

The length and width of each ACL bundle were measured on digital MRI using Stentor, Philips Medical System. Measurements were performed on sagittal and coronal images through the ACL and were independently measured in blinded fashion by 2 observers. In the sagittal plane, the AM bundle was defined as the oblique fibers inserting at the anterior border of the ACL on the tibia and the proximal aspect of the lateral femoral condyle attachment. The PL bundle was defined as the oblique fibers inserting posteriorly on the tibial insertion, and inferiorly on the lateral femoral condyle. In the coronal plane, the AM bundle was defined as the central of the two bundles; whereas the PL bundle was defined as the lateral of the two bundles, from its insertion on the tibia to its origin in the intercondylar notch.

Results: The average age of patients included was 33.5 years (range: 15-61) There were 20 females and 30 males. Both the AM and PL bundles were visualized for all 50 patients. In the sagittal plane MRIs, the AM bundle was an average of 36.9 mm \pm 2.8mm in length, and 5.1 mm \pm 0.7mm in width. The PL bundle, by contrast, was an average of 20.5mm \pm 2.4mm in length, and 4.4 \pm 0.8mm in width. In the coronal plane, the width of the AM bundle was 4.2 \pm 0.8mm and the PL bundle 3.7 \pm 0.8mm. The inter-observer reliability for length of the ACL in the sagittal plane was .849 with a 95% CI of .748 to .911 for the AM bundle, and .748 with a 95% CI of .597 to .849 for the PL bundle.

Conclusion: This is the first study that quantifies the two anatomic bundles of the ACL based on MRI. Digital MRI allows for a high degree of accuracy. Providing precise measurement of the AM and PL bundles of the ACL on MRI allows for an accurate determination of damage to one or both of the bundles following injury.

Tunnel Positioning of AM and PL Bundle in Anatomic ACL Reconstruction (SS-10). *Thore Zantop, MD, Wolf Petersen, MD, Freddie Fu, MD*

Summary: The centre of the femoral PL bundle is shallow and inferior to the AM bundle. To reproduce the anatomy, it is mandatory to place the tunnels exactly within the femoral origin and tibial insertion of the ACL.

Purpose: Aim of the current study was to provide anatomical details of AM and PL bundle of the ACL giving guideline for tunnel positioning in anatomical ACL reconstructions.

Methods: A total of 20 human cadaveric knees (range 45-87 years) were dissected and the the medial femoral condyle cut to expose the ACL. The bundles were separated due to their tensioning pattern and the distances of the centre of AM and PL bundle to the

articular cartilage were measured. Radiographic analyses were performed using the techniques of Bernard and Hertel and Harner at the femur as well as the method by Harner and Stäubli and Rauschnig at the tibia.

Results: The center of the PL bundle was more shallow and inferior when compared to the center of the AM bundle with a distance of 6.5 mm and a mean of 5.8 mm to the shallow and inferior cartilage margin, respectively. On the tibia, the center of the AM bundle is aligned with the anterior horn of the lateral meniscus. According to Bernard and Hertel the center of the AM bundle is at 18.5% and 22.3% and the PL bundle at 29.3% and 53.6%. At the tibia, the centre of the AM bundle is at 30% and the PL bundle is located at 44% according to Stäubli and Rauschnig.

Conclusions: The centre of the femoral PL bundle is shallow and inferior to the AM bundle. To reproduce the anatomy, it is mandatory to place the tunnels exactly within the femoral origin and tibial insertion of the ACL.

Double Bundle ACL Reconstruction Better Restores the Tibiofemoral Pressure and Contact (SS-11). *Yusuke Morimoto, MD, Mario Ferretti, MD, Rodrigo Kaz, MD, Patrick Smolinski, MD, Freddie Fu, MD*

Summary: In order to evaluate the tibiofemoral pressure and contact area after ACL reconstruction, ten knees from cadavers were tested under 1000 N axial load. The tibiofemoral pressure and contact area were marked in a pressure measuring film placed between tibia and femur. Double-Bundle (DB) ACL reconstruction demonstrated better restoration of the average and maximum tibiofemoral pressure as well as tibiofemoral contact area when compared to the Single-Bundle (SB) ACL reconstruction. These in vitro findings may suggest that DB ACL reconstruction better preserve the cartilage after an ACL reconstruction compared to the SB ACL reconstruction.

Purpose: The long-term clinical outcomes of ACL surgery show a large amount of patients with cartilage degenerative changes. Biomechanical studies have shown that Double-Bundle (DB) ACL reconstruction better restores the knee biomechanics when compared to the conventional Single-Bundle (SB) ACL reconstruction. However, it is unknown whether the tibiofemoral cartilage pressure and contact area is better restored after DB reconstruction when compared to SB reconstruction. The purpose of this study is to evaluate the tibiofemoral pressure and contact area after SB or DB ACL reconstruction.

Methods: 10 knees from cadavers were used for this study. Five knees were tested for DB and five for SB