BIOLOGY AND BIOMECHANICS OF ROTATOR CUFF REPAIR

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Disclosures
Introduction

• Incidence: Rotator Cuff Tears affect 50% of those over age 60, 80% of those over 80

• Etiology: dysvascularity > trauma
RCR has come full circle open suture management to current TOE with suture bridg
Current techniques, pioneered and perfected by Burkhart, result in stable footprint repair construct.

Multiple anchors/sutures and tapes provide the best biomechanical stability.
• Snyder (Crimson Duvet) feels the RC must regenerate and requires less fixation and more biology

• Less anchors, less tension, more biology
BIOMECHANICS
- 4 – 8 anchors-occupies a majority of 12x24 mm FP
- Multiple sutures
- Multiple crossing patterns
- Strengths: stability of tendon/bone interface allows vascular ingrowth
- Weakness: tendon doesn’t heal to anchors

BIOLOGY
- 1-2 anchors with multiple sutures
- Trephination/microfracture footprint, leaves most of the 12x24 mm bone exposed and bleeding
- Strengths: good blood flow into dysvascular area
- Weakness: biomechanically unsound
TULANE STUDY

- Our study: randomized control trial comparing a vented anchor to a non vented anchor
- Randomization was based on OR room-each surgeon runs 2 rooms so in one room vented anchors were used and in the other non vented
Hypothesis

• Vented anchors allow blood and stem cells to contribute to the healing process of the rotator cuff

• Evaluation to be determined by 6 week US study of repair
  • Integrity of repair
  • Thickness at medial anchor site
  • Tendon “contour and alignment”
Materials and Methods

• Review of Prospective, IRB approved randomized Study of Post-Operative Rotator Cuff Repair Patients
  • 40 Vented Anchors
  • 30 Nonvented Anchors

• Assessed at Six Week post-operative visit with Ultrasound
Materials and Methods

• Greater Tuberosity was debrided and microfracture with medial trephination holes performed on both groups

• Patients randomly assigned vented or nonvented anchor based on OR room
Materials and Methods

- Rotator Cuff thickness was measured at medial anchor site with ultrasound at 2\textsuperscript{nd} post op visit, as close to 6 weeks (42 days) as possible.
- US performed by operative surgeon in usual clinic visit, with representative image with tendon thickness measured.
- Surgeons were blinded to implant type when performing ultrasound.
## Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Vented (n = 40)</th>
<th>Nonvented (n = 30)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotator Cuff Thickness</td>
<td>0.59 + 0.18</td>
<td>0.48 + 0.15</td>
<td>0.0074</td>
</tr>
<tr>
<td>Days Post-Op</td>
<td>42.1 + 5.1</td>
<td>40.8 + 6.2</td>
<td>0.3194</td>
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<tr>
<td>Age</td>
<td>55.0 + 10.1</td>
<td>62.5 + 10.7</td>
<td>0.0035</td>
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</tbody>
</table>
## Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>P value</th>
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<tbody>
<tr>
<td>Intercept</td>
<td>0.44633</td>
<td>0.0124</td>
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<tr>
<td>Implant</td>
<td>-0.05006</td>
<td>0.1918</td>
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<tr>
<td>Gender</td>
<td>0.08244</td>
<td>0.0238</td>
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<tr>
<td>Age</td>
<td>-0.00513</td>
<td>0.0040</td>
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<tr>
<td>Days</td>
<td>0.00895</td>
<td>0.0063</td>
</tr>
</tbody>
</table>
Discussion

• Initial evaluation with student T test showed a statistically significant difference between vented and non vented anchors

• However, after further regression analysis the difference, although in favor of vented anchors produce a non-statistically significant increase in rotator cuff healing

• Subjectively both blinded surgeons related better contour and alignment of the tendons in the vented group as compared to the non-vented anchor group

• All rotator cuff’s intact at 6 weeks in both cohorts
Limitations

- US was performed by operative surgeon so examiner bias could be present
- We did not account for medical co-morbidities that might affect tendon healing
- All patients in both groups had both trephination holes and micro-fracture of the greater tuberosity to improve the healing response, which seemed to improve the results in non-vented group as US of the tendon was performed
Conclusions

• Biomechanically sound fixation shows improved healing rates in most studies

• Overfixation and overtensioning leads to poor results and type 2 failure

• Biologic improvements including vented anchors and multiple trephination holes leads to improved tendon healing

• Underfixation allows tendon separation and failure to heal
Bibliography


Bibliography Cont.

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Questions?