

Static lateral tibial plateau subluxation on MRI is associated with measured laxity at one year following ACLR

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INTRODUCTION:

Anterior lateral tibial plateau translation (ATT) as measured on MRI has been shown to be predictive of anterior cruciate ligament (ACL) rupture and is correlated with high grade rotatory laxity in ACL deficient knees. Post operative laxity following ACL reconstruction (ACLR) has also been shown to predict re-rupture and return to sports rates, and can be assessed objectively using the GNRB® arthrometer. To date, the relationship between ATT and postoperative laxity has not been established, and this study therefore investigated the relationship between laxity as measured on GNRB® and ATT at 1 year post ACLR.

METHODS:

A retrospective analysis was conducted of 172 patients who had undergone both high resolution standardised protocol 3T MRI scan and completed GNRB laxity testing at 1 year following ACLR. The measured variables were ATT in millimetres (mm) on MRI, and maximum anterior displacement of the tibia (TD, also in mm) at 200N of force using the GNRB machine. Analysis was carried out with SPSS version 28 with descriptive statistics to calculate means, standard deviations (SD) and range. Independent samples *t*-test was used to compare means between two cohorts of ATT determined by the post hoc cut off, and linear regression to investigate correlation between ATT and TD. Significance was set at $p < 0.05$.

RESULTS:

Mean ATT was 3.9mm (SD 2.4, range 0 - 12), and mean TD was 8.5mm (SD 2.2, range 4 – 15). To allow comparison between two cohorts of ATT, a cut off was set at 4mm which was in keeping with both median and mean values for our cohort and available literature on ATT. There was a significant difference ($p < 0.001$) when comparing TD between the cohort with ATT less than 4mm and those greater or equal to 4mm ($n=85$ vs $n=87$, mean TD 7.9mm vs 9.1mm respectively). ATT and TD were found to be weakly correlated ($r = 0.4$, $p < 0.01$).

DISCUSSION AND CONCLUSION:

ATT of greater than 4mm measured on MRI scan at 1 year post ACLR was predictive of increased laxity. Our findings support the use of this measure as a generalisable and easily accessible tool to identify patients with residual laxity post ACLR who may be at increased risk of re-rupture and poorer outcomes. This is the first study to investigate ATT as a surrogate measure of objective laxity following ACLR.