Preserving the semitendinosus distal attachment is associated with improved graft remodeling after ACL reconstruction

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Faculty Disclosure Information

Etienne Cavaignac is paid consultant for Arhtrex, Amplitude, Smith & Nephew and BioBank

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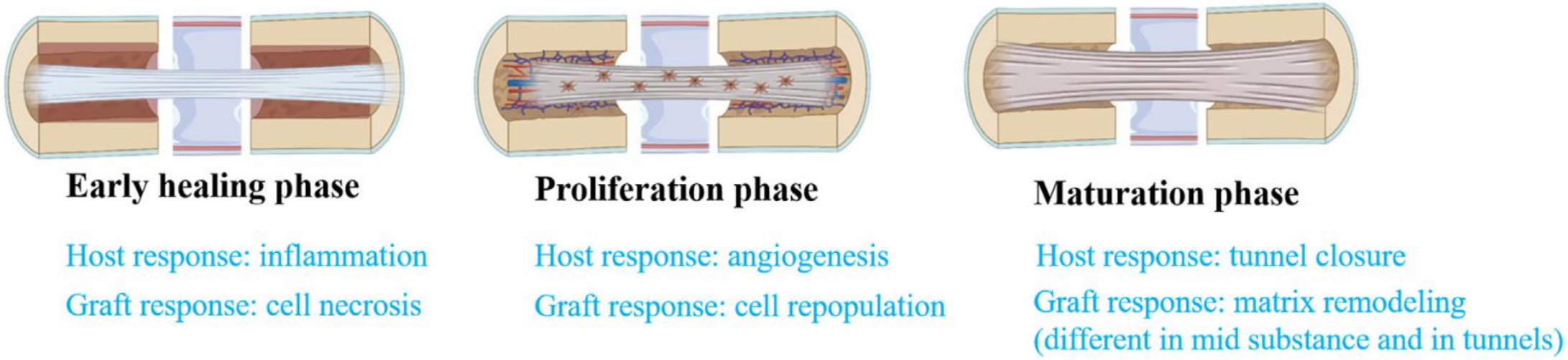
Graft incorporation



Early healing phase

Host response: inflammation

Graft response: cell necrosis

Proliferation phase

Host response: angiogenesis

Graft response: cell repopulation

Maturation phase

Host response: tunnel closure

Graft response: matrix remodeling
(different in mid substance and in tunnels)

Yao S, Fu BS, Yung PS. ***Graft healing after anterior cruciate ligament reconstruction (ACLR)****. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2021*

3 stages

Graft evaluation

- Clinical exam
  - Lachmann
  - Pivot Shift
- **MRI**
  - SNQ
  - Howell

Van Dyck et al. ***Assessment of Anterior Cruciate Ligament Graft Maturity With Conventional Magnetic Resonance Imaging: A Systematic Literature Review****. Orthop J Sports Med. 2019*

Graft signal = PCL signal

Signal to Noise Quotient

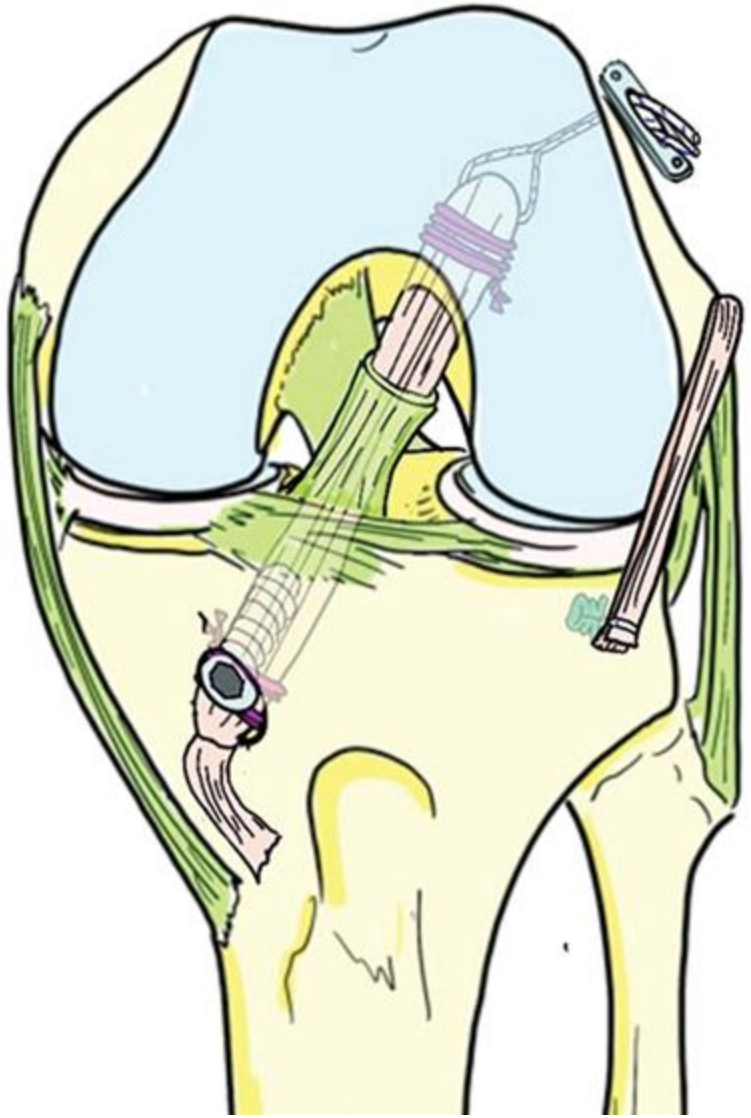
$$\text{SNQ} = \frac{(\text{Graft signal} - \text{PCL signal})}{\text{Background signal}}$$

Weiler et al. ***Biomechanical Properties and Vascularity of an Anterior Cruciate Ligament Graft can be Predicted by Contrast-Enhanced Magnetic Resonance Imaging: A Two-Year Study in Sheep****. Am J Sports Med.*

↓ SNQ = Better incorporation

Our technique

- **Attached ST graft**
- +/- Lateral tenodesis[1]

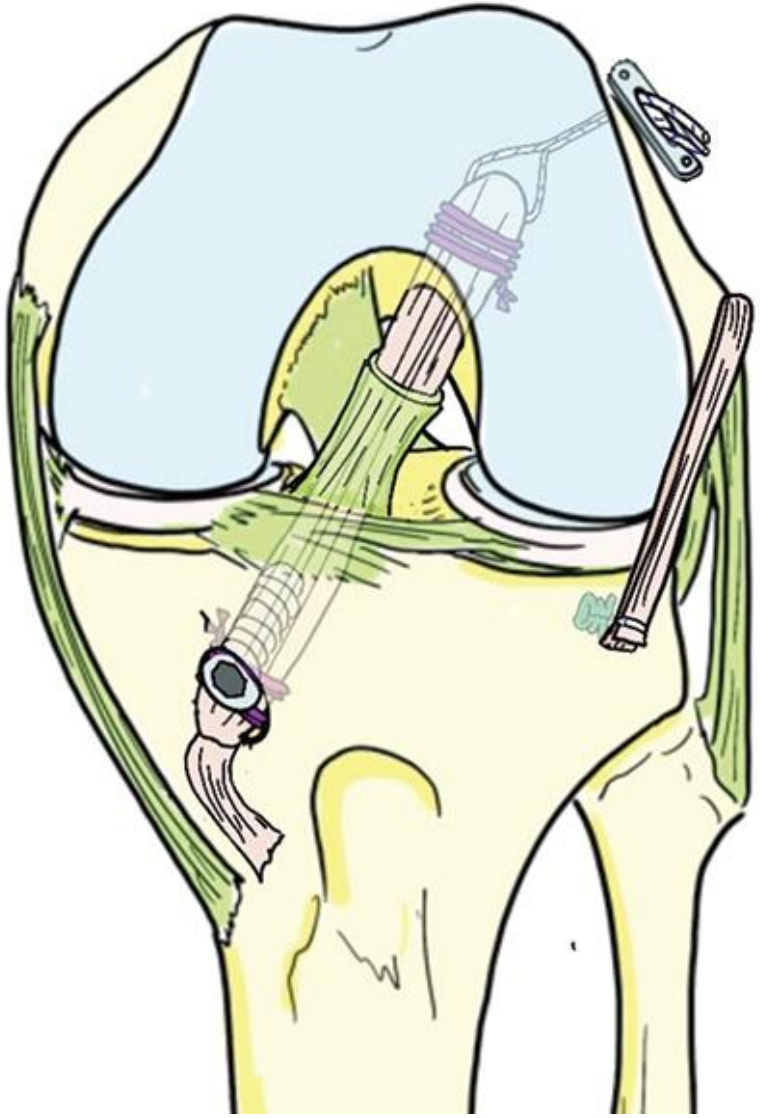


1. Cavaignac et al. ***Effect of Lateral Extra-articular Tenodesis on Anterior Cruciate Ligament Graft Incorporation****. Orthop J Sports Med. 2020*

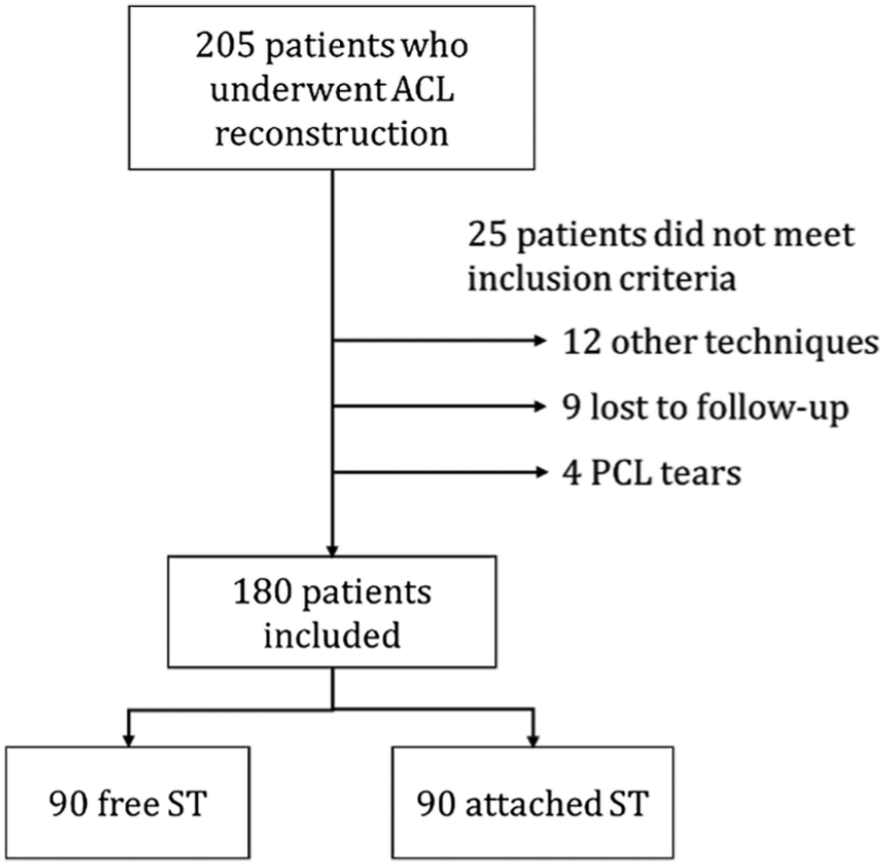
Use of a single pedicular tendon

Goals

- **To evaluate our pedicled ST technique at 1 year post-operatively**



Comparative study at 1 year



Patient characteristics

Patient Characteristics[a]

	ST Graft			
	Free (n = 90)	Attached (n = 90)	All (N = 180)	*P* Value
Age at surgery, y	27.20 ± 9.37	27.74 ± 8.86	27.47 ± 9.10	.689
Male	52 (57.8)	59 (65.6)	111 (61.7)	.283
Body mass index	23.75 ± 4.15	24.08 ± 3.54	23.91 ± 3.85	.382
Smoker	23 (25.6)	17 (18.9)	40 (22.2)	.282
Time to surgery, wk	26.24 ± 37.85	21.40 ± 24.40	23.82 ± 31.85	.290
Lateral tenodesis	73 (81.1)	46 (51.1)	119 (66.1)	<.0001
Graft diameter, mm	8.64 ± 0.87	9.02 ± 0.73	8.83 ± 0.82	.001
Meniscal lesion				
Medial	13 (14.4)	8 (8.9)	21 (11.7)	.245
Lateral	14 (15.6)	16 (17.8)	30 (16.7)	.689
ALL tear	66 (73.3)	46 (51.1)	112 (62.2)	.002
Preoperative Tegner score[b]	7.48 ± 2.01	7.59 ± 1.64	7.53 ± 1.83	.684

[a]Data are presented as mean ± SD or No. (%). ALL, anterolateral ligament; ST, semitendinosus.
[b]Out of 10.

Results

Primary endpoint

- **aST : 1.18 (95% IC : 0.72 – 1.65)**

p<0.001

- fST : 3.88 (95% IC : 3.42 – 4.34)

Adjusted SNQ ↓ in the pedicled ST group

Results
Secondary endpoints

TABLE 2
Secondary Endpoints[a]

	Free ST	Attached ST	*P* Value
TTW, %	73.03 ± 40.18	68.73 ± 45.87	.503
Median Howell grade	2.00	2.00	.149
Retear	1 (1.1)	0 (0.0)	>.999
New surgery	9 (10.0)	2 (2.2)	.029
SKV (0-100)	84.76 ± 10.46	87.79 ± 11.16	.061
Median Lysholm, 0-100, IQR (range)	95 (91-99)	99 (95-100)	.004
Tegner postop (0-10)	6.32 ± 2.20	6.64 ± 2.14	.320
Change in Tegner (preop-postop)	1.16 ± 1.64	0.94 ± 1.65	.317
ACL-RSI (0-100)	71.17 ± 18.80	75.91 ± 19.28	.097
IKDC (0-100)	89.36 ± 9.86	90.09 ± 9.96	.621
Return to sports	83 (92.2)	83 (92.2)	>.999
Time to return to sports, d	317.23 ± 144.69	248.73 ± 141.62	.002

Conclusion

- **Remodeling of an ST graft assessed using MRI is better when its distal attachment is left intact**

References

- *Yao S, Fu BS, Yung PS.* ***Graft healing after anterior cruciate ligament reconstruction (ACLR)****. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2021*
- *Van Dyck et al.* ***Assessment of Anterior Cruciate Ligament Graft Maturity With Conventional Magnetic Resonance Imaging: A Systematic Literature Review****. Orthop J Sports Med. 2019*
- *Weiler et al.* ***Biomechanical Properties and Vascularity of an Anterior Cruciate Ligament Graft can be Predicted by Contrast-Enhanced Magnetic Resonance Imaging: A Two-Year Study in Sheep****. Am J Sports Med.*
- *Cavaignac et al.* ***Effect of Lateral Extra-articular Tenodesis on Anterior Cruciate Ligament Graft Incorporation****. Orthop J Sports Med. 2020*

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