Improving Healing Rates After Rotator Cuff Repair: What We Do Now That Works

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Surgeon Factors

• 1.) Construct
  – Single row vs. Double row
• 2.) Rehabilitation
  – Slow vs. Accelerated
• 3.) Biologics
  – PRP
  – Stem cells
  – Grafts
1.) Construct – Single Vs Double Row

- Too much data to review…
- Mascarenhas et al Arthroscopy 2014
  - Systematic review of 8 meta-analyses comparing SR vs DR healing
  - DR > SR healing in tears > 3cm
  - No difference in smaller tears
- Huang et al JBJS 2017
  - Cost Utility analysis
  - DR more cost effective than SR
  - Most cost-effective in larger tears > 3cm

Conclusions:
- S/M - SR = DR healing; DR not cost-effective
- L/M - DR > SR healing; DR more cost-effective

2.) Rehabilitation

- Arthroscopic repair
  - Possibly delay rehab w/o development of stiffness → improved healing
  - Meta-analysis of randomized studies (6)
  - Early ROM - minimal effect on final ROM; worse healing in larger tears
- Huberty, Burkhart Arthroscopy 2009
  - Stiffness 13% - in at-risk patients
    - Preop adhesive capsulitis, Calcium, single tendon repair, PASTA, any concomitant labral repair

Conclusions:
- Limit early passive motion in large tears – improve healing
- Early passive motion in at risk patients – improve motion

3.) Biologics

- Various augmentation solutions
- Cellular
  - Growth Factors
  - Stem Cells
- Grafts/Patches
  - Biologic only
  - Structural
3.) Stem Cells - Tuberosity Microfracture

- Milano et al Arthroscopy 2013
  - 60% micro fx vs. 12.5% control healing
- Jo et al AJSM 2013
  - 78% healing with; 55% healing without
- Taniguchi et al JSES 2015
  - 91% healing with; 76% without
  - (large/massive – 29% vs. 4.5%)

Conclusions – Significant improvement in Healing rates in every study. Should use on every case.

3.) Stem Cells - Iliac Crest

- Hernigou et al Int Orthop 2014
  - 90 single row cuff repairs of 1 to 3 cm tears
  - Randomized repairs to concentrated bone marrow derived MSCs from IC vs. no augment
  - 10 years – 87% augmented healed/44% non-augmented healed

Conclusions – Beneficial to add if able to maintain at repair site.

3.) Stem Cells - Adispose Derived

- Kim et al AJSM 2017
  - 70 patients randomized to conventional repair vs augmented with ADMSC
  - Liposuction 1 day prior to surgery
  - MSC’s harvested; injected w/ Fibrin Glue
  - Retear 29% conventional/14% stem cell

Conclusion – good potential for fibrin holding cells; problems - 2 surgeries/liposuction.
3.) PRP

- Vavken et al AJSM 2015
  - Meta-analysis 13 studies
  - Improved healing in small/medium sized tears
  - Not cost effective
- Saltzman et al Arthroscopy 2016
  - Systematic review of meta-analyses
  - 7 meta-analyses
  - No universal improvement in re-tear outcomes

Conclusions – high variability in healing data; questionable cost effectiveness

3.) Biologic Only Graft

- Reconstituted type I bovine collagen scaffold
- NO INITIAL MECHANICAL PROPERTIES
- Limited animal and clinical data
  - Van Kampen et al. Muscles Tendons Ligaments J 2013
  - Bokor et al. Muscles Tendons Ligaments J 2015
- No comparative healing data to controls

Conclusions – Promising; no data currently supporting healing over repair only in full thickness tears; high cost

3.) Acellular Dermal Graft Augment

- Barber FA et al Arthroscopy 2012
  - 85% (with) vs 40% (w/o)
- Gilot et al Arthroscopy 2015
  - 90% (with) vs 74% (w/o)
- Kim et al JSES 2017
  - 24 large/massive tears augmented – 79% healing
- Hohn et al JSES 2017
  - 23 revision cuff repairs augmented – 69% healing

Conclusions – Improve healing rates consistently; increased OR time; Consider for cases with poor quality/retracted tissue in young patient
Healing Conclusions

Works Now – Should be implemented
1.) DR in large/massive – cost effective; SR with Small/medium
2.) Early passive in small tears/at-risk; delayed passive in large/massive
3.) Multiple channeling of footprint in all cuff repairs
4.) Arthroscopic acellular dermal matrix augmentation improves healing consistently – consider in large/massive w/poor mobility/tissue quality

Might work - needs more data
5.) Biologic only graft – Needs more comparative healing data/cost analysis
6.) Iliac crest or adipose stem cells – Promising; needs better method of holding cells at repair site/cell prep
   Does not work consistently/not cost effective
7.) PRP or PRFM – lack of consistent healing data; questionable cost effectiveness

THANK YOU