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Passive Anterior Tibial Subluxation after Anatomic ACLR. An MRI analysis.

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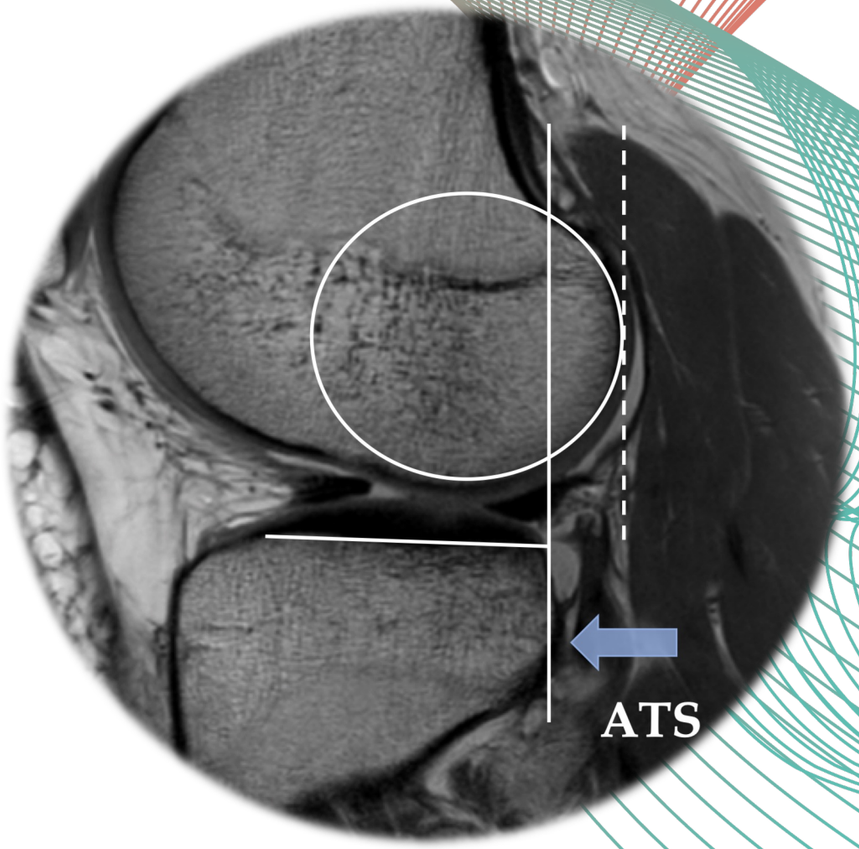
INTRODUCTION

- Anterior Tibial Subluxation (ATS)
  - 3.5 mm is highly specific of complete ACL tears [1]
  - A 6 mm threshold is needed to produce a positive pivot shift test [2]

- Factors related to the amount of ATS [3]:
  - increased posterior tibial slope (PTS)
  - concomitant injuries (meniscus, articular cartilage, or anterolateral ligament)
  - chronic ACL tears
  - ACL re-ruptures



INTRODUCTION

- Several studies have shown that subluxation is often irreducible and that the normal tibiofemoral relationship is not reestablished with ACL reconstruction (ACLR) [4].

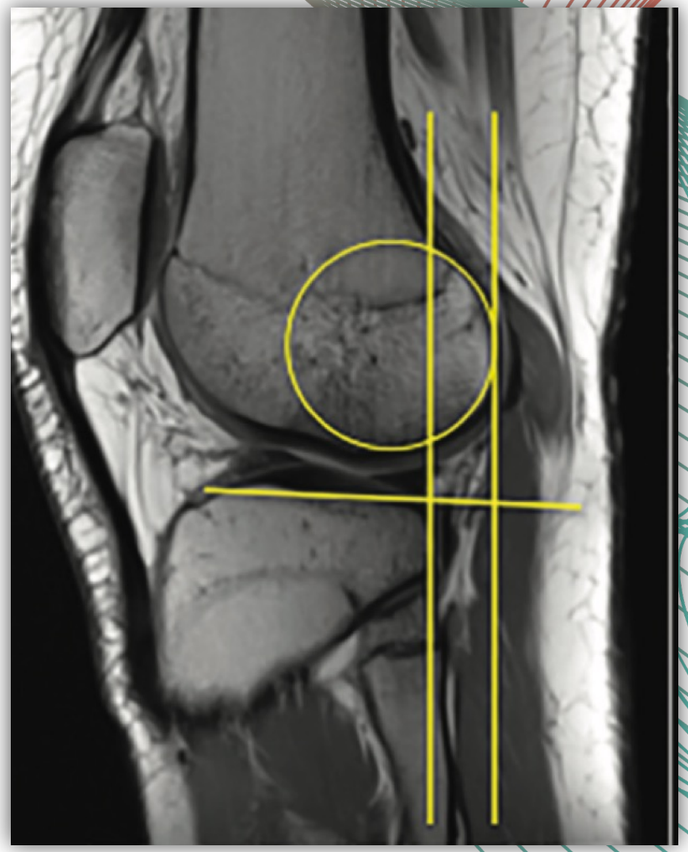
- Persistent postoperative ATS is associated with:
  - inferior knee stability
  - worse clinical outcomes
  - risk factor for ACL failure (common finding in cases of multiple ACL failures) [5]

PURPOSE

- The purpose of this study was to determine whether static ATS on MRI is reduced after anatomic ACL reconstruction.
- Furthermore, we sought to identify specific factors associated with fixed ATS after surgery.

METHODS

- All consecutive patients who underwent primary anatomic ACLR between January 2015 and December 2019 were retrospectively analyzed. Those who underwent preoperative and postoperative MRI at our hospital were included.
- The primary outcome was the difference between preoperative and postoperative Anterior Translation of the Lateral Compartment (ATLC)[6] relative to the femoral condyle measured on MRI.
- We defined failure or "fixed ATS" as those cases with ATLC ≥6mm on postoperative MRI.
- Predictors of fixed ATS were assessed by multivariable conditional logistic regression analysis.



Tanaka et al.[6]

RESULTS

Figure 1. Flowchart

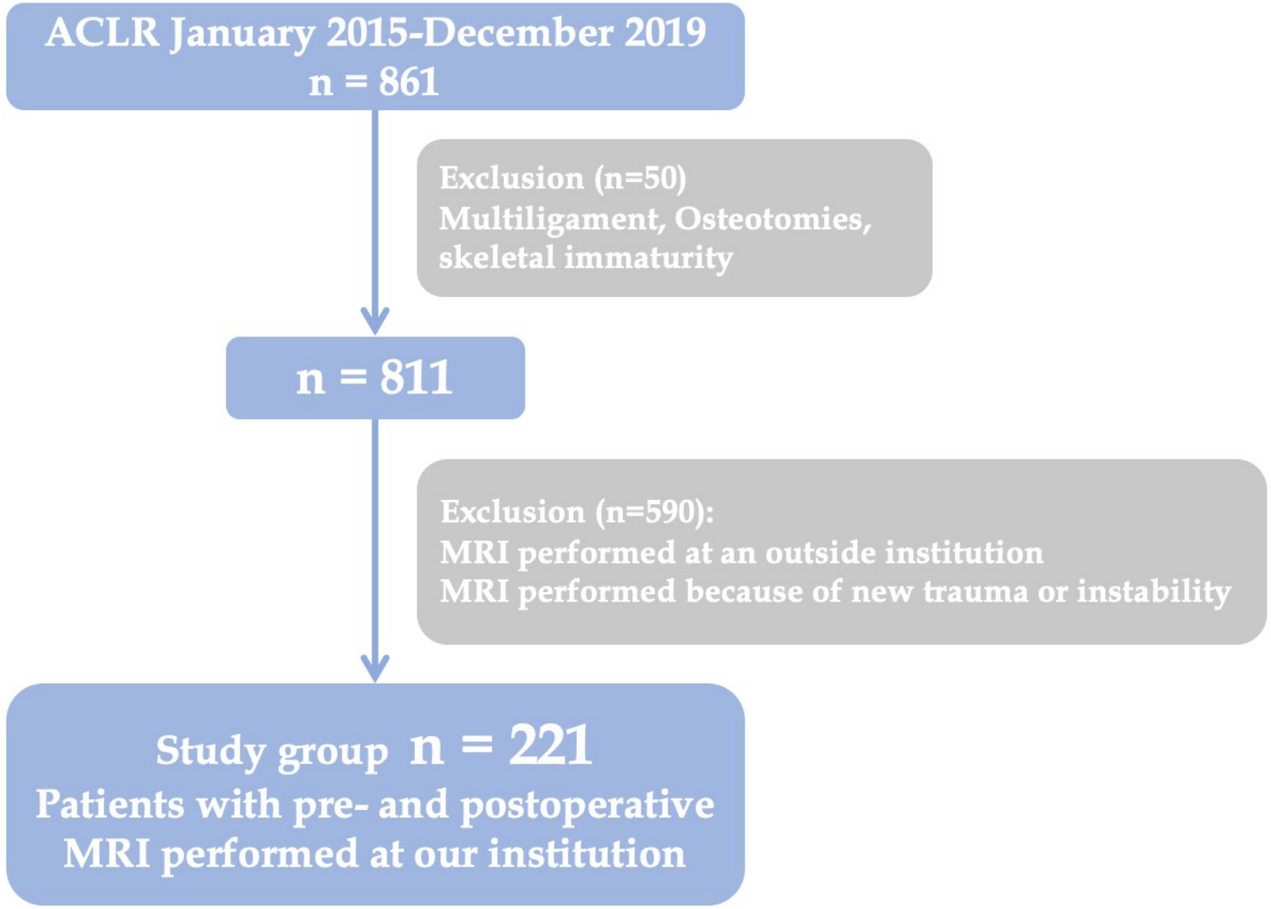


Table 1. Demographics

	Mean ± SD or n (%)
n	221
age	29,89 ± 9,77
gender, male	176 (79.6%)
Injury-to-Surgery time, acute	155 (70.1 %)
Injury-to-MRI time, acute	171 (77.4 %)
Cartilage injury	50 (22.6%)
Meniscal injury	115 (52%)
Anterolateral injury	70 (31.7%)
Medial PTS	4.61 ± 2.76
Lateral PTS	5.54 ± 3.13
ACL graft: BTB	19 (8.6%)
Hamstrings	202 (91.4%)

(PTS: Posterior tibial slope)

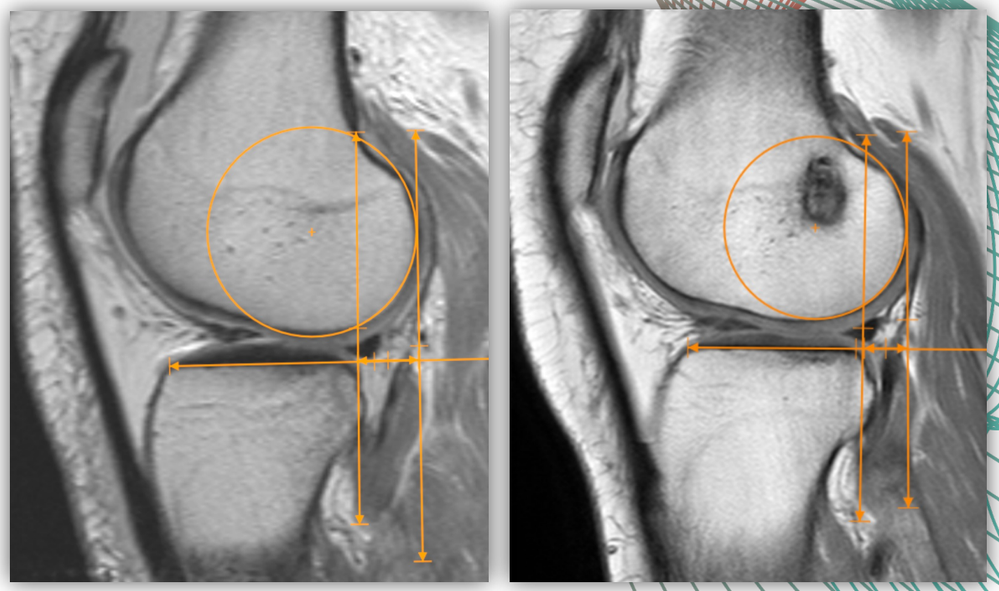
RESULTS

Table 2. Preoperative and Postoperative ATLC

	Mean ± SD or n (%)
Preoperative ATLC	8,03 mm ± 3,69
Postoperative ATLC	7.34 mm ± 3.25
pre-postop ATLC difference	- 0,69mm ± 3.09, ***p = 0.001***
Postoperative "Fixed ATS" (≥ 6mm)	137 (**62%**)

(ATLC: Anterior translation of the lateral compartment)

Figure 2. Example case



Preoperative MRI
ATLC: 13mm

Postoperative MRI
ATLC: 8mm

RESULTS

- After performing a multivariate logistic regression analysis to evaluate the cases of fixed ATS, the degree of preoperative ATLC was the only factor that showed a significant association.
- None of the other factors studied showed significance.

Table 3. Logistic multivariate regression analysis for Fixed ATS:

	p	OR	95% CI
age	0.093	0.031	-0.005 – 0.068
gender, male	0.94	0.031	-0.863 – 0.926
Graft	0.035	-1.37	-2.649 – 0.100
Injury-to-Surgery time, acute	0.663	-0.175	-0.968 – 0.617
Cartilage injury	0.955	-0.025	-0.894 – 0.844
Meniscal injury	0.404	-0.303	-1.018 – 0.411
ALL injury	0.182	-0.492	-1.216 – 0.232
Lateral PTS	0.051	-0.132	-0.264 – 0.0004
Medial PTS	0.075	0.144	-0.014 – 0.302
Preop Lateral ATS	0.000	0.442	0.347 – 0.538

CONCLUSION.

- We believe this is the first study with preoperative and follow-up MRI to analyze Anterior Tibial Subluxation after ACLR.
- Although the mean difference between preoperative and postoperative MRI was -0.69mm ($p<0.01$), anatomic ACLR did not restore the tibiofemoral relationship in a high number of patients. 62% remained with 6mm or more of ATLC postoperatively.
- The only factor associated with fixed ATS was the amount of preoperative ATLC.

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