

SUMMARY OF PEER-REVIEWED LITERATURE

Transosseous-Equivalent Rotator Cuff Repair: A Systematic Review on the Biomechanical Importance of Tying the Medial Row

Mall NA, Romeo AA, Verma NN, Cole BJ, et al. *Arthroscopy* 2013;29:377-386.

Background

Rotator cuff repairs are performed to reduce pain and restore function. Although pain may improve despite lack of healing, functional improvement is directly related to tendon healing. Biomechanical studies have shown that double-row transosseous-equivalent repairs are stronger than single-row repairs¹. However, not all double-row techniques have similar biomechanical properties.

Purpose

The purpose of this study was to determine whether tying the medial-row of a double-row repair provides added stability, which is thought to be directly correlated to tendon healing².

Methods

Systematic review of 5 cadaveric studies examining biomechanical differences between double-row techniques.

Results

Of the 5 studies, 4 showed improved biomechanical properties (gap formation, stiffness, load to failure, and contact area) with tying the medial-row anchors, whereas 1 study showed no difference.

Discussion

Gap Formation: Tendon-to-bone healing requires direct contact, thus gap formation would inhibit rotator cuff healing. Of the 4 studies that measured gap formation, 3 studies showed a significant reduction ($P < .05$) in gap formation with tying the medial-row sutures. Leek et al.⁴ showed a strong trend ($P = .053$) toward lower gap formation with tying the medial-row.

Stiffness: Three studies measured stiffness at the initial and final testing, with 2 studies showing significantly stiffer constructs ($P < .05$) with the presence of knots medially. One study showed a trend toward stiffer construct ($P = .07$) with knots medially.

Load to Failure: All 4 studies that measure ultimate load showed significantly higher results ($P < .05$) with knots medially.

Contact Area: Improved contact area should improve the likelihood of healing. Maguire et al.⁷ was the only study to evaluate contact area, noting significantly greater contact area with knotted medial-row technique ($P < .05$). Other studies not included in this review (Park et al.⁸ & Mazzocca et al.⁹) also found improved contact area with a knotted medial-row construct.

Conclusions

The biomechanical factors of gap formation, stiffness, load to failure, and contact area are significantly improved when medial knots are tied as part of a double-row transosseous-equivalent repair. The use of FiberTape in an all-knotless approach did not aid in the repair stability⁴.

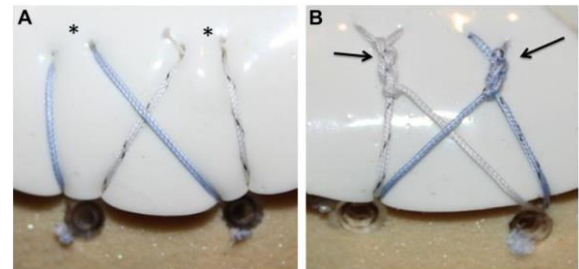


Fig. 1: Model of knotless repair (A - knotless) versus tying the medial row (B - knotted)

Chart 1. Biomechanical results for the 5 studies included.

| Study | Gap Formation (mm) | Stiffness (N/mm) | Load to Failure (N) |
|-----------------------------|--|---|------------------------------|
| Busfield et al ³ | Knotted better ($P < .05$) | Trend toward knotted better ($P = .07$) | Knotted better ($P < .05$) |
| Leek et al ⁴ | Trend toward knotted better ($P = .053$) | Knotted better ($P < .001$) | N/A |
| Chu et al ⁵ | Knotted better ($P < .05$) | No difference | Knotted better ($P < .05$) |
| Kaplan et al ⁶ | Knotted better ($P < .05$) | Knotted better ($P < .05$) | Knotted better ($P < .05$) |
| Maguire et al ⁷ | N/A | No difference | Knotted better ($P < .05$) |

¹ Wall LB, et al. *J Shoulder Elbow Surg* 2009;18:933-941.

² Nho SJ, et al. *Arthroscopy* 2009;25:1319-1328.

³ Busfield BT, et al. *Am J Sports Med* 2008;36:901-906.

⁴ Leek BT, et al. *Arthroscopy* 2010;26:S127-S133.

⁵ Chu T, et al. *Arthroscopy* 2011;27:479-485.

⁶ Kaplan K, et al. *Arthroscopy* 2011;27:471-478.

⁷ Maguire M, et al. *Knee Surg Sports Traumatol Arthrosc* 2011;19:1582-1587.

⁸ Park MC, et al. *J Shoulder Elbow Surg* 2007;16:461-468.

⁹ Mazzocca AD, et al. *Arthroscopy* 2010;26:592-599.