2. Tunnel position paramount to establish kinematics

3. Tunnel vs collagen placement not investigated for BTB grafts

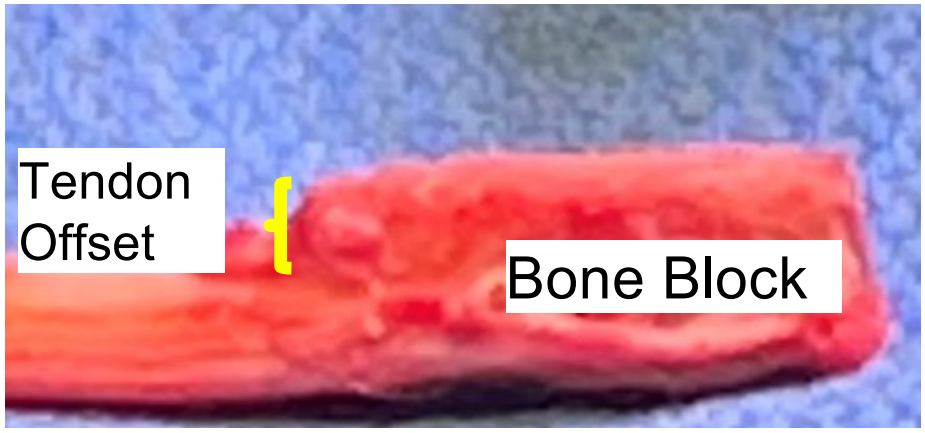


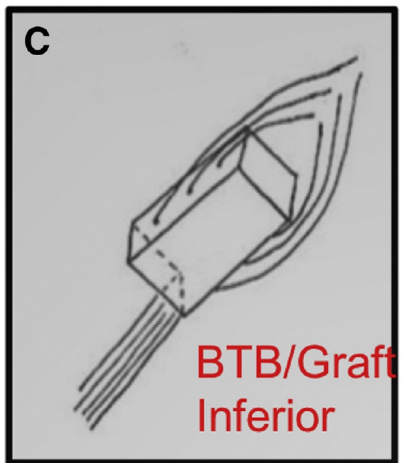
Background

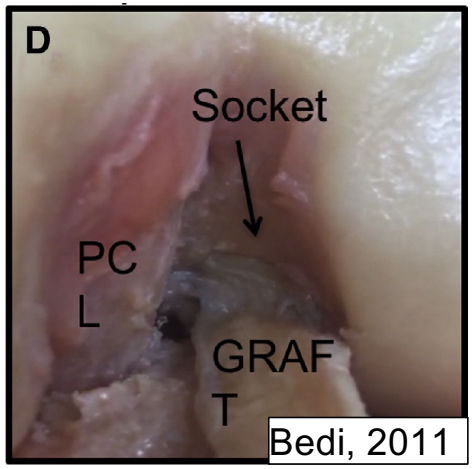
1. BTB collagen offset from bone

2. BTB tendon may not occupy tunnel center

3. Tunnel position may need to account for this







Background

1. Purpose: Assess the difference in position between the footprint, tunnel, and tendinous portion of a BTB graft

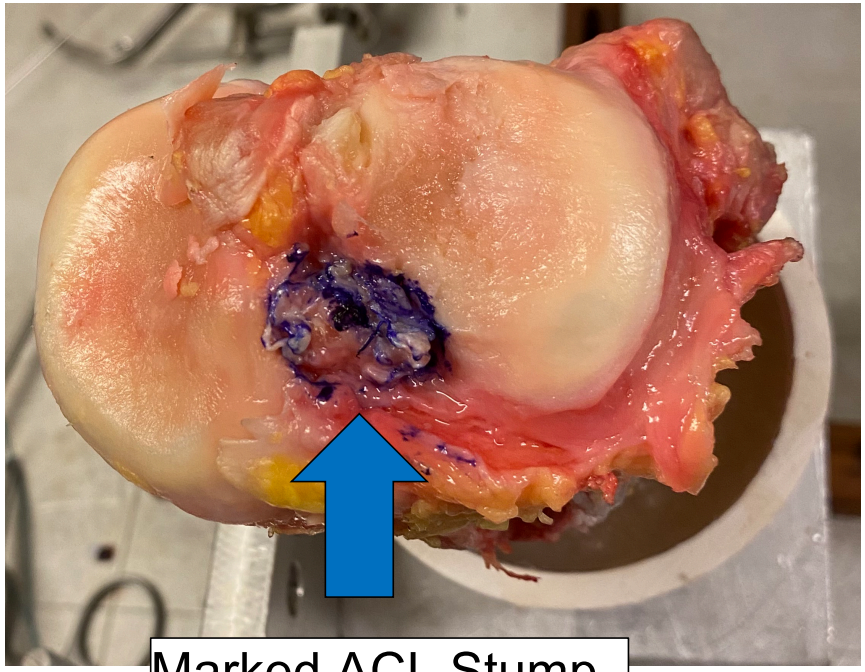
2. Hypothesis: The tendon would be significantly more offset than the tunnel from the native ACL footprint

Methods—Preparation:

1. 10 Cadavers (mean age 43.0 years)

2. BTB harvested from each

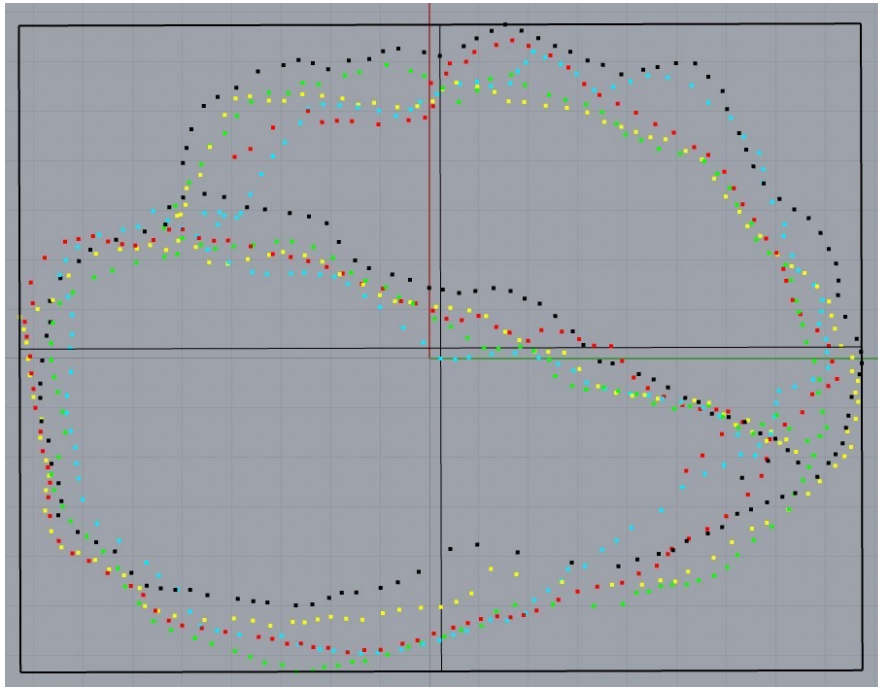
3. Residual ACL stump maintained for mapping



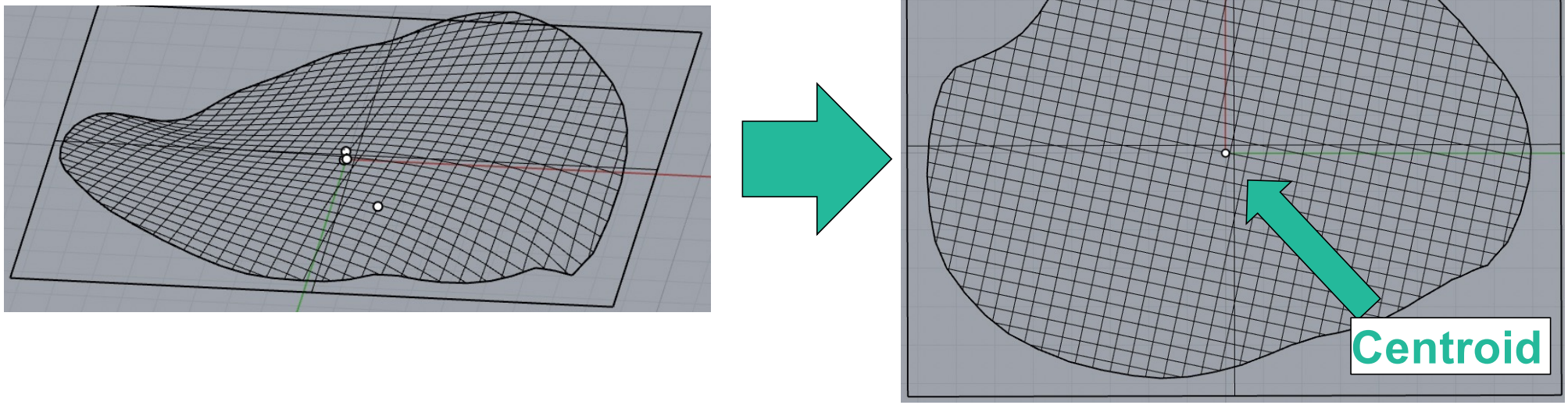
Marked ACL Stump

Methods—Native Footprint Mapping with a Microscribe

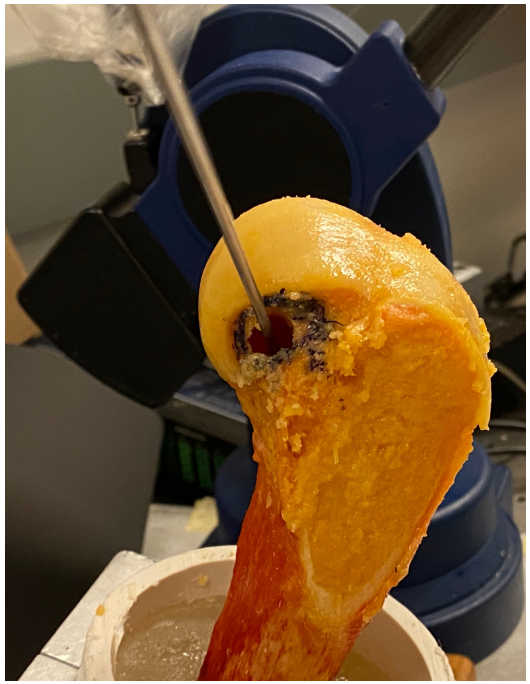
Native footprint

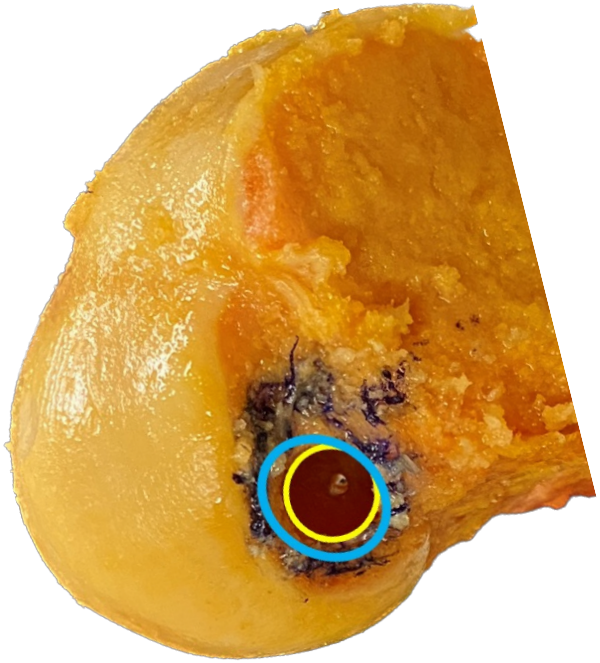


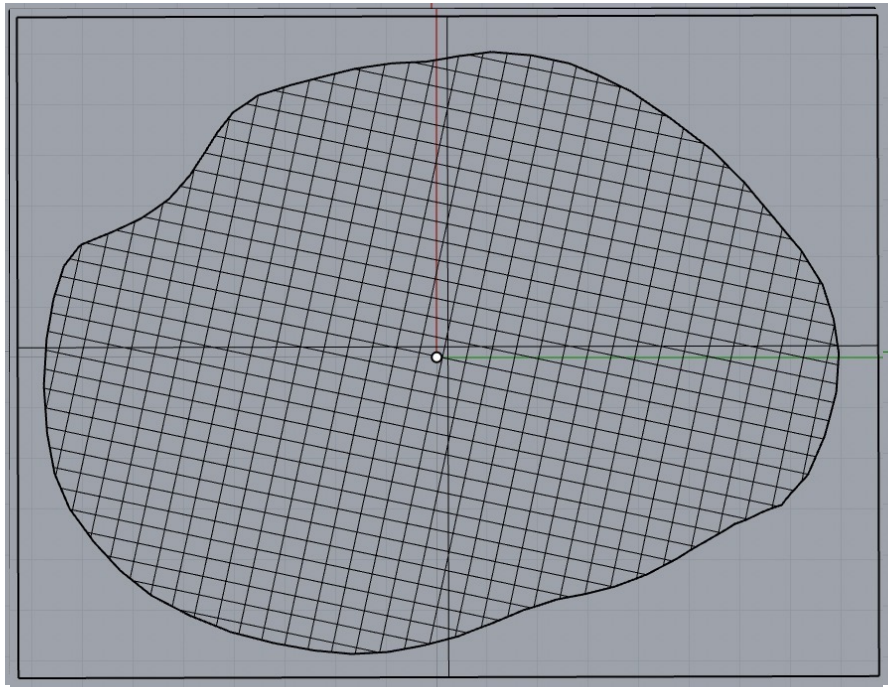
Methods—Centroid Creation



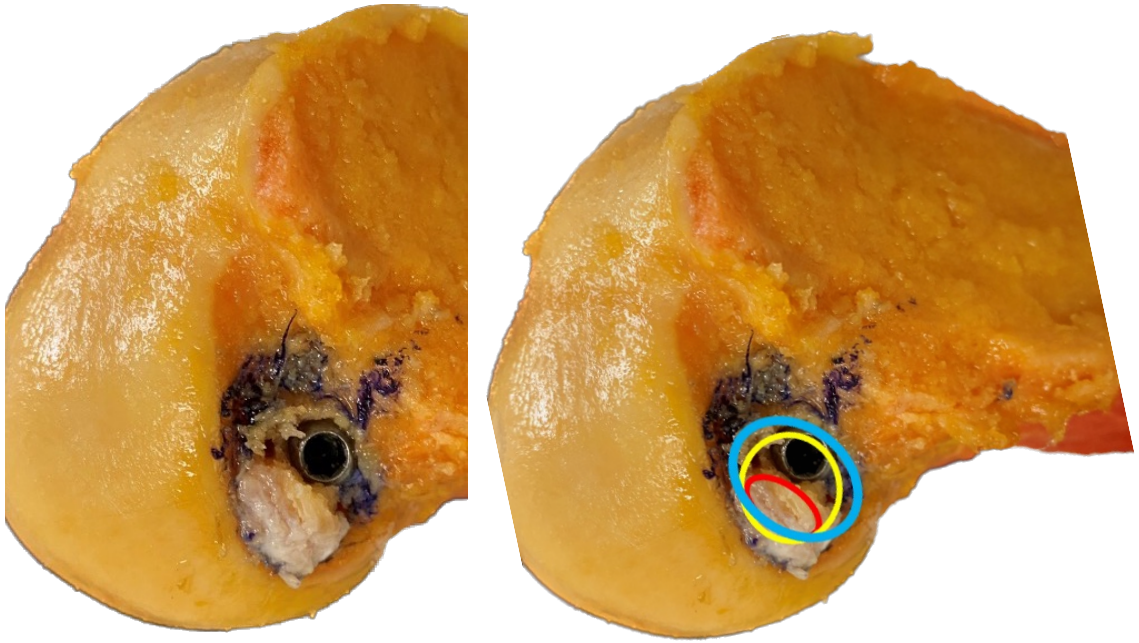
Methods—Tunnel Drilling

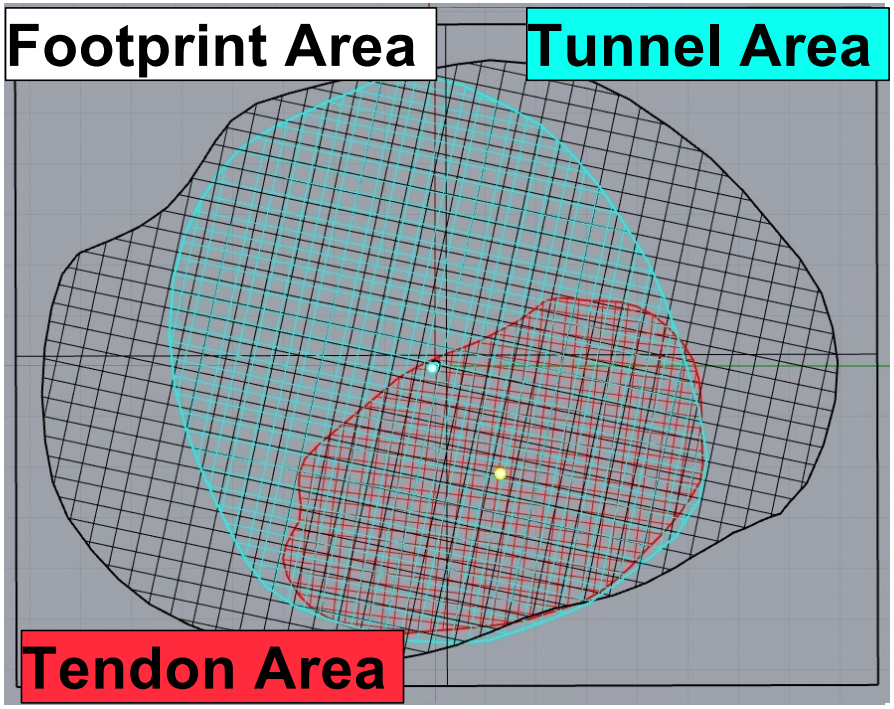






Methods—Graft Placement



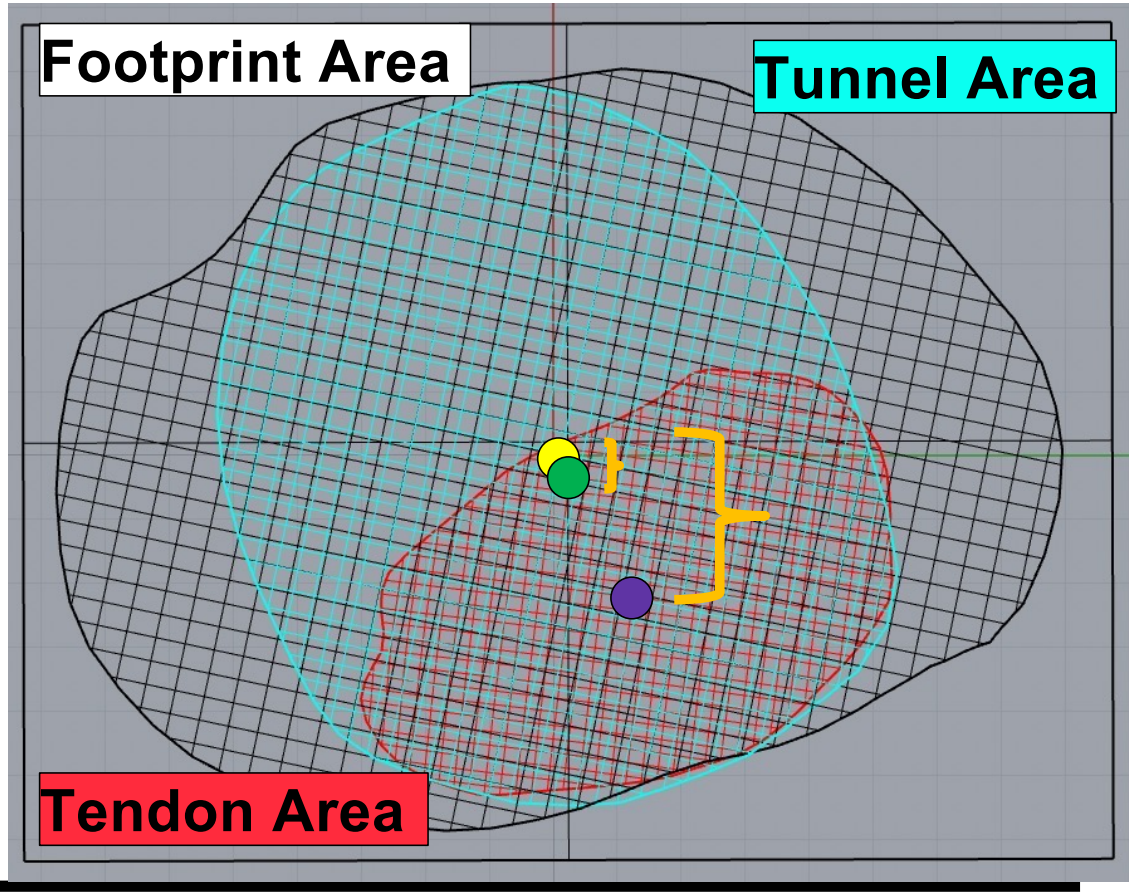


Methods—Measurements

1. Areas calculated

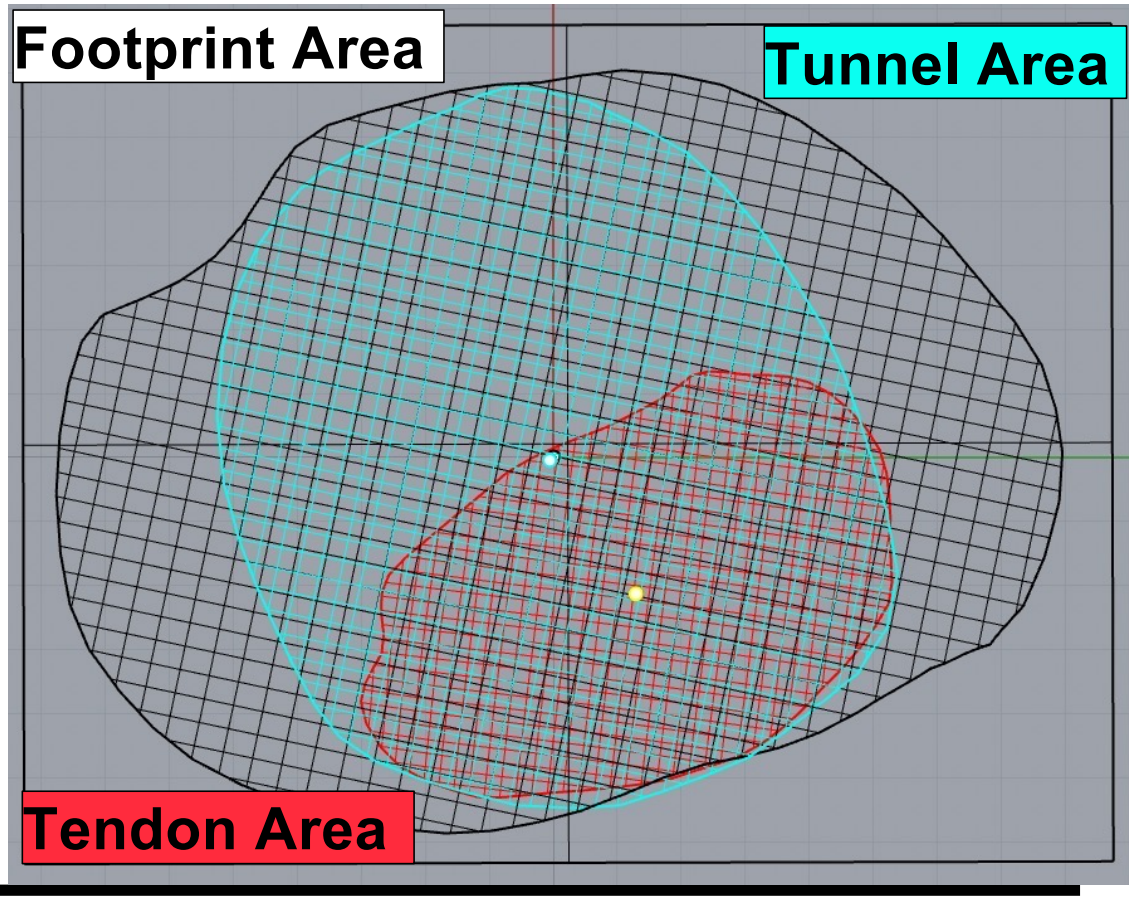
2. Centroids calculated

3. Distances between centroids calculated



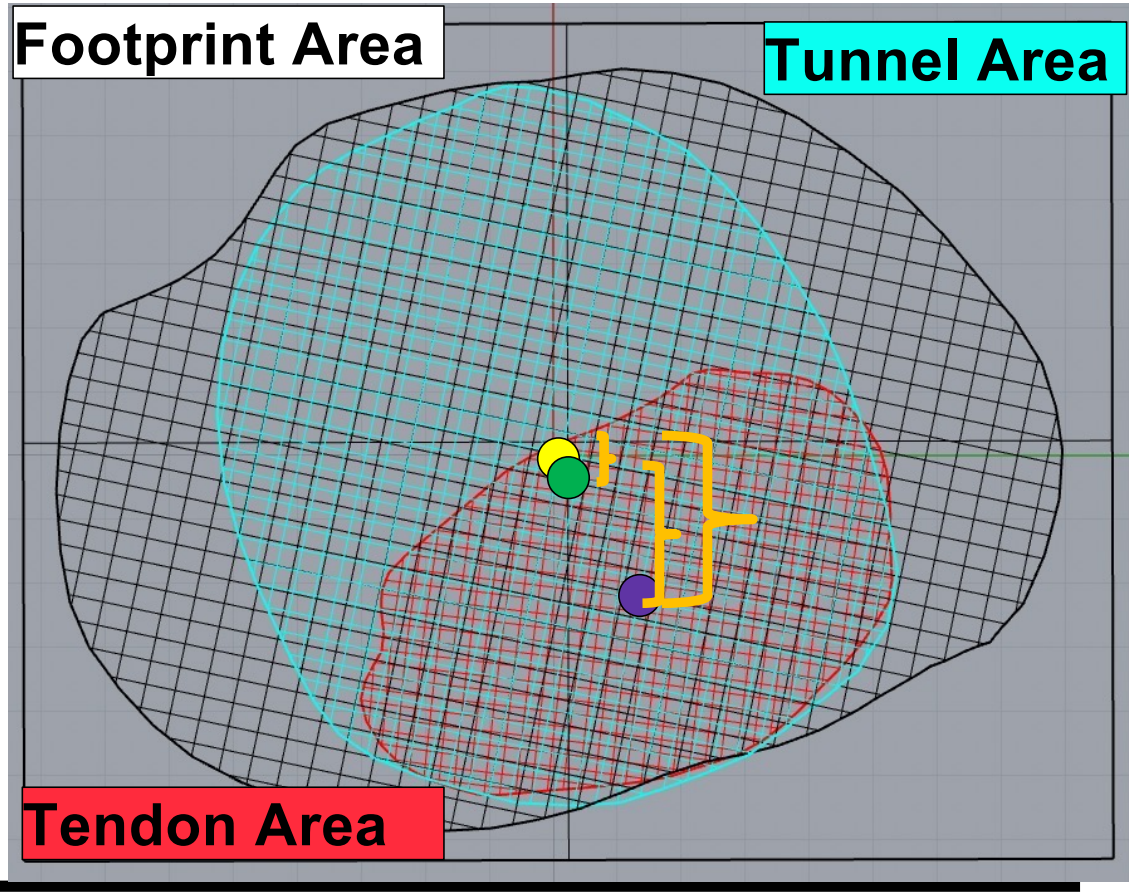
Results—Femur Area

Location	Area (mm^2)	% of Footprint
Footprint	154.89 ± 42.81	xx
Tunnel	86.45 ± 17.96	56%
Tendon	40.14 ± 7.84	26%



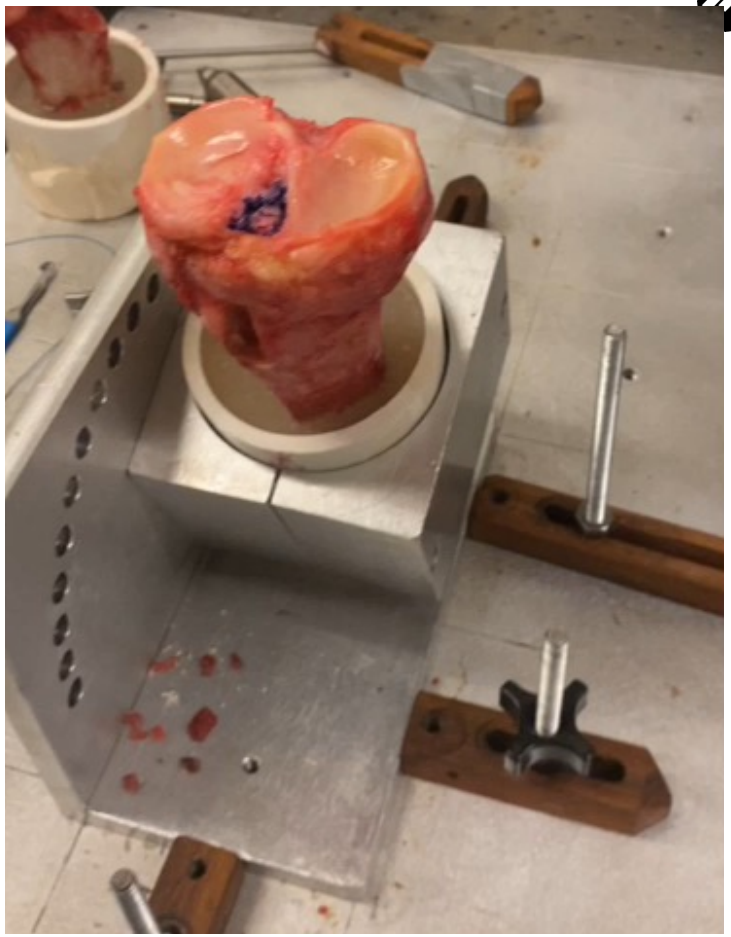
Results—Femoral Centroid Distance

Centroid Location	Distance (mm)	P-value
Footprint to tunnel (human error)	0.4	xx
Tendon to Footprint	2.84	<0.01
Tendon to Tunnel	2.90	0.92



Results—Tibia Area

Location	Area (mm^2)	% of Footprint
Footprint	143.60 ± 19.00	xx
Tunnel	86.48 ± 8.76	60%
Tendon	42.84 ± 6.70	30%



Results—Tibial Centroid Distance

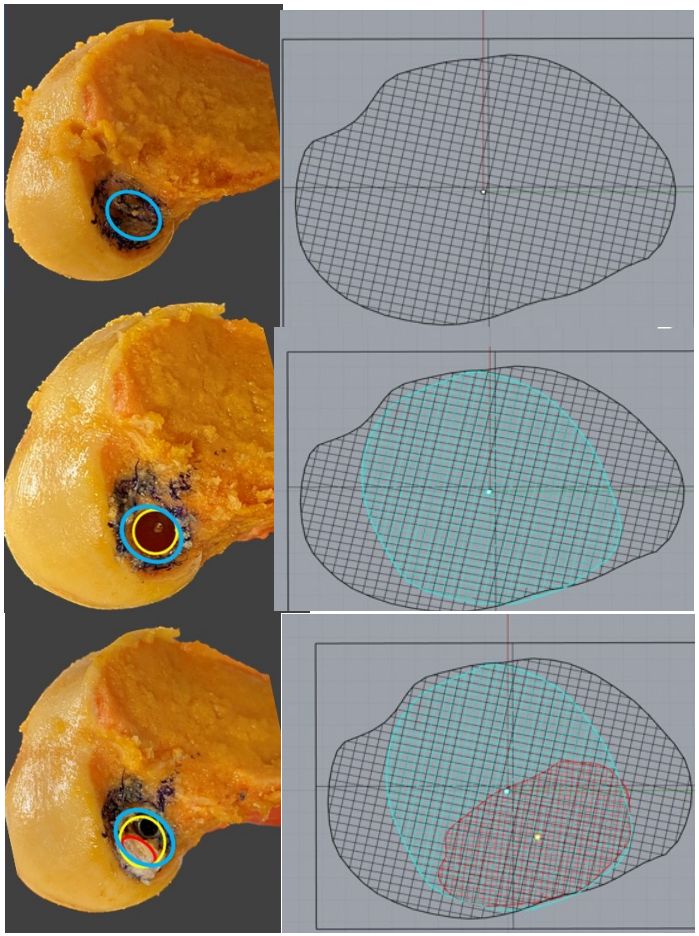
Centroid Location	Distance (mm)	P-value
Footprint to tunnel (human error)	0.28 ± 0.07	xx
Tendon to Footprint	3.02 ± 0.16	<0.01
Tendon to Tunnel	3.13 ± 0.23	0.99

Discussion—Major Findings

1. Tendon occupies small portion of native footprint on femur and tibia

2. Femoral side tendon graft was inferior (6 o'clock direction) relative to footprint and tunnel centers

3. Tibial side tendon graft was posterolateral relative to footprint and tunnel centers



Discussion—Disclaimer!

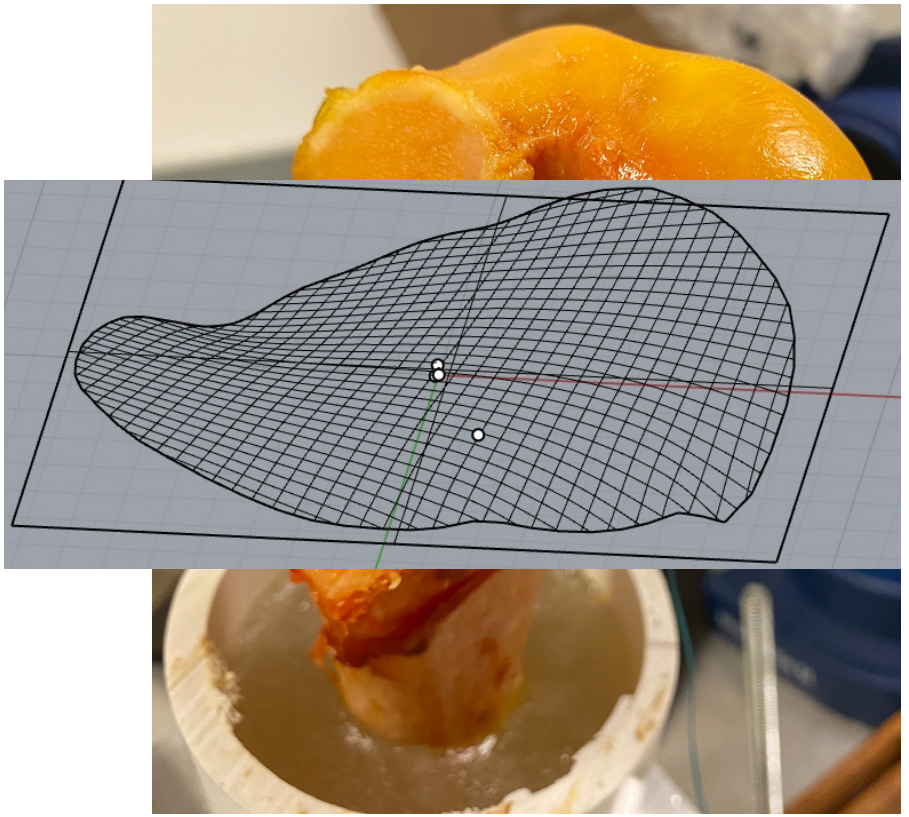
1. This study provides a map

2. Cannot tell you where to go for optimal graft placement

Discussion—Limitations

1. 2D representation of 3D structure

2. Non-clinical drilling trajectories permitted



Conclusions

1. Tendinous portion occupies small portion of footprint

2. To best position collagen over footprint, shift femoral tunnel 2.8 mm proximal and tibial tunnel 3.0 mm anteromedial (toward tibial spine) relative to the footprint center

3. Biomechanical study required to determine clinical significance of a more central collagen position

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Thank you.