

INTRO/BACKGROUND

- As the incidence of pediatric ACL tears continuously increases, there are a greater number of ACL reconstruction (ACLR) procedures.
- Growth deformity and limb-length discrepancy are risks associated with pediatric ACLR.
- The Micheli, iliotibial band (ITB) technique takes an extra-osseous approach to ACLR minimizing these risks for future growth complications.
- Literature on neurovascular complications during ACLR is scarce.

OBJECTIVES/AIMS

- Evaluate the Micheli ITB graft passage technique for ACLR using cadaveric knee models.
- Measure the distance between surgical instrument tip and the neurovascular bundle in the posterior knee joint: peroneal nerve, tibial nerve, and popliteal artery.

METHODS

- Gross dissection of 17 pediatric cadaveric knees (12M and 5F) ages 4-12.
- Curved-tip hemostat clamp passed through to posterior capsule, with knee flexed to 90-100°.
- Clinical photographs taken and digital imaging software (Image J) was used to measure the distance in cm.

RESULTS

- In the majority of our specimens, the surgical clamp tip was found to lie within 1 centimeter of the tibial nerve and popliteal artery.
- Among the 11 to 12-year-old group, there was increased distance from clamp tip to the peroneal nerve (95% CI=[0.6, 2.2], p=0.005).

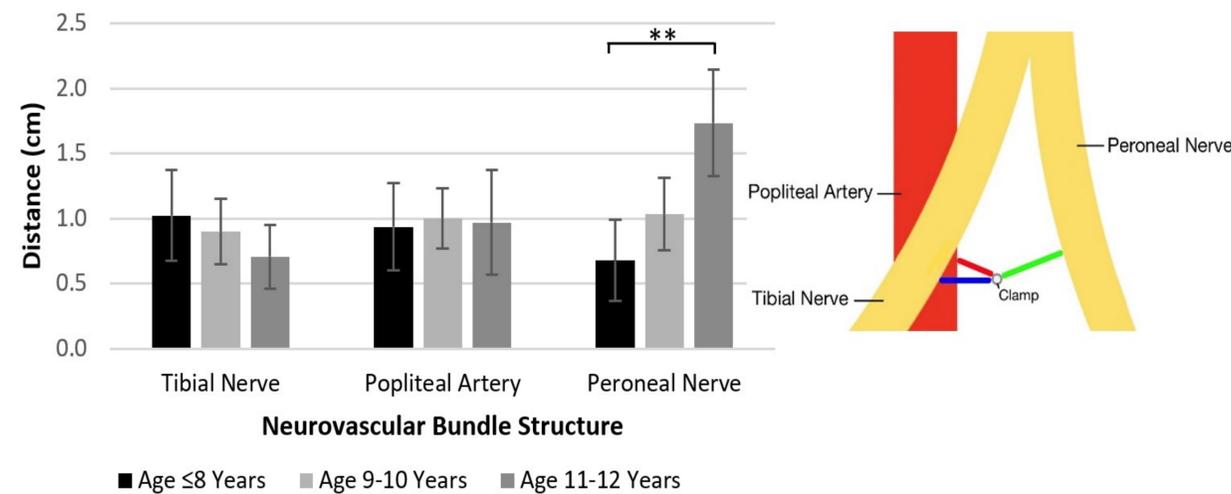


Figure 1. Average distance from clamp tip to neurovascular bundle by age. Error bars = 95% CI, **p <0.01

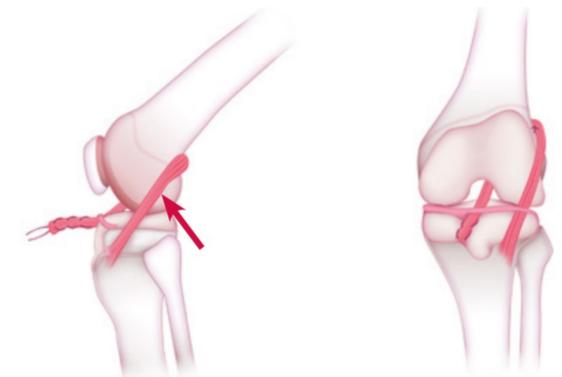


Figure 2. Lateral View: Clamp positioning after passage through intercondylar region to posterior knee joint on 3D pediatric knee model.



Figure 3. Measurements (cm) from clamp tip to neurovascular bundle structures in right knee specimen. Red line to tibial artery, blue line to tibial nerve, and green line to peroneal nerve.

PROCEDURE



LIMITATIONS

- Two-dimensional analysis of a three-dimensional anatomic relationship.
- Fluid insufflation during ACLR procedure may allow for slightly greater working room between the posterior knee capsule and neuro-vascular structure during ACL graft passage.

CONCLUSIONS

- While the Micheli ITB ACLR technique has proven to have the least risk of growth complications, great care must be taken when performing this procedure to avoid damage to the neurovascular structures at the posterior knee.

FUTURE DIRECTIONS

- Future research on instrument design, approach for graft passage may enhance surgical technique and decreased risk of neurovascular complications.