

Commonly used ACL autografts size do not correlated with the size of ACL footprint and femoral condyle

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Objective

The purpose of this study was to reveal the correlation between the size of the native ACL footprint and the size of the commonly used autografts using cadaveric knees.

The hypothesis of this study was that native ACL footprint size would not be correlated with the size of autografts.



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I have no financial conflicts to disclose



Materials and Methods

Twenty-Four (24) non-paired formalin fixed Japanese cadaveric knees were used (9 Males, 15 Females, median age 84, range: 68-98).

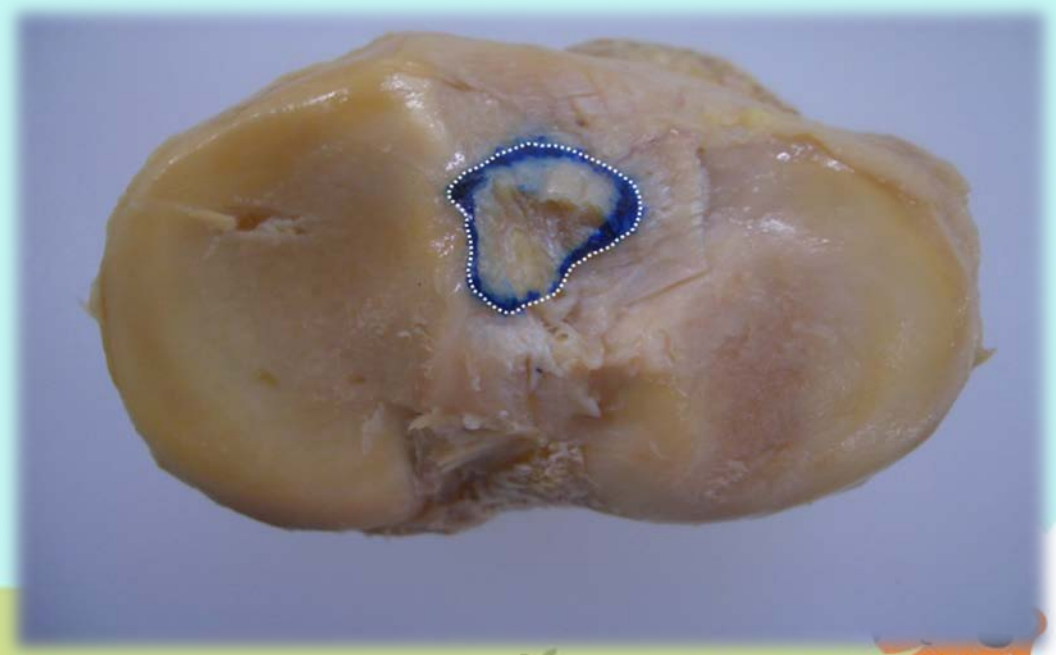
Knees with severe osteoarthritic changes were excluded from this study.



Materials and Methods

Evaluation of ACL footprint size

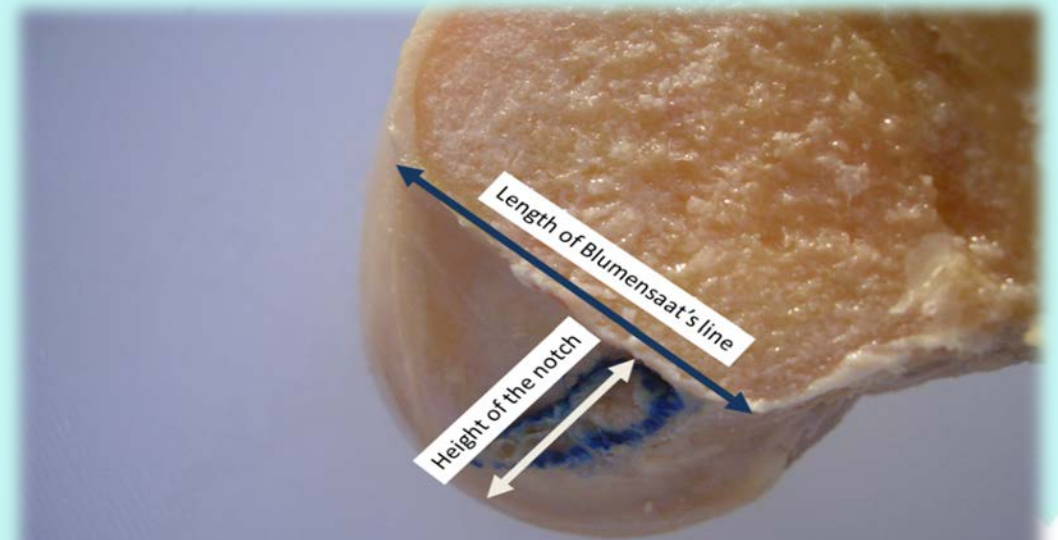
After Careful dissection of ACL, the size of the ACL footprint was measured using Image J software (National Institute of Health).



Materials and Methods

Evaluation of intercondylar notch morphology

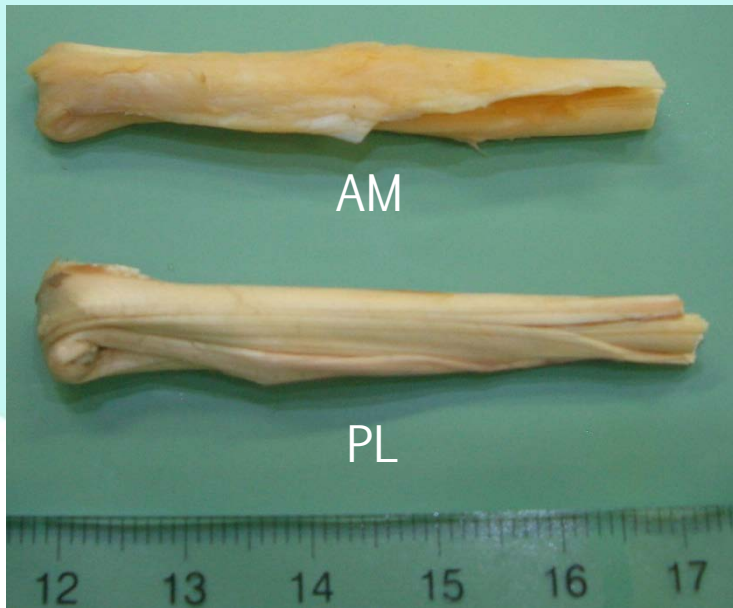
With the same images used in the ACL footprint evaluation, the height, area, and length of Blumensaat's line of the lateral wall of femoral intercondylar notch were measured with Image J software.



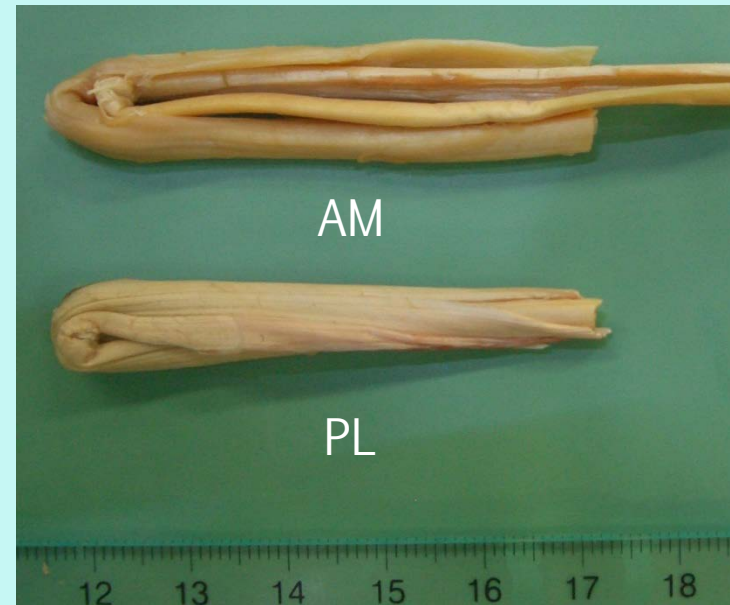
Materials and Methods

Hamstrings preparation

The semitendinosus muscle and the gracilis muscle were harvested from the tibial insertion site to the proximal end of the tendon tissue (n=24).



ST graft



ST-G graft

$$\text{Graft area (mm}^2\text{)} = (\text{AM diameter}/2)^2 \times 3.14 + (\text{PL diameter}/2)^2 \times 3.14$$



Materials and Methods

Bone patella tendon bone (BPTB) graft preparation

After careful dissection of the surrounding soft tissue, the width, length and thickness of the patella tendon was measured (n=24).

A 10-mm wide BPTB graft was harvested from the central portion of the patella tendon with 15-mm long bone plugs on both ends.



Graft area (mm²) = 10 (mm) width × thickness of patella tendon (mm)

Materials and Methods

The Pearson's product movement correlation was calculated to reveal the correlation (SPSS ver. 21.00) between:

- Autograft areas and
 - Femoral and tibial ACL footprint size
 - The height and area of femoral intercondylar notch, and the length of Blumensaat's line
- Femoral or tibial footprint size and
 - The height and area of femoral intercondylar notch, and the length of Blumensaat's line



Results

Femoral ACL footprint	$72.3 \pm 24.4 \text{mm}^2$
Tibial ACL footprint	$134.1 \pm 32.4 \text{mm}^2$
Notch height	$17.7 \pm 2.3 \text{mm}$
Length of Blumensaat's line	$29.5 \pm 2.5 \text{mm}$
Notch area	$400.9 \pm 62.6 \text{mm}^2$
ST area	$52.7 \pm 6.3 \text{mm}^2$
ST-G area	$64.7 \pm 7.6 \text{mm}^2$
BPTB area	$37.1 \pm 7.5 \text{mm}^2$



Results

The correlation of ACL footprint size and autograft areas

	Pearson's correlation coefficient	p-value
Femoral footprint size and:		
ST area	0.14	N.S
ST-G area	0.26	N.S
BPTB area	-3.26	N.S
Tibial footprint size and:		
ST area	0.66	N.S
ST-G area	0.25	N.S
BPTB area	-1.56	N.S



Results

The correlation of autograft areas and the size of notch

	Pearson's correlation coefficient	p-value
Notch height and:		
ST area	-1.31	N.S
ST-G area	-0.01	N.S
BPTB area	-0.15	N.S
Notch area and:		
ST area	-0.26	N.S
ST-G area	0.18	N.S
BPTB area	0.25	N.S
Blumensaat's line length and:		
ST area	-0.26	N.S
ST-G area	0.14	N.S
BPTB area	0.15	N.S



Results

The correlation of ACL footprint size and the size of intercondylar notch

	Pearson's correlation coefficient	p-value
Femoral footprint size and:		
Notch height *	0.536	0.007
Notch area *	0.528	0.008
Blumensaat's line length	0.132	N.S
Tibial footprint size and:		
Notch height *	0.420	0.041
Notch area	0.378	N.S
Blumensaat's line length	-0.274	N.S

*P<0.05



Conclusion

For clinical relevance, there is no correlation between the size of ACL footprint and commonly used autografts. In the ACL reconstruction, if the reconstructed ACL size was determined by the harvested autograft size, there is potential risk of not to be reproduced the native ACL size and anatomy.

