

A Matched Cohort Study of Posterior Tibial Slope in Primary Pediatric ACL Reconstruction Compared to Unaffected Peers

Introduction: Posterior tibial slope (PTS) $>12^\circ$ has been reported as an important adult morphological risk factor for ACL reconstruction (ACL-R) failure.¹ In the pediatric population, increasing lateral tibial slope as measured on MRI has been associated with increased risk of ACL rupture.² The purpose of this study is to compare radiographic PTS between pediatric patients undergoing ACL reconstruction to age and sex matched patients without knee pathology, as well as characterize changes in PTS by age and sex.

Methods: Pediatric patients (age ≤ 18 years) undergoing primary ACL-R from July 2017 to February 2023 at a single academic center were retrospectively identified. Patients without adequate imaging were excluded. An age and sex matched cohort without known osseous or ligamentous pathology was identified in a 2:1 ratio as the control. Posterior tibial slope (PTS) was measured by 3 independent examiners using the proximal anatomic axis of the tibia and average of the medial and lateral tibial plateaus.³ Interobserver reliability was calculated. Independent samples t-tests were used to compare PTS between affected and controls, while linear regression analysis was used to characterize the relationship between age and PTS.

Results: 281 patients who underwent primary ACL-R and 562 age and sex matched patients were included. There were 148 males at an average age of 15.9 years who underwent ACL-R with a measured PTS of $9.3 \pm 0.417^\circ$ compared to $9.1 \pm 0.355^\circ$ in the control group. There were 133 females at an average age of 15.8 years who underwent ACL-R with a measured PTS of $9.3 \pm 0.449^\circ$ compared to $9.0 \pm 0.382^\circ$ in the control group (Figure 1). There was no statistically significant correlation between age and posterior tibial slope.

Conclusion: Aside from 14-year-old females, this study demonstrates no statistically significant difference in PTS measured on radiographs among pediatric patients undergoing primary ACL-R when compared to age and sex matched peers.