Background
Recent publications have described significant variability in the femoral attachment and overall anatomy of the anterolateral ligament (ALL). Additionally, there is a paucity of data on its structural properties.

Objectives
To provide quantitative data characterizing the anatomic and radiographic locations and the structural properties of the ALL to guide graft selection and placement and to facilitate future development of an evidence-based approach to ALL reconstructions.

Materials & Methods
Specimens
15 non-paired, fresh-frozen human cadaveric knees (male; mean age, 58.2 ± 11 years; range, 39-69 years). Knees with history of surgery, ligamentous injury, and/or indications of osteoarthritis were excluded. Tissues were kept moist with a 0.9% saline solution applied throughout all phases of testing.

Anatomic Dissection Technique
Identification of the ALL was performed by a combined outside-in and inside-out anatomic dissection. The ITB was inferiorly reflected to its distal aspect following a midsubstance incision 6 cm proximal to the lateral epicondyle. Previous literature has noted that fibers of the ALL become taut with an applied internal rotation between 30° and 60° of knee flexion.

Anatomic Data Collection
Quantitative anatomic relationships were made using a 3-dimensional coordinate measuring device (7315 Romer Absolute Arm; Hexagon Metrology). Measurements on anteroposterior (AP) and lateral radiographs were obtained by use of a picture archiving and communications system program (eFilm Workstation 3.4; Merge Healthcare Inc).

Biomechanical Testing
The distal end of the tibia was potted in poly(methyl methacrylate) (PMMA; Fricke Dental International Inc) and rigidly secured to the base of a tensile testing machine (ElectroPuls E10000; Instron). The vertical alignment of the anterolateral ligament during pull-to-failure testing (anterolateral view, left knee). Theibia was manipulated posteriorly relative to normal knee positioning to achieve vertical alignment of the anterolateral ligament (ALL). Immediately after preconditioning, each specimen was pulled to failure at 20 mm/min.

Failure mechanisms of the ALL included tearing at the femoral insertion, and/or indications of osteoarthritis were excluded. The Steadman Clinic, Vail, Colorado

Conclusions
- We observed that the capsular thickening of the lateral knee contains a ligament, the anterolateral ligament (ALL), primarily coursing from posterior and proximal to the lateral femoral epicondyle to the anterolateral tibia.
- The defined attachment locations can be augmented with intraoperative radiographs for reconstruction guidance.
- Failure mechanisms of the ALL included tearing at the femoral origin, intrasubstance tears, and bony avulsions of its tibial attachment (Segond fractures)

Clinical Significance
- The ALL was consistently found in all knees. Also, Segond fractures appear to occur primarily from avulsion of the ALL, which were posterior to Gerdy’s tubercle.
- For surgical reference: the ALL originated on the femur posterior and proximal to the FCL attachment and coursed anteromedially to its anterolateral tibial attachment. All specimens had an attachment between the ALL and the lateral meniscus.
- If necessary, the ALL can be adequately reconstructed using soft tissue grafts.

Acknowledgements

References