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Risk factor of failure after the revision anterior cruciate ligament reconstruction

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ISAKOS CONGRESS 2023

COI Disclosure

There are no COI to disclose

Background

Graft failure rate after revision anterior cruciate ligament (ACL) reconstruction is around 6-14% [1-3]

3-4 times higher than that of primary surgery

Risk factors for primary reconstruction [4-7]

Patient factors	Concomitant injury	Anatomical factors
✓ Age at initial injury	✓ Meniscal injury	✓ Posterior tibial slope
✓ Joint laxity	✓ Chondral injury	✓ Anterior tibial translation
✓ BMI		

Lacks data about risk factors of failure after revision surgery

Purpose

- To investigate risk factors of graft failure after revision ACL reconstruction

Hypothesis

- Hyperextended knee, large posterior tibial slope (PTS), and anterior tibial translation (ATT) are risk factors of graft failure after revision ACL reconstruction

Patients

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Retrospective analysis (2014-2020)

Inclusion

- ✓ Underwent revision ACL reconstruction in our hospital
- ✓ Flow up > 1 year

Exclusion

- ✓ Post operative infection
- ✓ Insufficient radiographic data

Patients (n): 46 (18 males/ 28 females)
Mean age at injury (years): 20.1 (13-53)

Group N	Group F
No failure	Failure

Method

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Patient characteristics

Sex

Age at initial injury

Tegner activity score

Period from injury to surgery

Hyperextended knee

Contralateral injury

Preop pivot shift test grade

Preop KT2000 SSD

Operative factors

Meniscal injury (medial/lateral)

Chondral injury

Graft (hamstrings/BTB)

Preop image

Space for the ACL (sACL)(Xp)

Medial/Lateral PTS (CT)

Medial/Lateral ATT (CT/MRI)

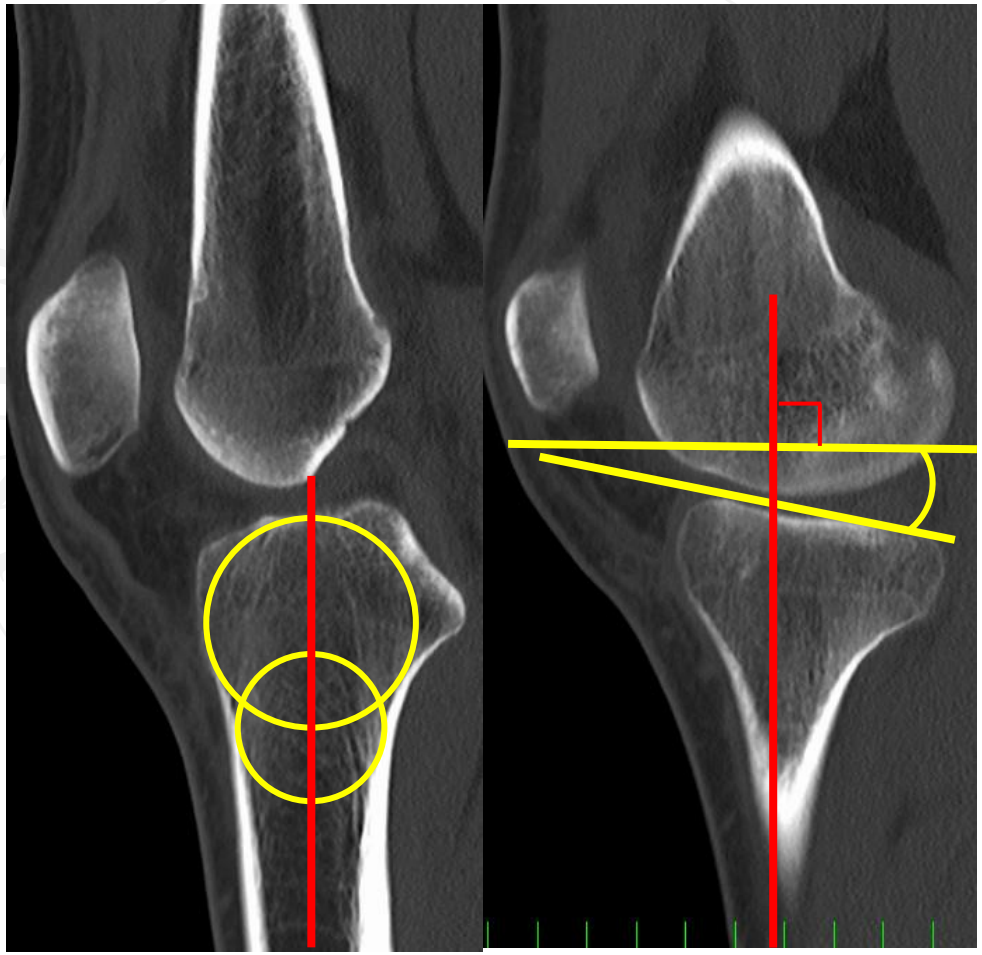
✓Univariate analysis of each factors

✓Multivariate analysis using significant risk factors from univariate analysis

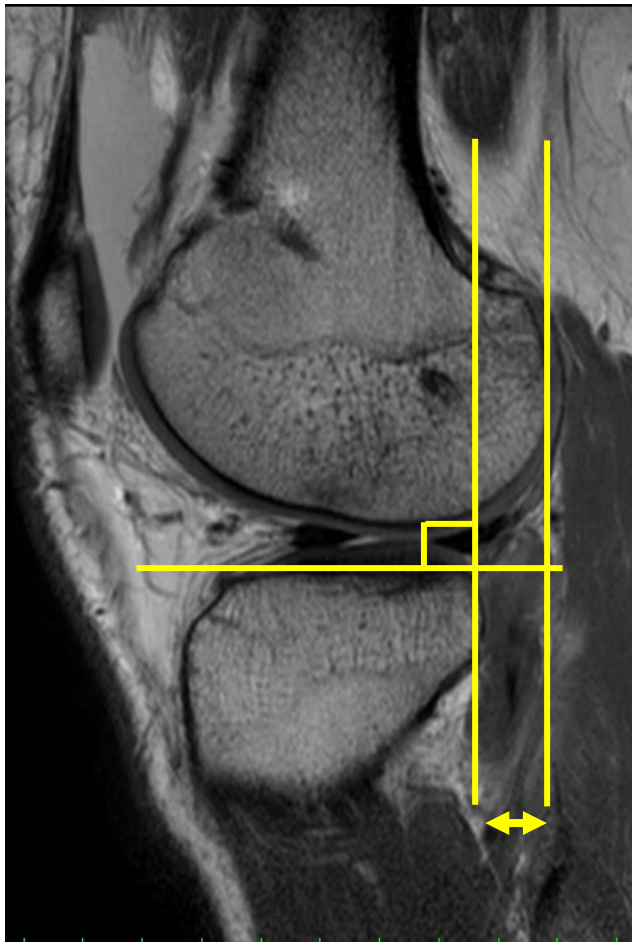
Method (radiographic measurement)

sACL (mm) [8]

PTS (°) [9]



ATT (mm) [7]



Univariate analysis（patient characteristics）

Failure rate 13.0%

	Group N (n=40)	Group F (n=6)	P value
Sex (M/F)	17/23	1/5	0.38
Age at initial injury	20.8±7.7	15.8±1.5	0.051
Tegner activity score	7.1±2.2	7.3±3.6	0.33
Period from injury to revision surgery	5.6±9.4	4.7±6.1	0.87
Hyperextended knee (yes/no)	6/34	5/1	0.0018
Contralateral injury (yes/no)	6/33	2/4	0.079
Preop pivot shift test grade (grade 0-1/grade 2,3)	14/26	2/4	1.0
Preop KT-2000 SSD (mm)	6.5±3.1	9.0±3.3	0.11

Mean±SD

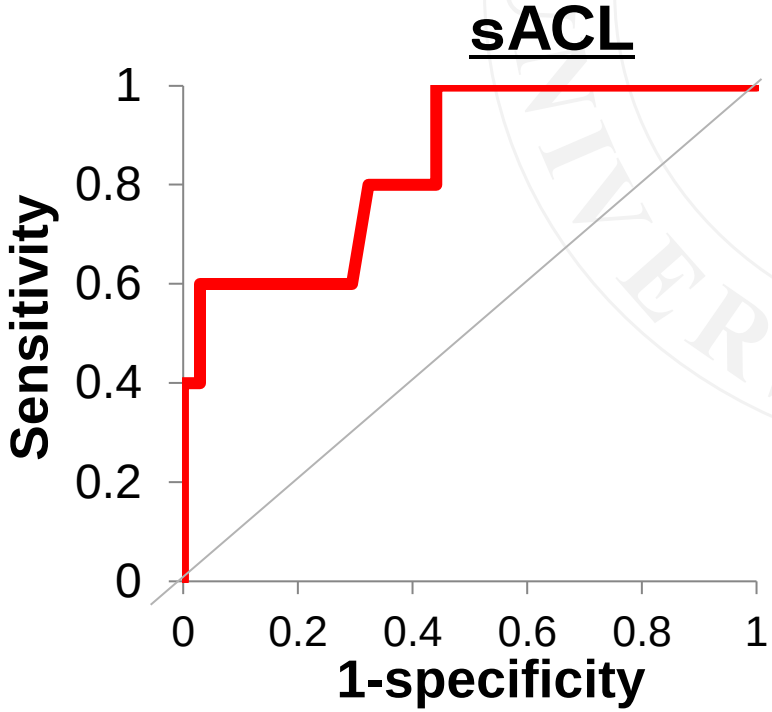
Univariate analysis (operative factors, preop image)

	Group N (n=40)	Group F (n=6)	P value
Medial meniscus injury (yes/no)	17/23	5/1	0.090
Lateral meniscus injury (yes/no)	15/25	2/4	0.29
Chondral injury (yes/no)	10/30	3/3	0.33
Graft (BTB/ST)	36/4	6/0	1.00
sACL (mm)	13.4±4.7	7.2±3.4	0.0042
Medial PTS (°)	6.5±3.0	5.5±3.2	0.34
Lateral PTS (°)	6.5±2.9	8.1±3.9	0.45
Medial ATT CT (mm)	1.6±2.5	2.3±4.1	0.78
Lateral ATT CT(mm)	-0.21±3.2	1.7±5.4	0.41
Medial ATT MRI(mm)	2,2±3.3	4.3±3.2	0.078
Lateral ATT MRI(mm)	4.4±4.0	7.1±4.3	0.14

Multivariate analysis

	Regression coefficient	Odds ratio	Odds ratio 95%CI		P value
			Min	Max	
Hyperextended knee	3.2	24.3	1.4	429.4	**0.029**
sACL	-0.54	0.58	0.35	0.98	**0.040**

ROC analysis (sACL)



Cut off 6.9mm

Sensitivity (SE) 67%

Specificity (SP) 97%

Area under curve(AUC) 0.87

Discussion (risk factors)

Patient characteristics

Sex

Age at initial injury

Tegner activity score

Period from injury to surgery

Hyperextended knee

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Preop KT2000 SSD

Operative factors

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Chondral injury

Graft（hamstrings/BTB）

Preop image

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Medial/Lateral PTS(CT)

Medial/Lateral ATT (CT/MRI)

Discussion (sACL)

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sACL

New parameter to evaluate anterior tibial subluxation

Predicting graft failure

Cutoff for preop sACL：10.2mm

（AUC 0.903, SE 86.2%, SP 81.8%）[8]

Present study

Cut-off for preop sACL：6.9mm

（AUC 0.87, SE 67%, SP 97%）

Could be useful parameter to predict graft failure after revision surgery

Conclusion

- Hyperextended knee and small preoperative sACL are risk factors of graft failure after revision ACL reconstruction

Reference

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