



# All-Suture Anchors for RCR

Scientific Update

Rotator cuff repair evolved significantly as aspects of the procedure advanced over the years. With improved visualization, the procedure progressed from open to mini-open to arthroscopic, allowing fixation to evolve from large metal anchors to low-profile PEEK and biocomposite anchors to current soft anchors. Due to the size of soft anchors, more points of fixation can be achieved on the medial row while minimizing bone removal and maintaining construct strength and integrity. Several biomechanical and clinical studies have demonstrated the efficacy of these anchors in rotator cuff repair.

## Biomechanical Studies

Hoffman TR,  
Lamplot JD,  
McClish SJ,  
Payne C,  
Denard PJ

Medial all suture anchors improves contact force compared to two hard body anchors in a biomechanical two-tendon rotator cuff tear model. *Arthrosc Sports Med Rehabil*. Accepted manuscript. Published online August 4, 2022. doi:10.1016/j.asmr.2022.05.012

- This was a two-part biomechanical study
- Part 1: Double-row repairs were compared in 12 matched-paired cadavers in a 2-tendon rotator cuff tear model
  - FiberTak® SpeedBridge™ repair: three 2.6 mm all-suture anchors medially
  - Classic SpeedBridge repair: two 4.75 mm SwiveLock® anchors medially
  - Both groups had two 4.75 mm SwiveLock anchors laterally
- No difference was observed in load to failure or cyclic displacement between groups
- Part 2: SynDaver® model was used to assess footprint contact area under 10-N incremental loads up to 40 N
- Contact force higher in the FiberTak SpeedBridge group as follows:
  - 25% increase at 20 N ( $P = .01$ )
  - 26% increase at 30 N ( $P = .02$ )
  - 30% increase at 40 N ( $P = .04$ )

## Takeaways

- The increased points of fixation and suture crossings in the 3 medial anchor FiberTak SpeedBridge construct improves contact force compared to a classic SpeedBridge construct
- Take Home: Furthermore, the difference in contact force progressively increases with larger medial loads, suggesting improved footprint compression with the FiberTak SpeedBridge construct. The FiberTak SpeedBridge construct may therefore be particularly beneficial in larger rotator cuff tears.



**Bernardoni ED,**  
**Frank RM,**  
**Veera SS,**  
**Waterman BR,**  
**Griffin JW,**  
**Shewman EF,**  
**Cole BJ,**  
**Romeo AA,**  
**Verma NN**

**Biomechanical analysis of medial-row all-suture suture anchor fixation for rotator cuff repair in a pair-matched cadaveric model.** *Arthroscopy*. 2019;35:1370-1376. doi:10.1016/j.arthro.2019.01.023

- Double-row RCR repairs were performed in 14 matched paired cadavers
  - One group had 2.8 mm all-suture anchors medially
  - One group had 5.5 mm hard-body anchors medially
  - Both groups had 5.5 mm PEEK anchors laterally
- Mean load to failure was 618 N in the all-suture group compared to 545 N in the hard-body group ( $P = .339$ )
- Specimens with higher bone density trended toward higher load to failure with the hardbody anchors, but not with the all-suture anchors, suggesting that the hard body anchors were more impacted by bone quality

#### **Takeaways**

- The biomechanical performance of a double-row RC repair with medial all-suture anchors is comparable to that of a double-row repair with hard-body anchors
- Demonstrates equivalent biomechanical performance of a double-row RC repair construct with an all-suture medial row compared to hard-body anchors.

**Ruder JA,**  
**Dickinson EY,**  
**Peindl RD,**  
**Habet NA,**  
**Fleischli JE**

**Greater tuberosity decortication decreases load to failure of all-suture anchor constructs in rotator cuff repair.** *Arthroscopy*. 2018;34(10):2777-2781. doi:10.1016/j.arthro.2018.05.030

- Fixation of 2.9 mm anchors were evaluated in 10 matched paired cadavers
  - Experimental group: 1.7 mm of decortication prior to anchor placement
  - Control group: No treatment of the bone
- Mean anchor displacement was higher in the decorticated group
  - No difference at 20 or 100 cycles
  - 3.4 mm compared to 2.7 mm at 200 cycles ( $P = .05$ )
- Load-to-failure was lower in the decorticated group
  - 314 N compared to 386 N ( $P = .049$ )

**Takeaway:** Decortication affects biomechanical properties of all-suture anchors and should therefore be minimized. However, the differences are small and overall, mechanics are favorable.



Ntalos D,  
Huber G,  
Sellenschloß K,  
Briem D,  
Püschel K,  
Morlock MM,  
Frosch KH,  
Thiesen DM,  
Klatte TO

Biomechanical analysis of conventional anchor revision after all-suture anchor pullout: a human cadaveric shoulder model. *J Shoulder Elbow Surg.* 2019;28(12):2433-2437.  
doi:10.1016/j.jse.2019.04.053

- Cadaveric study of defects following pullout of 2.8 mm anchors
- Anchors were tested as follows:
  - Placement of 2.8 mm all-suture anchor
    - Load to failure
  - Placement of 5.5 mm hard-body anchor in the same defect
    - Load to failure
  - Results compared to another group of 4.5 mm hard-body anchors
- There was no significant difference in load to failure between the 3 anchors
- Pullout of the all-suture anchors resulted in a mean defect of 4 mm
- Pullout of the 5.5 mm anchor placed in the all-suture anchor defect was not different than the 4.5 mm anchor

#### Takeaways

- Load-to-failure of the all-suture anchor in this study was the same as that of larger hardbody anchors
- In the event of pullout of an all-suture anchor (ie, following intraop testing), fixation can be salvaged with a standard hard-body anchor without compromising ultimate fixation

### Clinical Studies

Van der Bracht H,  
Van den  
Langenbergh T,  
Pouillon M,  
Verhasselt S,  
Verniers P,  
Stoffelen D

Rotator cuff repair with all-suture anchors: a midterm magnetic resonance imaging evaluation of repair integrity and cyst formation. *J Shoulder Elbow Surg.* 2018;27(11):2006-2012.  
doi:10.1016/j.jse.2018.03.006

- Prospective clinical evaluation of 20 rotator cuff repairs with soft anchors reviewed at a minimum of 1-year postoperatively
- Repairs were performed with a 2.9 mm all-suture based anchor, with an average of 2 anchors per case
- 95% of tears were healed postoperatively
- 10% of the anchor sites demonstrated fluid adjacent to the anchor
- No cases of cyst formation adjacent to the anchors were observed

**Takeaway:** All-suture anchors lead to high rates of healing without evidence of cyst formation following rotator cuff repair



Dhinsa BS,  
Bhamra JS,  
Aramberri-Gutierrez  
M,  
Kochhar T

**Mid-term clinical outcome following rotator cuff repair using all-suture anchors.** *J Clin Orthop Trauma.* 2019;10(2):241-243. doi:10.1016/j.jcot.2018.02.0146

- 31 arthroscopic double-row repairs with all-suture anchors
- 1.4 mm anchors were used in 8 cases and 2.3 mm anchors were used in 23 cases
- The postoperative Constant score was 77.1
- Two cases of anchor pullout were observed intraoperatively, which was solved with a different location of placement
- No cases of postoperative anchor failure occurred

**Takeaway:** Functional outcomes with all-suture anchors are comparable to hard-body anchors

Ro K,  
Pancholi S,  
Son HS,  
Rhee YG

**Perianchor cyst formation after arthroscopic rotator cuff repair using all-suture-type, bioabsorbable-type, and PEEK-type anchors.** *Arthroscopy.* 2019;35(8):2284-2292.

doi:10.1016/j.arthro.2019.03.032

- 213 single-row rotator cuff repairs were reviewed with MRI postoperatively to compare the appearance of all-suture and hard body anchors
  - 137 patients received 2.8 mm all-suture anchors
  - 36 patients received PLLA anchors
  - 40 patients received PEEK anchors
- There was no difference in functional outcomes based on anchor type
- No differences in perianchor reactions were observed
  - Bone cysts were seen in 8.8% of all-suture anchors, 16.7% of PLLA anchors, and 12.5% of PEEK anchors
- No differences in retear rates were observed

**Takeaway:** Bony reactions are uncommon with the use of all-suture anchors and comparable to that seen with hard-body anchors



**Ro K,**  
**Rhee SM,**  
**Kim JY,**  
**Kim MS,**  
**Kim JD,**  
**Lee H,**  
**Rhee YG**

**All-suture anchor settling after arthroscopic repair of small and medium rotator cuff tears.**

*Am J Sports Med.* 2019;47(14):3483-3490. doi:10.1177/0363546519886547

- 88 single-row repairs with all-suture anchors were evaluated at various timepoints for anchor migration
  - An immediate post-op MRI was obtained 2 days after surgery
  - Follow-up MRIs were performed 10 months after surgery
  - Bone mineral density was divided into 3 groups
- Anchor settling was a mean of 1.3 mm to 3.8 mm depending on bone mineral density
- There was no difference in rotator cuff healing between the groups based on bone mineral density

**Takeaway:** While slight anchor settling occurred postoperatively, the magnitude of migration was small, not exceeding the 5 mm value considered consistent with risk of cuff failure, and postoperative rotator cuff healing remained high

**Note:** It should be recognized that these were single-row repairs. Double-row repairs with lateral knotless anchors may further shield medial anchors from migration.