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Title: Sex Based Difference of the Most Common Autograft Sources for ACL Reconstruction Measured on Knee MRI

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Disclosures:

- Giovanna Medina, MD, PhD: This individual reports nothing to disclose.
- Maria Velasquez-Hammerle, MD: This individual reports nothing to disclose
- Miho Jean Tanaka, MD, PhD, FAAOS (Boston, MA)
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Background

- One of the most important factors for surgical outcomes is graft size.
- Graft diameters < 8 mm = Higher failure rates
- Complications/donor site morbidities:
 - Patellar tendon rupture, quadriceps and hamstring weakness, graft-tunnel mismatch
- Graft size = Varies with sex and anthropometric data
- Accurate knowledge of graft dimensions preoperatively allows adequate counseling in the decision-making process of selecting an autograft source





Methods

- Institutional database screening for normal knee MRIs (2012-2021
- Exclusion:
 - History of knee pathology or abnormal findings on MRI
 - MRI quality
- Data collection
 - Demographic
 - Anthropometric
 - Measurements were performed on Picture Archiving and Communication System Workstations (PACS)
- Statistics
 - Two-sample non-paired t-test: M vs F Measurements
 - Pearson's correlation coefficient: Measurements and Height





Methods

Length (Sagittal View)

Patellar Length: Measured from inferior to superior pole

Thickness (Sagittal View)

- <u>Quadriceps Tendon and Patellar Tendon</u>:
 3 measurements 10 mm apart from each other, mean was final value
- <u>Patella</u>: Three measurements obtained on thickest portions of the patella, mean was the final value





Quadriceps Tendon Thickness

Patellar Thickness

Patellar Tendon Thickness

Methods

Width (Axial View)

- <u>Quadriceps and Patellar Tendon</u>: Measured in corresponding levels to thickness measurements
- Mean was final value
- **Diameter and Cross-Sectional Area** (Axial View)
- <u>Hamstrings tendons</u> (Semi Tendinosus and Gracilis)
- Sum of both measurements was the final value





Results

Overall

60 Patients30 Males, 30 Females

Females

39.6 (16.9) Years Old
Height: 161.7 (7.5) cm

Males

31.8 (12.5) Years Old
Height: 178 (8.6) cm







Measurements

	Eemale (n-30)	Malo(n-30)	Mean difference
	Mean (SD)	Mean (SD)	95% CI
Patellar tendon (mm)			
Length	40.89 (3.83)	45.35 (4.99)	4.4 [2.1,6.7]
Thickness	3.64 (.59)	3.94 (.74)	.3 [5,.64]
Width	25.25 (2.5)	28.88 (2.85)	3.6 [2.2,5]
Patella (mm)			
Length	38.41 (3.51)	43.89 (4.13)	5.5 [3.5,7.4]
Thickness	15.64 (2.27)	18.06 (3.35)	2.4 [.9,3.9]
Width	38.99 (3.51)	43.21 (7.68)	4.2 [1.3,7.3]
Quadriceps tendon			
(mm)			
Thickness	7.79 (3.49)	7.99 (1.06)	.2 [-1.1,.5]
Width	25.06 (2.13)	28.25 (3.65)	3.2 [1.6,4.7]
Hamstring tendons			
Diameter (mm)	8.02 (.86)	8.96 (1.15)	.93 [.4,1.4]
CSA (mm²)	20.58 (3.77)	23.25 (4.4)	2.7 [.5,4.8]



#)

t-statistic	p value ^a	
(df)		
3.8 (58)	<.001	
1.7 (58)	.096	
5.2 (58)	<.001	
5.5 (58)	<.001	
3.3 (58)	.002	
2.7 (58)	.008	
.3 (58)	.77	
4.1 (58)	<.001	
3.5 (58)	<.001	
2.5 (58)	.014	



Results

- In women the PT was the widest of tendons, but both PT and QT showed mean widths of less than 30 mm.
- Height Patella Bone Length/thickness/width:
 - Positive correlation in females
- Patellar Tendon size enough for a minimum 8 mm graft
 - 97% males and 70% females
- Quadriceps Tendon size enough for a minimum 8 mm graft
 - 93% males and 66% in females





Conclusions

- In this MRI-based study, all autograft sources in the knee were found to be smaller in women compared to men, with significant differences in length, width, and diameter, but not thickness
- In women, 30% of PT and 34% of QT did not have adequate width to create an 8mm graft
- Given the greater risk of ACL failure when grafts are less than 8mm in size, further studies are needed to identify the optimal graft options to minimize donor site morbidity in female patients.
- Pre-operative MRI measurements: guide on decision making for ACL-R graft source options (individualized)



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