

Flexor Tendon Repair with Looped Suture: One versus Two Knots

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Introduction

- Mechanical properties of flexor tendons repaired with core strands created by independent passing single strand core sutures have been demonstrated to provide more repair strength than repairs performed with looped suture.
- The purpose of this study is to assess the strength of flexor tendon repair with looped suture. We hypothesize that, after passing the intact looped suture in the desired repair configuration, splitting the loop and tying two independent knots increases the strength of flexor tendon repair.

Methods

- 32 flexor tendons were harvested and were transected using a scalpel in zone II. The tendons were repaired with a 4-strand core suture repair completed with 3-0 looped Supramid suture. The harvested tendons were randomly assigned and repaired with either a one or two knot construct. The repaired flexor tendons were fixed in a MTS and were either loaded to failure with uniaxial tension or cyclically.

Results

- The average force at failure was 43.01 N for the one-knot repair and 27.73 N for the two-knot repair. The mode of failure of 15 of the flexor tendon repairs that were cyclically loaded to failure was suture pullout. The average number of cycles and force in cyclic testing that caused failure of flexor tendon repairs was 134.71 cycles and 31.08 N for tendons repaired with looped 3-0 suture tied with one knot and 94.25 cycles and 32.98 for tendons repaired with looped 3-0 suture tied with two knots.

Conclusions

- This study suggests that when using looped suture, tying two independent knots instead of tying a single knot does not increase the strength of the flexor tendon repair.

Load to Failure (N)					
		Single Strand (n=6)	Double Strand (n=6)		
3-0 Suture		36.30 ± 3.4 (33.60 to 38.99)	86.49 ± 17.9 (72.12 to 100.85)	p<0.01	
4-0 Suture		27.31 ± 1.25 (26.31 to 28.30)	51.39 ± 2.7 (49.24 to 53.54)	p<0.01	
Excursion at Load to failure (mm)					
		Single Strand(n=6)	Double Strand(n=6)		
3-0 Suture		10.61 ± 1.1 (9.74 to 11.49)	9.44 ± 0.9 (8.73 to 10.16)	p=0.06	
4-0 Suture		9.86 ± 0.5 (9.42 to 10.30)	8.11 ± 0.9 (7.43 to 8.80)	p=0.003	
Cyclic Testing to Failure					
		Single Strand (n=6)	Double Strand (n=6)		
3-0 Suture	<i>Cycle No.</i>	166.67 ± 22.5 (148.66 to 184.68)	421.67 ± 64.6(369.95 to 473.38)	p<0.01	
	<i>Force (N)</i>	30.48 ± 0.9 (29.76 to 31.21)	53.60 ± 6.1 (48.74 to 58.46)	p<0.01	
4-0 Suture	<i>Cycle No.</i>	75.33 ± 62.1 (25.68 to 124.98)	290 ± 46.0 (253.16 to 326.84)	p<0.01	
	<i>Force (N)</i>	25.67 ± 6.2 (20.71 to 30.62)	43.05 ± 3.6 (40.20 to 45.89)	p<0.01	

95% Confidence intervals in parentheses



		1 Knot	2 Knots		
Load to Failure (N)		43.01 ± 14.2 (28.79 to 52.87), (n=8)	25.04 ± 9.3 (18.60 to 31.47), (n=8)	p=0.031	
Cyclic Testing to Failure					
	<i>Cycle No</i>	134.71 ± 65.8 (68.95 to 183.43), (n=7)	94.25 ± 107.0 (-12.79 to 168.42), (n=8)	p=0.39	
	<i>Force (N)</i>	31.08 ± 4.9 (26.19 to 34.70), (n=8)	32.98 ± 29.1(3.93 to 53.11), (n=8)	p=0.86	

95% Confidence intervals in parentheses

References

1. Calfee RP, Boone S, Stepan JG, Osei DA, Thomopoulos S, Boyer MI. Looped versus single-stranded flexor tendon repairs: a cadaveric mechanical study. *J Hand Surg.* 2015;40(5):958-962.