Clinical outcome & complications of cortical button distal biceps repair: A systematic review of literature

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Epidemiology

Incidence: 1.2/100,000 per year

10% of biceps ruptures: **distal**

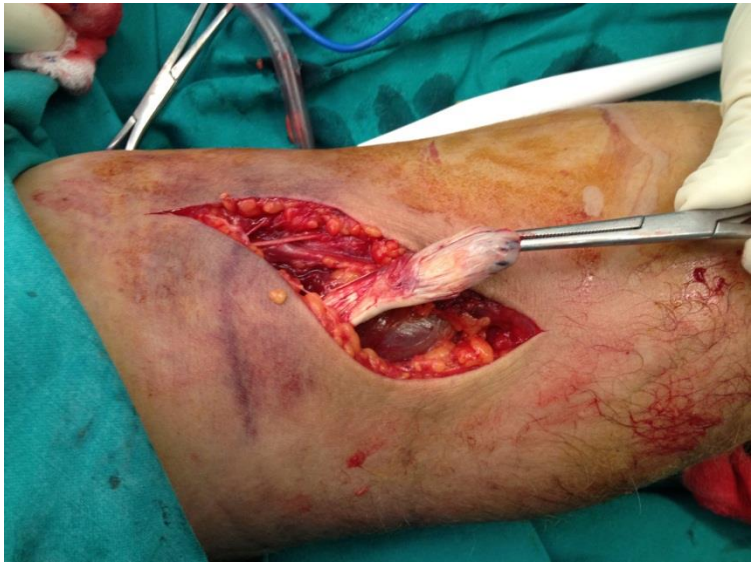
Dominant elbow: 85%

Men in 40's: 93%

Athletic activity: 29%

Cause: excessive eccentric tension

Smokers: 7.5 times at greater risk



Safran MR, et al. CORR, 2002

Diagnosis

Patient history

Clinical examination: hook test[1]

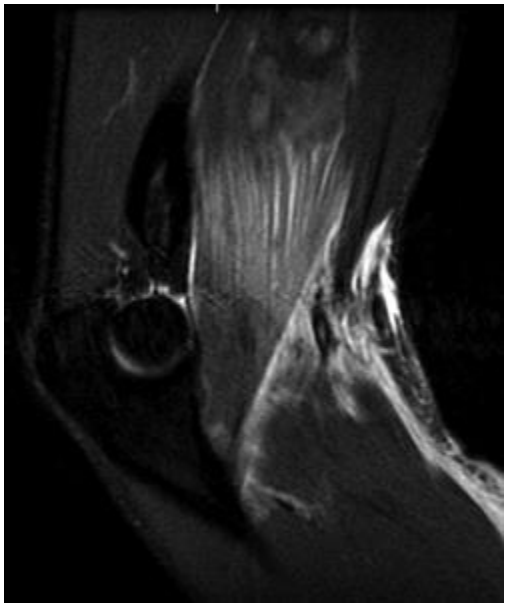
Sensitivity/specificity: 100% >MRI [2]

Imaging: US/MRI

1. Karen M, et al. AAOS, 2010

2. O'Driscoll SW, et al. AJ Sports Medicine, 2007

Treatment



Non-surgical:

- low-demand pts
- medically infirm pts
- partial rupture of tendon

Surgical:

- improvement of strength:

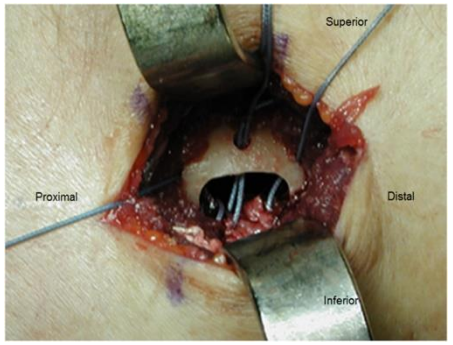
  flexion (30%) /supination (40%)

- early rehabilitation

Karen M, et al. AAOS, 2010
Baker BE, et al. JBJS, 1985
Greenberg JA, J Hand Surg., 2009

Surgical options

- Bone tunnels
- Suture anchors
- Intraosseous screws
- **Cortical button**
- Intramedullary button
- Button & interference screw
- Endoscopic techniques



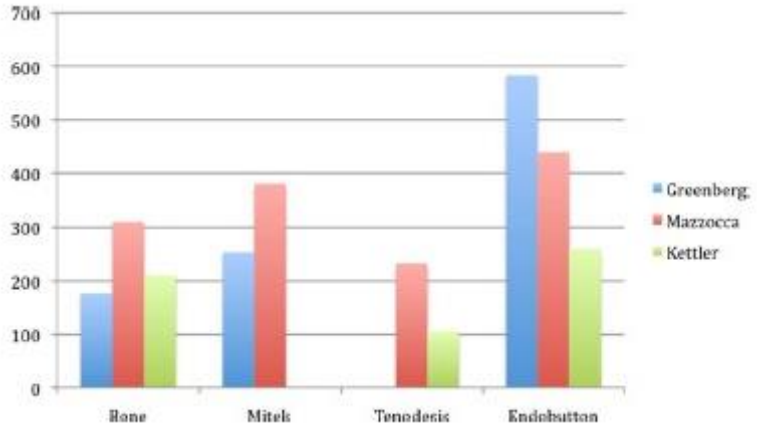
Cortical button repair

Superior load to failure strength

Greenberg JA, J Hand Surg, 2009,

Kettler M,et al. JBJS, 2008,

Spang JT, et al. J Shoulder Elbow Surg 2006



Superior cyclic load to failure

EndoButton (440 N), suture anchor (381 N), bone tunnel (310 N), interference screw (232 N)

Mazzocca AD, et al. Am J Sports Med 2007

Purpose of the study

A literature review was performed to investigate the clinical outcome and complications of the cortical button distal biceps fixation (Level of evidence, IV).

Methodology

Inclusion criteria

- English language,
- 5 or more patients,
- complete demographic data,
- at least 1 year follow up
- ROM and performance score
- report of complications

Search strategy

Search: Medline and PubMed databases, Embase, Google Scholar, Web of Science,

Query: distal biceps alone or with rupture, repair, injury, button, cortical button, endobutton, suspensory fixation or complications

643 articles

542 removed after title and/or abstract review

101 relevant articles

92 removed due to:
Follow-up < 1 year (2)
Biomechanical/Anatomical studies (19)
Imaging series (7)
Less than 5 cases (10)
No clinical outcome (1)
Conservative treatment (1)
Reviews or Editorial (12)
No treatment described (3)
No English language (9)
Surgical technique articles (3)
No endobutton fixation (25)

9 articles for final outcome review

9 eligible studies (all Level IV)

Author	Year	Patients/cases	Men/female	Acute/chronic	Mean age (y)	Follow-up (m)	Approach
1.Bain et al[11]	2000	13	13	9/4	38	17	Single anterior
2.Greenberg et al[14]	2003	14	14	11/3	45	20	Single anterior
3.Spencer et al[19]	2008	15	15	15/NR	46	12	Single anterior
4.Peeters et al[20]	2009	23	20/3	17/6	52	16	Single anterior
5.Dillon et al[24]	2010	27	26/1	17/9/1@	50.1	30.9	Single anterior
6.Gupta et al[26]	2012	8 / 9	8	9/-	27.35	41.5	Single anterior
7.Bosman et al[27]	2012	5	5	-/5	47.5	20.2	2-incisions
8.Kodde et al[28]	2012	20/ 22	19/1	5/17	49	22	Single anterior
9.Banerjee et al[22]	2013	27	27	27/NR	47.9	36.1	Single anterior
Total		**152 /155**	**147/5**	**110/45**	**44.8**	**21,5**	

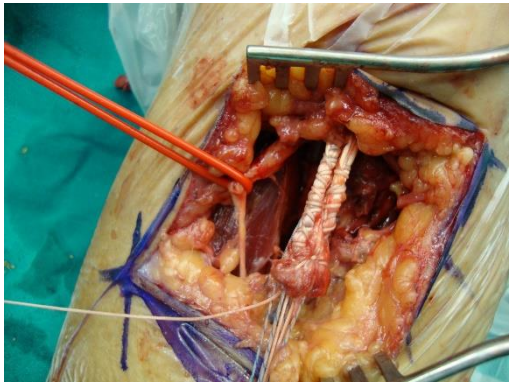
Clinical results

96.7% **male**
flexion strength 91% - 101%
supination strength 82% - 99%.
Level of **activity** at pre-injury status in 84/89 patients (6/9 studies)

ROM
Mean flexion 138.1^{o},
Extension ranged -4 to 0^{o}
Mean supination 77,54^{o}
Mean pronation 85.8^{o}

MEPS
ASES >90 in the 7/9 studies

Complications



PIN: 6 cases (3.8%), all resolved

LABN: 15 cases (9.7%), 2 persistent

SRN: 2 cases (1.3%)

Heterotopic ossification: 9.7%

(13/15 asymptomatic)

Other: 3 infections, 3 wound irritation of the cortical button,

2 button disengagement, 2 cases wrong button placement, 3 re-ruptures

The overall **re-operation rate** was 5.8% (9/155 cases).

Discussion

Risk of biases

surgical approach,

rehabilitation protocol,

no universal outcome scoring,

chronic ruptures (29%)

comparison of complications

Surgical approach

Single incision in 147/155 cases

Clinical Sports Medicine Update

Repair of the Ruptured Distal Biceps Tendon

A Systematic Review

Prithviraj R. Chavan, MD, Thomas R. Duquin, MD, and Leslie J. Bisson,* MD
From the University of Buffalo Sports Medicine and University of Buffalo Department of Orthopaedics, Buffalo, New York

no difference in complications between 2-incision approaches (16%) and single-incision approaches (18%), but more instances of significant loss of forearm rotation with the 2-incision approach.

Rehabilitation protocol

most surgeons prefer a short period of immobilization in a cast and gradual non-restricted ROM thereafter

HAND (2008) 3:316–319
DOI 10.1007/s11552-008-9129-8

ORIGINAL PAPER

Is Therapy Necessary After Distal Biceps Tendon Repair?

Edwin E. Spencer Jr. · Anita Tisdale · Kevin Kostka · Robert E. Ivy

mean time to full ROM 8.67 weeks for the supervised therapy (6 pt) and 4.38 weeks for the unrestricted group (9 pt).

Outcome scoring

Measurement of functional outcomes were not homogeneous or no outcome score at all (2 studies)

Future studies:

ASES

MEPS

SF-12, DASH

objective ROM

isokinetic strength evaluation

Chronic ruptures

45 (29%) chronic ruptures (tendon grafting 4 cases)


SCIENTIFIC ARTICLE

Complications Following Distal Biceps Repair

Richard A. Cain, MD, Jason A. Nydick, DO, Matthew I. Stein, MD, Bailee D. Williams, BS, John A. Polikandriotis, PhD, Alfred V. Hess, MD

198 patients with a 46% complication rate in patients operated > 4 weeks compared to 30 % in those operated upon acutely

Nerve injuries

SCIENTIFIC ARTICLE

Complications Following Distal Biceps Repair

Richard A. Cain, MD, Jason A. Nydick, DO, Matthew I. Stein, MD, Bailee D. Williams, BS, John A. Polikandriotis, PhD, Alfred V. Hess, MD

PIN palsy 6%, LABCN 30%, RSN 3%

Prognosis for recovery of posterior interosseous nerve palsy after distal biceps repair

Phillip T. Nigro, MD[a], Richard Cain, MD[b], Mark A. Mighell, MD[a,*]

PIN palsy 3.2%, (9/280 patients) (all resolved spontaneously)

- **Current review 3.8%** (all transient)

Heterotopic ossification

Extensive Heterotopic Ossification After Suspensory Cortical Fixation of Acute Distal Biceps Tendon Ruptures

Armando F. Vidal, M.D., Ryan C. Koonce, M.D.,
Michelle Wolcott, M.D., and Joel B. Gonzales, M.D.

4/8 cases (50%) severe HO, 3 re-operations

Current review: 15/155 (9.7%) only one re-operation

Possible underestimation due to lack of routine x-ray control at final follow up

Conclusions

The clinical studies on suspensory cortical button fixation for distal biceps ruptures were few, based on retrospective study designs, and often unclearly reported

Advantages:

- Early aggressive rehabilitation
- Sufficient for acute and chronic (> 4 weeks) ruptures
- Very good clinical results with low morbidity
- Low percentage of serious complications (PIN palsy)

More well designed prospective comparative studies are needed to prove this superiority