



Acute versus Chronic repair for Distal Biceps Tendon Ruptures: A Systematic Review and Meta-Analysis

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Disclosures

- Edward S. Chang, MD
 - Avanos Consultant
 - Arthrex Education and research support



Background

- Operative treatment is recommended for distal biceps tendon ruptures (DBTR) due to inferior functional outcomes of nonoperative treatment
- Acute repair is favored due to the operative complexity of chronic repairs
- Given the inferior results of nonoperative treatment, some recommend proceeding with repair regardless of chronicity





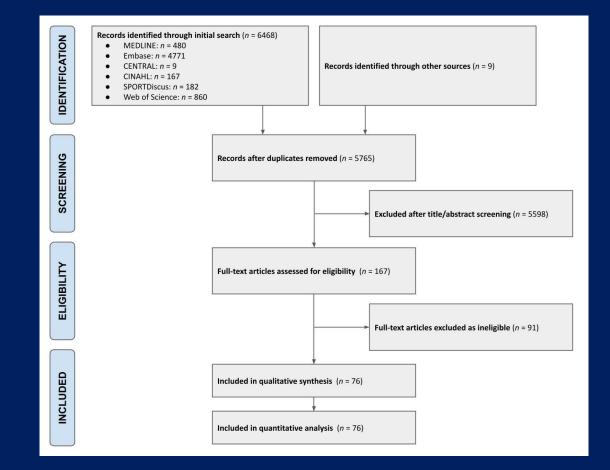
Purpose: To compare function, patient reported outcomes (PROs), and complications after acute and chronic DBTR

Hypothesis: Chronic repair would result in worse outcomes and more complications when compared with acute repairs



Methods

- Study Design:
 - Systematic review and meta-analysis
- Inclusion Criteria:
 - Stated timing of repair
 - Outcomes and/or complications stratified by time (when acute and chronic results reported), or (if not clearly stratified) ≥ 75% of results corresponded to acute or chronic repairs
 - Repairs were classified as "acute" if performed within 6 weeks of known injury and "chronic" if performed outside of that
- Statistical Plan:
 - Single-moderator models contained a variable to account for "acute vs chronic"
 - Multiple-moderator models also accounted for variables for approach and fixation
 - Wald-type tests were used to evaluate the effects of acute vs chronic repair for each combination of approach and fixation





Single-Moderator Results

Acute vs. Chronic Repair: Irrespective of Approach or Fixation

• Functional Outcomes

- Supination endurance was greater with acute repairs (p=.044)
- No difference between groups with:
 - Flexion-extension arc ROM (p=.486)
 - Supination ROM (p=.463)
 - Pronation (p=.288)
 - Flexion strength (p=.699)
 - Supination strength (p=.413)
 - Flexion endurance (p=.162)
- Patient Reported Outcome Measures:
 - No difference in:
 - Disabilities of the Arm, Shoulder and Hand (DASH) score (p=.868)
 - Mayo Elbow Performance Score (MEPS) (p=.741)

Table 1. Acute vs Chronic Distal Biceps Tendon Repair, Irrespective of Fixation or Approach.

Outcome	Est	Acute 95% Cl	Est	Chronic 95% Cl	P value
Endurance % Supination	97.18	92.28 – 102.07	86.63	77.47 – 95.79	.044

Lead Author (Journal, Year; No.)		Mean [95% C
Acute		
Suda (AOTS, 2017; n = 49)	·	93.18 [84.47, 101.89
Redmond (IJSPT, 2016; n = 23)	H	105.13 [82.59, 127.67
Recordon (JSES, 2015; n = 46)	⊢ -	88.43 [77.70, 99.17
Lynch (KSSTA, 1999; n = 6)	H	100.65 [59.84, 141.46
Leighton (CORR, 1995; n = 9)		100.33 [88.31, 112.35
Klonz (JSES, 2003; n = 6)	→ →	92.83 [81.88, 103.79
Karunakar (CORR, 1999; n = 21)		121.71 91.34, 152.08
Johnson (HSSJ, 2008; n = 26)		90.07 [79.06, 101.08
Hetsroni (Injury, 2008; n = 12)	F	90.00 [80.38, 99.62
Dillon (Hand, 2011; n = 17)		76.00 52.26, 99.74
Bosman (JSES, 2012; n = 2)		99.27 [60.06, 138.48
Bell (JSES, 2000; n = 21)		106.25 [100.69, 111.81
Balabaud (JHS, 2004; n = 9)		113.00 96.97, 129.03
Baker (JBJS, 1985; n = 10)	· · · · · · · · · · · · · · · · · · ·	113.99 [85.52, 142.46
Summary Effect for Acute	•	97.18 [92.28, 102.07
Chronic		
Tanner (JSES, 2013; n = 17)	H	86.00 [74.88, 97.12
Bosman (JSES, 2012; n = 3)		85.11 [80.12, 90.10
Dillon (Hand, 2011; n = 9)		115.70 [69.91, 161.49
Summary Effect for Chronic		86.63 [77.47, 95.79
0 25	50 75 100 125	150



Single-Moderator Results (cont.)

Acute vs. Chronic Repair: Irrespective of Approach or Fixation

• Complications

- No significant difference in:
 - Any/all complications (%, p=.056)
 - Rate of any/all complications (per 100 person-years, p=.261)
 - Non-nerve complications (%, p=.895)
 - Rate of non-nerve complications (per 100 person-years, p=.389)
 - Heterotopic ossification (%, p=.066)
 - Motor nerve complications (%, p=.086)
 - Sensory nerve complications (%, p=.147)
 - Infection (%, p=.147)
 - Failure (%, p=.407)
 - Subsequent surgeries (%, p=.156)
 - Rate of subsequent surgeries (%, p=.189)

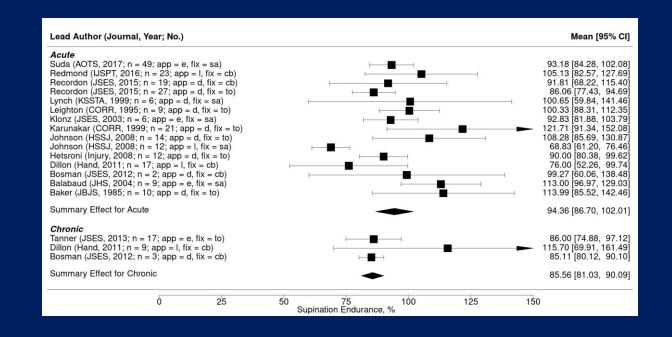


Multiple-Moderator Results

Acute vs. Chronic Repair: Controlling for Approach and Fixation

Functional Outcomes

- Supination endurance was greater with acute repairs (p=.029)
- No difference between groups with:
 - Flexion-extension arc ROM (p=.510)
 - Supination ROM (p=.456)
 - Pronation (p=.260)
 - Flexion strength (p=.471)
 - Supination strength (p=.419)
 - Flexion endurance (p=.124)
- Patient Reported Outcome Measures:
 - No difference in:
 - DASH score (p=.916)
 - MEPS (p=.742)





Multiple-Moderator Results (cont.)

Acute vs. Chronic Repair: Controlling for Approach and Fixation

- Complications
 - Significant difference in:
 - Any/all complications (%, p=.027)
 - Infection (%, p=.011)
 - No significant difference in:
 - Rate of any/all complications (per 100 person-years, p=.339)
 - Non-nerve complications (%, p=.188)
 - Rate of non-nerve complications (per 100 person-years, p=.339)
 - Heterotopic ossification (%, p=.308)
 - Motor nerve complications (%, p=.118)
 - Sensory nerve complications (%, p=.134)
 - Failure (%, p=.612)
 - Subsequent surgeries (%, p=.192)
 - Rate of subsequent surgeries (%, p=.117)

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	0.00 [0.00, 0.08]
	0.00 [0.00, 0.09]
	0.11 [0.00, 0.32]
	0.00 [0.00, 0.08]
	0.02 [0.00, 0.14]
_	0.00 [0.00, 0.04]
	0.01 [0.00, 0.28]
	0.00 [0.00, 0.19]
	0.01 [0.00, 0.09]
	0.05 [0.00, 0.23]
	0.00 [0.00, 0.17]
	0.05 [0.00, 0.22]
	0.01 [0.00, 0.28]
	0.00 [0.00, 0.05]
	0.00 [0.00, 0.07]
	0.19 [0.00, 0.58]
	0.00 [0.00, 0.01]
	0.00 [0.00, 0.01]
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	0.09 [0.00, 0.26]
	0.06 [0.00, 0.65]
_	0.00 [0.00, 0.02]
-	0.00 [0.00, 0.05]
	0.09 [0.00, 0.33]
	0.01 [0.00, 0.25]
	0.00 [0.00, 0.09]
	0.01 [0.00, 0.09]
1	0.00 [0.00, 0.01]
	0.00 [0.00, 0.09]
	0.11 [0.00, 0.32]
	0.64 [0.12, 1.00]
	0.14 [0.00, 0.54]

0.25 0.5 0.75 Overall Complication Proportion



Multiple-Moderator Results (cont.)

Acute vs. Chronic Repair: Individual Combinations of Approach and Fixation

- 7 combinations of techniques demonstrated significant differences in infection (%) between acute and chronic repairs (Table 2)
- There were no significant differences in any other outcome of interest

			Acute		Chronic	
		Est.	95% CI	Est.	95% CI	P value
nfection, %						
Approach	Fixation					
Double	Transosseous	0.00	0.00-0.01	0.11	0.01-0.26	0.012
Extensile	Cortical button	0.03	0.00-0.07	0.18	0.05-0.36	0.029
Extensile	Suture anchor	0.01	0.00-0.04	0.15	0.03-0.32	0.025
Extensile	Tension slide	0.05	0.01-0.11	0.23	0.07-0.42	0.040
Limited	Cortical button	0.00	0.00-0.02	0.12	0.01-0.28	0.017
Limited	Suture anchor	0.00	0.00-0.00	0.09	0.00-0.24	0.021
Limited	Tension slide	0.02	0.00-0.05	0.16	0.03-0.34	0.025



Discussion/Conclusions

- Acute Repairs demonstrated:
 - Increased supination endurance
 - Lower proportion of complications
 - No difference in failures
- Acute fixation of DBTR is preferred, but chronic repairs can allow for improved function over nonoperative treatment and should be considered



References

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- Dunphy TR, Hudson J, Batech M, Acevedo DC, Mirzayan R. Surgical Treatment of Distal Biceps Tendon Ruptures: An Analysis of Complications in 784 Surgical Repairs. Am J Sports Med. 2017 Nov;45(13):3020-3029