

Increased Posterior Tibial Slope (PTS) is Associated with ACL graft and Contralateral ACL Injury after ACL Reconstruction

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Introduction:

ACL injury is multifactorial, but previous studies have shown that an increased PTS can be a risk factor for primary ACL injury. The purpose of this study is to determine if an increased PTS also predisposes to a second injury after ACL reconstruction, either an ACL graft rupture or a contralateral ACL rupture.

Methods:

A total of 200 consecutive patients with isolated ACL ruptures who underwent primary reconstruction with hamstring autografts were enrolled in a prospective longitudinal study over 15 years.

The PTS was measured from a lateral knee radiograph by 2 blinded orthopaedic surgeons using Proximal Anatomical Axis (PAA) on OsiriX software. Measurers were blinded to clinical outcome.

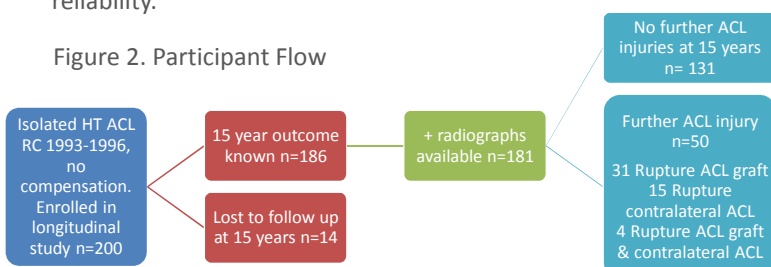


PAA = most parallel to sagittal mechanical axis (mean angle difference: -0.2°)
PTS = angle between MEDIAL tibial plateau and the proximal anatomic axis.
Ref: Anatomical References to Assess the Posterior Tibial Slope in Total Knee Arthroplasty: A Comparison of 5 Anatomical Axes (J Arth 2008)

The data were analysed for the association between an increased posterior tibial slope and the incidence of further ACL injuries. The inter-observer reliability of the posterior tibial slope measurements was assessed.

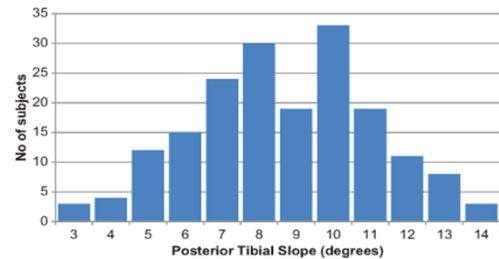
Results: There were 90 females and 91 male patients. There were 93 right sided reconstructions and 88 left sided reconstructions. The mean time to surgery was 6.7 months from injury (range 1-84). The mean time to review was 15 years (range 14.25 to 16.9). The participant flow is shown in Figure 2. The intraclass correlation coefficient of the 2 measurers was 0.88 (95% CI 0.85-0.91), indicating very high inter-rater reliability.

Figure 2. Participant Flow

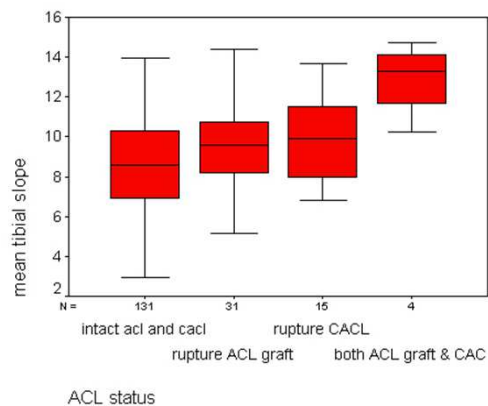


Results:

The distribution of PTS is shown in Figure 3.



The mean PTS for a patient with any further injury was 9.9° compared to 8.5° with no further injury ($p=0.001$). The mean PTS for each of the groups of further injury is shown in Figure 3.



There were 22 patients with a PTS of more than 12° (12%). Subjects with a PTS of more than 12° had a 59% incidence (13 of 22 subjects) of further ACL injury compared to a 23% incidence (37 of 159) for those with a PTS of 12 or less ($p=0.001$) (Figure 4).

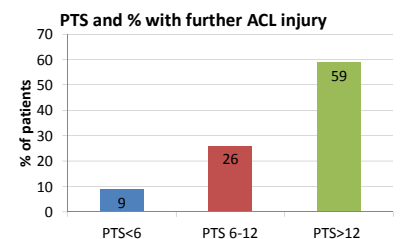


Table 1: Regression analysis of variables of tibial slope, age < 18 years and gender on the odds of further ACL injury.

Factor	Odds Ratio	95% CI	P value
PTS of $\geq 12^\circ$	5.2	2.1-13.8	0.001
Age < 18 years	2.9	1.2-6.7	0.016
Male sex	0.9	0.4-1.8	0.683

Conclusion: An increased PTS is associated with an increased incidence of further ACL injury after ACL reconstruction. A PTS of $>12^\circ$ occurs infrequently but increases the odds of further ACL injuries by a factor of 5. Suitable counselling regarding this risk is warranted in those with a very high PTS.