

When Should I add an Extra-Articular Procedure with my ACL Reconstruction?

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Team Physician, Princeton
University and Neptune HS

May 30, 2024



Life In Motion

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Disclosures

- Smith and Nephew: Consultant
 - Nothing relevant to this talk

Let's Start with the Basics...

- ACL Reconstruction Goals
 - Restore knee stability
 - Return to pre injury level of function/sport
 - Restore motion
 - Prevent future meniscus and chondral injury



ACL Reconstruction Failure

- Multifactorial
 - Higher rates in young
 - Higher rates in allograft
 - MOON group
 - <20 with increased revision
 - Danish Registry
 - <20yo, <8mm graft
 - Both with higher revision rates
- Particularly high in young, female athletes in cutting sports



Risk of Re-Injury?

Risk of Secondary Injury in Younger Athletes After Anterior Cruciate Ligament Reconstruction

CME

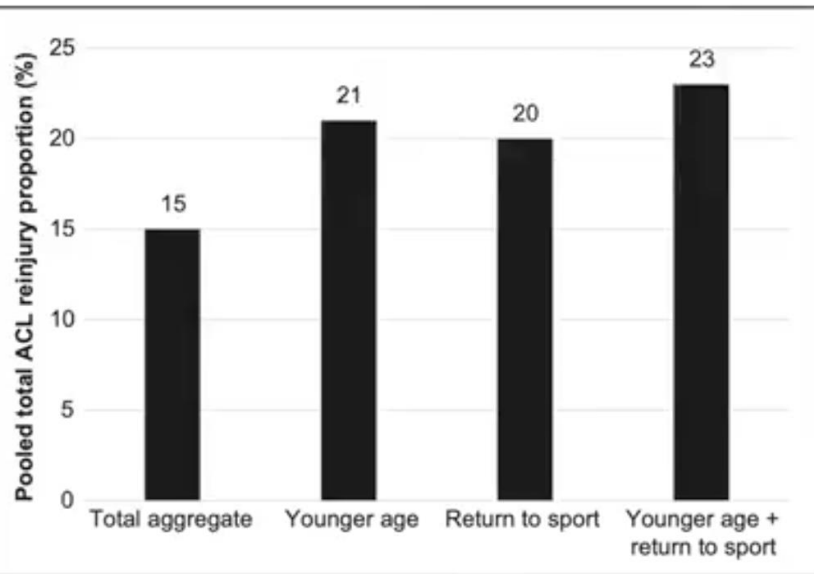
A Systematic Review and Meta-analysis



Amelia J. Wiggins,* DO, Ravi K. Grandhi,^{††} MBA, Daniel K. Schneider,^{‡§} Denver Stanfield,[¶] MD, Kate E. Webster,[¶] PhD, and Gregory D. Myer,^{§§***} PhD
Investigation performed at Cincinnati Children's Hospital, Cincinnati, Ohio, USA

We have room for improvement to control rotational instability!

High rate of persistent pivot shift post ACL-R

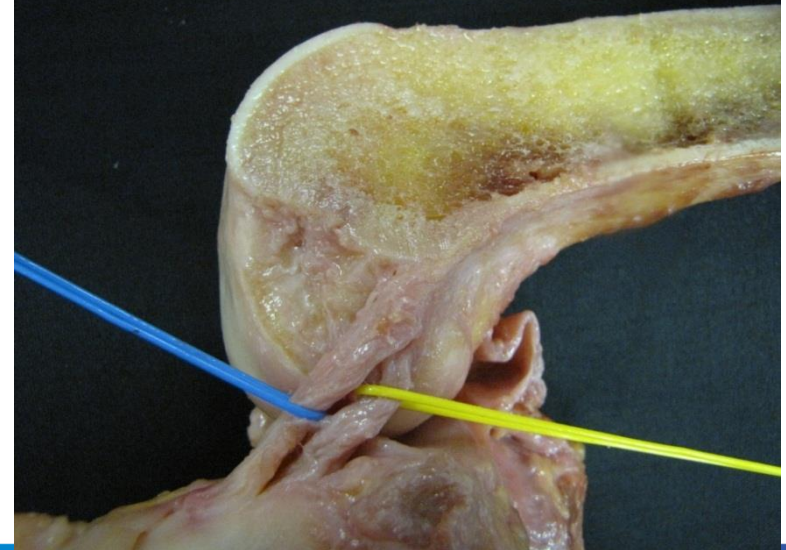
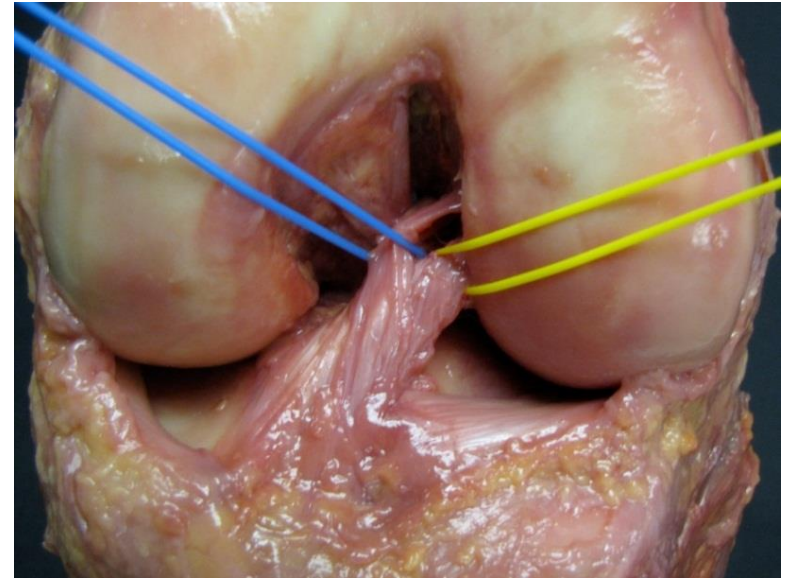


Up to 20% re-tear!

Anterior Cruciate Ligament

Main stabilizer to anterior translation (30°)

-Also, important in rotational control



Assessment of Anterolateral Rotation

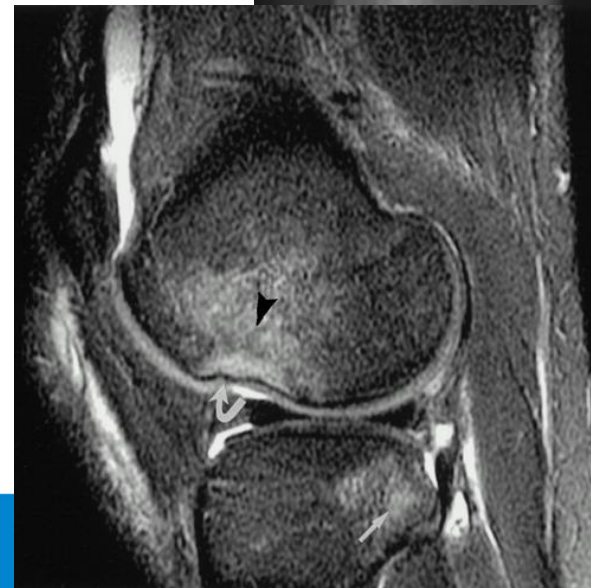
Pivot Shift Exam

- Knee in extension
- Valgus
- Internal rotation
- Flex knee
- Tibia will reduce as knee flexes around 30°



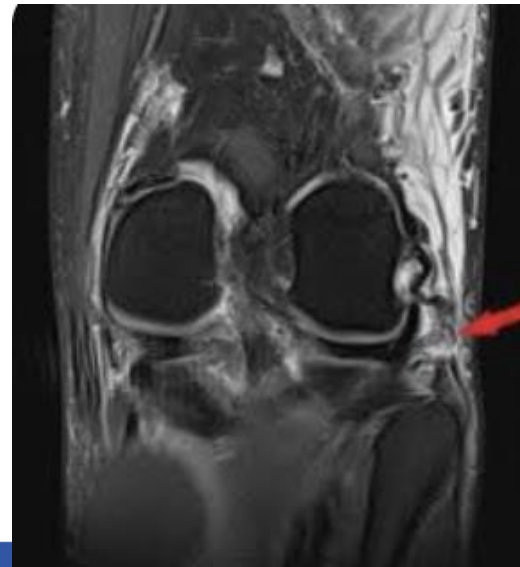
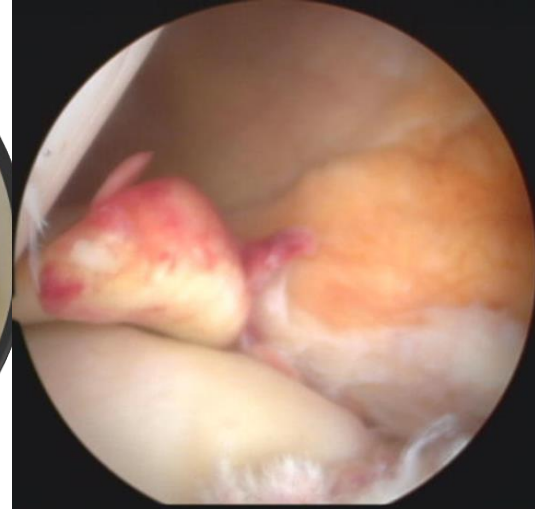
The Facts

- A graft controlling anterior translation does not always translate to rotational control.
- We need to think about more than just the ACL tear!!



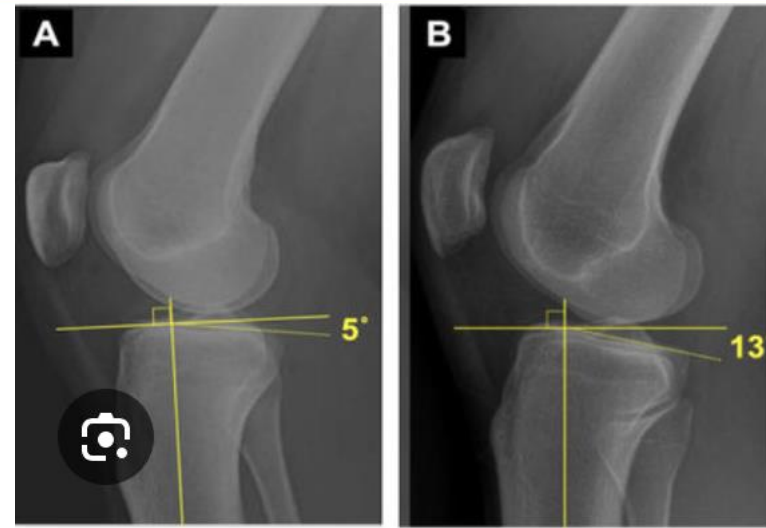
Associated Injuries Need to be Fixed!

- Meniscus tears
 - Ramp/ root tears
- Lateral side of knee
 - Posterolateral corner injuries
 - Lateral femoral condyle
 - Segond Fracture

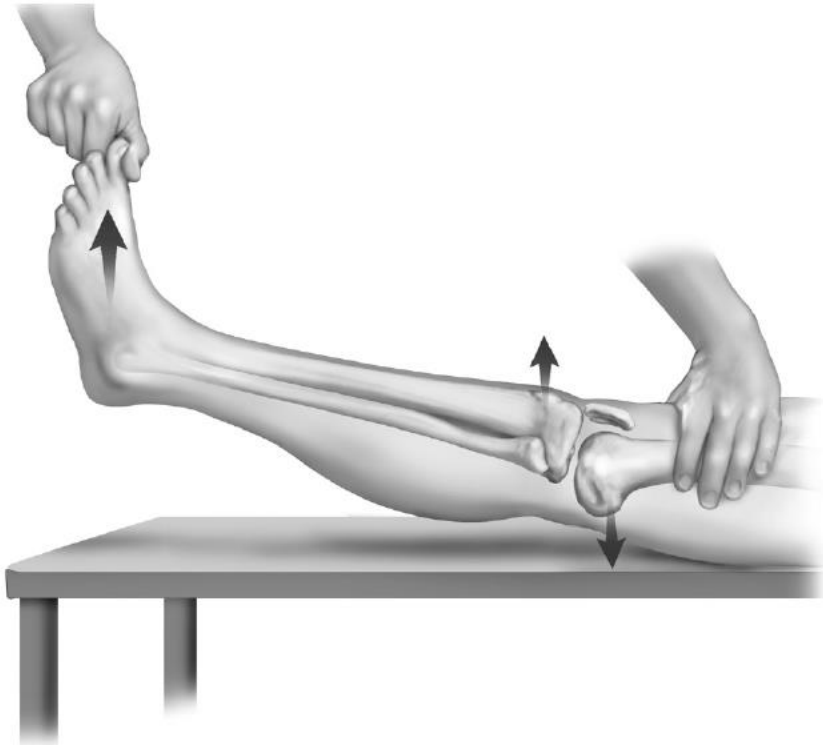


Tibial Slope

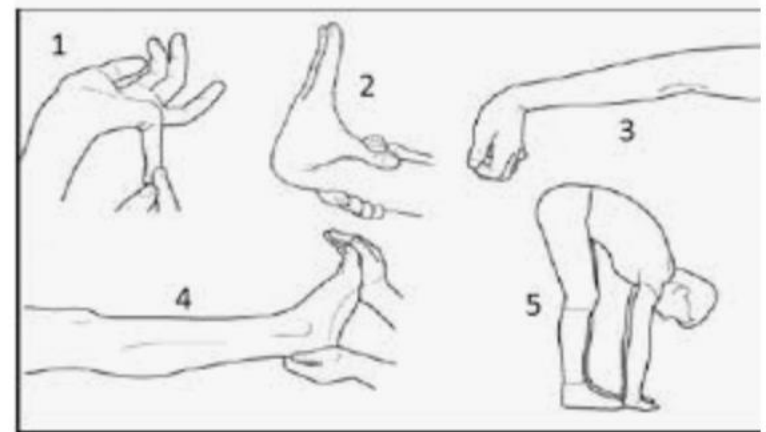
- High tibial slope increases risk of graft tear
- Normal posterior tibial slope = 7-9° (Harner, AJSM, 2007)
- When to correct with slope altering tibial osteotomy is debated....



Check for Recurvatum and Hyperlaxity



Beighton's Score



Lateral Extra-Articular Tenodesis (LET)

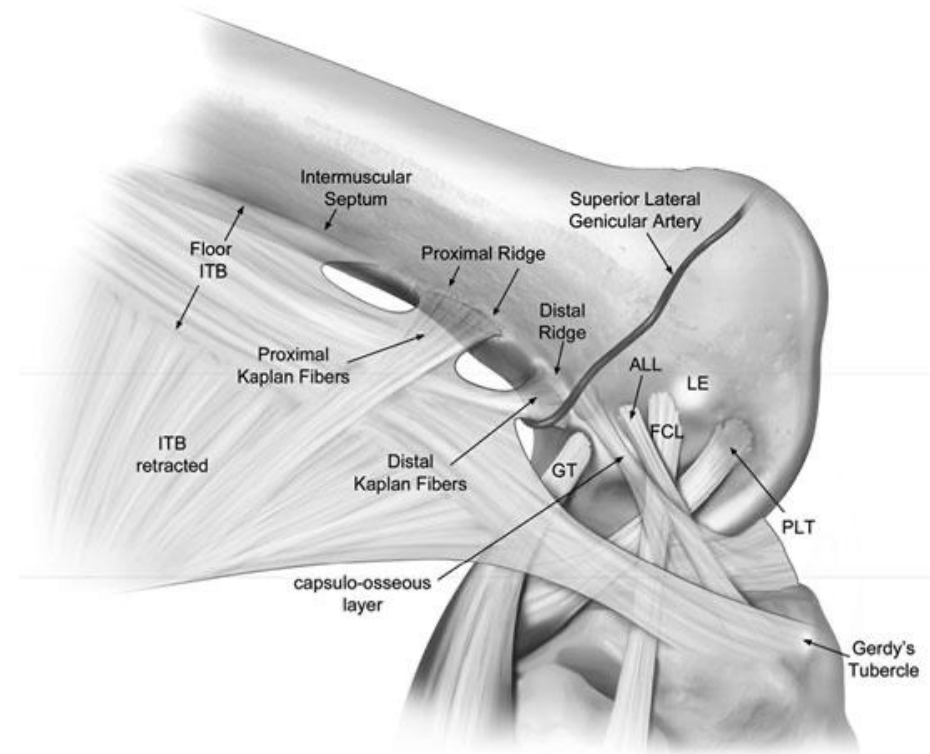
- First described in the mid 1960s by Lemaire
- Used to treat anterolateral knee instability



...Replaced when modern arthroscopic ACL reconstruction techniques became gold standard

Anterolateral Ligament (ALL)

- Anatomic studies have demonstrated ALL
 - Sectioning → instability
- Described previously as similar anatomic structures
 - Paul Segond, 1879
- On tibia, posterior to Gerdy's tubercle, halfway between Gerdy's and head of fibula



Renewed Interest



lateral extra-articular tenodesis



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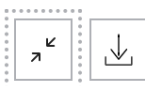
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RESULTS BY YEAR

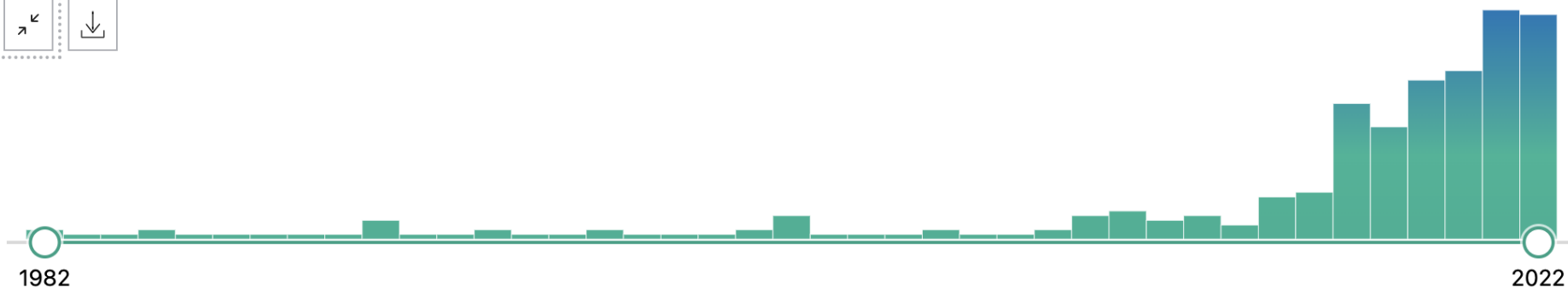
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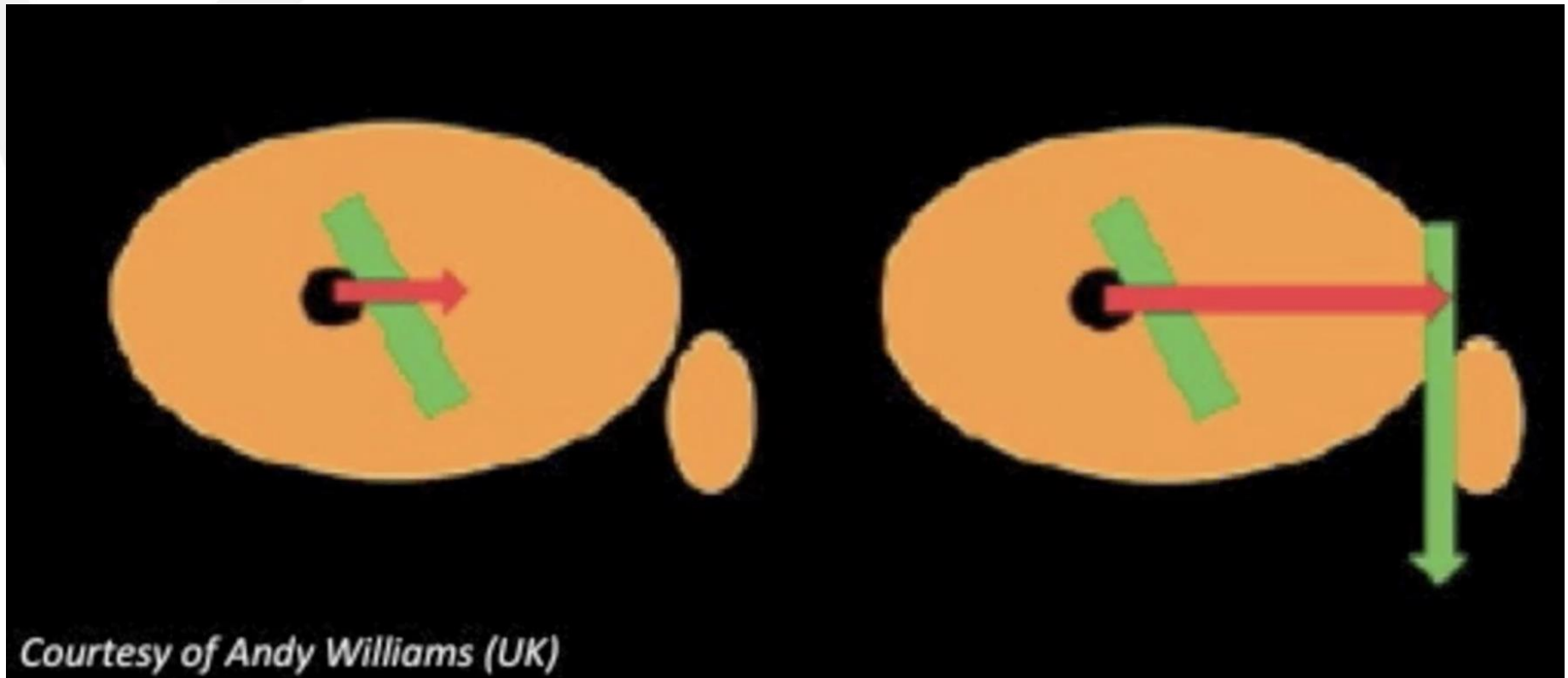


1982

2022



Controlling Rotation with a centrally placed graft.....



Winner of the O'Donoghue Sports Injury Award

Lateral Extra-articular Tenodesis Reduces Failure of Hamstring Tendon Autograft Anterior Cruciate Ligament Reconstruction

2-Year Outcomes From the STABILITY Study Randomized Clinical Trial

Alan M.J. Getgood,* MD, FRCS(Tr&Orth), Dianne M. Bryant, MSc, PhD, Robert Litchfield, MD, FRCSC, Mark Heard, MD, FRCSC, Robert G. McCormack, MD, FRCSC, Alex Rezanoff, MD, FRCSC, Devin Peterson, MD, FRCSC, Davide Bardana, MD, FRCSC, Peter B. MacDonald, MD, FRCSC, Peter C.M. Verdonk, MD, PhD, and Tim Spalding, FRCS, and the STABILITY Study Group



- **Stability 1 Trial**
 - 9 centers across Canada and Europe
 - 618 patients under the age of 25 randomized to hamstring tendon autograft with or without LET
- **Stability 2 results hopefully this year (BTB)**

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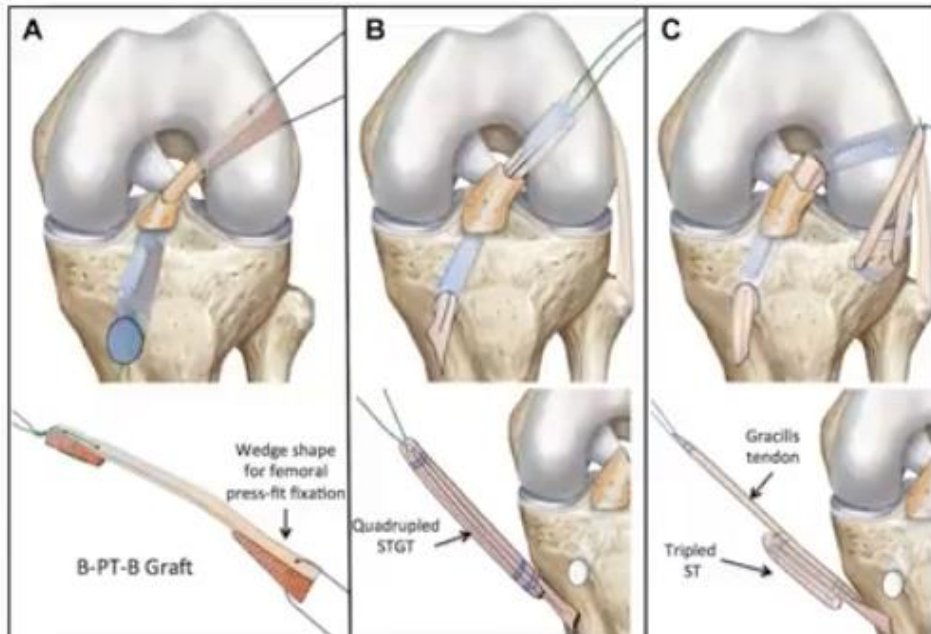


- Addition of LET resulted in
 - Reduction of risk of graft rupture (4% vs 11%, RRR, 0.67; 95% CI, 0.36-0.83; $P < .001$)
 - Reduction in risk of persistent rotational instability (25% vs 40%, RRR, 0.38; 95% CI, 0.21-0.52; $P < .0001$)
 - No increase in complications
 - No difference in return to sport rates, but...
 - Improved rotational stability returned at higher level of play

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 Sonnerly-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, and Mathieu Thauvat,[†] MD
Investigation performed at the Centre Orthopédique Santy, Lyon, France



What about ALL reconstruction?

-50% reduction risk of graft re-tear...

BUT...

These are with hamstring ACL-R, still don't know BTB or quad tendon results

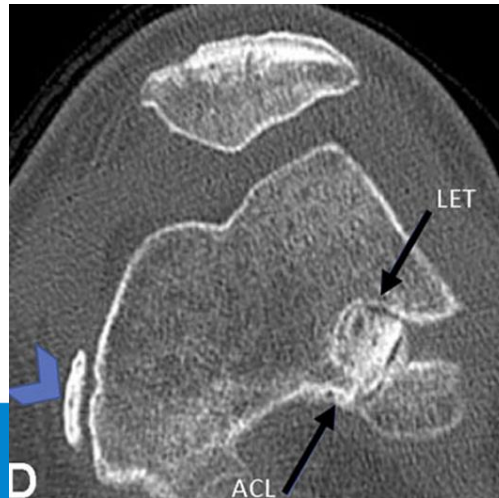
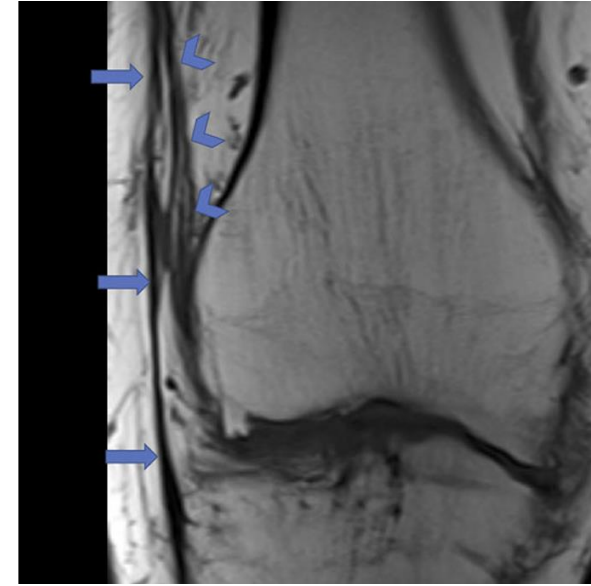
Reconstruction of ALL

- Techniques vary, remain controversial which is best
- Modified Lemaire LET
 - Posterior portion of the ITB
 - Distal attachment preserved
 - Tunneled under LCL and tenodesis to femur



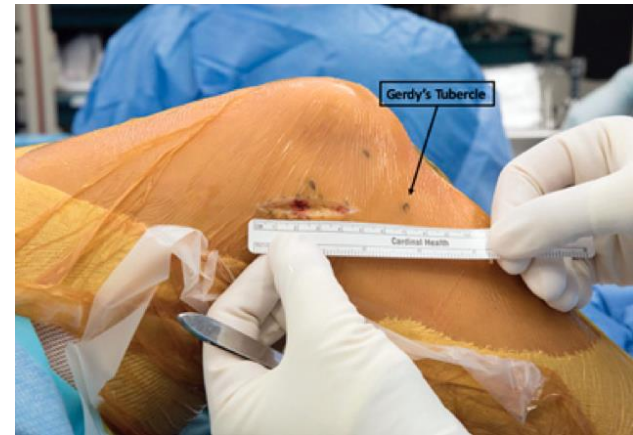
What are the drawbacks?

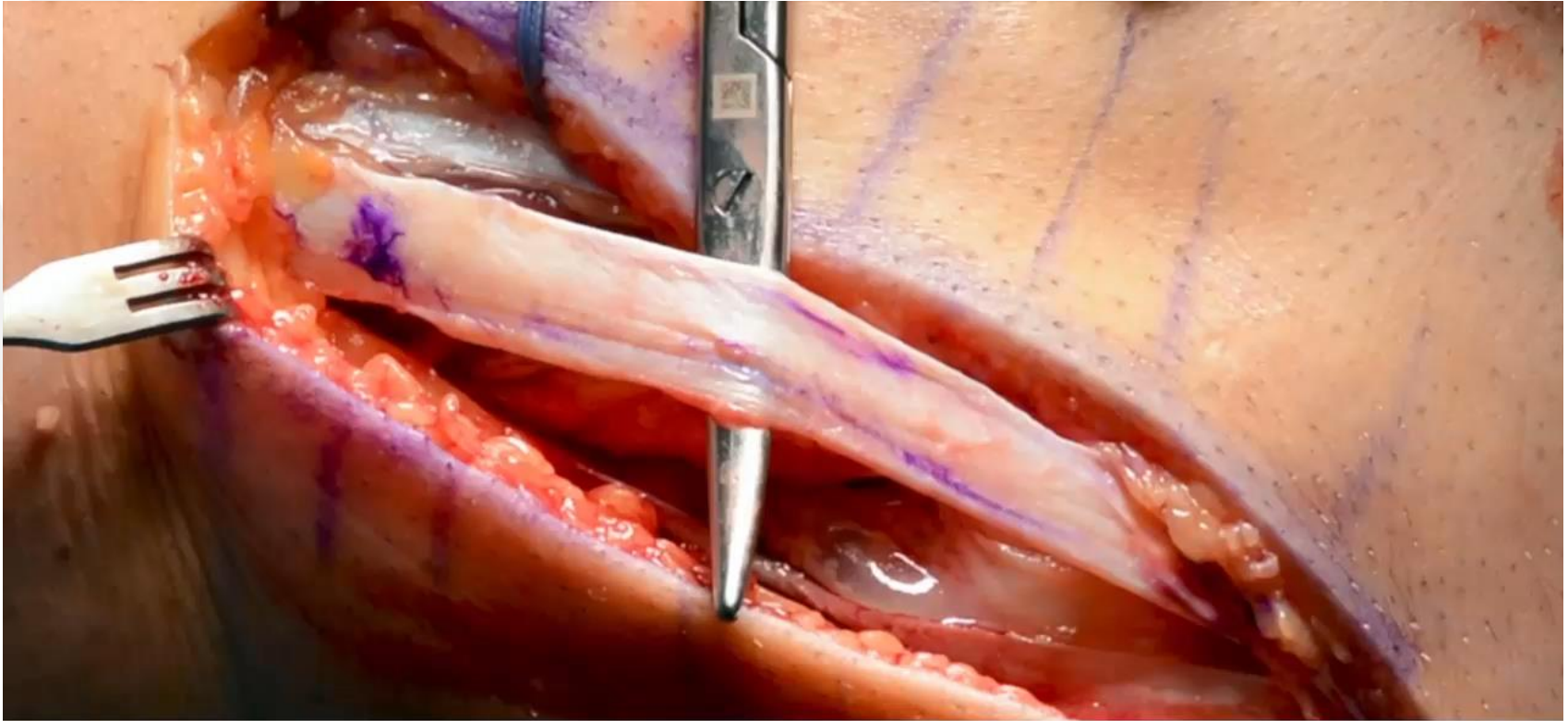
- Additional incision/ pain- is it needed
 - Need longer term data
- Concern for over constraint of lateral knee? Early OA?
 - Stiffness
 - Disproven with high level studies/ meta analysis **
- Hardware irritation
- Tunnel convergence



LET Technique

- Oblique incision between lateral epicondyle and Gerdy's tubercle
- Dissection to ITB
- 8cm long, 1cm wide of posterior ITB harvested
 - Distal end left attached
- Shuttle under prox LCL
- Tenodesis on femur
 - Position of leg recommendations vary
 - Don't over constrain





Combined ACL Reconstruction and Lateral Extra-Articular Tenodesis

David Bernholt, Mitchell I. Kennedy, Matthew Crawford, Nicholas N. DePhillipo, Robert F. LaPrade, MD, PhD

Lateral Extra-Articular Tenodesis

- Indications in 2024 (debated....)
 - Revision ACL in high risk patient
 - Primary ACL
 - High grade pivot
 - Teenage athlete in cutting sports
 - Recurvatum
 - Generalized ligamentous laxity
 - High tibial slope
 - (likely some combination of above)



Questions?


- Thank you!

Outcomes

- Significant reduction in pivot shift in combined procedure
- Reduction in retear rates
- No increase in complications
- Decreased retear rates
- Decreased residual rotatory instability

Systematic Review

Lateral Extra-articular Tenodesis Reduces Rotational Laxity When Combined With Anterior Cruciate Ligament Reconstruction: A Systematic Review of the Literature

Christopher E. Hewison B.Sc.(Kin), Michael N. Tran M.D., F.R.C.S.C., Nicole Kaniki A.T.C., M.Sc., Alliya Remtulla B.Sc.(Kin), M.Sc., Dianne Bryant Ph.D., Alan M. Getgood M.Phil., M.D., F.R.C.S.(Tr&Orth), Dip.S.E.M. 

Isolated ACL Reconstruction Versus ACL Reconstruction Combined With Lateral Extra-articular Tenodesis: A Comparative Study of Clinical Outcomes in Adolescent Patients

Edoardo Monaco, MD  Alessandro Carrozzo, MD  [...], and Andrea Ferretti, MD  [View all authors and affiliations](#)

Lateral Extra-articular Tenodesis Reduces Failure of Hamstring Tendon Autograft Anterior Cruciate Ligament Reconstruction: 2-Year Outcomes From the STABILITY Study Randomized Clinical Trial

Alan M.J. Getgood, MD, FRCS(Tr&Orth)  Dianne M. Bryant, MSc, PhD [...], and Mieke Van Haver  [View all authors and affiliations](#)

Outcomes

- 0% vs 15% re-tear rates
- No increase in complications or reoperations

- 3x lower re-tear rate with LET
- Improved PROMs
- Lower residual pivot shift

> [Am J Sports Med.](#) 2022 Oct;50(12):3244-3255. doi: 10.1177/03635465221118377. Epub 2022 Sep 13.

Isolated ACL Reconstruction Versus ACL Reconstruction Combined With Lateral Extra-articular Tenodesis: A Comparative Study of Clinical Outcomes in Adolescent Patients

Meta-Analysis > [Am J Sports Med.](#) 2022 Mar;50(4):1137-1145. doi: 10.1177/03635465211004946. Epub 2021 Apr 22.

Anterior Cruciate Ligament Reconstruction Alone Versus With Lateral Extra-articular Tenodesis With Minimum 2-Year Follow-up: A Meta-analysis and Systematic Review of Randomized Controlled Trials

Indications

- Debated...
- Evolving...
- High risk population
 - Young, ligamentous laxity, recurvatum, high risk sport, high grade pivot, revision ACL (without clear reason for failure), increased tibial slope, meniscal root/ramp tears