THE **DOSTAR** TRIAL

SEMI-T + ADJUSTABLE BUTTON
VS
SEMI-T/GRACILIS + SCREW

IN HAMSTRING ACL RECONSTRUCTION

A DOUBLE BLINDED
RANDOMIZED CONTROLLED TRIAL

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THE UNIVERSITY OF WESTERN AUSTRALIA

PERTH SPORTS SURGERY FELLOWSHIP

ORTHOPAEDIC RESEARCH FOUNDATION WESTERN AUSTRALIA

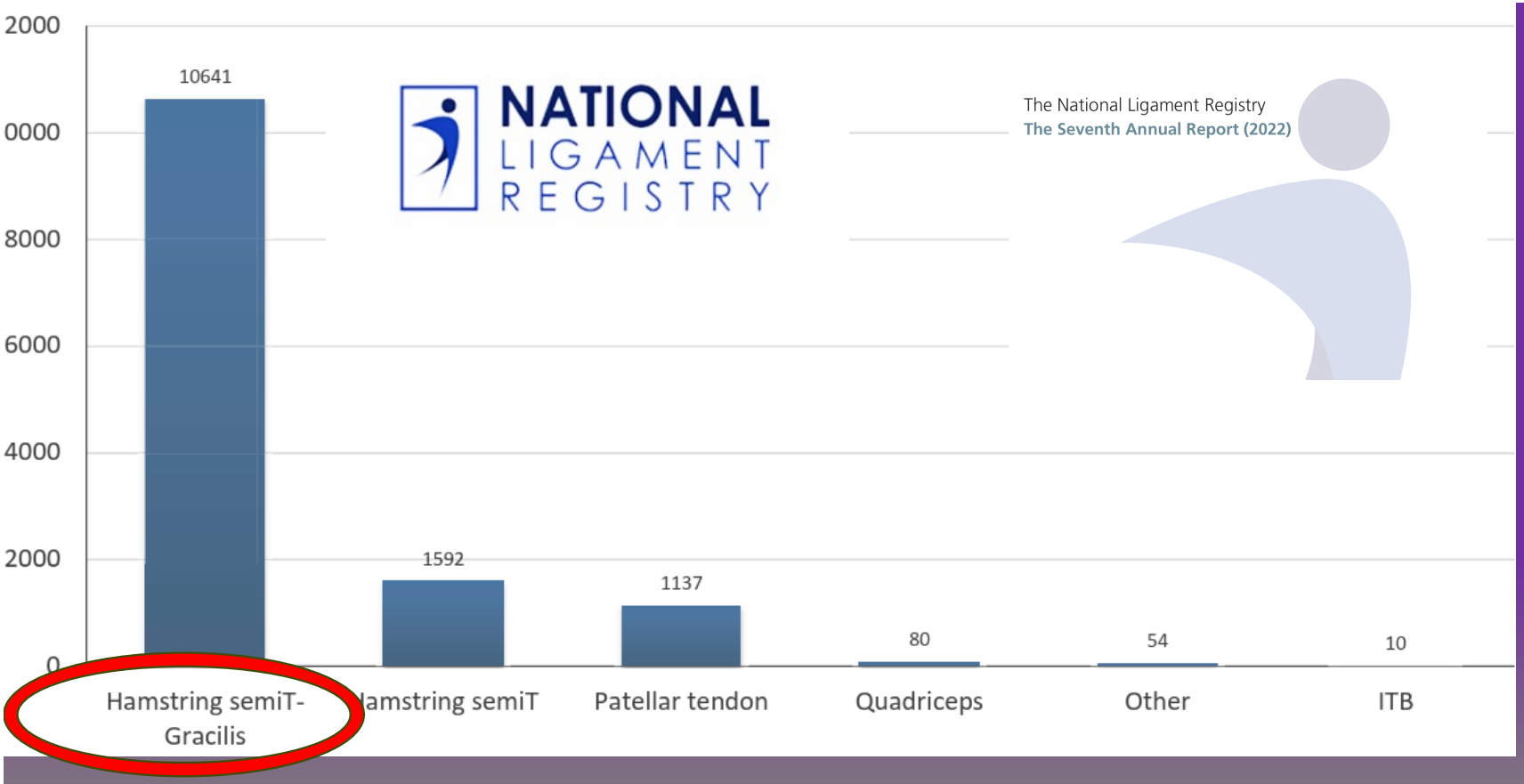
Adam Lawless, Jay Ebert, Peter Davies, Peter Edwards, Shahbaz Malik

Declaration of Interest

I declare that in the past three years I have:

- **held shares in:** *Nil*
- **received royalties from:** *Nil*
- **done consulting work for:** *Smith & Nephew, St John of God Healthcare*
- **given presentations for:** *Smith & Nephew, Medacta, Arthrex*
- **received research/institutional support from:** *Smith & Nephew, Arthrex*
- ***received travel support from:*** *Smith & Nephew, Medacta, Pune Knee Course Thai Orthopaedic Society for Sports Medicine*

Signed: Peter D'Alessandro *31 January 2026*



NATIONAL LIGAMENT REGISTRY

The National Ligament Registry
The Seventh Annual Report (2022)

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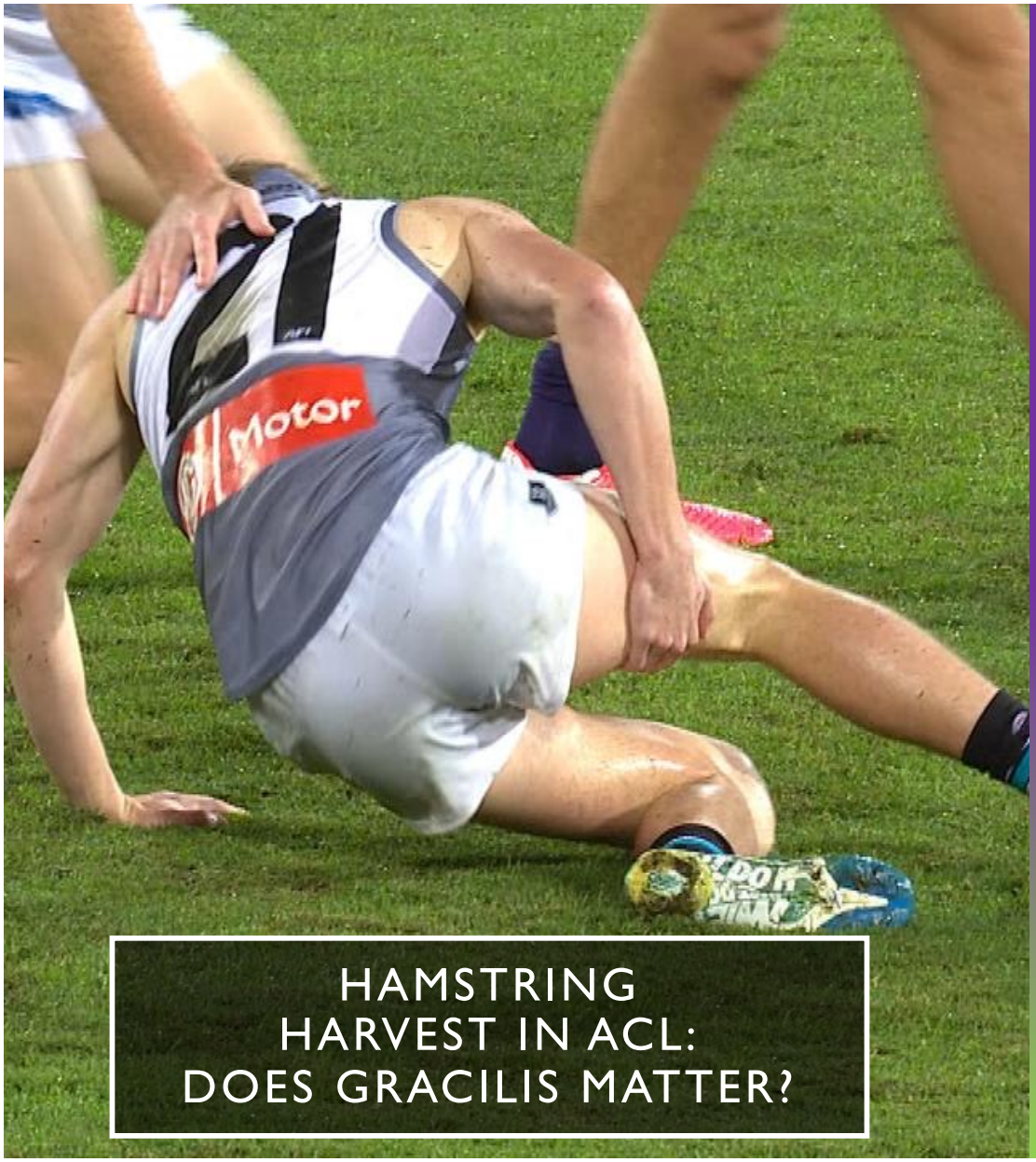

HAMSTRING HARVEST IN ACL: DOES GRACILIS MATTER?

Reduced hamstring strength

Donor site pain/morbidity

Muscle strains after return to sport

Single Tendon theoretical Advantages:
Broad short graft
Adjustable button fixation

No high level evidence
suggesting technique superiority

Editorial Commentary: Gracilis-Sparing Anterior Cruciate Ligament Hamstring Graft Reconstruction Is Less Invasive Than Semitendinosus-Gracilis Graft Harvest, and Shows No Clinical Difference in Outcomes With Grafts Greater Than 8 mm in Diameter

Griffin R. Rechter, M.D. • Eric Mason, M.D. • Bruce A. Levy, M.D.

Published: January 11, 2024 • DOI: https://doi.org/10.1016/j.arthro.2023.11.023

If we really want to put to rest the issue of whether harvesting the gracilis makes a "clinically important difference," then we would need to design a study 1 of 2 ways: One would typically assume that the optimal study design would involve a prospective randomized controlled trial in which patients would

Riccardo Cristiani M.D., Ph.D. [a b], Magnus Forssblad M.D., Ph.D. [a], Gunnar Edman M.D., Ph.D. [a], Karl Eriksson M.D., Ph.D. [c d], Anders Stålman M.D., Ph.D. [a b]

A semitendinosus with adjustable button graft construct in patients undergoing hamstring ACL reconstruction results in improved knee flexor strength symmetry and less donor site p
DOSTAR randon

DOI: 10.1002/ksa.12698

KNEE

Knee Surgery, Sports Traumatology, Arthroscopy WILEY

A semitendinosus with adjustable button graft construct in patients undergoing hamstring ACL reconstruction results in improved knee flexor strength symmetry and less donor site pain and morbidity: Outcomes from the DOSTAR randomized controlled trial

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Abbreviations: ACLR, anterior cruciate ligament reconstruction; BMI, body mass index; CKRS, Cincinnati Knee Rating System; DFPACLR, Donor-site-related Functional Problems following Anterior Cruciate Ligament Reconstruction; IKDC, International Knee Documentation Committee; LET, lateral extra-articular tenodesis; LKS, Lysholm Knee Score; LSI, limb symmetry index; MRI, magnetic resonance imaging; PROMs, patient-reported outcome measures; RCT, randomized controlled trial; ROM, range of motion; SHD, single horizontal hop for distance; SMD, standardized mean difference; ST, semitendinosus; STG, semitendinosus–gracilis; VAS, visual analogue scale; VAS-F, visual analogue score for pain frequency; VAS-S, visual analogue score for pain severity.

SINGLE (ST)

DUAL (STG)

Prospective Double Blinded RCT

University of Western Australia

Single Tendon + Adjustable Button
UltraButton
Vs
Dual Tendon + Screw
BioRCI

ANZCTR
Australian New Zealand Clinical Trials Registry

AIMS

DONOR-SITE RELATED FUNCTIONAL PROBLEMS FOLLOWING ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION

NAME: _____

DATE: _____ YEAR OF BIRTH: _____

DATE OF ACL-RECONSTRUCTION: _____

SEX: ☐ Female ☐ Male GRAFT: ☐ Patellar tendon ☐ Hamstring tendon

The purpose of this questionnaire is to evaluate **donor-site related problems** that can occur following an ACL-reconstruction.

- To you who have undergone reconstruction with the **knee cap tendon** (patellar tendon):

When you answer the questions about symptoms from the donor-site, you should focus on symptoms from your **scar on your knee and on the front of your knee and thigh**. When answering questions about your thigh, the answer should be related to the **front of your thigh.** The symptoms may be for example pain, cramp, tenderness, numbness and tightness.

- To you who have undergone reconstruction with **a tendon from the back of your thigh** (hamstring tendon):

When you answer the questions about symptoms from the donor-site, you should focus on symptoms from your **scar below the knee and on the back/inside of your knee and thigh**. When answering questions about your thigh, the answer should be related to the **back/inside of your thigh**. The symptoms may be for example pain, cramp, tenderness, numbness and tightness.

When answering the questions tick the box that best characterize your symptoms related to the donor-site during the last week (Please, mark only one box per question)

1. **How often do you experience symptoms related to the donor-site?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
2. **Do you experience symptoms related to the donor-site when you walk?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
3. **Are you troubled by pain/numbness around your scar?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
4. **Are you troubled by numbness/tingling/loss of sensation in the lower part of your leg?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
5. **Do you experience symptoms related to the donor-site when you straighten your knee fully?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
6. **Do you experience symptoms related to the donor-site when you bend your knee fully?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
7. **How much do the symptoms related to the donor-site affect your *ability* to perform daily activities?**
   ☐ Not at all ☐ Very little ☐ Little ☐ Moderate ☐ Much ☐ Very much ☐ Totally

In addition, 4 months and onwards

8. **Do you experience symptoms related to the donor-site when you squat?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
9. **Do you experience symptoms related to the donor-site when you kneel?**
   ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
10. **Do you experience symptoms related to the donor-site when you walk more than 2 km?**
    ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
11. **Do you experience symptoms related to the donor-site when you walk the stairs?**
    ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
12. **Do you experience symptoms related to the donor-site when you jog?**
    ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
13. **Are you troubled by weakness in your thigh during daily activities?**
    ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
14. **Are you troubled by weakness in your thigh during your rehab training/exercise?**
    ☐ Never ☐ Very seldom ☐ Seldom ☐ Sometimes ☐ Often ☐ Very often ☐ Always
15. **How much do the symptoms related to the donor-site affect your *performance* in your rehab training/exercise/specific sport?**
    ☐ Not at all ☐ Very little ☐ Little ☐ Moderate ☐ Much ☐ Very much ☐ Totally
16. **How much do the symptoms related to the donor-site affect your *ability* to perform your rehab training/exercise/specific sport?**
    ☐ Not at all ☐ Very little ☐ Little ☐ Moderate ☐ Much ☐ Very much ☐ Totally

Clinical
DONOR SITE MORBIDITY

PROMS/Functional scores

- IKDC
- Modified Cincinnati
- Lysholm
- ACL-RSI

Graft Laxity– KT-1000

Comparison to GNRB DYNELAX

Re-Injury

- Graft Rupture
- Hamstring Injuries

SECONDARY AIMS

Hamstring/Quads Strength	Isokinetic Dynamometer
Functional Capacity	Single hop for distance Triple hop for distance Triple crossover hop for distance 6m timed hop
MRI Evaluation	Graft Maturation/Signal Hamstring Volumetric Reconstitution
Adverse events	

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METHODS

Number Required 128	• Alpha 0.05 and power 80%
Random number generator	• 1:1 allocation to both surgical arms
Primary and secondary study aims	• 2 weeks, 3 months, 6 months, 1 year, 2 years, 5 years

ANAESTHETIC & SURGICAL TECHNIQUE

Standardized anaesthetic

GA

Adductor canal block - 20mL/0.2% Ropivocaine

Local anaesthetic infiltration

- 50mL 0.2% Ropivocaine: Hamstrings
- Remainder: Knee

Surgical technique

Min 8mm graft diameter

Endobutton Femur

Ultrabutton/Tibial Extendobutton (ST)

BioRCI Tibia (STG)

Standardized Rehab

WBAT if ACL Only (no brace)

PWB/Progressive Range 6/52 with meniscal repair

RTS >9 months after RTS Assessment

INCLUSION/ EXCLUSION

Inclusion	Exclusion
18 -50 years	Skeletal immaturity
ACL rupture confirmed clinically and radiologically with MRI last 12 months	Multi-ligament knee injury
Meniscal injury/LET OK	Revision ACL
Graft diameter ≥8mm	Graft diameter <8mm

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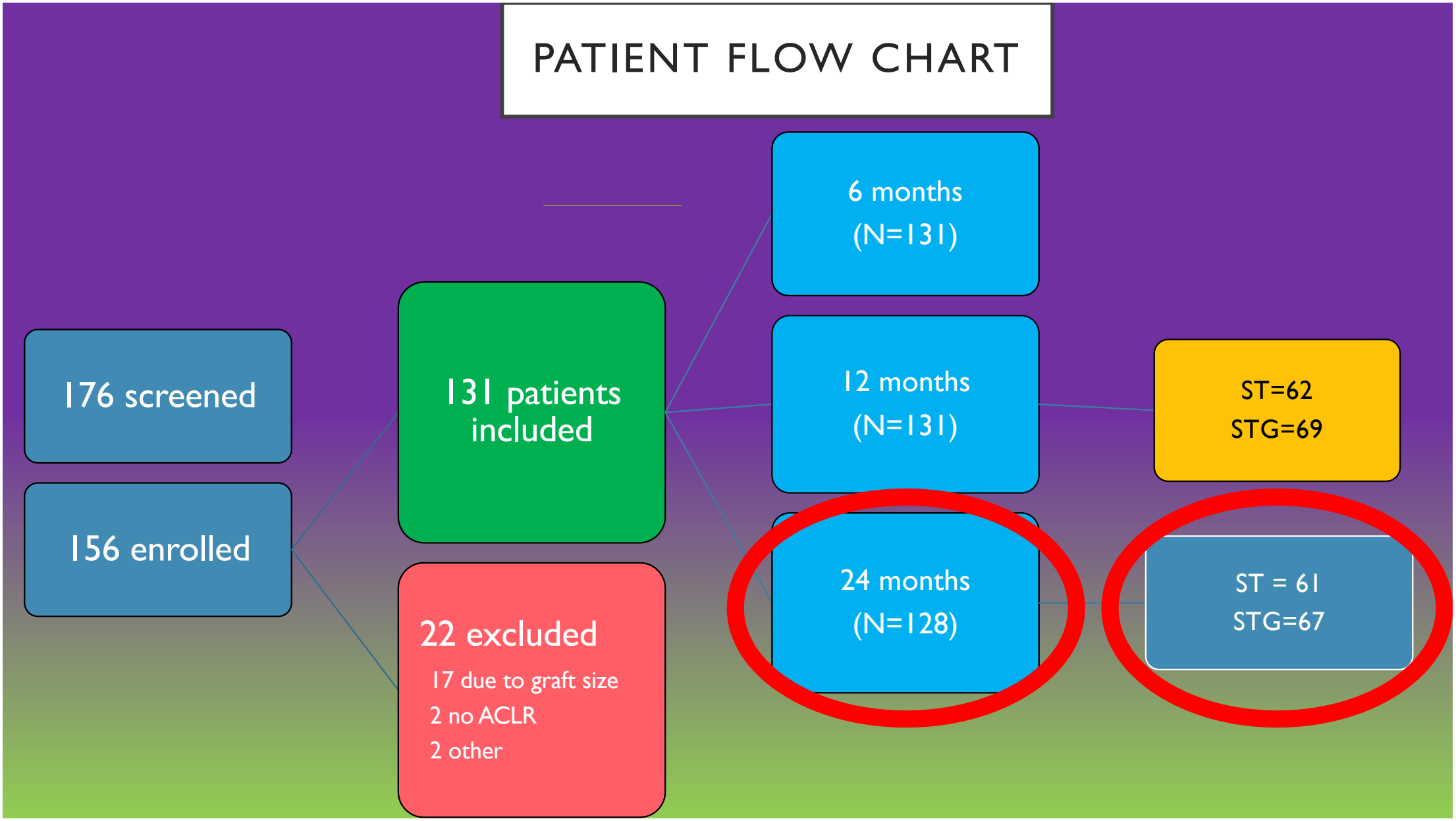
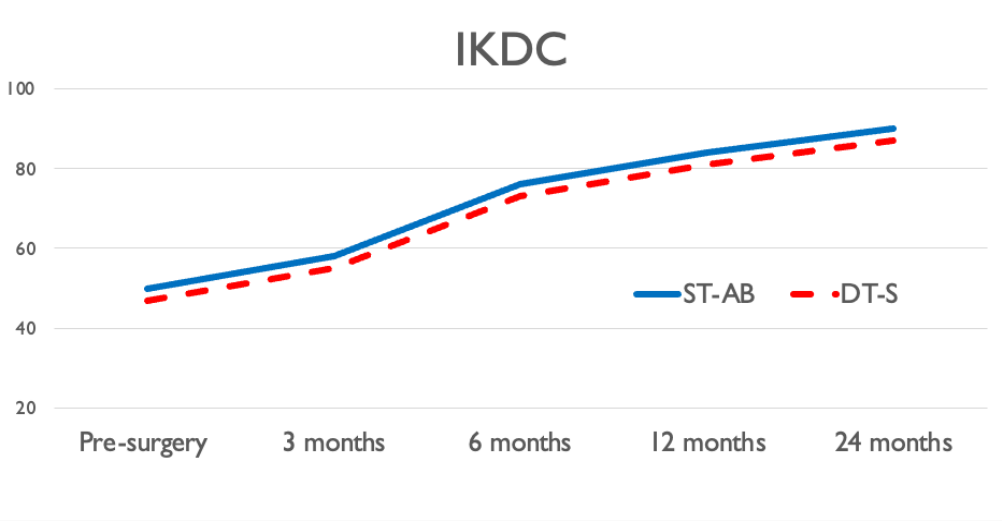
PATIENT FLOW CHART

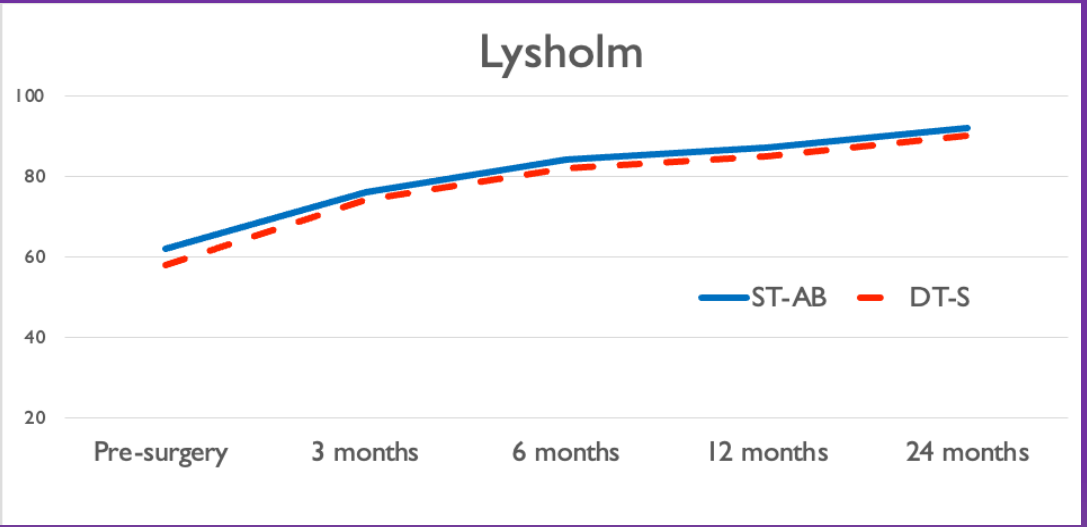


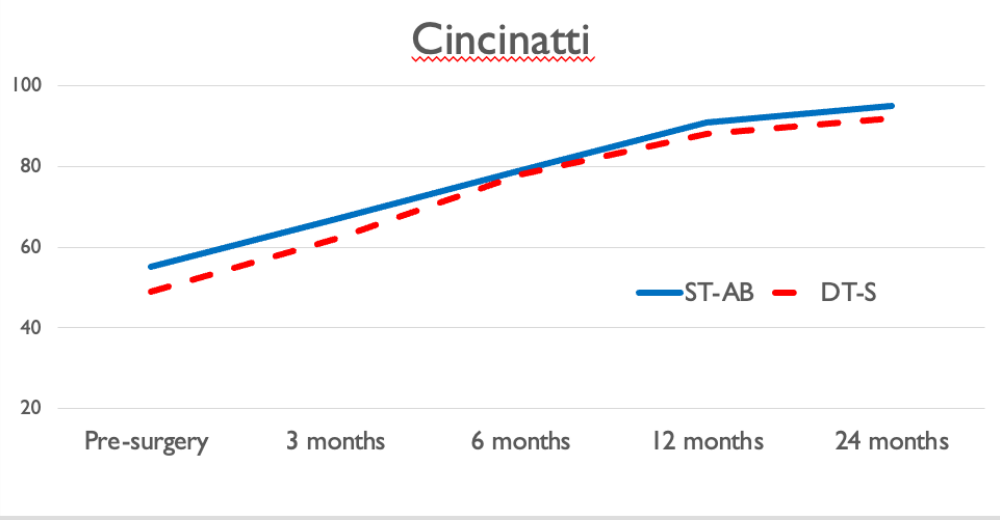
PATIENT AND SURGICAL CHARACTERISTICS

Characteristics	ST-AB N=62	STG-S N=69
Sex Male	44	41
Age	28.6	27.9
BMI	25.8	25.2
Time from Injury (weeks)	14.2	12.1
Graft size	8.5mm (8-9.5)	8.9mm (8-9.5)
Concomitant meniscal repairs	61%	59%
Re-Rupture	1 18 months	5 (17-24 months)

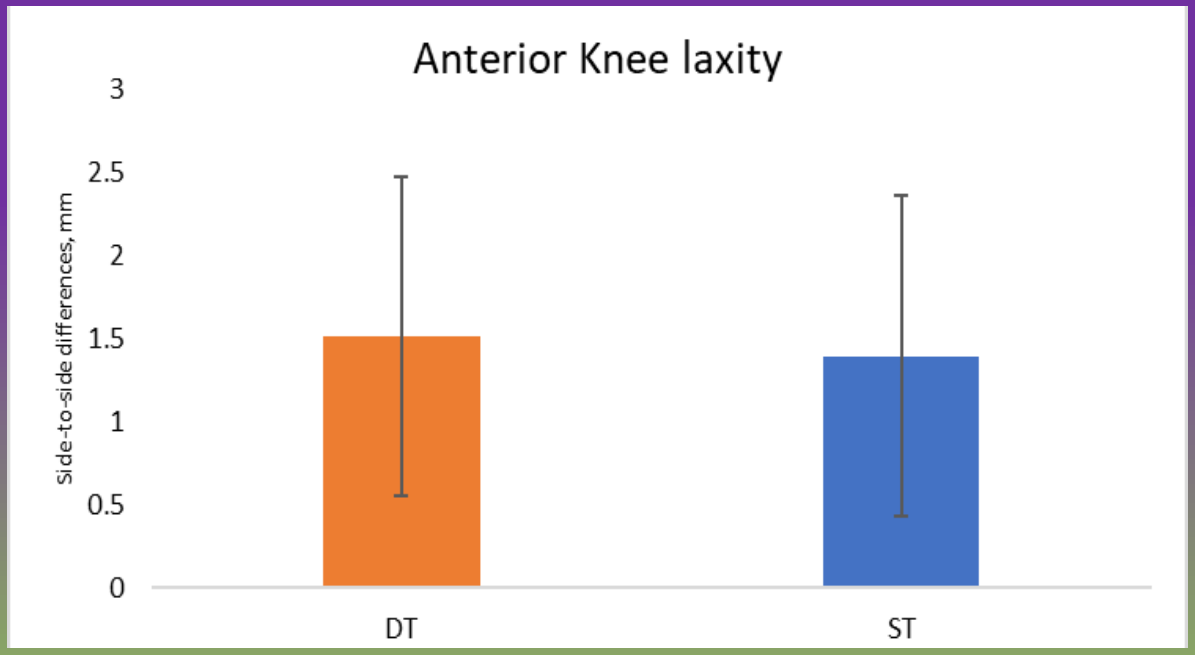
PROMS


IKDC
100
80
60
40
20
ST-AB
DT-S
Pre-surgery
3 months
6 months
12 months
24 months


Lysholm
100
80
60
40
20
ST-AB
DT-S
Pre-surgery
3 months
6 months
12 months
24 months

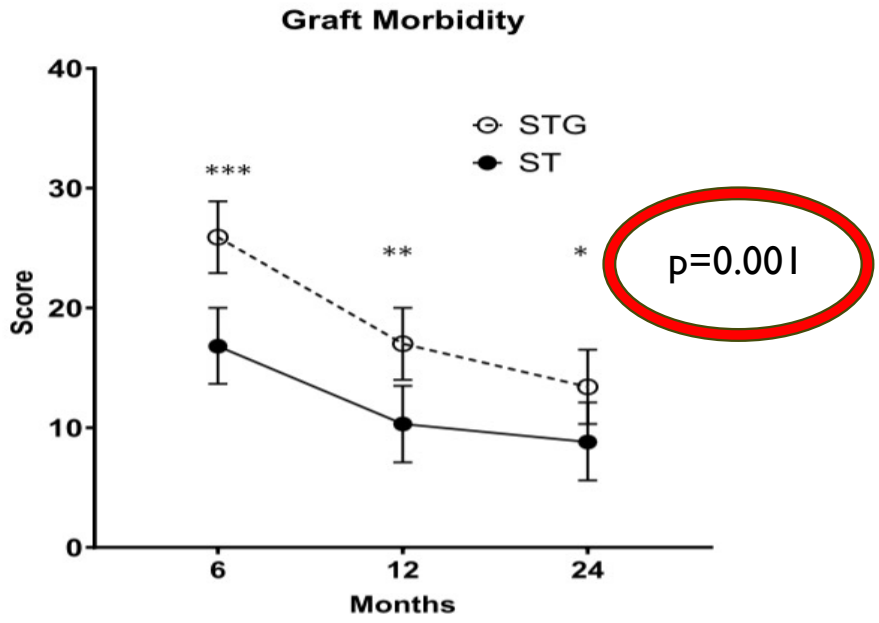

Cincinatti
100
80
60
40
20
ST-AB
DT-S
Pre-surgery
3 months
6 months
12 months
24 months

ANTERIOR KNEE LAXITY (SSD)

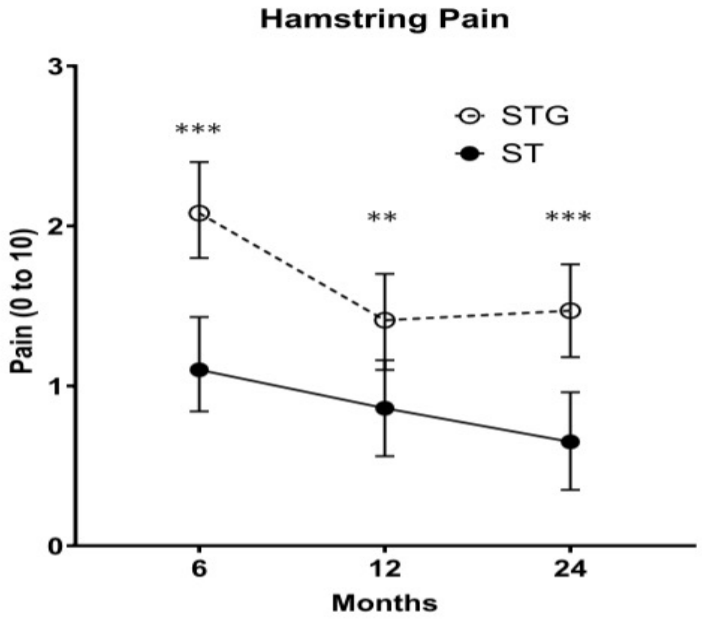


No differences were observed in side-to-side differences in anterior knee laxity between ST and DT groups ($p>0.05$) **(1.5mm, 1.3mm)**

DONOR SITE MORBIDITY



p=0.001



Significantly **LESS** donor site morbidity
at **6, 12 and 24 months** in
ST Group

QUADS + HAMSTRING FUNCTION

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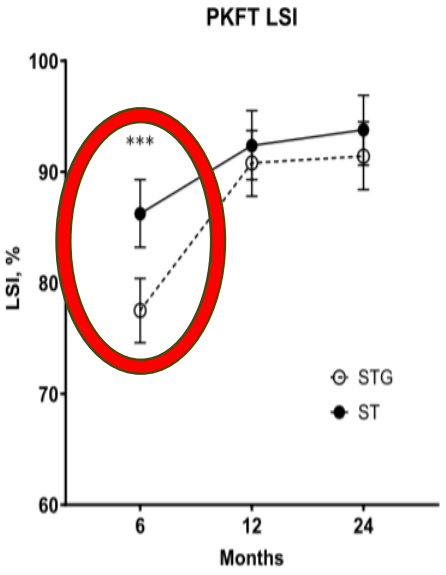
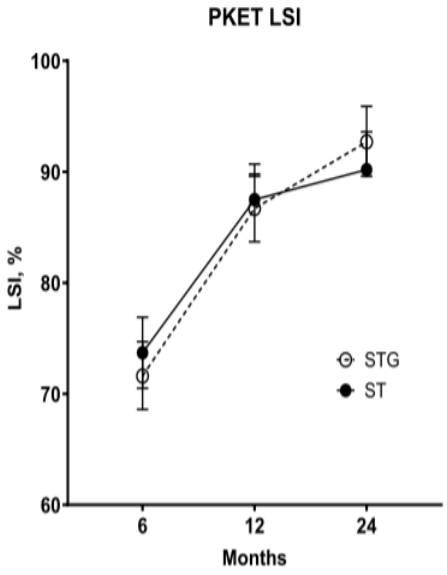
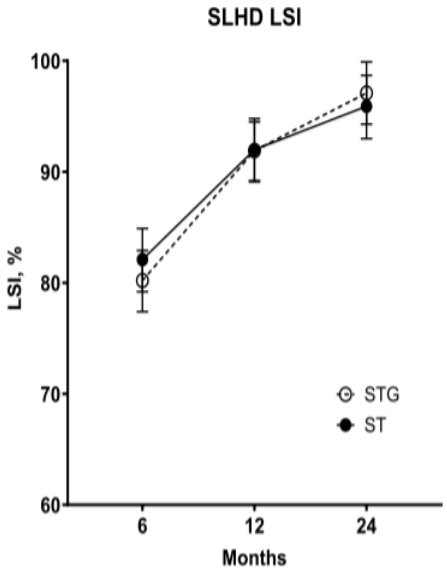
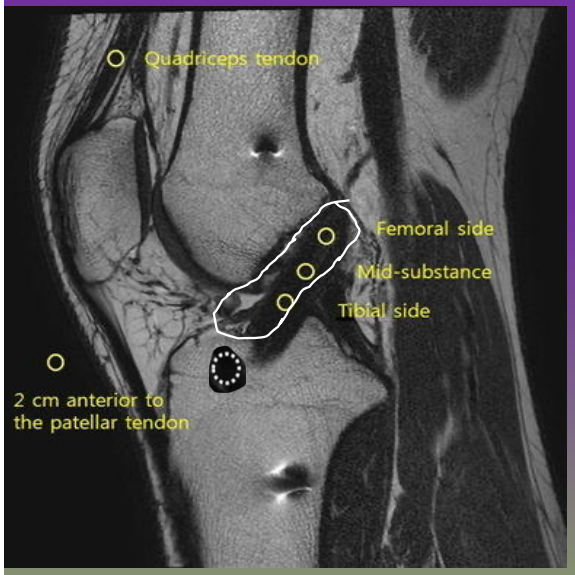






SIGNAL INTENSITY RATIO



Variable	STG		ST			P Value
	6 Months	12 Months	6 Months	12 Months	Time effect	Group effect
T2 SIR						
Tibial aperture	2.44 ± 0.95	2.11 ± 0.69	1.33 ± 0.53	1.60 ± 0.52	0.761	**<0.001**
Adjacent to tibial tunnel	2.17 ± 0.88	2.19 ± 0.80	1.56 ± 0.79	1.62 ± 0.55	0.725	**0.001**
Mid portion	3.18 ± 1.73	3.21 ± 1.37	1.93 ± 0.97	1.93 ± 0.76	0.943	**<0.001**
Adjacent to femoral tunnel	2.68 ± 1.70	2.32 ± 1.26	1.78 ± 0.78	1.67 ± 0.63	0.296	**0.011**
Femoral tunnel	3.26 ± 1.28	3.00 ± 1.12	2.52 ± 1.20	2.11 ± 0.73	0.064	**<0.001**
Drawn intra articular graft	3.09 ± 1.43	3.04 ± 1.13	1.92 ± 0.93	1.97 ± 0.57	0.995	**<0.001**

Variable	STG		ST			P Value
	6 Months	12 Months	6 Months	12 Months	Time effect	Group effect
T1 SIR						
Tibial aperture	3.22 ± 1.34	3.10 ± 0.97	1.92 ± 0.71	2.07 ± 0.66	0.933	**0.002**
Adjacent to tibial tunnel	2.41 ± 0.85	2.63 ± 0.79	1.69 ± 0.61	1.88 ± 0.60	0.080	**0.002**
Mid portion	3.10 ± 1.28	3.16 ± 0.93	2.18 ± 0.70	2.45 ± 0.60	0.292	**0.014**
Adjacent to femoral tunnel	2.46 ± 0.80	2.41 ± 0.60	2.17 ± 0.83	2.08 ± 0.51	0.563	0.237
Femoral tunnel	3.21 ± 0.99	3.09 ± 0.79	2.76 ± 0.93	2.89 ± 0.65	0.978	0.524
Drawn intra articular graft	2.94 ± 0.95	3.03 ± 0.84	2.26 ± 0.70	2.46 ± 0.56	0.304	**0.015**

1ST
DOUBLE BLINDED
RCT

SEMI - T
+
ADJUSTABLE
BUTTON
=
BETTER
OUTCOMES

SIGNIFICANTLY less CLINICAL donor site morbidity to 24 months!

Quicker hamstring recovery + SIGNIFICANTLY better hamstring early strength

MRI: Improved signal intensity/graft integration

80% Risk Reduction for Re-Injury

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THANK YOU

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