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Thicker and Shorter Hamstring Tendon Autograft Can Improve Graft Survival in Double Bundle ACLR

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Faculty Disclosure Information

- Nothing to disclosure

Background

- *DB ACLR could enhance **rotational stability** and improve **functional outcomes.***
- ***Higher-than-expected failure rate** of DB ACLR.*
  - 31 of 129 (***24%***) patients failed *(Onishi et. al. OJSM 2023)*
  - 9 of 55 (***16.4%***) patients failed *(Yabroudi et. al. OJSM 2016)*
- ***Insufficient thickness of the hamstring graft*** during *ACLR can lead to an increased risk of failure*
- *To increase graft diameter, use **both the semitendinosus and gracilis** tendons together or **fold the hamstring tendon (HT) multiple times.***
- ***DB ACLR, the HTs must be used separately for each bundle.***

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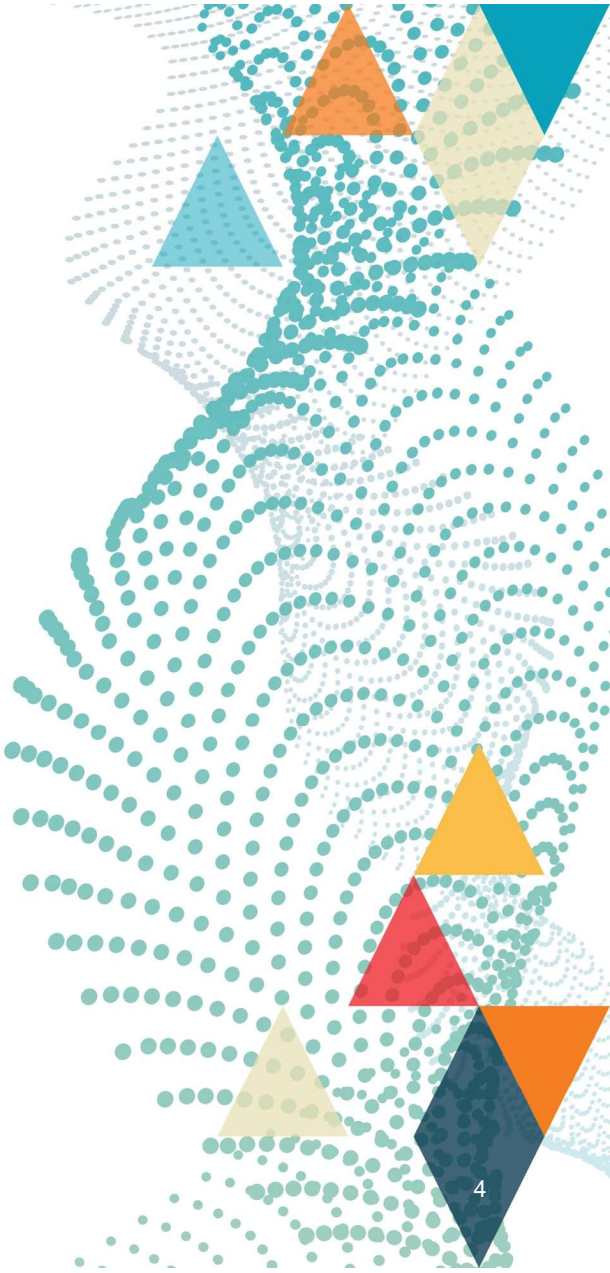
Purpose

- ***To compared the graft failure rate and clinical outcomes*** *between two different HT graft preparation methods used in* ***DB ACLR***



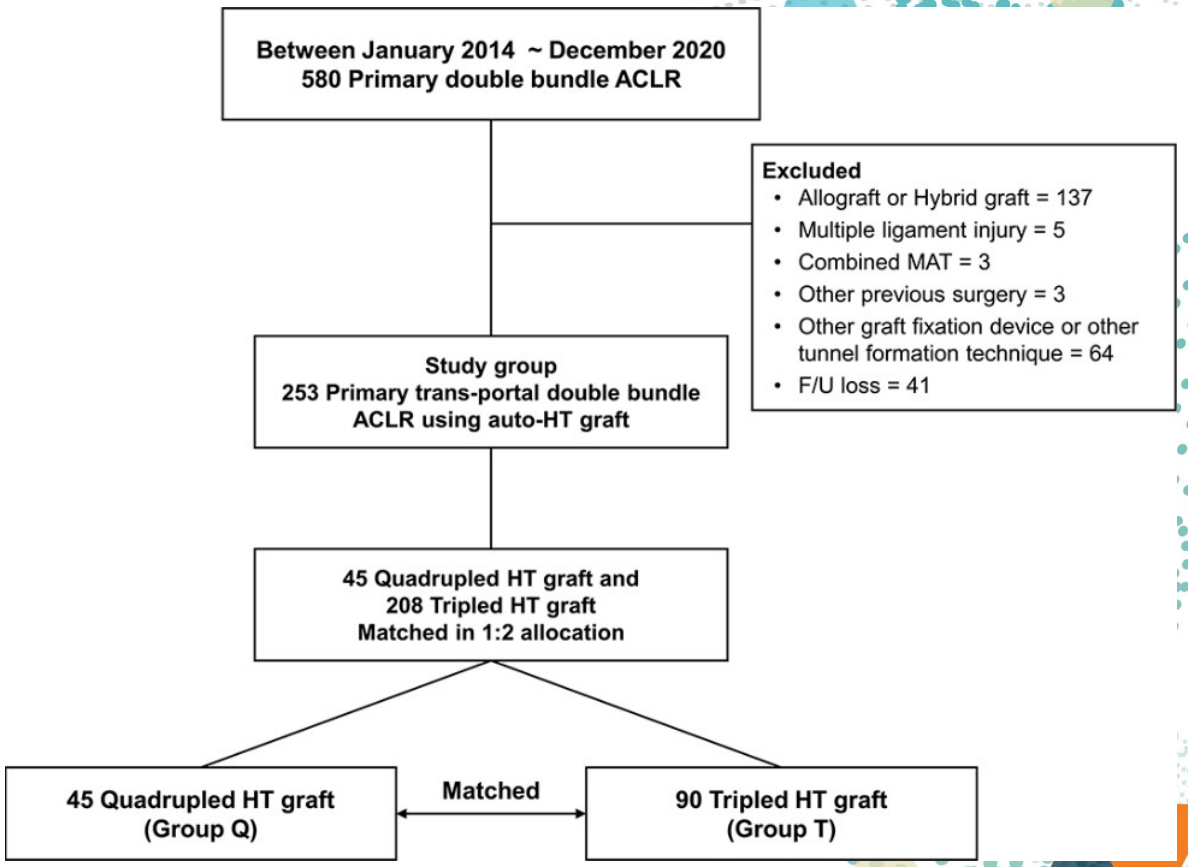
Methods

1:2 Propensity score match

Group Q (Quadrupled) vs Group T (Tripled)

ASMD < 0.25 for appropriate matching

Age, Sex, BMI, Pre-injury Tegner activity scale, Injury to ACLR interval (3 months)



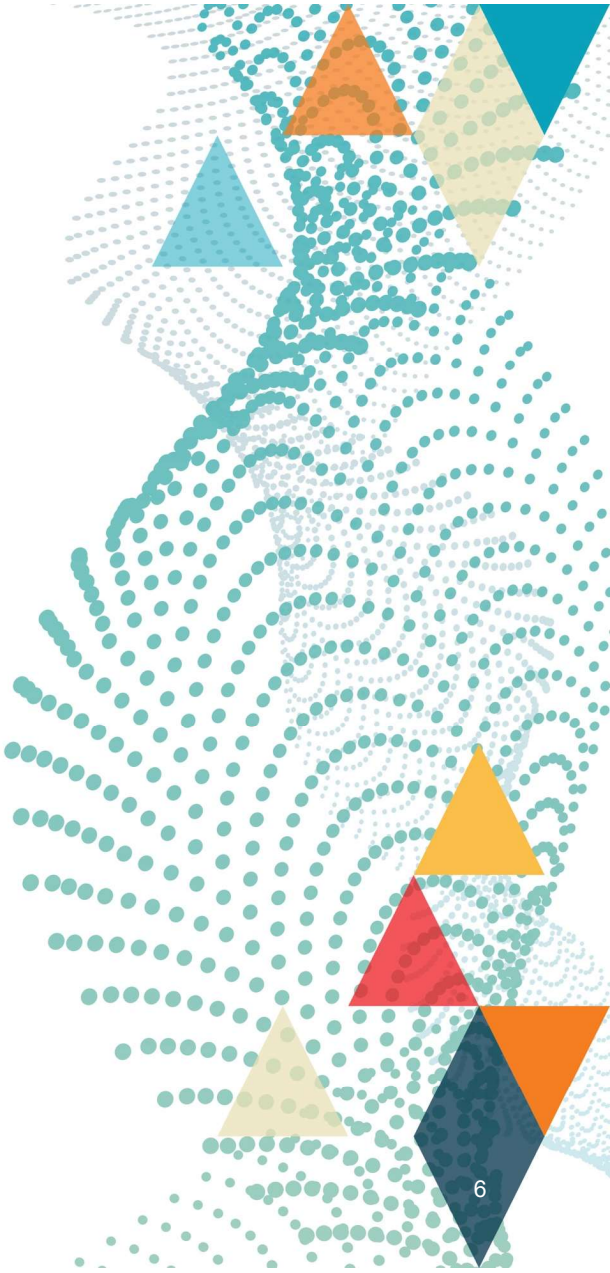
Methods

Group Q

- *Quadrupled (4-strand) hamstring graft*
- *≥ 10mm graft inserted into femur tunnel*

Group T

- *Tripled (3-strand) hamstring graft*
- *≥ 15mm graft inserted into femur tunnel*



Methods

MRI evaluation of graft continuity

Intact ***Partial tear*** ***Complete tear***

Results

	Group Q	Group T	P Value	ASMD
Number of patients	45	90		
Age (yr)	31.6 ± 11.4	31.5 ± 12.2	.964	.009
Sex			.781	.074
Male	41 (91.1)	80 (88.9)		
Female	4 (8.9)	10 (11.1)		
BMI	25.4 ± 3.0	25.1 ± 3.0	.628	.090
Injured side (%)			.387	
Right	24 (53.3)	55 (61.1)		
Left	21 (46.7)	35 (38.9)		
Interval between injury and surgery, (months)	5.8 ± 10.0	5.6 ± 10.8	.899	
> 3 months (%)	21 (46.7)	40 (44.4)	.807	.045
Follow-up period, (months)	37.3 ± 12.0	39.6 ± 17.6	.261	
Pre-injury Tegner	7.2 ± 1.6	7.3 ± 1.4	.404	.051

Demographic factors did not show a significant difference between the two groups.

Results

	Group Q	Group T	P Value
Graft diameter, mm			
AM	8.2 ± 0.6	7.2 ± 0.6	<.001
PL	6.2 ± 0.5	5.6 ±0.5	<.001
Graft length, mm			
AM	69.3 ± 12.3	84.8 ± 17.1	<.001
PL	69.5 ± 18.7	77.3 ± 16.5	.038
Femur tunnel length, mm			
AM	34.9 ± 4.8	35.9 ± 4.3	.202
PL	36.2 ± 4.1	37.6 ± 4.1	.092

	Group Q	Group T	P Value
Suspensory loop length, mm			
AM	22.4 ± 4.6	16.2 ±2.7	<.001
PL	24.5 ± 3.8	17.6 ± 3.2	<.001
Length of graft engaged in femur tunnel, mm			
AM	13.4 ± 5.9	18.5 ± 4.0	<.001
PL	13.9 ± 6.9	18.1 ± 3.3	<.001

In Group Q, both the AM and PL diameters were significantly thicker, while the lengths were shorter.

In Group Q, the graft length engaged in the femoral tunnel was shorter.

Results

Group Q (N = 45)

- *Total 1 graft failure (2.2%)*
- *1 failure d/t re-injury*

Group T (N = 90)

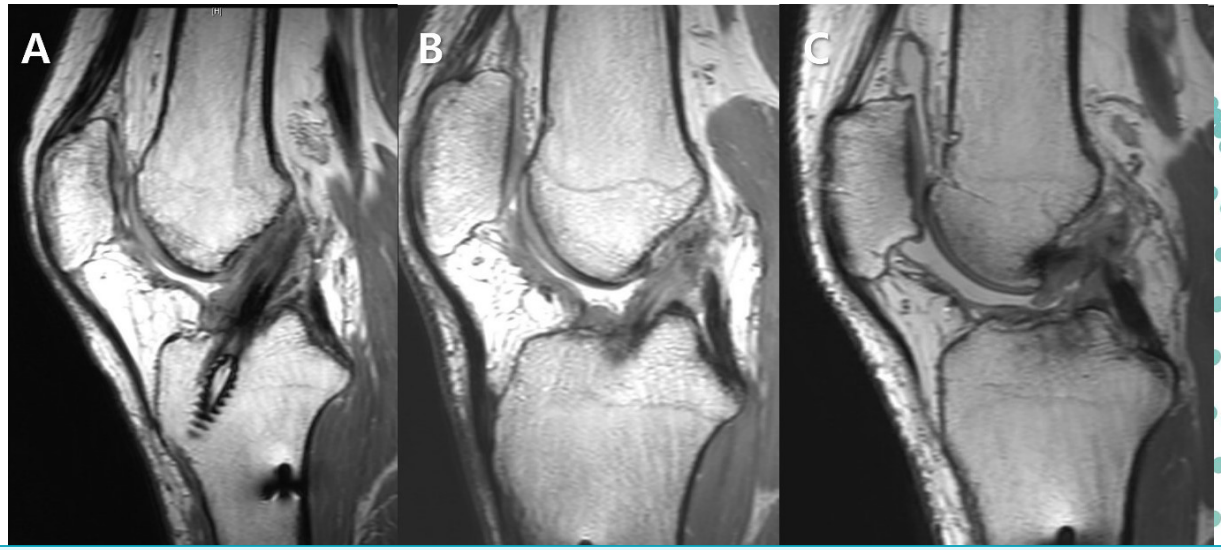
- *Total 14 graft failure (15.6%)*
- *10 failure d/t re-injury*
- *4 failure w/o definite injury*

	Group Q	Group T	P Value
Lysholm	92.1 ± 9.3	94.4 ± 6.2	.165
Tegner activity scale	6.6 ± 1.9	6.4 ± 1.4	.616
≥ 6, %	34 (75.6)	61 (67.8)	.351
IKDC subjective score	84.0 ± 14.0	85.7 ± 11.2	.480
KOOS			
Pain	94.5 ± 8.1	95.3 ± 5.7	.620
Symptoms	94.0 ± 6.7	92.4 ± 9.0	.400
Activity in daily living	97.4 ± 5.1	97.3 ± 5.8	.890
Sports and recreation	84.2 ± 16.1	83.5 ± 19.0	.858
Quality of life	80.8 ± 17.9	85.0 ± 18.2	.310

No significant difference in postoperative PROs between the two groups.

Results

	Number, %	Postoperative months	*Intact*	*Partial*	*Substantial loss*
Group Q	41 (91.1)	8.5 ± 6.7	38	3	0
Group T	71 (78.9)	10.2 ± 10.2	***53***	***17***	***1***

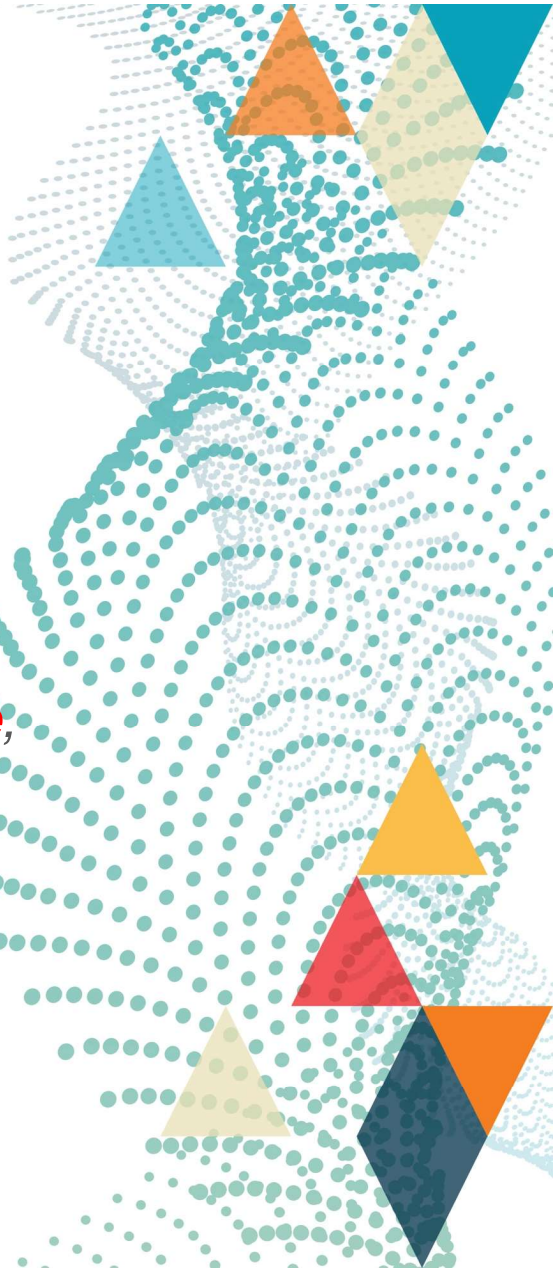


Difference in graft continuity on MRI between the two groups did not reach statistical significance. (P=0.067)

Conclusion

- *In DB ACLR using HT autografts,* ***graft survival was superior with quadrupled HT grafts*** *than with tripled grafts.*

- ***Increasing the graft diameter, particularly in the AM bundle****, is expected to positively affect graft survival, even if it results in a reduction in graft length and femoral tunnel engagement length*



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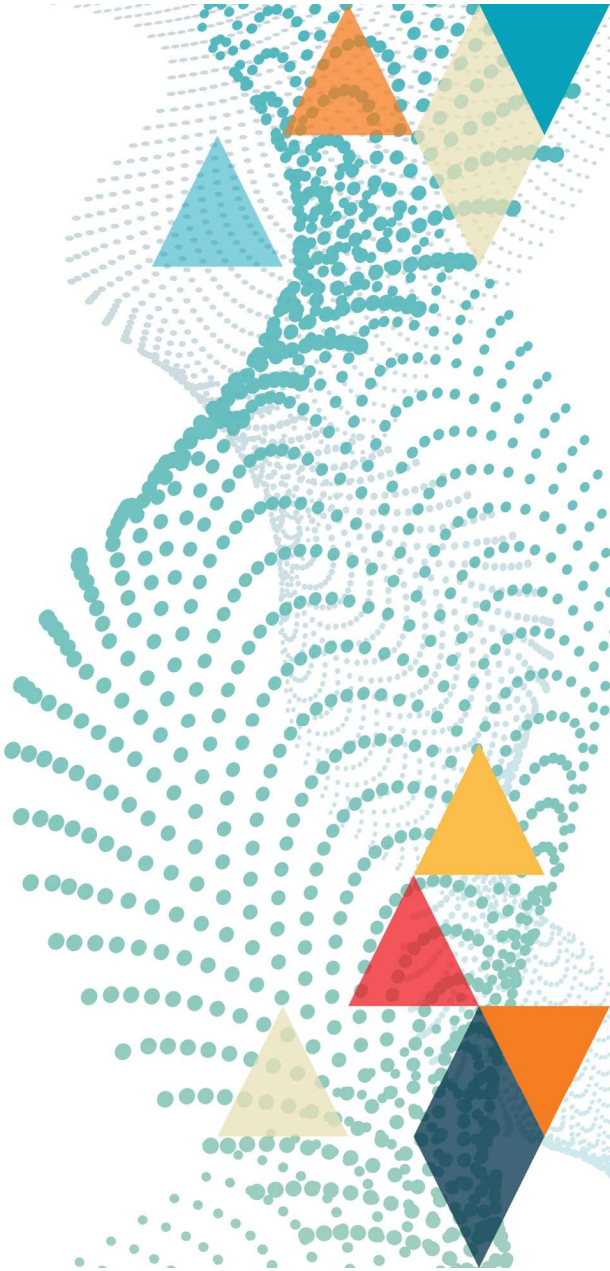

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