# The Revision ACL “Outsiders”

## Additional Considerations for the ACL graft tear

Sean Hazzard, PA

MGH Sports Medicine

PAOS 2019: San Antonio, TX

HARVARD MEDICAL SCHOOL

MASSACHUSETTS GENERAL HOSPITAL SPORTS MEDICINE

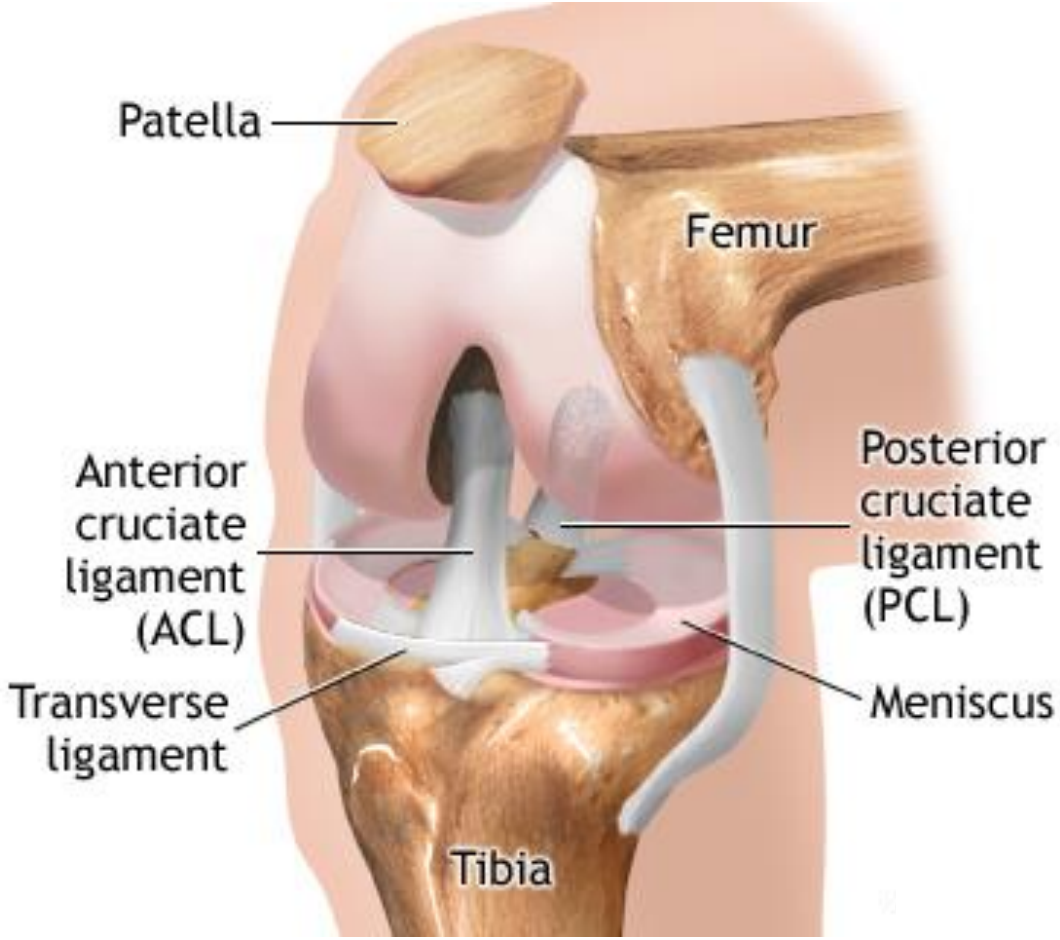
# Disclosures

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- No relevant disclosures

# Knee Anatomy

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE



# ACL graft tear

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- Rare but devastating
  - 91% survival rate 25 yr post-op (Sanders '17)
- Examine reasons
  - Acute explainable trauma
  - Preventable



Knee Surg Sports Traumatol Arthrosc. 2017 Jan;25(1):222-228. doi: 10.1007/s00167-016-4275-y. Epub 2016 Aug 13, Long-term rate of graft failure after ACL reconstruction: a geographic population cohort analysis. Sanders TL[1], Pareek A[2], Hewett TE[2], Levy BA[2], Dahm DL[2], Stuart MJ[2], Krych AJ[2].

# ACL Epidemiology

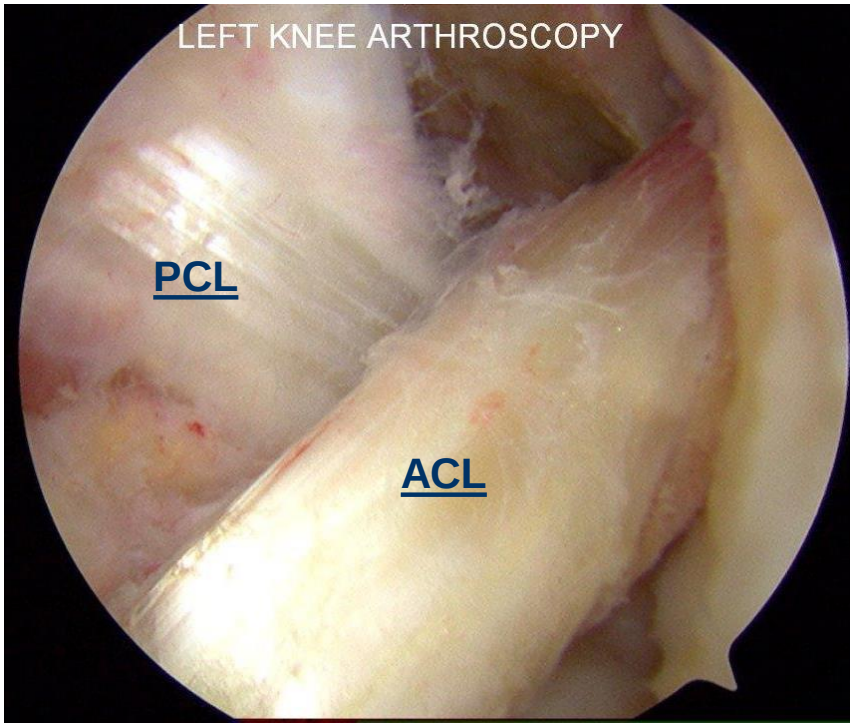
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- 200,000 ACL reconstructions are performed annually in the US

# Different Approaches to ACL

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## ACL Reconstruction




10 miles from Boston

# ACL graft tear

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Revision Anterior Cruciate Ligament Reconstruction Surgery

*Mark H. Gelebman, MD, and Marc J. Friedman, MD*

**JAAOS 1999**

**Table 1**
**Causes of Failure**

| |
|---|
| Technical |
| Nonanatomic tunnel placement |
| Inadequate notchplasty |
| Improper tensioning |
| Graft fixation |
| Insufficient graft material |
| Biologic |
| Failed ligamentization |
| Infection |
| Arthrofibrosis |
| Infrapatellar contracture syndrome |
| Traumatic |
| Early (before graft incorporation) |
| Late (after incorporation) |
| Failure due to secondary instability |
| Rotatory instability |
| Skeletal malalignment |
| Varus/valgus instability |

# ACL re-tear: PREVENTION

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study

Hege Grindem,[1] Lynn Snyder-Mackler,[2] Håvard Moksnes,[3] Lars Engebretsen,[3,4] May Arna Risberg[1,4]

Grindem H, *et al*. *Br J Sports Med* 2016;**50**:804–808. doi:10.1136/bjsports-2016-096031

British Journal of Sports Medicine

- Landmark paper for ACLR with returning to sports
- Quad symmetry (isokinetic test) + single-legged hop test
- Muscle + Hop must be >90%
- 51% reinjury rate PER MONTH until 9 months

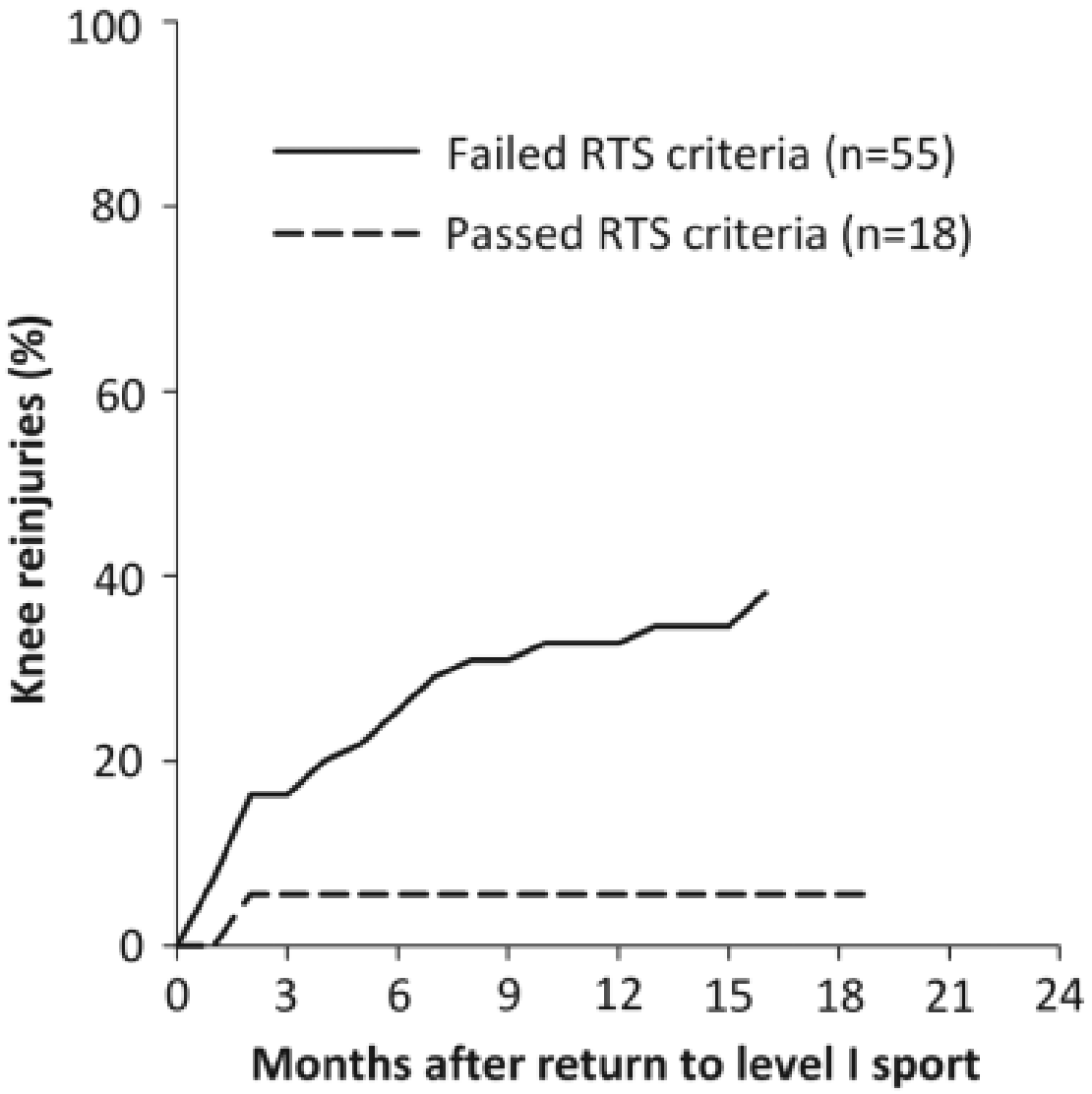
# ACL re-tear: PREVENTION

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study

Hege Grindem,[1] Lynn Snyder-Mackler,[2] Håvard Moksnes,[3] Lar
May Arna Risberg[1,4]

Grindem H, *et al*. *Br J Sports Med* 2016;**50**:804–808. d



# Revision ACL: “The others”

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

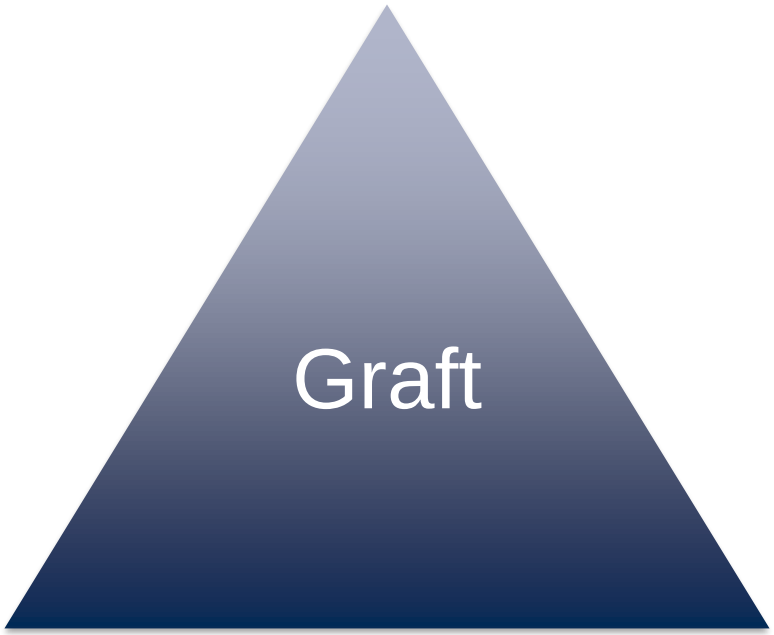
- Technical
  - Graft
  - Tunnel considerations
  - Tibial Slope
  - Anterolateral Ligament (ALL)
  - Synthetic graft
- Rehabilitation
  - Objective measurement
    - Limb symmetry index
    - Functional movement assessment
    - Synder-Mackler: 84% reduction in re-injury if pass RTS criteria
      - British Journal Sports Medicine 2016

# Graft Considerations

# ACL “Triangle of Success”

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

Skilled Rehabilitation




Motivated Patient

Skilled Surgeon

# ACL Graft Options

**Autograft**

**Allograft**

**Bone-Tendon-Bone (BTB)**

**Hamstring**

**Quadriceps**

# ACL Graft selection bias

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

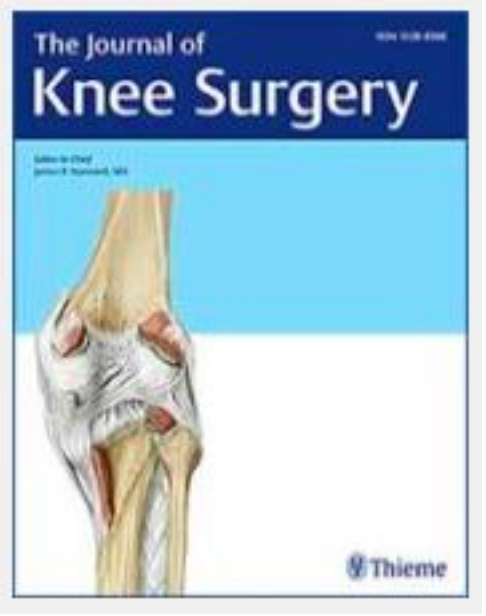
J Knee Surg 2018; 31(05): 472-478
DOI: 10.1055/s-0037-1604147

**Original Article**

Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.

## Variance in Anterior Cruciate Ligament Reconstruction Graft Selection based on Patient Demographics and Location within the Multicenter Orthopaedic Outcomes Network Cohort

Darby A. Houck, Matthew J. Kraeutler, Armando F. Vidal, Eric C. McCarty, Jonathan T. Bravman, Michelle L. Wolcott,
MOON Knee Group




- 2,149 ACLR patients broken into 4 regions of USA
- Strong affiliation between region and graft selection
  - AKA: Evidence of regional bias
  - Northeast: BTB

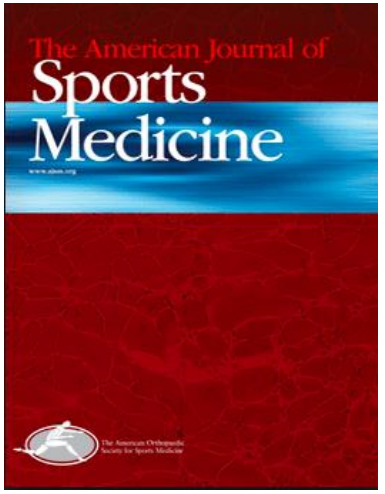
# Generalizations

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Risk Factors and Predictors of Subsequent ACL Injury in Either Knee After ACL Reconstruction

### Prospective Analysis of 2488 Primary ACL Reconstructions From the MOON Cohort

Christopher C. Kaeding,*†‡ MD, Angela D. Pedroza,† MPH, Emily K. Reinke,§ PhD, Laura J. Huston,§ MS, MOON Consortium,¶ and Kurt P. Spindler,‖ MD
*Investigation performed at the Ohio State University, Columbus, Ohio, USA, and Vanderbilt University Medical Center, Nashville, Tennessee, USA*



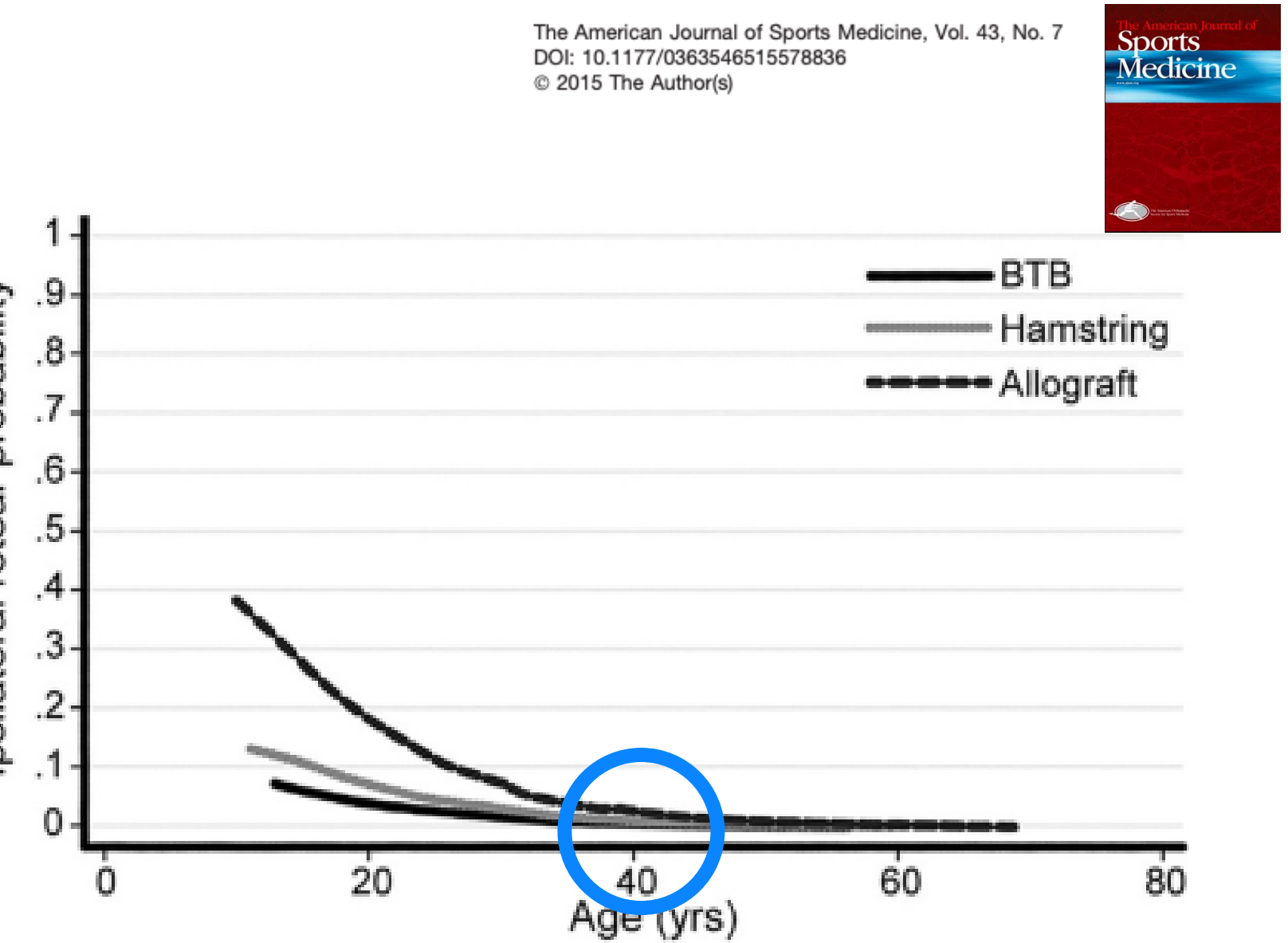

The American Journal of Sports Medicine, Vol. 43, No. 7
DOI: 10.1177/0363546515578836


- 2488 Primary ACL results
- Significantly higher rate of re-tear with allograft (5.2x higher than BTB Auto)
- Significantly higher rate of re-tear with younger age and higher activity level
- Chance of re-injury rose by 11% for each point on Marx scale

# Landmark study for Age/ACL

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

The American Journal of Sports Medicine, Vol. 43, No. 7
DOI: 10.1177/0363546515578836

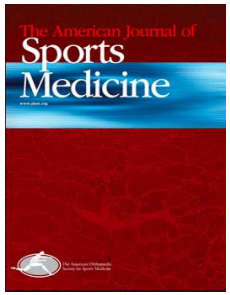
# Landmark study for ACL revision graft

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

**Winner of the 2014 O'Donoghue Award**

## Effect of Graft Choice on the Outcome of Revision Anterior Cruciate Ligament Reconstruction in the Multicenter ACL Revision Study (MARS) Cohort

PODCAST In-Depth




The MARS Group*†
*Investigation performed at the Department of Orthopaedic Surgery, Washington University School of Medicine at Barnes-Jewish Hospital, St Louis, Missouri, USA*

The American Journal of Sports Medicine, Vol. 42, No. 10
DOI: 10.1177/0363546514549005


- 1205 patients getting revision ACL. Median age: 26. Two-year follow-up.
- Grafts: Autograft (48%) and Allograft (49%)
- 28% getting surgery by original surgeon
  - "Nothing ruins good results like follow up"

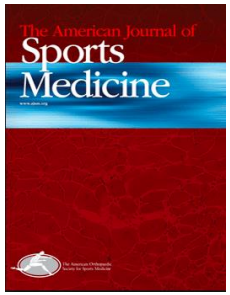
# Landmark study for ACL revision graft

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

**Winner of the 2014 O'Donoghue Award**

## Effect of Graft Choice on the Outcome of Revision Anterior Cruciate Ligament Reconstruction in the Multicenter ACL Revision Study (MARS) Cohort

PODCAST In-Depth




The MARS Group*†
*Investigation performed at the Department of Orthopaedic Surgery, Washington University School of Medicine at Barnes-Jewish Hospital, St Louis, Missouri, USA*

The American Journal of Sports Medicine, Vol. 42, No. 10
DOI: 10.1177/0363546514549005


- 1205 patients getting revision ACL. Median age: 26. Two-year follow-up.
- Autograft: Predictor of better IKDC, KOOS Sports subscale, KOOS quality of life, and 2 year Marx scales.
- Autograft: 2.78 times less likely to re-tear vs allograft in revision setting

# Synthetic grafts the first time?

# Synthetic Graft: Back to the Future?



- 1980's: Synthetic grafts are developed
- Significant complications rates due to material reaction (synovitis, post-traumatic arthritis, etc)
- Abandoned soon after

# ACL: Synthetic Grafts



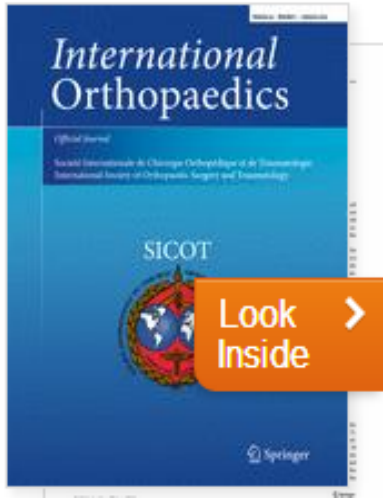
- LARS
  - Ligament Augmentation & Reconstruction System
- Polyethylene terephthalate (PET) designed for tissue ingrowth
  - Fixed the issues from 1980's
- 1995: First clinical report (Dericks)
  - 220 cases, 0 cases synovitis
- 2013 saw international surge in LARS results and studies

LARS®
Ligament Augmentation & Reconstruction System

International Orthopaedics
August 2013, Volume 37, Issue 8, pp 1567-1574

# Anterior cruciate ligament reconstruction with LARS™ artificial ligament results at a mean follow-up of eight years

Paolo Domenico Parchi, Ciapini Gianluca, Lorenzo Dolfi, Alessandro Baluganti, Piolanti Nicola, Fabio Chiellini, Michele Lisanti




- Multi-database search for LARS results
- 35 papers
- 1,245 cases
  - F/U 3 months-9 years
- 12 graft ruptures (0.96%)
- 3 cases knee synovitis (0.24%)

- Five papers compared vs autograft
  - No significant difference
  - LARS had faster recovery and return to sport
- One paper reported on long term results
  - 25 patients with 9 year F/U
  - 95% success rate
  - Zero cases of synovitis

# 2019 ACL graft choice

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- Patient specific
- Age
- Activity Level

# Tunnel Considerations

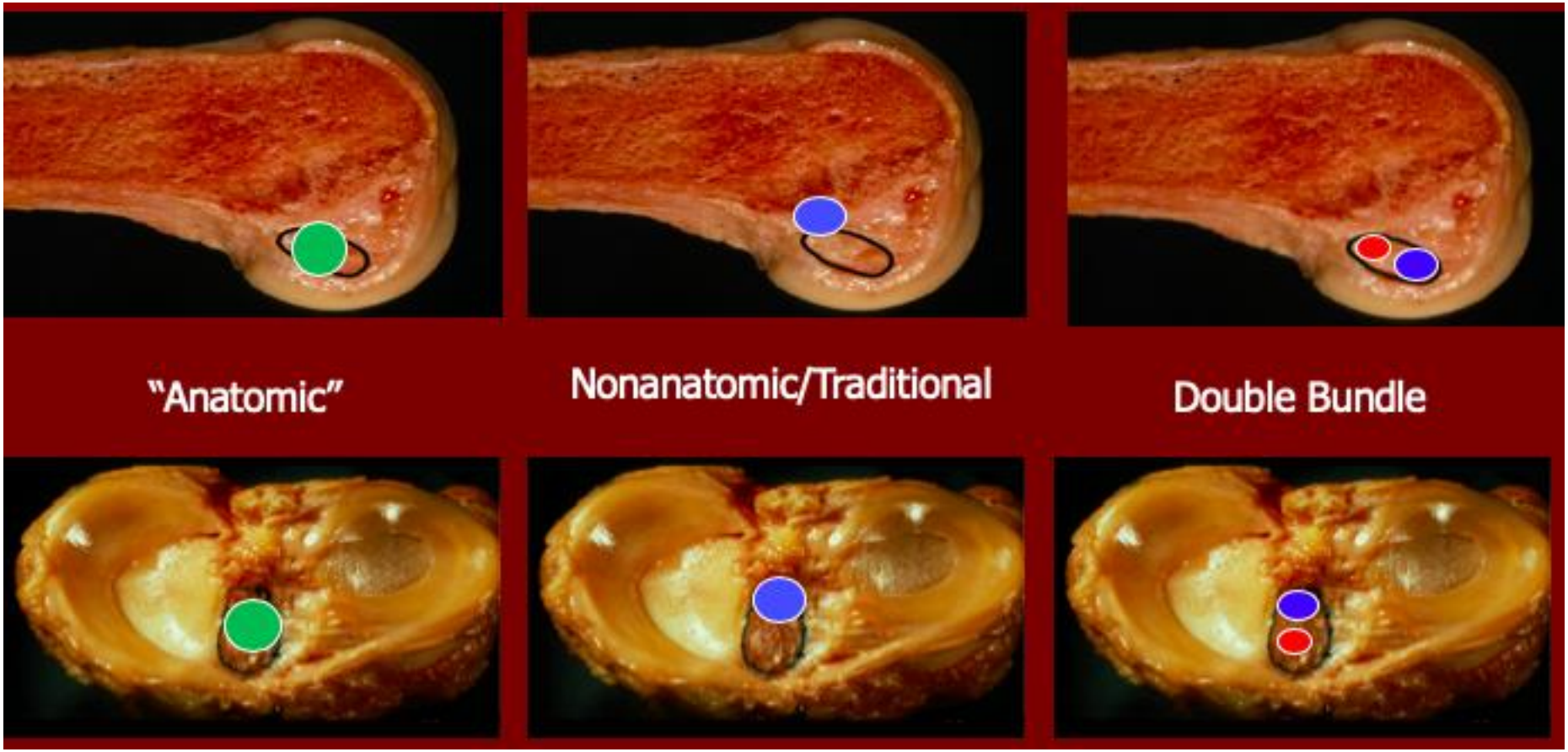
# Tunnels



- Femoral
  - Vertical (superior)
  - Anterior
  - Wide
- Tibial
  - Anterior
  - Posterior
  - Wide

# Tunnel Overview

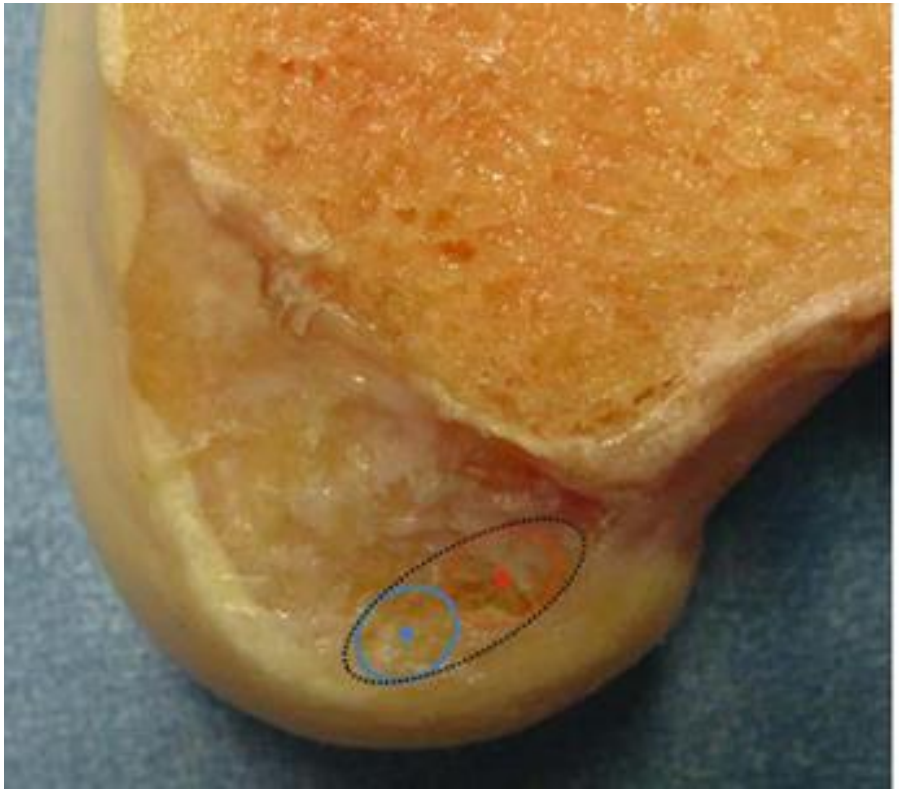
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE



# Femoral Side

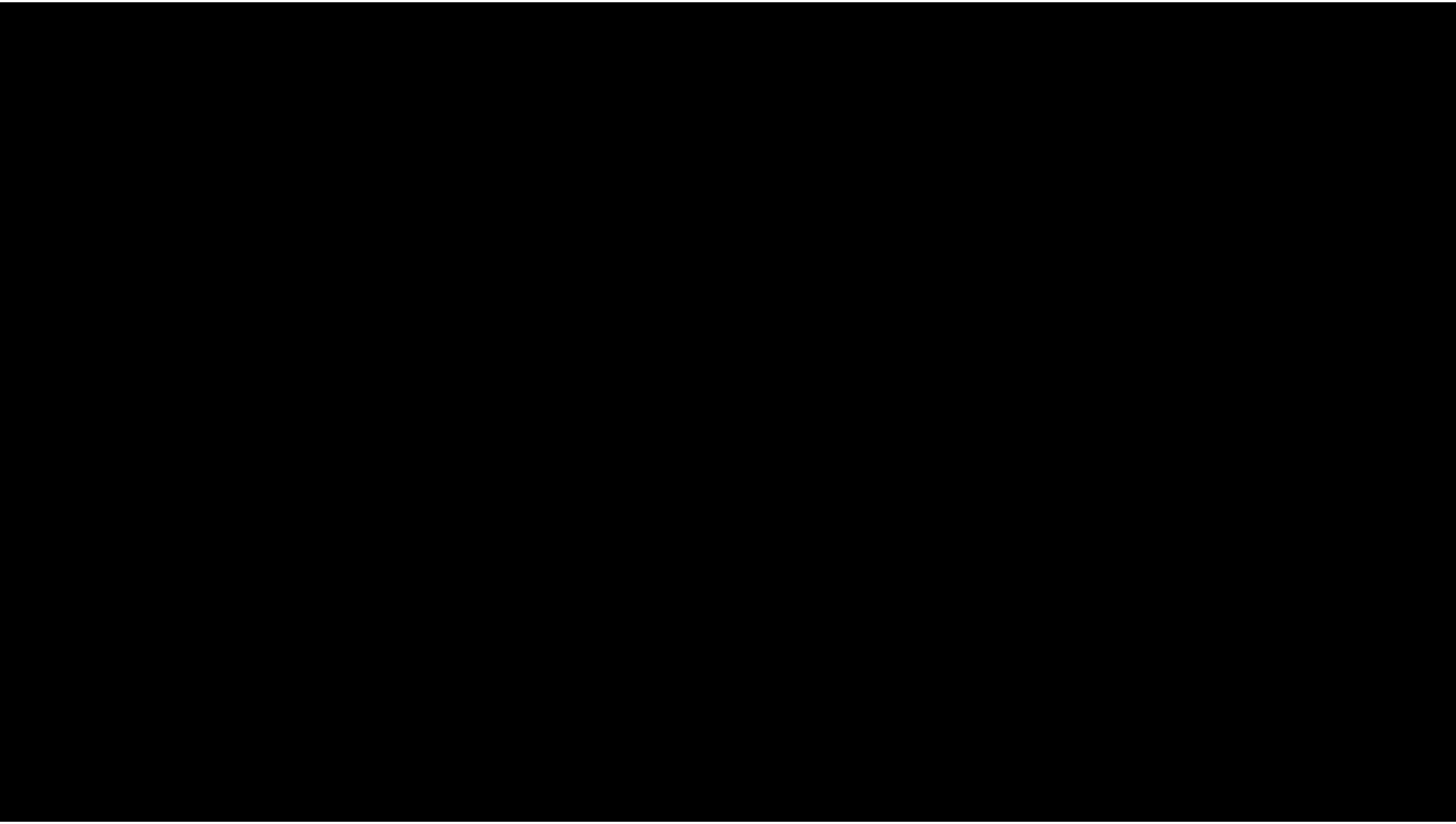


- ACL comprised of two bundles
  - Anteromedial (AM)
  - Posterolateral (PL)

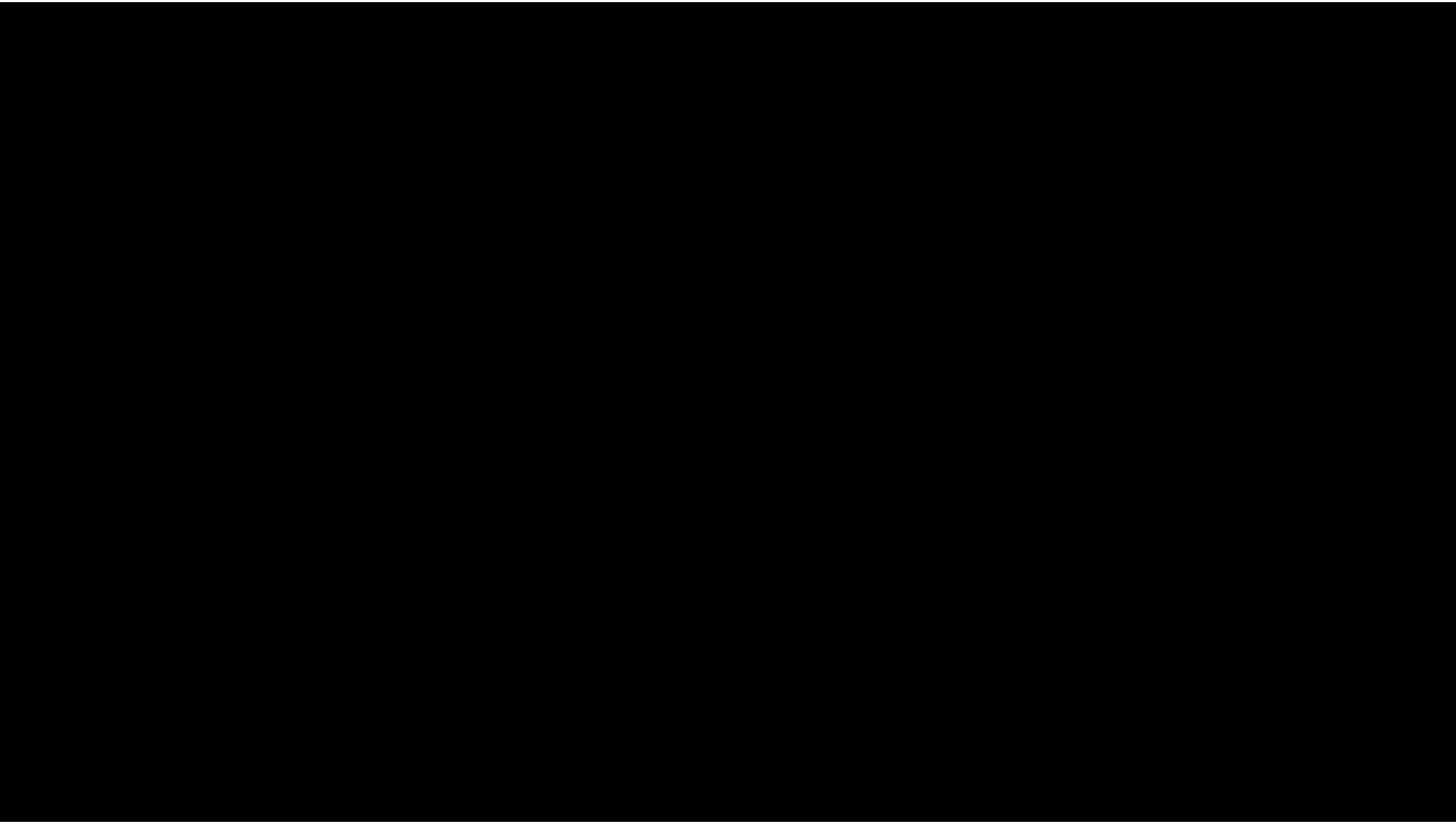


# Be prepared to move (Bypass)

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE



# Be prepared to fill



# Tibial Slope

# ACL/Tibial slope relationship

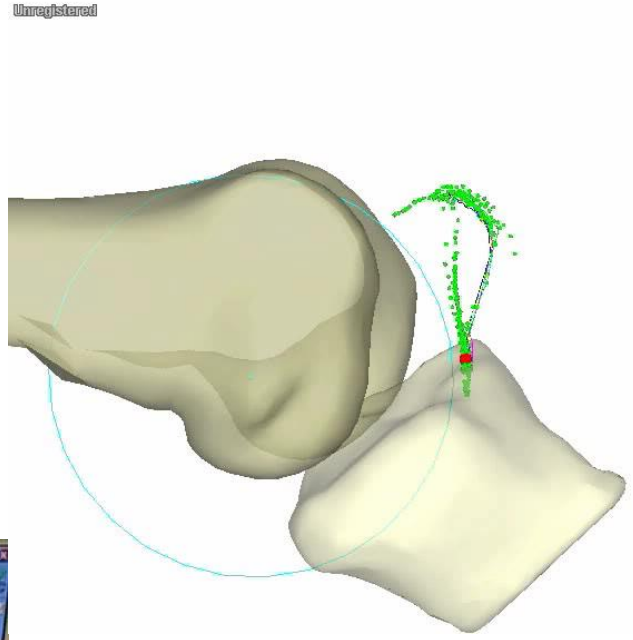
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

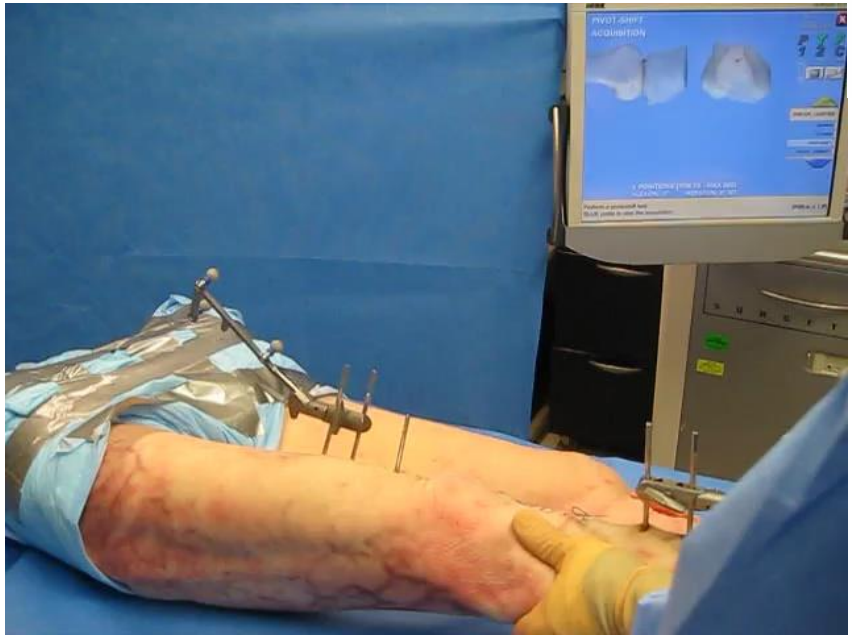
- ACL tears with lateral femur subluxing posterior off the tibial plateau (aka: “pivot shift”)

# ACL/Tibial slope relationship

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- ACL tears with lateral femur subluxing posterior off the tibial plateau (aka: “pivot shift”)



# ACL/Tibial slope relationship

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

Better grip

Not as secure

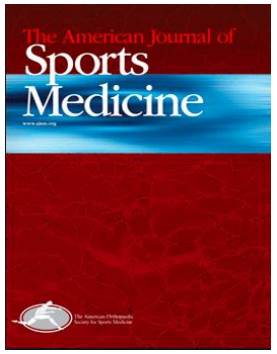
# ACL/Tibial slope relationship

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

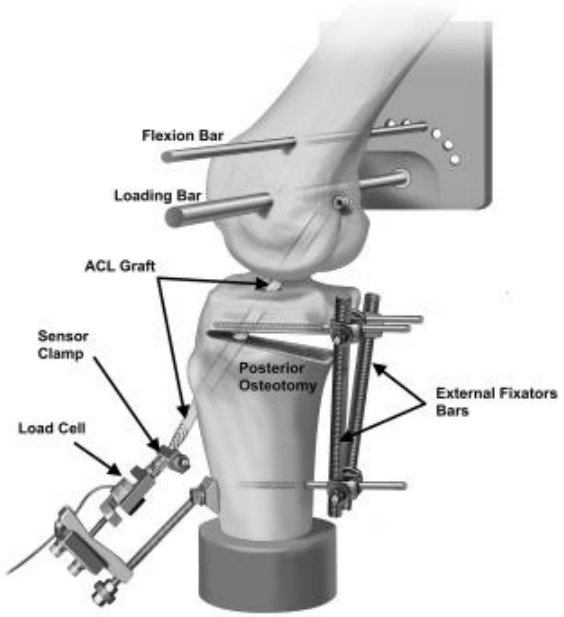
## Tibial Slope and Its Effect on Force in Anterior Cruciate Ligament Grafts

### Anterior Cruciate Ligament Force Increases Linearly as Posterior Tibial Slope Increases

Andrew S. Bernhardson,[†] MD, LCDR, MC, USN, Zachary S. Aman,[*] BA, Grant J. Dornan,[*] MSc, Bryson R. Kemler,[*] MS, Hunter W. Storaci,[*] MS, Alex W. Brady,[*] MSc, Gilberto Y. Nakama,[*] MD. and Robert F. LaPrade,[†‡] MD, PhD
*Investigation performed at the Department of BioMedical Engineering, Steadman Philippon Research Institute, Vail, Colorado, USA*




The American Journal of Sports Medicine
2019;47(2):296–302
DOI: 10.1177/0363546518820302


- Cadaveric study
- ACL graft tested at various points of flexion
- Tibial slope was varied between -$2^0$ and $20^0$ of posterior slope at $2^0$ increments

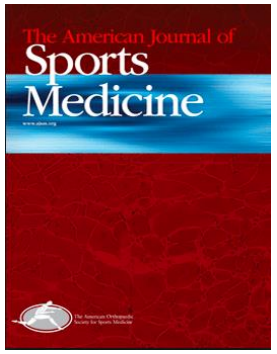
# ACL/Tibial slope relationship

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Tibial Slope and Its Effect on Force in Anterior Cruciate Ligament Grafts

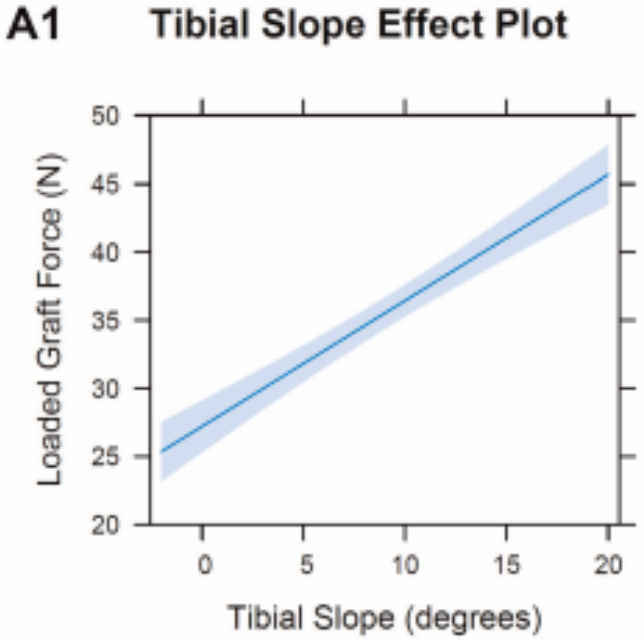
### Anterior Cruciate Ligament Force Increases Linearly as Posterior Tibial Slope Increases

Andrew S. Bernhardson,[†] MD, LCDR, MC, USN, Zachary S. Aman,[*] BA, Grant J. Dornan,[*] MSc, Bryson R. Kemler,[*] MS, Hunter W. Storaci,[*] MS, Alex W. Brady,[*] MSc, Gilberto Y. Nakama,[*] MD, and Robert F. LaPrade,[†‡] MD, PhD
*Investigation performed at the Department of BioMedical Engineering, Steadman Philippon Research Institute, Vail, Colorado, USA*




The American Journal of Sports Medicine
2019;47(2):296–302
DOI: 10.1177/0363546518820302


- Result: Direct linear correlation between graft force and *increasing* tibial slope



# Tibial slope evidence

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Association between tibial plateau slopes and early graft failure after Anterior Cruciate Ligament Reconstruction

**Ahmet Kulduk, MD, Istanbul TURKEY**
Kerem Sencan, MD, Istanbul TURKEY
Rasit Özcafer, MD, Istanbul TURKEY
Mehmet O. Buyukkuscu, MD, Istanbul TURKEY
Engin Çetinkaya, MD, Assoc. Prof., Istanbul TURKEY
Sükrü Sarper Gürsu, MD, Assoc. Prof., Istanbul TURKEY
Vedat Sahin, MD, Istanbul TURKEY
*MS Baltalimani Bone Research & Educational Hospital, Istanbul, TURKEY*

12TH Biennial ISAKOS CONGRESS 2019
Cancun, Mexico • May 12–16, 2019

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

- 37 patients underwent revision ACL within two years of primary surgery
- Compared to 37 controls with intact ACL
- Intact ACL group: Lateral tibial plateau slope 3.3 degrees
- Revision ACL group: Lateral tibial plateau slope 7.1 degrees

# Tibial slope evidence

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Increased Lateral Tibial Plateau Slope Predisposes Male College Football Players to Anterior Cruciate Ligament Injury

Ata A. Rahnemai-Azar, MD, Zaneb Yaseen, MD, Carola F. van Eck, MD, James J. Irrgang, PhD, PT, ATC, Freddie H. Fu, MD, DSc(Hon), DPs(Hon), and Volker Musahl, MD

*Investigation performed at the Department of Orthopaedic Surgery, University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania*

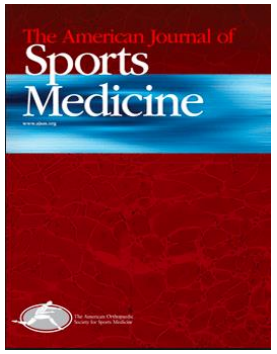
Journal of Bone & Joint Surgery - American Volume
**Volume 101(10) pgs. 859-943,e42-e48 May 15, 2019**
ISSN: 0021-9355


- 90 NCAA-1 football players with ACL tears
- Case matched for age, height, weight, and BMI to subjects without an ACL injury (control group)
- Measured notch size, medial and tibial plateau slopes, and condylar widths, and bicondylar width.
- Multivariable analysis revealed **that increased lateral tibial slope** (odds ratio, 1.32 [95% CI, 1.03 to 1.70]) was the **sole independent predictor of ACL injury.**
- Lateral tibial slope (deg) 7.7 ± 3.5 (ACL group) vs 4.7 ± 2.8 (Control)

# Tibial slope evidence

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Lateral Tibial Posterior Slope Is Increased in Patients With Early Graft Failure After Anterior Cruciate Ligament Reconstruction




Joshua J. Christensen,* MD, Aaron J. Krych,* MD, William M. Engasser,* MD, Matthias K. Vanhees,† MD, Mark S. Collins,‡ MD, and Diane L. Dahm,*§ MD
*Investigation performed at the Department of Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota, USA*

The American Journal of Sports Medicine, Vol. 43, No. 10
DOI: 10.1177/0363546515597664

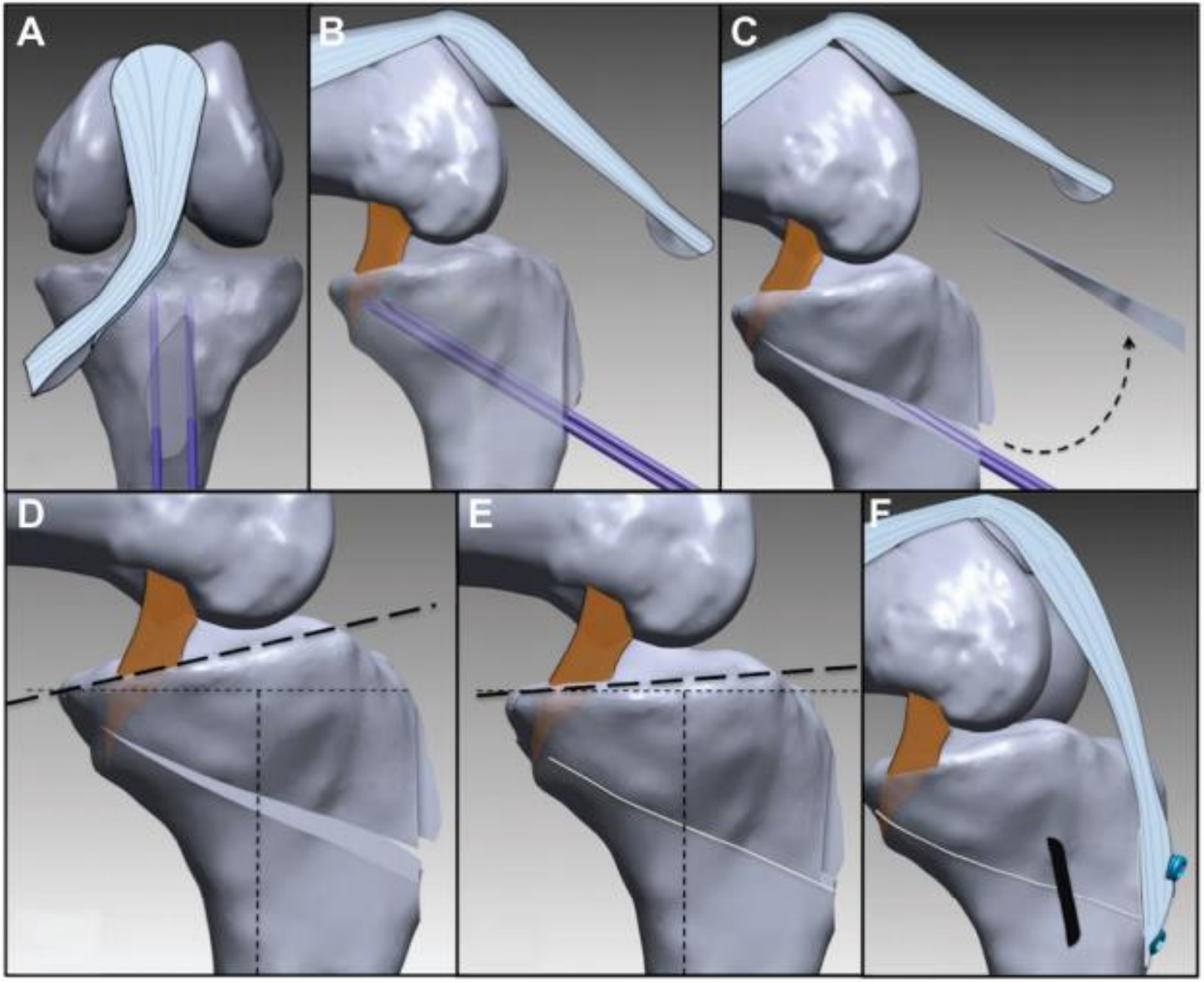

- 35 patients who tore ACL graft within 2 years from primary
- Case matched for age, sex, date of primary surgery, and graft type (control group with intact ACL)
- 2.4 times increased risk for graft failure with a 4 degree increase in slope
- Nearly 4 times increased risk for failure with a 6 degree increase in slope.

# Increased lateral tibial slope:

# The Fix?

# Anterior closing wedge osteotomy

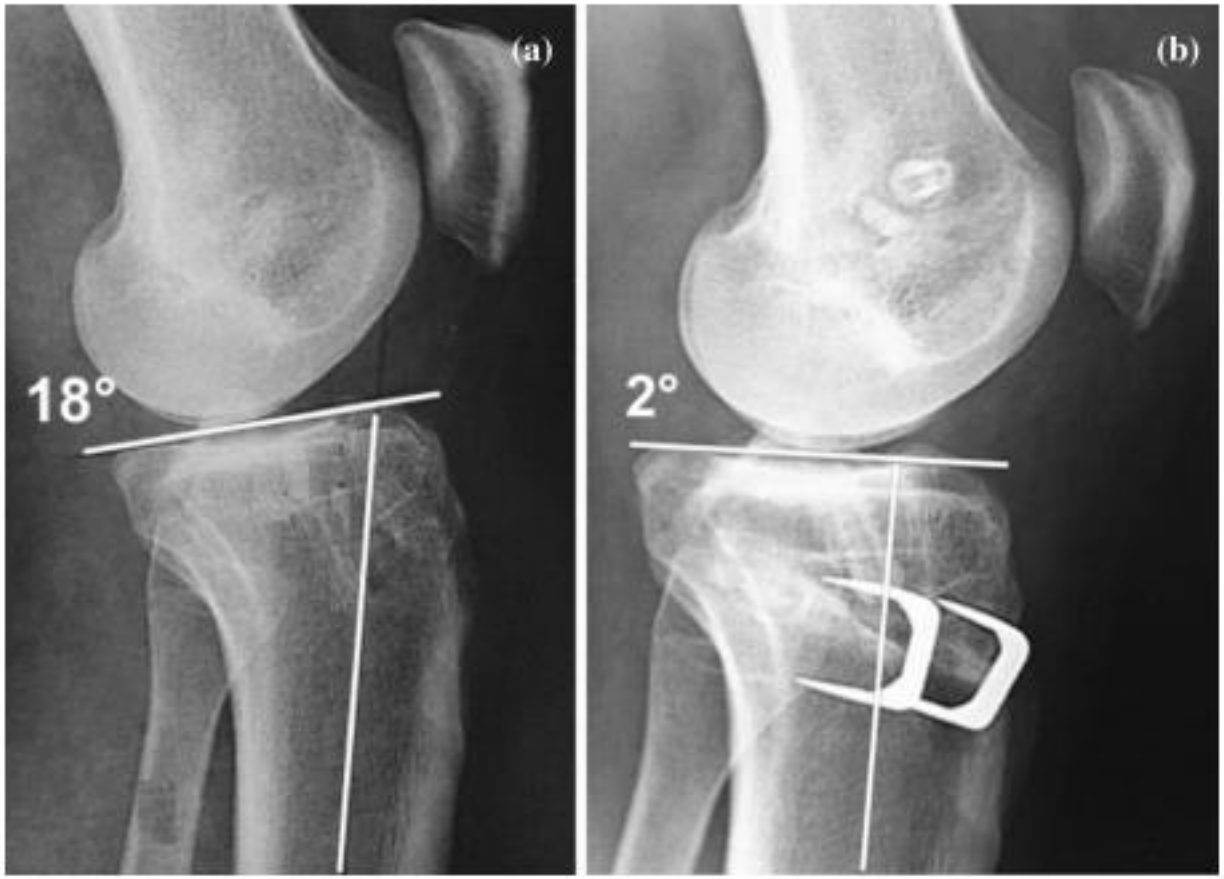
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE




Sonnery-Cottet, AJSM 2014

# Anterior closing wedge osteotomy

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE




**Tibial slope correction combined with second revision ACL produces good knee stability and prevents graft rupture**

David Dejour[1] · Mo Saffarini[2] · Guillaume Demey[1] · Laurent Baverel[1]

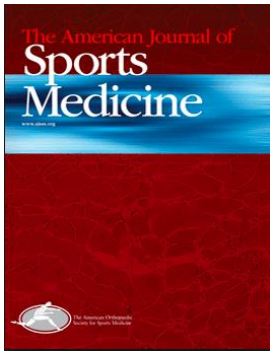
Dejour. *Knee Surgery, Sports Traumatology, Arthroscopy* Volume: 23 Issue 10 (2015) ISSN: 0942-2056 Online ISSN: 1433-7347

# Tibial slope results

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Effects of Anterior Closing Wedge Tibial Osteotomy on Anterior Cruciate Ligament Force and Knee Kinematics

Kent T. Yamaguchi,*† MD, Edward C. Cheung,† MD, Keith L. Markolf,† PhD, Daniel V. Boguszewski,† PhD, Justin Mathew,† BS, Christopher J. Lama,† MS, David R. McAllister,† MD, and Frank A. Petrigliano,† MD
*Investigation performed at the Biomechanics Laboratory, Department of Orthopaedic Surgery, David Geffen School of Medicine at UCLA, Los Angeles, California, USA*




The American Journal of Sports Medicine
2018;46(2):370–377
DOI: 10.1177/0363546517736767

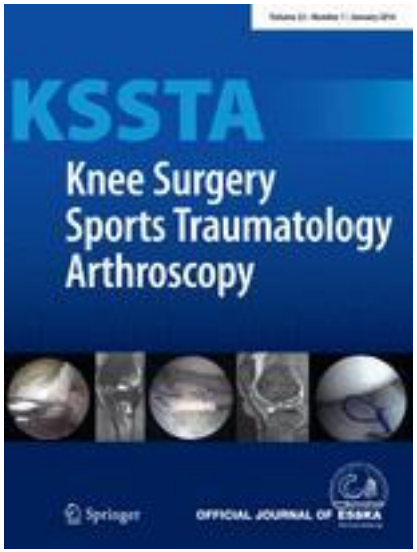

- 11 cadavers tested before and after surgery
- Ten-degree anterior closing wedge osteotomy of the proximal tibia
- Anterior tibial translation was tested between 5° and 45° flexion
- “Posterior Tibial Slope-reducing osteotomy significantly decreased ACL force”

# Tibial slope results

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Tibial slope correction combined with second revision ACL produces good knee stability and prevents graft rupture

David Dejour[1] · Mo Saffarini[2] · Guillaume Demey[1] · Laurent Baverel[1]



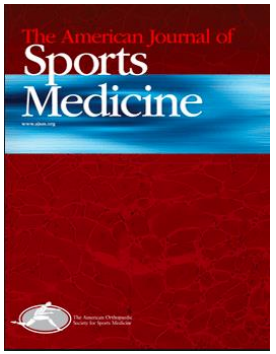

- 9 revision ACL patients
- Indication: Osteotomy if >12 degree posterior tibial slope
- Mean age 30.3. Mean follow-up: 4yr
- Aimed for 3-5 degree slope
- Results: Satisfactory outcome with no complication. No re-tear.

Dejour. *Knee Surgery, Sports Traumatology, Arthroscopy* Volume: 23 Issue 10 (2015) ISSN: 0942-2056 Online ISSN: 1433-7347

# Tibial slope results

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

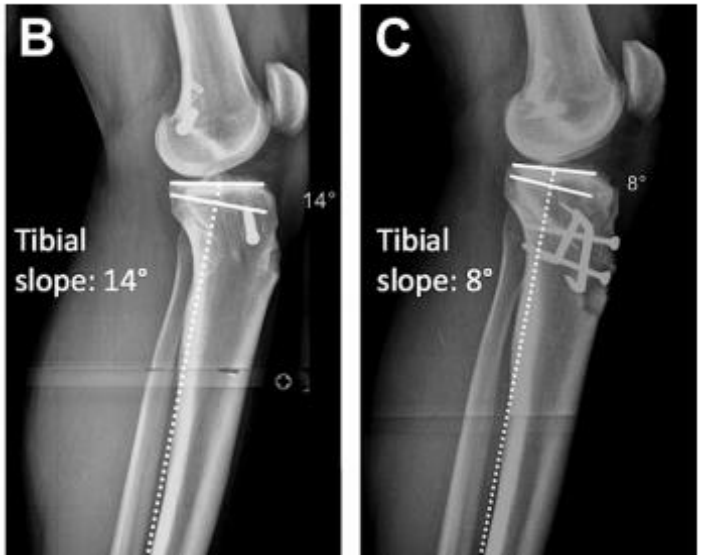
## Proximal Tibial Anterior Closing Wedge Osteotomy in Repeat Revision of Anterior Cruciate Ligament Reconstruction




Bertrand Sonnery-Cottet,*† MD, Stefan Mogos,† MD, Mathieu Thaunat,† MD, Pooler Archbold,‡ MD, Jean-Marie Fayard,† MD, Benjamin Freychet,† MD, Julien Clechet,† MD, and Pierre Chambat,† MD
*Investigation performed at the Centre Orthopédique Santy and Hôpital Privé Jean Mermoz, Lyon, France*

The American Journal of Sports Medicine, Vol. 42, No. 8
DOI: 10.1177/0363546514534938


- 5 RE-revision ACL patients. 23-45 month follow-up.
- Pre-operative 13.6 degree posterior tibial slope
- Post-operative 9.2 degree posterior tibial slope
- Results: Satisfactory outcome with no complication. No re-tear.

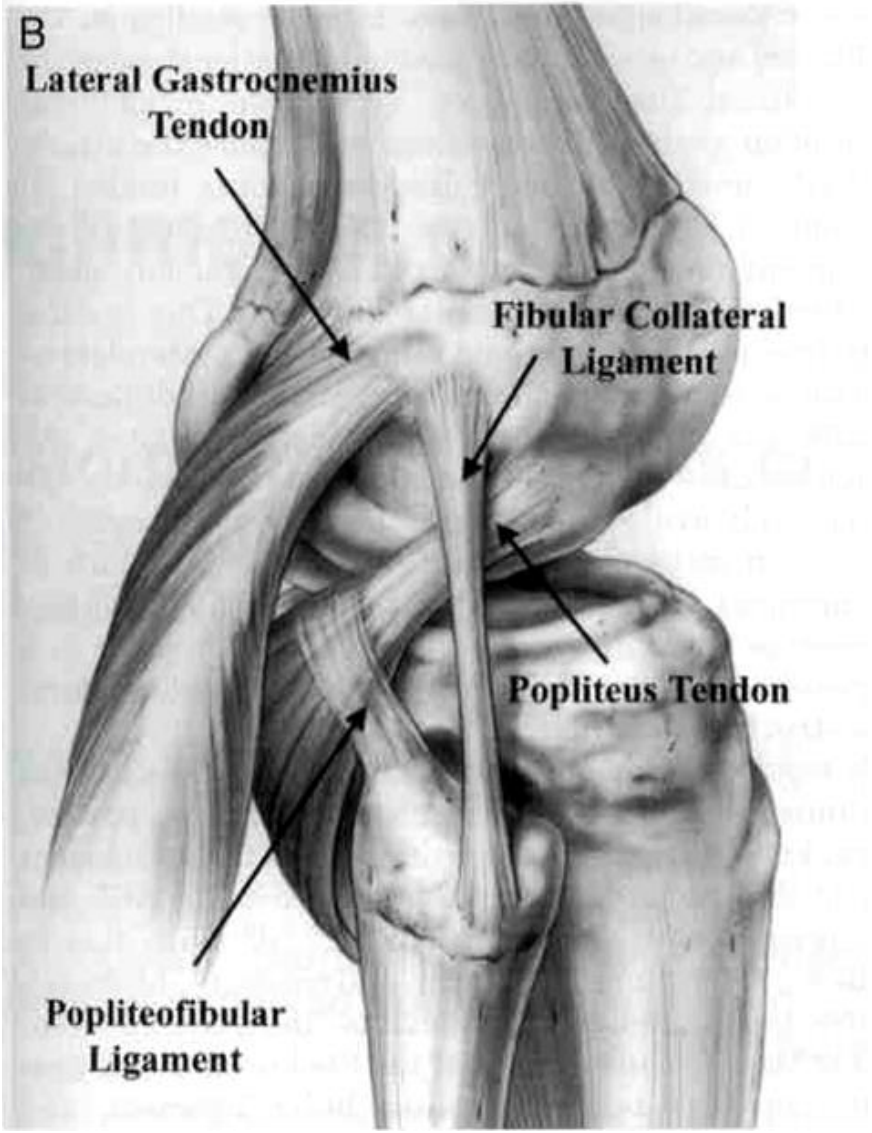


# Secondary Stabilizers:

# The Anterolateral Ligament (ALL)

# Known: Posterolateral Corner






- Rotatory stabilizing region
- Incidence PLC injury 7% to 13.9% with ACL injury (LaPrade Arthroscopy 2007)
  - Underreported – physical exam difficult
- Failure to treat posterolateral corner injuries associated with increased risk for graft failure after ACL
  - LaPrade AJSM 1999, Hughston JBJS 1985
- Corten, Bellemans AJSM 2008
  - Suggest initially missed posterolateral corner injury as “key variable” explaining 24% revision in their cohort

# Known: Anterolateral rotatory instability

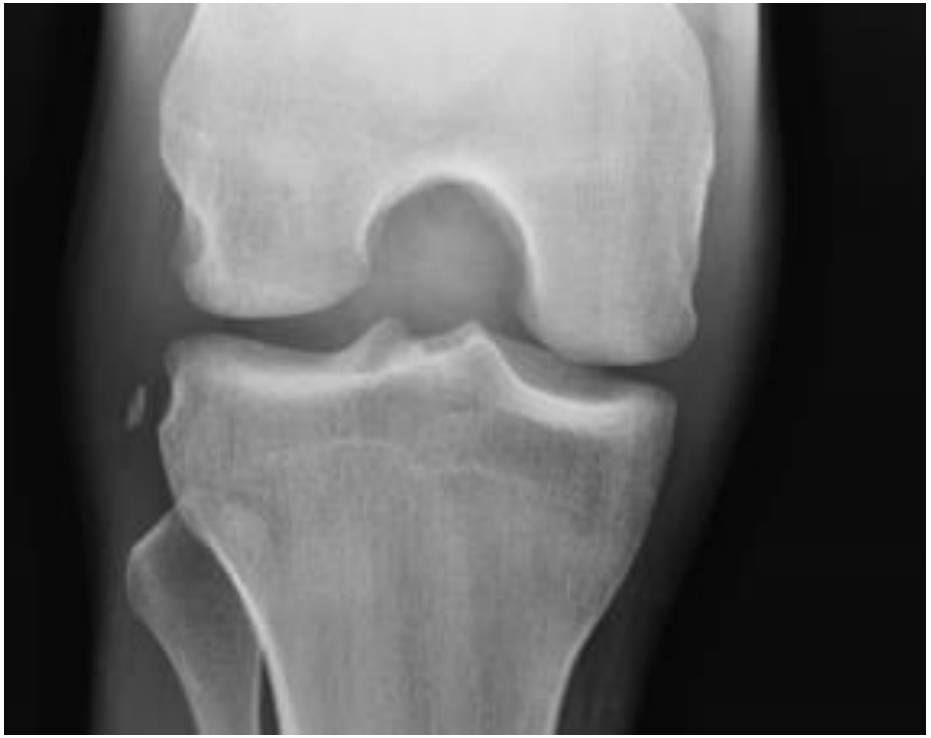


- Physical Exam
- Evaluate every patient with an ACL-deficient for varus laxity and rotational instability
- Varus stability 30 degrees
- **Dial Test** at 30 and 90 degrees
  - 10° increase in ER = laxity
  - At 30° only: Posterolateral corner
  - At 30 and 90: Posterolateral corner and PCL

# Known: Anterolateral rotatory instability

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

- Dr. Paul Segond
- 1879: “Pearly, resistant fibrous band”
  - Small bony avulsion off the lateral tibial plateau
    - 75-100% of ACL tears



# New?: “Anterolateral ligament”

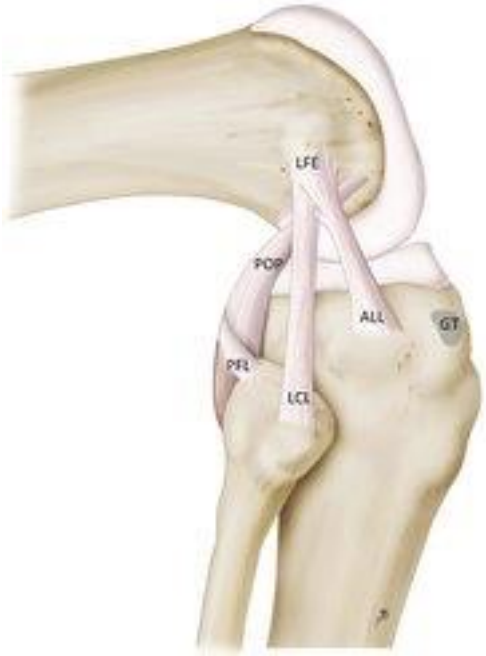
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

The New York Times

PHYS ED

## Doctors Identify a New Knee Ligament

By GRETCHEN REYNOLDS NOVEMBER 13, 2013 12:01 AM 64 Comments



# Anterolateral ligament

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

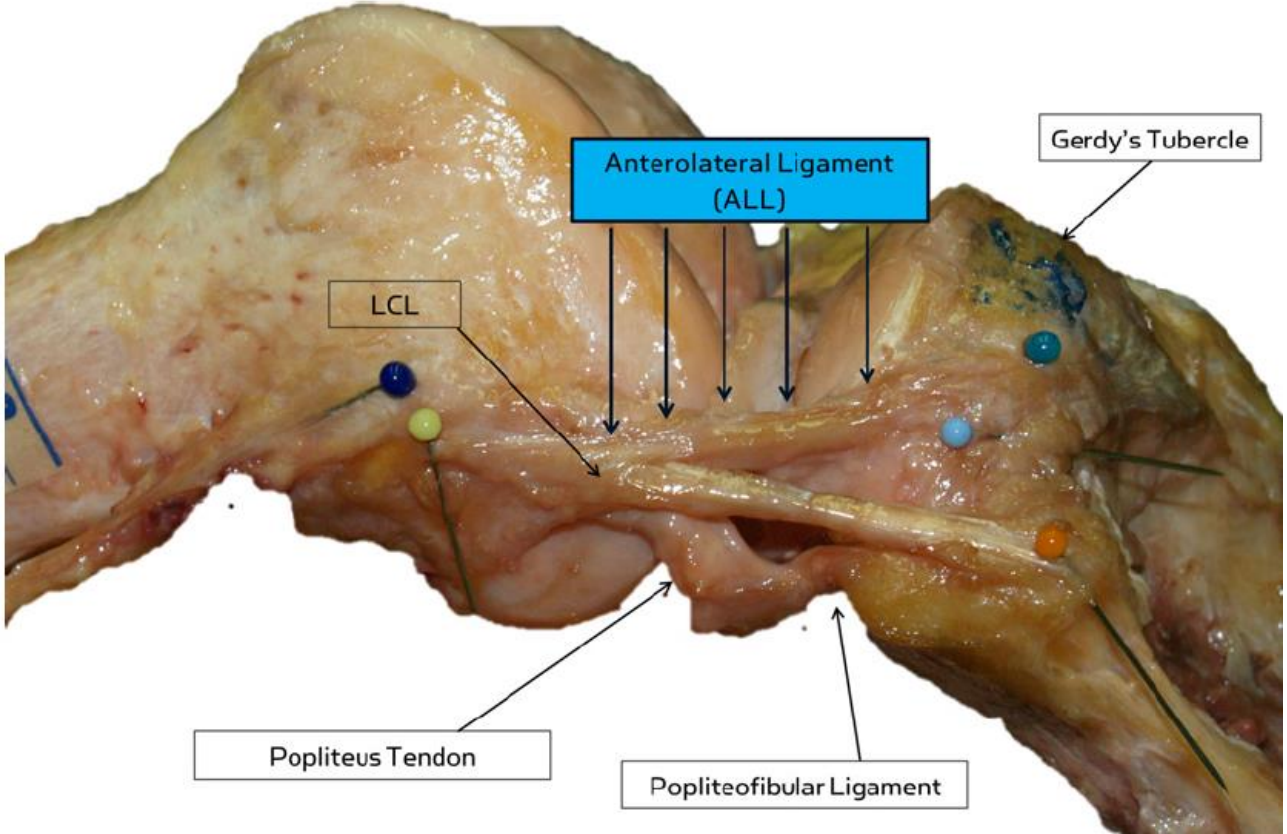
Journal of Anatomy

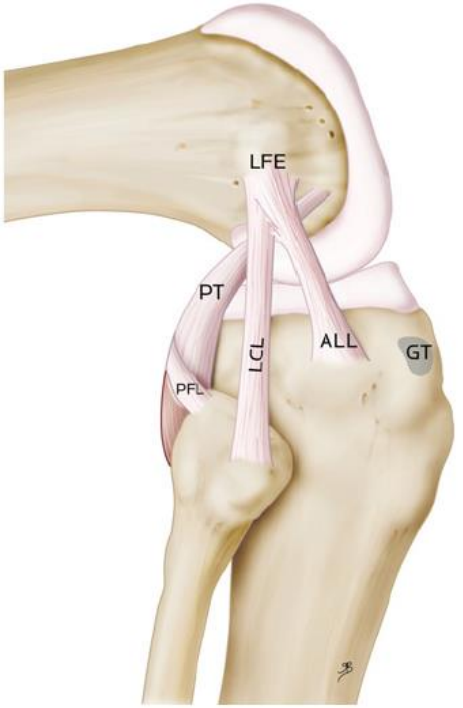
J. Anat. (2013) doi: 10.1111/joa.12087

## Anatomy of the anterolateral ligament of the knee

Steven Claes,[1] Evie Vereecke,[2] Michael Maes,[1] Jan Victor,[3] Peter Verdonk[4] and Johan Bellemans[1]

[1]Department of Orthopedic Surgery & Traumatology, University Hospitals Leuven, Leuven, Belgium
[2]Department of Development and Regeneration, Faculty of Medicine@Kulak, Catholic University Leuven, Kortrijk, Belgium
[3]Department of Orthopedic Surgery & Traumatology, University Hospital Gent, Ghent, Belgium
[4]Antwerp Orthopedic Center, Monica Hospitals, Antwerp, Belgium

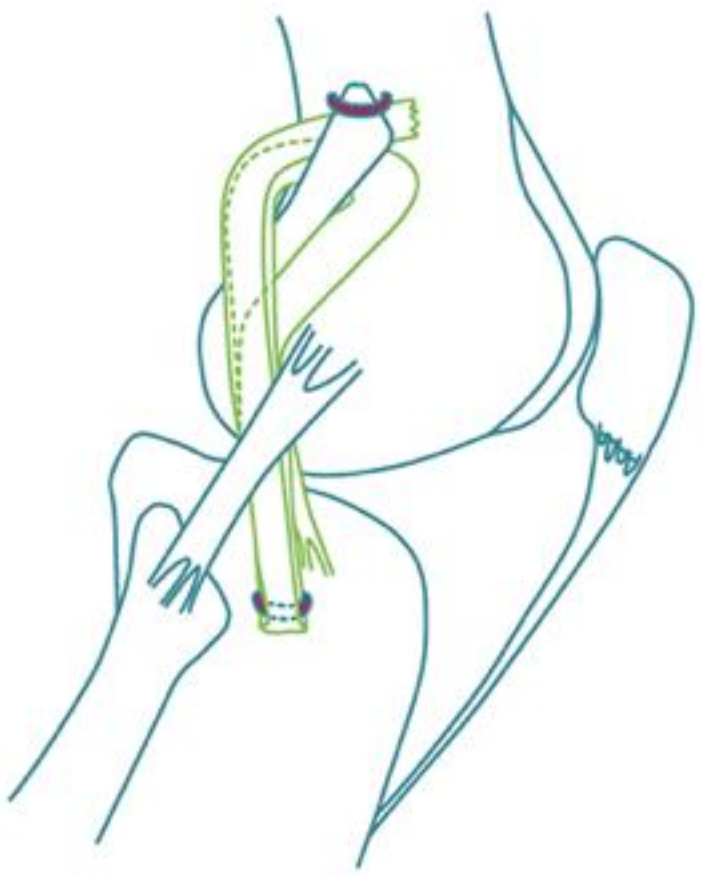


# Anterolateral ligament: Not new

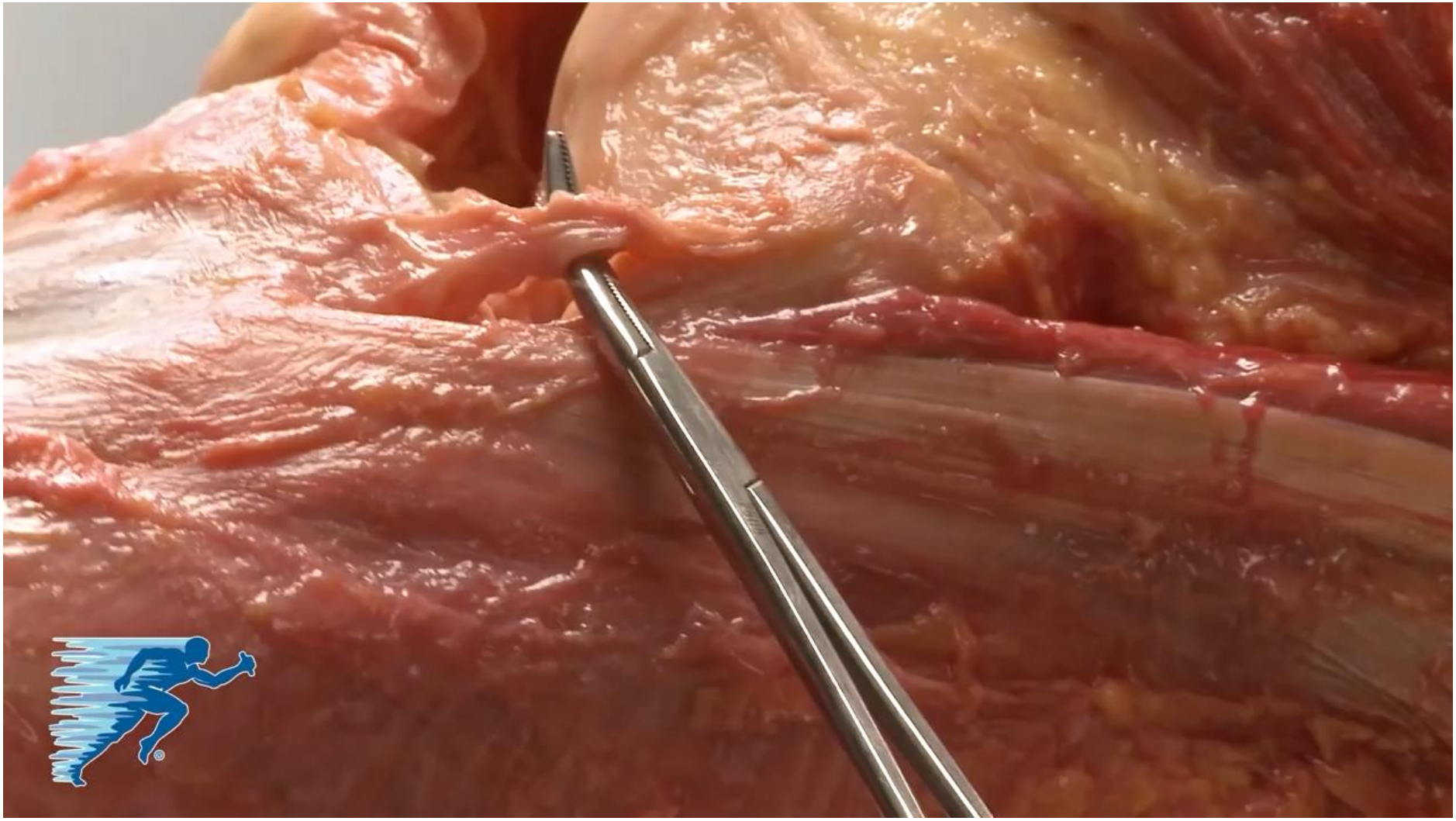


- **Descriptions of Anterolateral instability**
  - Jack Hughston JBJS 1976
  - Galway/Beaupre/MacIntosh 1972
  - Slocum et al 1976
  - Loee, Johnson, Southwick 1978
  - Noyes 1993
- **Extra-articular Surgery (IT Band tenodesis)**
  - Marcel Lemaire 1972
  - MacIntosh Procedure 1972
  - Coker-Arnold Modification
  - Frank Noyes 1991
  - Marcacci and Zaffagnini AJSM 2009



# Anterolateral ligament

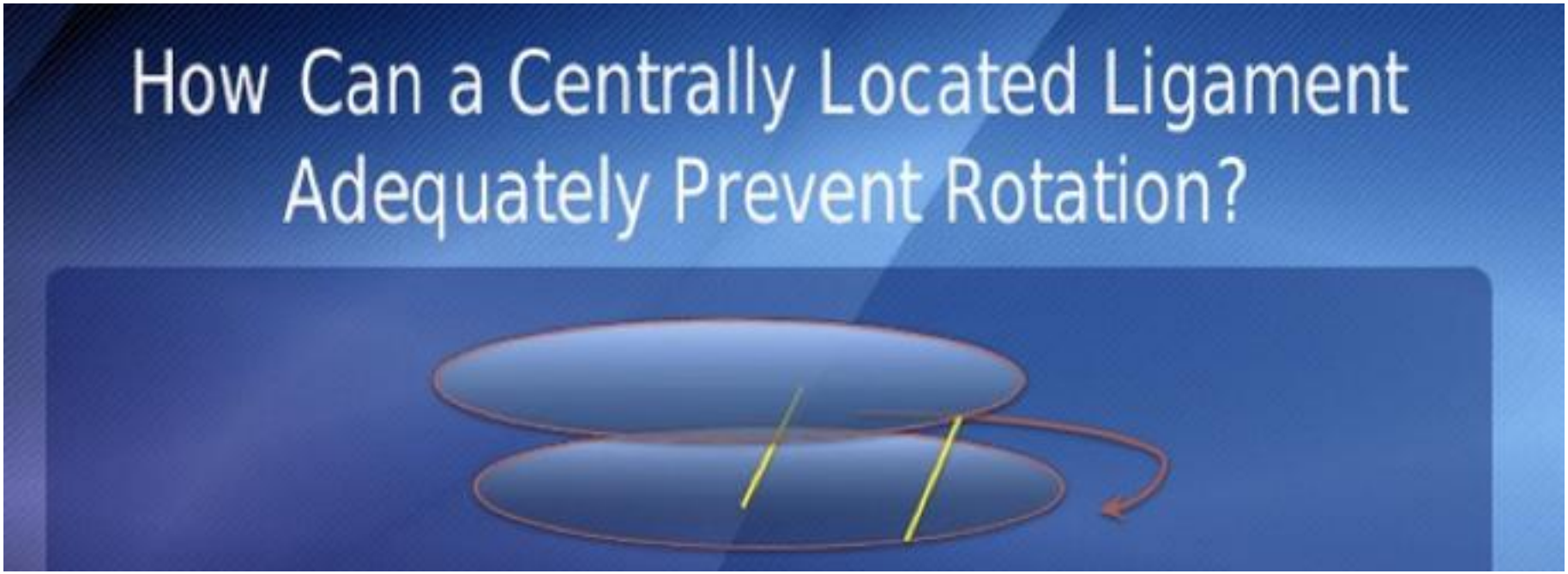
MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE



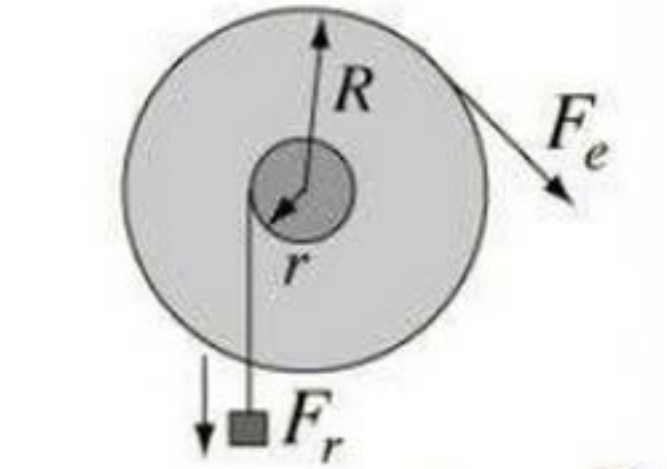
Courtesy http://drrobertlaprademd.com/

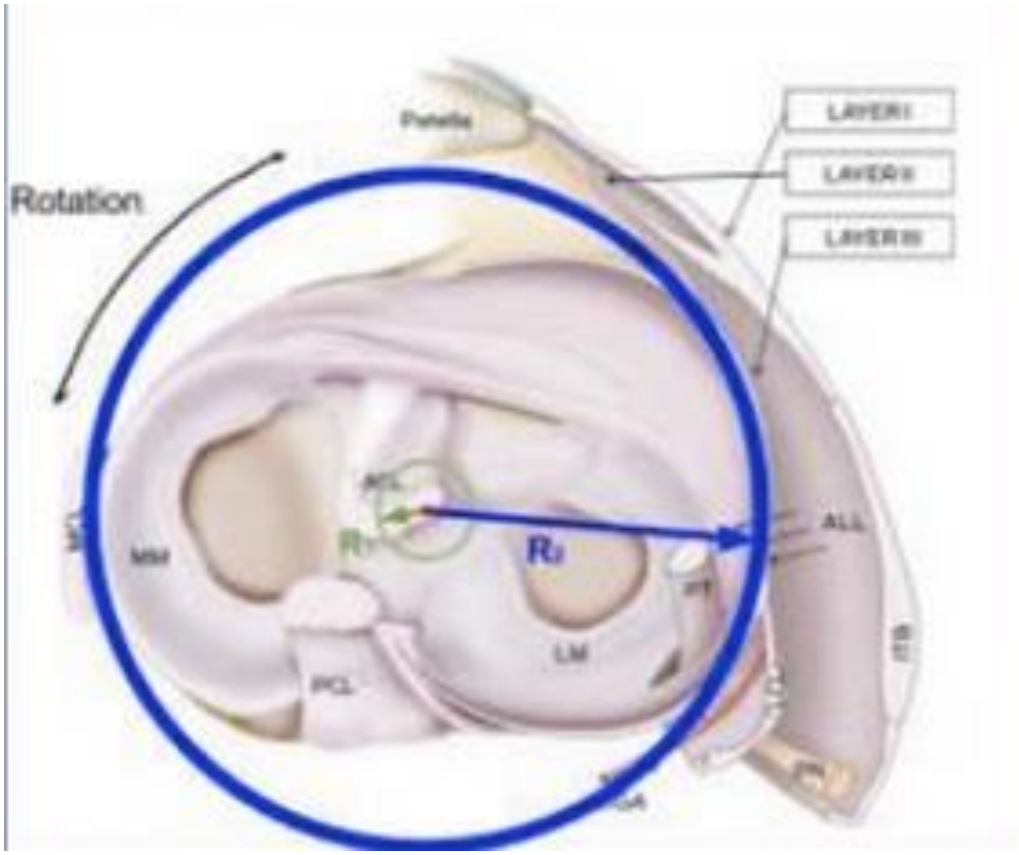
# ALL: Concept




How Can a Centrally Located Ligament Adequately Prevent Rotation?

# ALL: Wheel & Axle Concept




**Anterolateral ligament (ALL) sees 6 times the force seen by the ACL**

Mirahara A, from https://www.slideshare.net/hiraharamd/anterolateral-ligament-all

# Initial Scuttlebutt



- “I’ll use it in a second revision”
- “I’ll wait for the clinical”
- “Concept seems good….”
- “This is nothing new”
- “3+ Pivot”

# Results: Anterolateral ligament

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE


Am J Sports Med. 2015 Mar 4. pii: 0363546515571571. [Epub ahead of print]

**Outcome of a Combined Anterior Cruciate Ligament and Anterolateral Ligament Reconstruction Technique With a Minimum 2-Year Follow-up.**

Sonnery-Cottet B[1], Thaunat M[2], Freychet B[2], Pupim BH[2], Murphy CG[2], Claes S[3].

- 92 Patients. Primary ACL + ALL.
- 2 year follow up (mean 32.4 +/- 3.9 months)
- Indications: Segond fracture, chronic ACL lesion, grade 3 pivot shift, high level of sporting activity, pivoting sports, and radiographic lateral femoral notch sign
- 1.1% ACL re-rupture

# Results: Anterolateral ligament

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

Arthroscopy. 2019 Mar;35(3):885-892. doi: 10.1016/j.arthro.2018.09.020. Epub 2019 Jan 29.

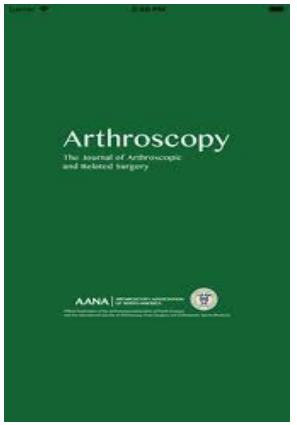
**Combined Anterior Cruciate and Anterolateral Ligament Reconstruction in the Professional Athlete: Clinical Outcomes From the Scientific Anterior Cruciate Ligament Network International Study Group in a Series of 70 Patients With a Minimum Follow-Up of 2 Years.**

Rosenstiel N[1], Praz C[1], Ouanezar H[1], Saithna A[1], Fournier Y[1], Hager JP[1], Thaunat M[1], Sonnery-Cottet B[2].

**Author information**

1 Centre Orthopédique Santy, FIFA Medical Center of Excellence, Groupe Ramsay-Generale de Santé, Lyon, France.

2 Centre Orthopédique Santy, FIFA Medical Center of Excellence, Groupe Ramsay-Generale de Santé, Lyon, France. Electronic address: sonnerycottet@aol.com.




- 72 Professional Athletes. Primary ACL + ALL.
- Minimum 2 year follow up (mean 3.9 years)
- 5.7% ACL re-rupture (4 patients)
- Final follow up Tegner: 8.8 +/- 1.5
- At 1 year: 87% return to same level. Avg 7.9 months.

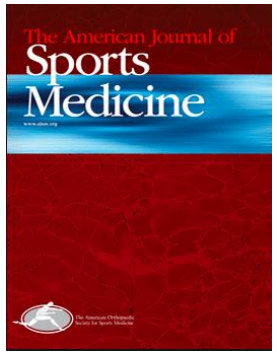
# Results: Anterolateral ligament

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Anterolateral Ligament Reconstruction Is Associated With Significantly Reduced ACL Graft Rupture Rates at a Minimum Follow-up of 2 Years: A Prospective Comparative Study of 502 Patients From the SANTI Study Group

Bertrand Sonnery-Cottet, MD*, Adnan Saithna, MBChB, DipSEM, MSc, FRCS(T&O), Maxime Cavalier, MD, Charles Kajetanek, MD, Eduardo Frois Temponi, MD, Matt Daggett, DO/MBA, Camilo Partezani Helito, MD, Mathieu Thaunat, MD

Show less



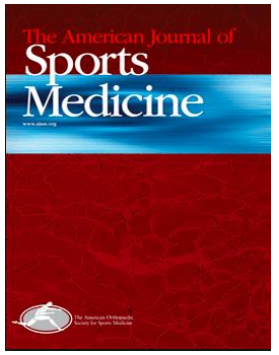

- Scientific ACL NeTwork International (SANTI)
- 502 Primary ACL patients. BTB (105) *vs* Ham (176) *vs* Ham +ALL (221)
- Mean age: 22.4yrs
- Mean follow-up of 38.4 months
- Hamstring: **10.77% re-tear**(range, 6.60%-17.32%)
- BTB: **16.77% re-tear** (range, 9.99%-27.40%)
- Hamstring + ALL: **4.13% re-tear** (range, 2.17%-7.80%)

Volume: 45 issue: 7, page(s): 1547-1557
Article first published online: February 2, 2017; Issue published: June 1, 2017

# Results: Anterolateral ligament

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE

## Clinical Outcomes of Isolated Revision Anterior Cruciate Ligament Reconstruction or in Combination With Anatomic Anterolateral Ligament Reconstruction




Dhong Won Lee,* MD, Jin Goo Kim,*† MD, PhD, Seung Ik Cho,‡ MS, and Du Han Kim,* MD
*Investigation performed at the Department of Orthopaedic Surgery, Konkuk University Medical Center, Seoul, Republic of Korea*

The American Journal of Sports Medicine
2019;47(2):324–333
DOI: 10.1177/0363546518815888


- 87 revision ACL split into 2 groups
- 45 isolated revision ACL vs 42 combo revision ACL + ALL.
- Mean Isolated F/U: 3.5 yrs Mean Combo F/U: 3.2 yrs
- Results:
  - Subjective IKDC score, Tegner score, and ACL-RSI better in **combo** group at final follow up.
  - *Return to sport at same level*: 57.1% in **combo** group vs 25.6% in isolated group

# Summary



- Avoid the re-tear in the first place
  - Rehab and don't bend
- Learn from mistakes
  - Graft/patient selection, tunnel placement, etc
- Change with the times
- Stay up on research
- Be transparent with the patient

# Thank You!

HARVARD MEDICAL SCHOOL

MASSACHUSETTS GENERAL HOSPITAL
SPORTS MEDICINE