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A Radiographic Investigation Exploring Differences In Static Anterior Tibial Translation Expressed As A Percentage Between Acl Injured Cohort And Controls, In The Hope To Improve Inter-Institutional Utilization Of Normative Values.

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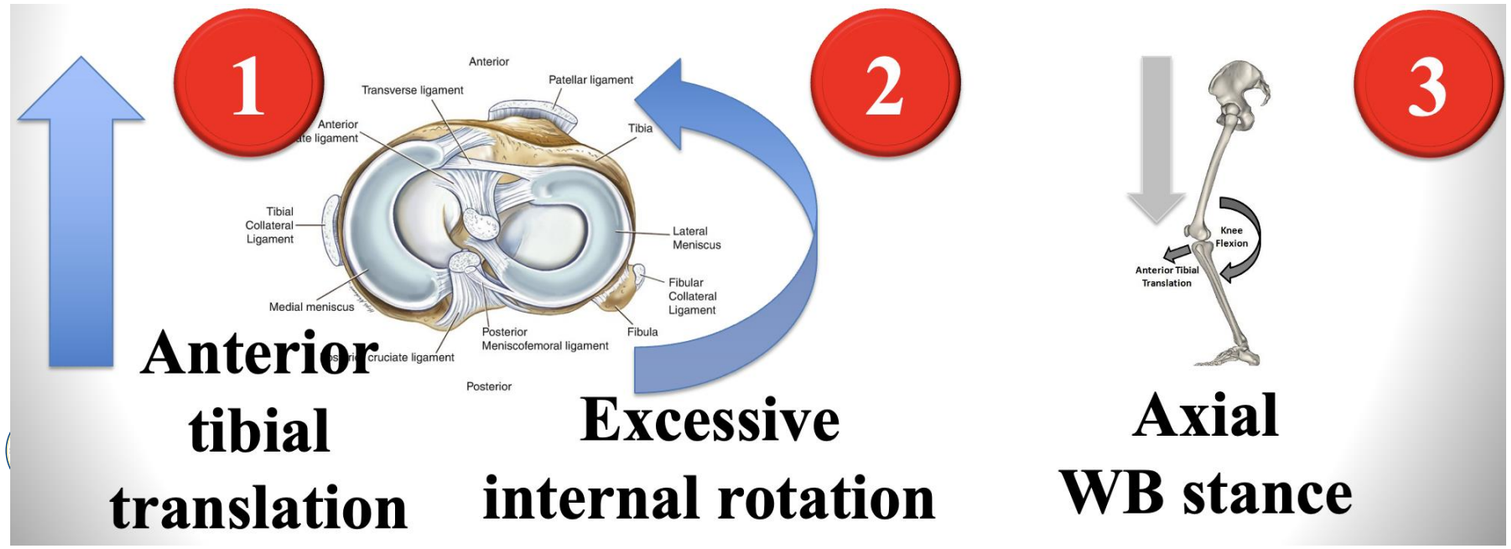
Faculty Disclosure Information

- Nothing to disclosure

Introduction

Laxity in ACL surgery can be assessed by the response to:

1) Translational force – Lachman test/ KT-1000
2) Excessive internal rotation- Pivot shift
3) Axial load- ‘Static anterior tibial translation’



Introduction- Axial load measurement

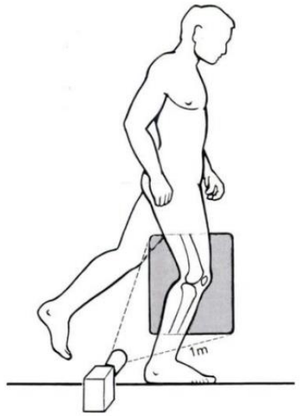


Fig. 1

The technique of the lateral monopodal stance test.

Fig. 2

The radiological measurement of medial anterior tibial translation (MATT-MS) in a monopodal stance test on a patient with chronic anterior laxity of one knee. On the right knee which had ACL rupture and a damaged medial meniscus, the MATT-MS was 10 mm, on the left (normal) knee it was 2 mm, giving a difference of 8 mm.

Static anterior tibial translation(SATT)
= In vivo measure of ACLR graft stress.

= radiographic measure of the amount of tibial translation
in response to the physiological **axial load** during a single-leg stance

H Dejour et al first described SATT but only in ACL injured limb + contralateral limb, no true 'normal' cohort

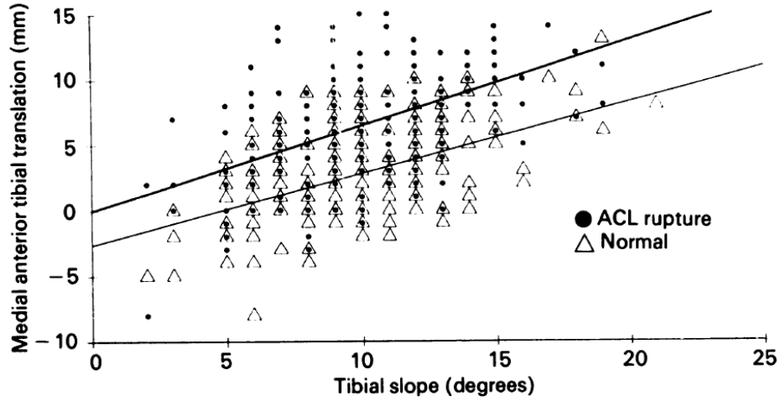


Fig. 6

Correlation between the slope of the tibial plateau and medial anterior tibial translation in monopodal stance (see text).

Slope and translation correlated, even if ACL intact

Introduction- Axial load measurement

The American Journal of Sports Medicine

Radiographic Investigation of Differences in Static Anterior Tibial Translation With Axial Load Between Isolated ACL Injury and Controls

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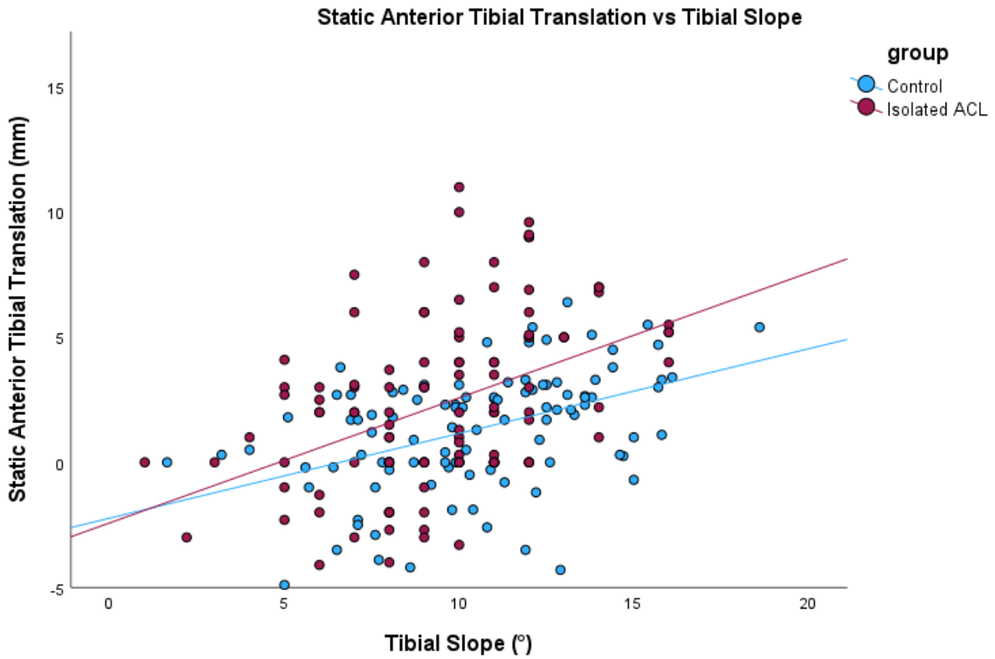

Normal values for SATT established for controls and ACL injured patients

SATT increases 4.5-6mm per 10 degrees of slope

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Introduction- Axial load measurement

Issue= **SATT is an absolute value-** issues related to magnification and size of patient

Wide variation in values reported in the literature

SATT values reported for ACL injured patients were 2.43mm by Cance= in agreement with D. Dejour et al who reported mean values of 2.3-2.4mm

vs

H. Dejour reported mean values of 2.9mm in the contralateral uninjured leg, and 6.4mm in the ACL deficient

vs

Macchiarola et al. reported mean values of 3.1mm in the contralateral uninjured leg, and 5mm in the ACL deficient leg

Our **goal was to define SATT expressed as a percentage** of the medial plateau distance to improve accuracy and inter- institutional utilization of SATT.

Methods

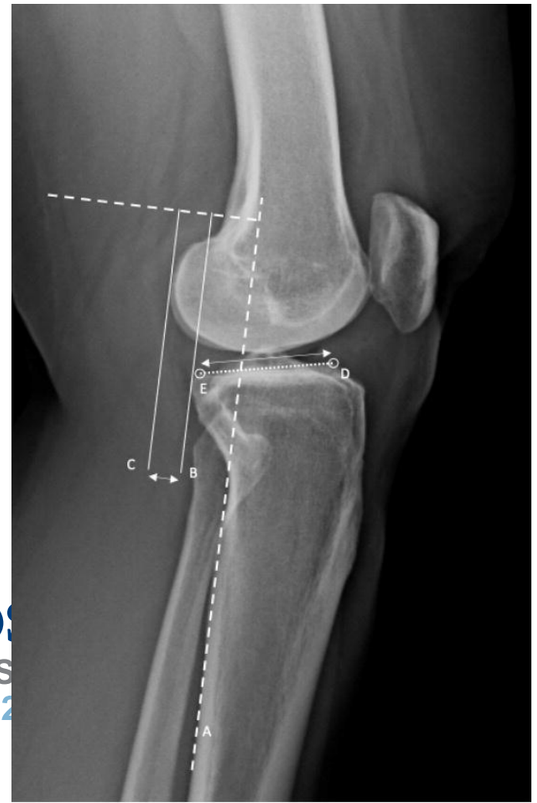
Consecutive series of patients without ligamentous or meniscal injuries between 2019 and 2022 was reviewed.

A matched consecutive cohort nonacute ACL injuries (surgery between 6 and 12 weeks after injury) without concomitant pathology was reviewed.

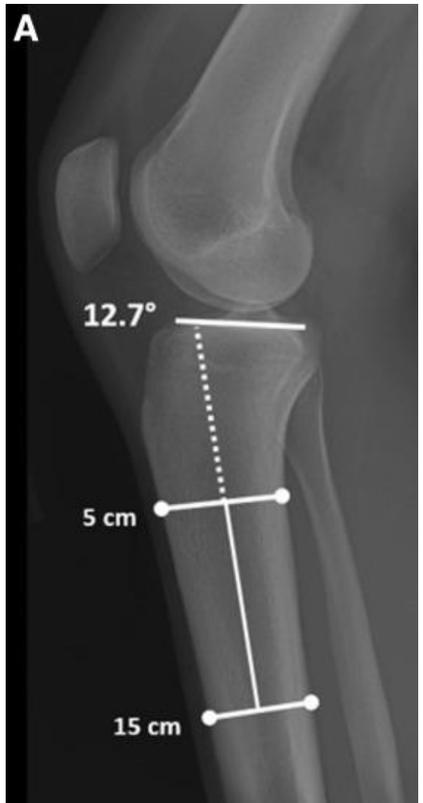
Methods

Measure and performed regression analysis;

SATT%= SATT(B-C)/
medial plateau distance(D-E)



Slope



Results

101 controls +115 ACL deficient patients

	Control cohort	ACL cohort	p value
Gender	Male 36.6%	Male 48.7%	0.074
Side	Right 51.5%	Right 52.2%	0.98
Weight (Kg)	**65.09(12.25)**	**69.20(12.39)**	**0.05**
Height (cm)	169.67(10.44)	170.24(9.18)	0.74
BMI	**22.49(2.92)**	**23.79(3.47)**	**0.02**
Age	**22.91(8.02)**	**32.81(10.74)**	**<0.001**
MPD	**41.04(7.07)**	**45.43(8.27)**	**<0.001**
SATT (mm)	**1.31 (2.44)**	**2.27(3.36)**	**0.02**
SATT (%)	**3.18 (5.92)**	**5.16(7.41)**	**0.04**
PTS (°)	**10.61 (3.28)**	**9.46(2.85)**	**0.02**

statistically significant difference in the mean age between the cohorts (p<0.001).
There was no statistically significant correlation between SATT and age (p=0.263) or sex (p=0.103).
There was no statistically significant correlation between PTS and age (p=0.802) or sex (p=0.106).

Medial Plateau Distance was correlated with height a Pearson Correlation Coefficient in females of 0.22 (p =0.05), and males 0.28 (p=0.04).

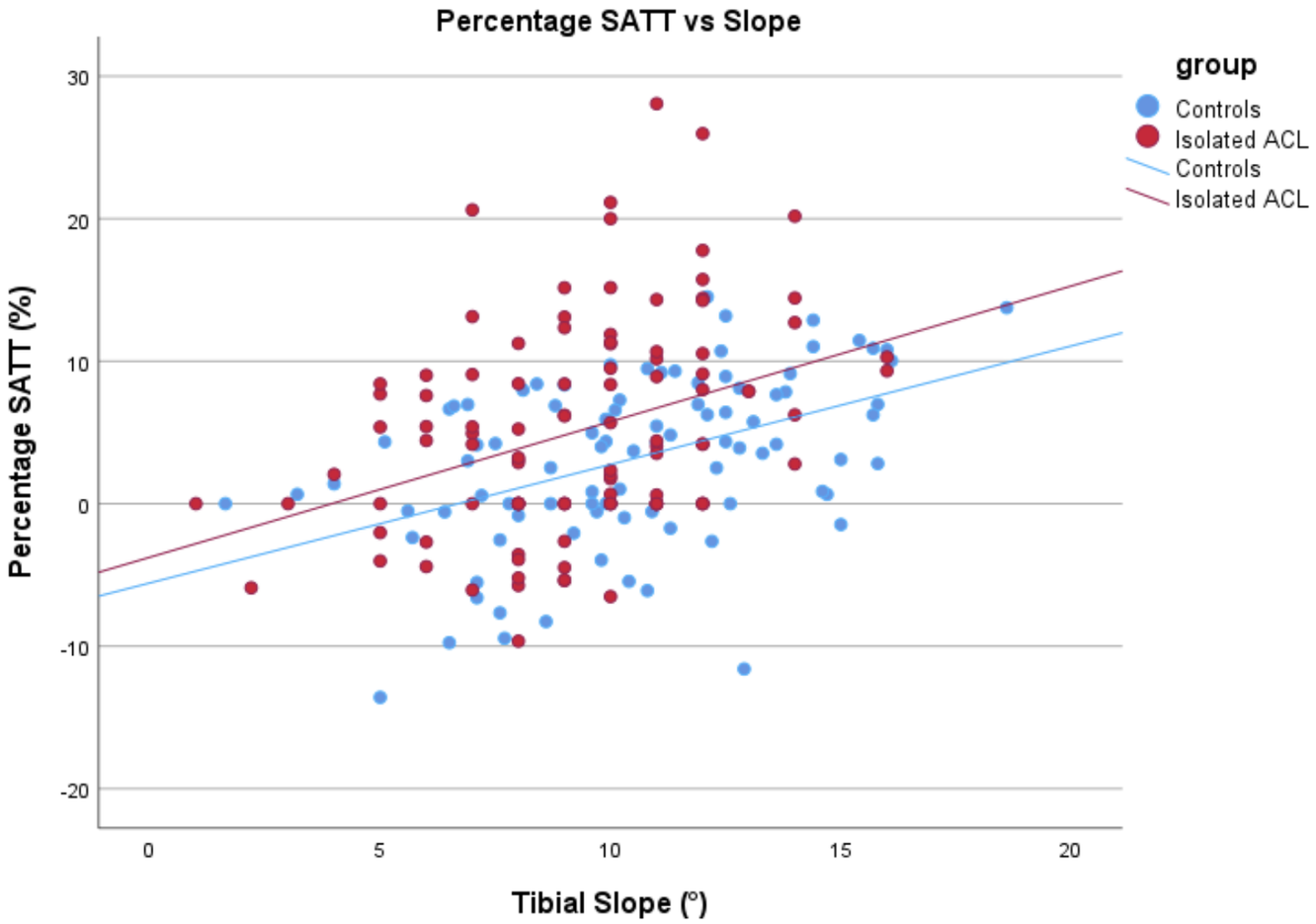
Results

Control **mean SATT % was 3.18%** (SD 5.92)

-every 1 degree of increase in PTS, there was a 0.08%increase in SATT%

ACL **mean SATT % of 5.16%** (SD 7.41)

- every 1 degree of increase in PTS, there was an increase of 0.97% SATT%



Discussion

The most important finding of this paper was that the SATT expressed as a percentage of the medial tibial plateau distance, is elevated in acute ACL injured patients, compared to non-ACL patients, despite the ACL cohort having a longer medial plateau.

SATT did not correlate with BMI, or height or weight of the patient. Given SATT represents anterior tibial translation due to axial load, it would be intuitive that as the weight or BMI increased, so to would the axial load and the subsequent anterior tibial translation during single leg stance.

Discussion

Given SATT;

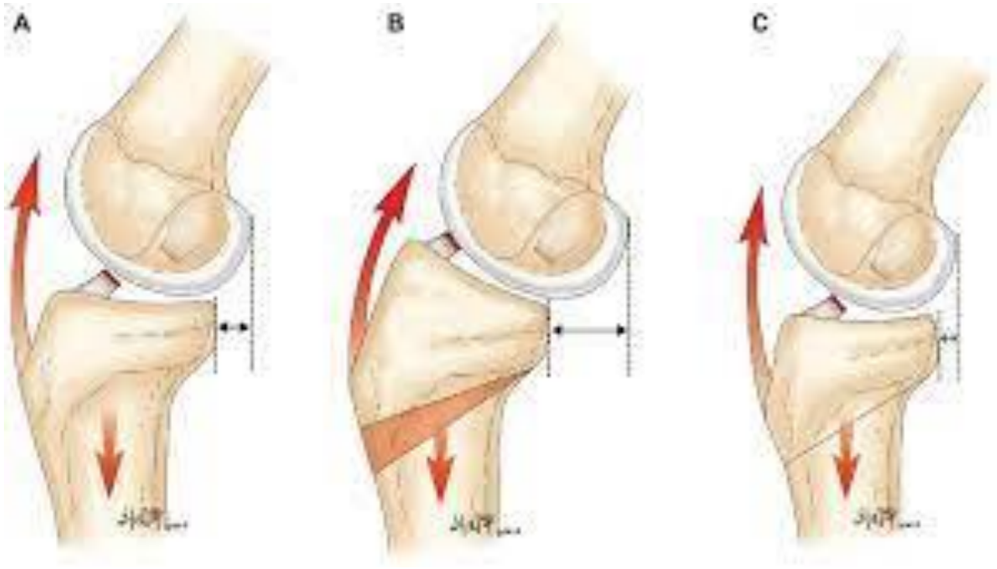
has also been proven to be independently associated with increased odds of graft failure

Is not decreased by ACL reconstruction alone

Is only improved by a slope reducing tibial deflexion osteotomy

Importance of aggreeance for SATT reference values is of upmost importance

SATT percentage should improve the agreement of SATT values between institutions, allow the use of non-true size radiographs, and therefore increase the usability of threshold values



Conclusion

The present study reports a reference SATT percentage value of 3.18% in a non-ACL injured cohort, which was lower than in the ACL cohort mean 5.16%, despite the ACL cohort having a longer medial tibial plateau than the control population.

The effect of slope on weight bearing anterior tibial translation was greater in the ACL population compared to the control cohort.

These scaled, percentage values should improve the inter institutional usage of Static Anterior Tibial Translation in the assessment of ACL injury and potential tibial deflexion osteotomy.

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