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The relationship between knee stability after ACL reconstruction and anterior tibial subluxation

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I have no COI with regard to our presentation

【Introduction】

＊Anterior tibial subluxation (ATS) is seen in anterior cruciate ligament (ACL) injured knees in knee extension.

Almekinders LC, et al.Arthroscopy 2001

＊Preoperative ATS affects postoperative anterior and rotation stability and risks early graft failure.

Tanaka Y, et al. Orthop J Sport Med 2018

＊Preoperative ATS influenced knee stability after ACLR.

Takase R, Hatayama K, et al. ISAKOS 2019

【Purpose】

The purpose of this study was to investigate the association between knee stability after ACL reconstruction and ATS.

【Methods】

＊The inclusion criteria

A total of 113 patients who underwent primary ACL reconstruction at our hospital from July 2017 to December 2021 were included (58 females, 55 males)

＊The exclusion criteria：Contralateral ACL injury, multi-ligament injuries

＊Preoperatively and 1 year postoperatively, all patients were taken lateral radiographs in full extension of both knees to evaluate ATS.
ATS was measured and side to side difference (SSD) was calculated.

【Methods】

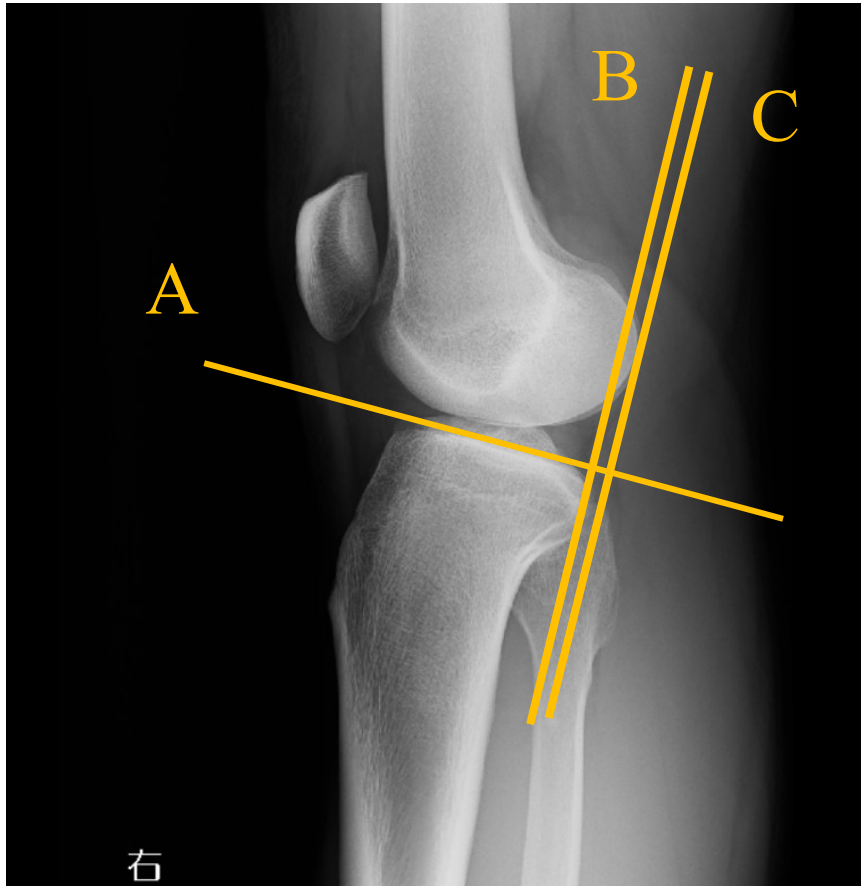
Evaluation items

* Age, Height, BMI, Gender, Time from injury to surgery, Mechanism of injury
* Posterior tibia slope (PTS), Hyperextension angle from knee radiographs
* Preoperative and postoperative ATS
* Anterior tibial translation (ATT) using Telos Stress device at 20 degrees
* Meniscal tear in arthroscopy
* Pivot shift test (N test) at 1 year postoperatively

Patients with SSD in ATT of 3 mm or more at 1 year postoperatively were classified into the Failure (F) group, and those with less than 3 mm into the Success (S) group.

J Beldame, et al. OTSR 2011

【ATS measurement】



A：Medial tibial plateau

B：A line perpendicular to A and passing through the midpoint of the medial and lateral condyles of tibia

C：A line perpendicular to A and passing through the midpoint of the medial and lateral condyles of femur

ATS was measured the distance from **B** to **C**

【Result】

＊F group **36** patients

＊S group **76** patients

Mean ATT at 1 year: 2.1 ± 2.1 mm

	F group (n=36)	S group (n=76)	p value
Age (year)	25.4 ± 11.2	31.2 ± 14.0	**0.015**
Height (cm)	163.9 ± 8.2	166.2 ± 8.5	0.183
BMI (kg/m²)	23.2 ± 3.7	25.2 ± 4.9	**0.033**
Sex (M/F)	17 / 19	38 / 38	0.841

	F group (n=36)	S group (n=76)	p value
Preop. ATS (mm)	2.5 ± 2.0	1.3 ± 1.5	**0.002**
Postop. ATS (mm)	1.7 ± 2.5	0.4 ± 1.9	**0.003**
Preop. ATT (mm)	8.4 ± 4.1	5.9 ± 3.3	**0.001**
Pivot shift test at 1year postop. (glide, clunk, gross)	8 / 1 / 0	1 / 1/ 0	**0.001**

F group characteristics:

Younger age, Lower BMI, Higher pre and postoperative ATS

Larger preoperative ATT, Positive pivot shift test

【Result】

		F group (n=36)	S group (n=76)	p value
PTS (°)		10.0 ± 2.9	10.1 ± 2.5	0.805
Hyper extension angle (°)	Injured side	+5.0 ± 4.0	+4.8 ± 4.1	0.761
	Contralateral side	+6.0 ± 4.1	+6.3 ± 4.0	0.685
Graft choice (ST / BTB)		34 / 2	73 / 3	0.810
Time from injury (day)		423 ± 1269	581 ± 1460	0.579
Time from injury 6 month or more (n)		9 (25%)	20 (26%)	0.882

	F group (n=36)	S group (n=76)	p value
Meniscal tear	30 (83%)	43 (56%)	**0.006**
ramp lesion	17 (47%)	19 (25%)	**0.008**
MM tear (including ramp lesion)	24 (67%)	27 (36%)	**0.002**
LMPRT	8 (22%)	10 (13%)	0.223
LM tear (including LMPRT)	21 (58%)	30 (39%)	0.061

F group had significantly more

Medial meniscus tears, Ramp lesions

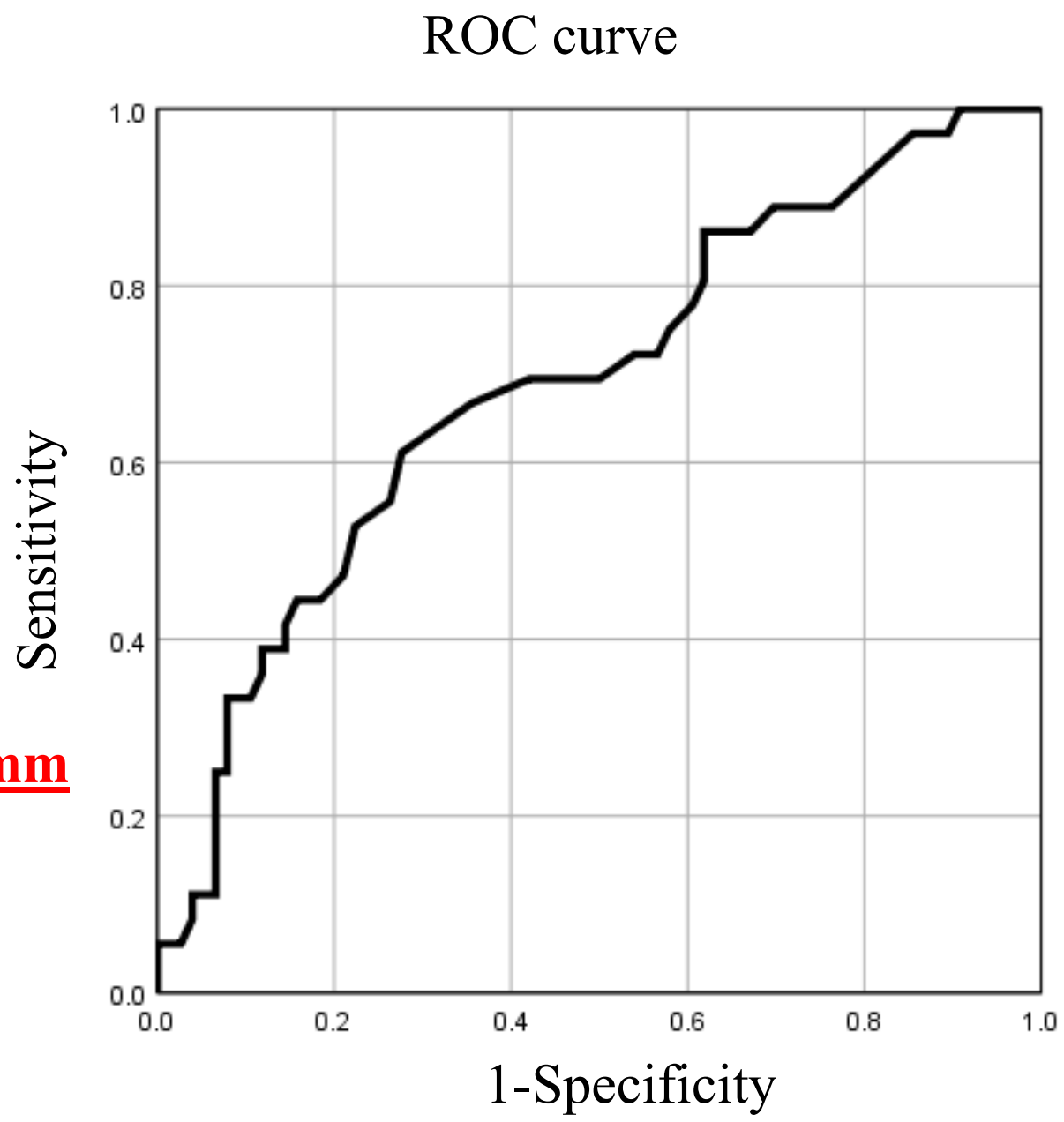
【Result】

ROC Analysis

＊Predicting instability at 1 year
(ATT SSD ≧ 3 mm)

＊AUC = 0.690

＊Optimal cutoff for preoperative ATS = **1.85 mm**



【Discussion】

＊ROC analysis in this study identified a cut-off value of preoperative ATS as **<u>1.85 mm</u>** (postoperative ATT SSD ≥ 3 mm)

＊**Associated factors with postoperative instability**:

・Younger age　・Medial meniscus injury　・Ramp lesion

・Preoperative ATS > 1.85 mm　・Postoperative rotational instability

Patients with these risk factors may experience residual anterior and rotational instability after ACL reconstruction.

<u>Consideration of additional procedures such as **LET or ALL reconstruction** may be warranted</u>

【Conclusion】

Postoperative instability after ACLR is associated with:

- Greater ATS
- Younger age
- Medial meniscus tears
- Ramp lesions
- Postoperative rotational instability

【Reference】

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