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Unveiling the Low Incidence of 'Isolated' Anterior Cruciate Ligament Injury:

Highlighting the Overlooked Anterolateral Complex and Medial Collateral Ligament Complex injuries

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Disclosure Information

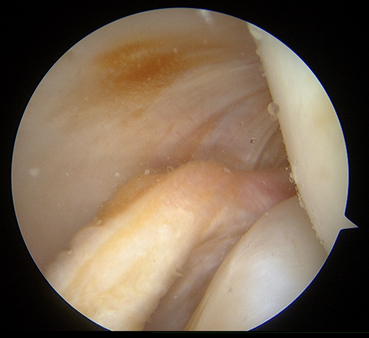
- Nothing to disclosure

Introduction

✓Anterior cruciate ligament (ACL) injuries are rarely isolated : 24%[1)]

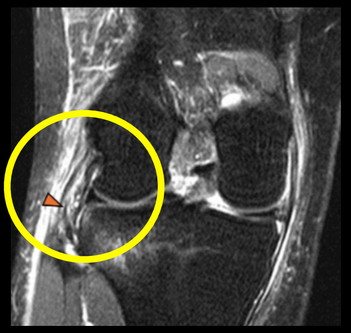
Concomitant Injuries	Incidence rate
‣Meniscal ramp lesions (RL)	9-40%[2-5)]
‣Lateral meniscus posterior root tears (LMPRT)	5-10%[6)]
‣Anterolateral complex (ALC) [anterolateral ligament (ALL), Kaplan fiber (KF)]	63%[7)]
‣Medial collateral ligament complex (MCLC) [superficial MCL (sMCL), deep MCL (dMCL), posterior oblique ligament (POL)]	40%[8-9)]

RL

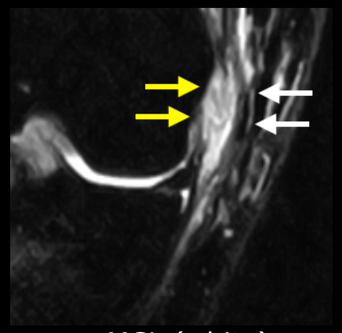


LMPRT

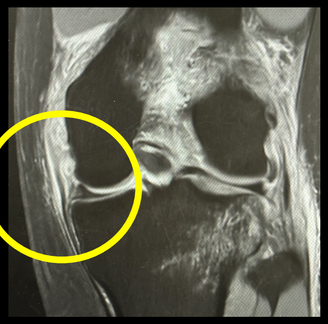
ALC



MCLC



sMCL (white)
dMCL (yellow)



POL

Introduction

✓These concomitant injuries increase instability in ACL-injured knees[10)]

✓Their diagnosis and treatment are considered critically important[11-12)]

Purpose

To investigate

- Incidence of concomitant injuries in clinically 'isolated' ACL injuries
- Their impact on knee instability

Hypothesis

- >80% of ‘isolated’ ACL tears have at least one concomitant injury
- the presence of certain injuries correlates with greater knee instability

Study Design & Patients

521 ACL reconstruction

- Not assessed for eligibility
  - -45 Revision
  - -2 Osteoarthritis
  - -191 Surgery >6 months
  - -3 LCL/PCL reconstruction
  - -28 MCL grade1 or reconstruction
  - -15 Segond fx

247 primary ACL reconstruction

- -92 MRI >3 weeks
- -45 Inadequate MRI quality

110 Final cohort included

✓Retrospective review of 521 patients (2016.6–2024.6)

✓Single-center series

✓Undergoing ACL reconstruction

✓Inclusion criteria:

Primary ACL reconstrucsion
MRI obtained <3 weeks of injury

✓Exclusion criteria:

Revision ACL reconstrucsion
Osteoarthritis
Surgery performed >6 months from injury
LCL/PCL reconstruction
MCL injury IKDC grade 1 or MCL reconstruction
Segond fracture

Assessments & Definitions

✓Diagnosis of concomitant injuries:

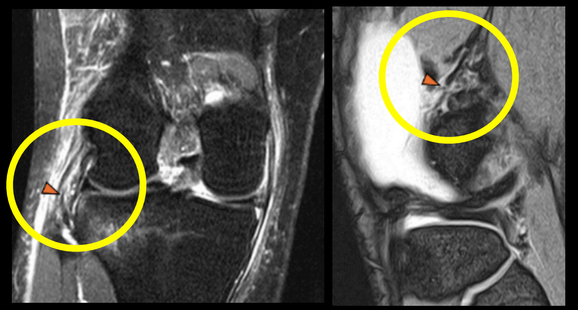
Preoperative MRI

- 1.5 or 3T MRI within 3 weeks of injury
- reviewd for ALC injuries (ALL or KF)
  and MCLC injuries (sMCL, dMCL, POL)

Arthroscopy

- during ACL reconstruction
- probing for RL and LMPRT
- systamatic arthroscopic exploration especially for RL

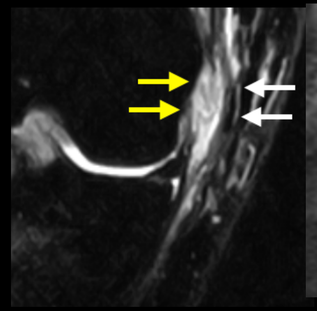
ALC injuries



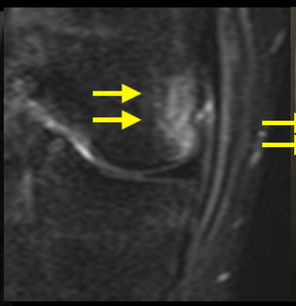
ALL injury

KF injury

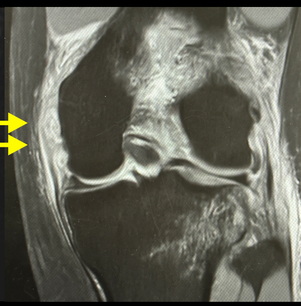
MCLC injuries



sMCL injury (white)
dMCL injury (yellow)



A bone edema at the dMCL attachment site (yellow)



POL injury (yellow)

✓Knee instability assessment

- under anesthesia
- anterior tibial translation (ATT) was measured using Rolimeter
- pivot shift grade as IKDC grade 0-3

ATT measurement using Rolimeter

✓Statistics

- logistic regression to see if concomitant injuries predicted a high-grade pivot shift
- linear regression for predictors of ATT
- Significance set at $p<0.05$

Results

✓Patients demographics

	n = 110
Age	26.3 ± 12.4
Sex, Female (%)	54.5
Height	165.2 ± 8.0
Weight	64.9 ± 12.8
BMI	23.7 ± 3.6
ATT (mm, side-to-side difference)	5.1 ± 1.6
Pivot shift grade (0/1/2/3)	4/36/50/20

✓Incidence rate

RL	32.7%
LMPRT	12.7%
ALC injuriy	64.5%
MCLC injury	60.0%

Results (Incidence of Concomitant Injuries)

✓Of analyzed 110 patients

- only 16 patients (15%) had truely isolated ACL injuries with no other lesions
- 94 patients (85%) had at least one concomitant injury in the ALC, MCLC, or menisci

✓Injury pattern

0 injury	1 injury	2 injury	3 injury	4 injury
isolated ACL injury 16	RL 3 LMPRT 0 ALC 14 MCLC 9	R+L 1 R+A 8 R+M 5 L+A 0 L+M 4 A+M 28	R+L+A 2 R+L+M 1 L+A+M 3 R+A+M 13	R+L+A+M 3

Results(Effect on Stability – ATT and Pivot Shift)

✓While no factors significantly affected ATT, RLs showed a weak influence (coefficient 0.57, p=0.07)

✓Regarding pivot shift grade,

both RLs (coefficient 0.77, p=0.048) and ALC injuries (coefficient 0.87, p=0.02) were found to be significant contributing factors.

✓ATT: Linear Regression analysis

	Coefficient	P-value
RL	0.57	0.07
LMPRT	-0.33	0.47
ALC injuriy	0.37	0.22
MCLC injury	-0.45	0.14

✓Pivot shift: Logistic Regression analysis

	Coefficient	P-value
RL	0.77	0.048
LMPRT	-0.88	0.13
ALC injuriy	0.87	0.02
MCLC injury	-0.54	0.14

Discussion

✓The incidence rates were
32.7% for RL, 12.7% for LMPRT, 64.5% for ALC injury, and 60.0% for MCLC injury, respectively.

- These rates were similar to previous reports [2-9)]

✓Our data showed the correlation of RL and ALC injury with increased ATT.

- similar to previous reports, [12)]
  the validity of performing RL repair and LEAP(augmentation of the ALC) was demonstrated.

✓Our series confirms that the vast majority of ACL tears have concomitant damage
to secondary stabilizers (only 15% were truly isolated).

- These results indicate that when examining ACL injury patients,
  we should carefully consider the presence of secondary stabilizer injuries in the majority of cases,
  suggesting that combined procedures such as meniscus repair, LEAP, and MCL reconstruction
  are necessary in most cases."

Conclusion

- ✓In our series, 85% of primary ACL injured patient had other concomitant injuries.
- ✓Most ACL injuries are accompanied by concomitant meniscal and soft tissue injuries, rather than being truly isolated.
- ✓These findings underscore the need for a comprehensive diagnostic approach in ACL injury cases to accurately identify and address associated lesions.
- ✓Specifically, the effective management of RLs and ALC injuries may be crucial for restoring knee stability and improving long-term patient outcomes.

References

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