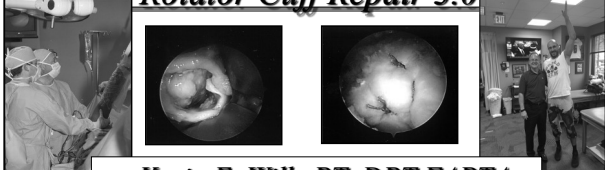



**Rehabilitation Following Rotator Cuff Repair 3.0**



**Kevin E. Wilk, PT, DPT, FAPTA**



1

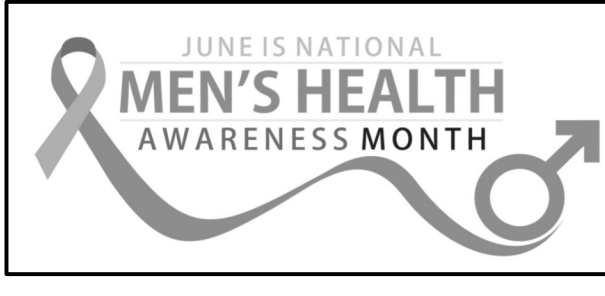
**Rehabilitation Following Rotator Cuff Repair**



**Why One Rehab Program Doesn't Work for All Patients**

2

JUNE IS NATIONAL  
**MEN'S HEALTH**  
 AWARENESS MONTH




6

**REHABILITATION FOLLOWING RTC REPAIR**

*Discussion Points:*

- ✓ All RTC Tears are Not the Same
  - ✓ Therefore all rehab programs should be the same
- ✓ Rehabilitation Must Match the Patient
- ✓ Team Approach to Treatment !!
- ✓ Slower May Be Better
- ✓ Precautions following Surgery
- ✓ Rehabilitation Specifics
  - ✓ ROM, Strengthening, Return to Activities

*Specific & Adjustable Rehab Programs*



8

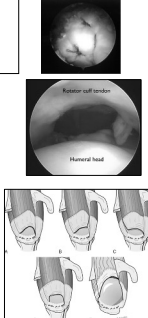
**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**

*Rehabilitation Guidelines:*

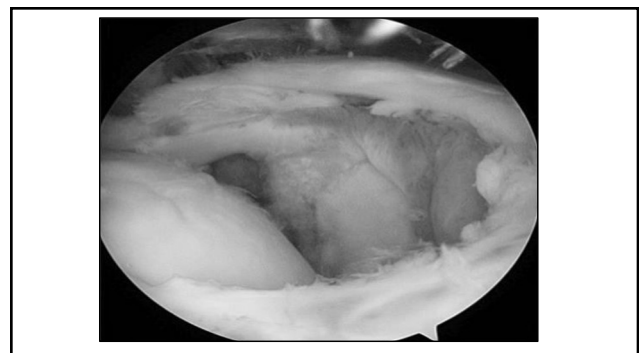
**#1 All Rotator Cuff Tears are Not the Same**  
*"Many Different Types & Variables"*

- ✓ Size of the tear
- ✓ Location of tear
- ✓ Tissue quality – tendon & muscle
- ✓ Tear pattern
- ✓ Surgery technique
- ✓ Concomitant lesions (DJD, spurs, AC joint)
- ✓ Patient variables

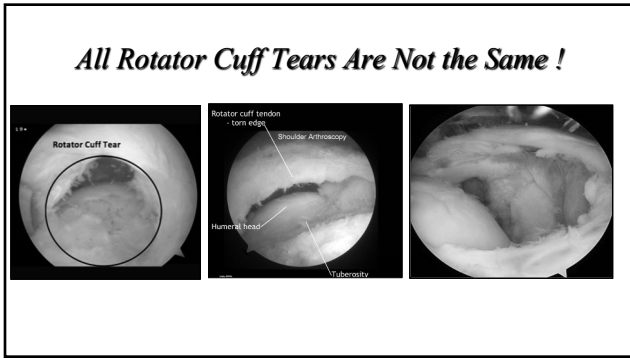
*Specific & Adjustable Rehab Programs*



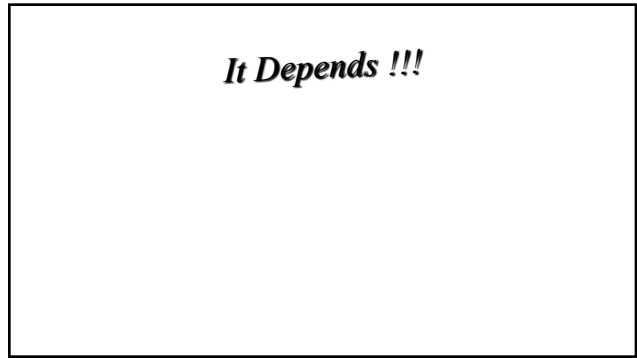
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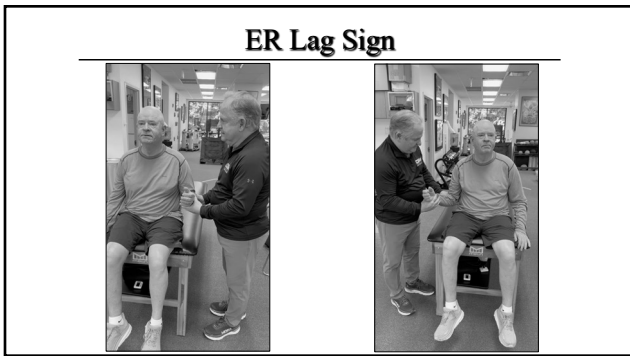
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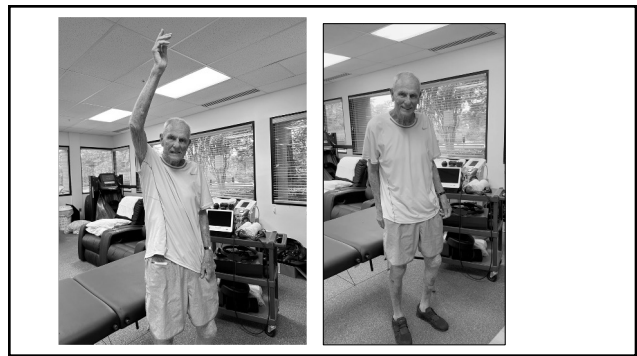
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12



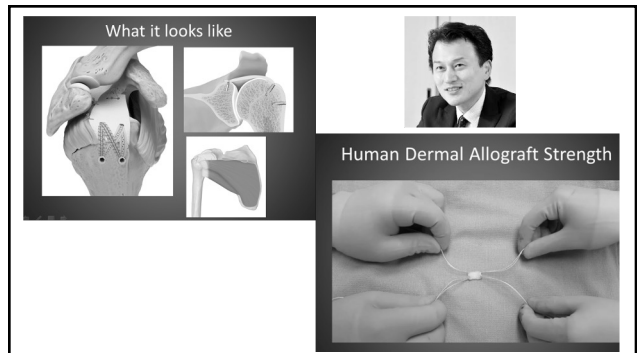
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15



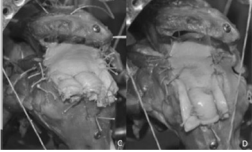
16



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### Superior Capsular Reconstruction SCR

#### Rehabilitation Following SCR



**A biomechanical cadaveric study comparing superior capsule reconstruction using fascia lata allograft with human dermal allograft for irreparable rotator cuff tear**

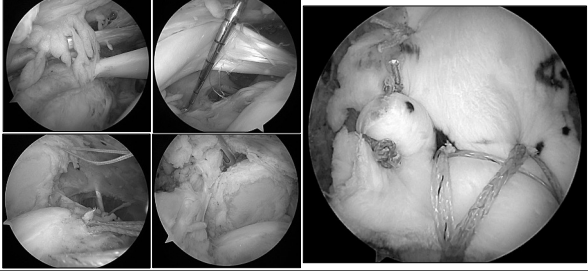
Rehabilitation: No, PNP, Christopher R. Adams, M.D., Michael J. Stone, MD, Matthew A. Cavatore, MD, Michael Santoro, MD, Alexander R. Petrecca, MD, Hercules N. Katsaris, MD, Yusef Hameed, MD, The University of Michigan, Ann Arbor, MI, PNP, Roy G. Lee, MD, The University of Michigan, Ann Arbor, MI

**SUPERIOR CAPSULAR RECONSTRUCTION REHABILITATION**

- No good data → use your discretion their approach
- 0-4 weeks: Passive ROM and sling full time (never don't start therapy until week 0)
- 6-12 weeks: ROM and Muscular endurance
- 12 weeks - 6 months: Progressive Strengthening

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### Procedure

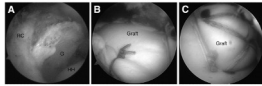


21

### Preliminary Results of Arthroscopic Superior Capsule Reconstruction with Dermal Allograft

Patrick J. Denard, M.D., Paul C. Brady, M.D., Christopher R. Adams, M.D., John M. Tokish, M.D., and Stephen S. Burkhart, M.D.

*Arthroscopy: The Journal of Arthroscopic and Related Surgery*, Vol 34, No 1 (January), 2018; pp 93-99



59 pts  
18 months

75% "Success"  
12% rTSA

	Preoperative Status (Mean ± SD)	Postoperative Status (Mean ± SD)	P Value
Active forward flexion	130° ± 68°	158° ± 32°	<.001
Active external rotation	36° ± 18°	45° ± 17°	.008
Internal rotation, spinal level	L3	L1	<.001
VAS pain	5.8 ± 2.2	1.7 ± 2.1	<.001
ASES	45.6 ± 18.6	77.5 ± 22.0	<.001
SSV	35.0 ± 19.9	76.3 ± 25.2	<.001
AHJ	6.6 ± 3.0 mm	6.7 ± 3.0 mm	.899


ASES, American Shoulder and Elbow Surgeons; SD, standard deviation; SSV, subjective shoulder value; VAS, visual analog scale.

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### Rehab Following SCR

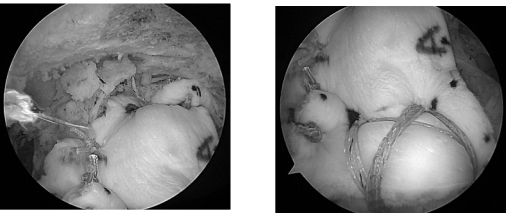
#### Adjustable Timeframes:

- ✓ Conservative (slow) post-operative rehab program
- ✓ First 4 weeks: sling, elbow & hand ROM, posture
- ✓ Week 4-8: Passive range of motion, scap NM control
  - ✓ Dynamic stabilization (ER/IR), postural exercises
- ✓ Week 8-12: Light strengthening exercises, RTC, Scap
- ✓ Week 13-20: Progress strengthening
- ✓ Week 26: Return to activities



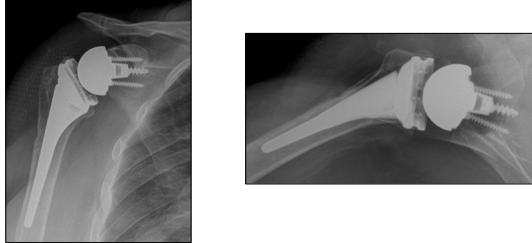
27

### Superior Capsular Reconstruction with Dermal Allograft, incorporate native cuff



30

### Postoperative Radiographs



35

### Treatment Options for RTC Tears

**Key Point #2**

✓ **New Techniques to Repair the Rotator Cuff**

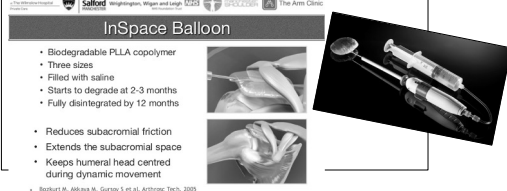
**InSpace Balloon**

- Biodegradable PLLA copolymer
- Three sizes
- Filled with saline
- Starts to degrade at 2-3 months
- Fully disintegrated by 12 months

- Reduces subacromial friction
- Extends the subacromial space
- Keeps humeral head centred during dynamic movement

• Redburn M, Aebisa M, Gurney S et al. Arthrosc Tech. 2005  
• Malchen M, Brand F, Agrawalchewar JB. Osseointegration. 2016

@theclinic



36




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### Rehab Following In Space Balloon

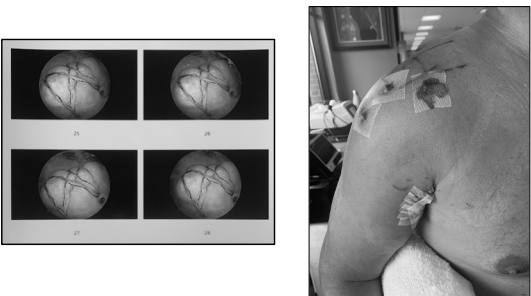
**Adjustable Timeframes:**

- ✓ **Post-operative rehab similar to decompression**
- ✓ **Week 1-2:** Sling, elbow & hand, postural exercises
- ✓ **Week 3-6:** PROM, AAROM, dynamic stab ex, RTC ex.
- ✓ **Week 7-12:** Progressive rotator cuff ex. & scap NM control
  - ✓ Dynamic stabilization (ER/IR), postural exercises
- ✓ **Week 12-16:** Progress strengthening & functional activities
- ✓ **Week 12-16:** Return to activities



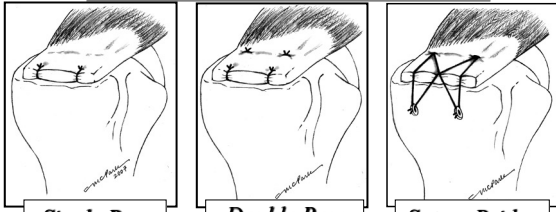
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### Case Presentation #40719



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### Rotator Cuff Repair



**Single Row Technique**

**Double Row Sutures**

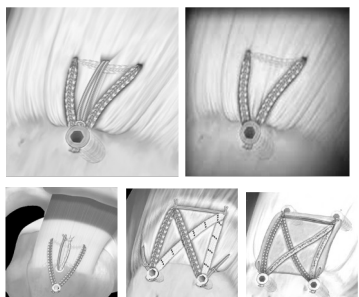
**Suture Bridge Technique**

41

### Technical Considerations for Rotator Cuff Repairs

Multiple techniques → customize treatment


- Small, non-retracted tears → "Simple" repairs (knotless)
- Medium/large/massive tears → All the options
  - DR Mattress Sutures, Rip-Stop Configurations, Augmentation



Romeo 2024

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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Variability of Rehab Programs*



✓ Same rehabilitation program for all patients  
 ✓ Program depends on goals of patient, patient variables

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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Rehabilitation Guidelines;*

#2 **Rehabilitation Must Match the Patient**  
 "One size does not fit all"

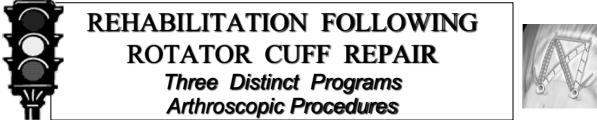
*Surgery & Patient Variables*

- ✓ Rehab based on surgery & patient
- ✓ Multiple programs – several programs
- ✓ 3 Different Rehab Programs:
  - ✓ Type I: slightly quicker pace
  - ✓ Type II: moderate progression
  - ✓ Type III: slow progression


*Rehabilitation Program Must Match the Patient*      **Just Right!**

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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Three Distinct Programs Arthroscopic Procedures*

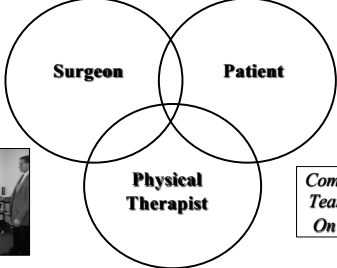


- Type I: small tears (1cm or<) (very good tissue quality)
  - ✓ Abduct sling 4 weeks, Full AROM 6-8 weeks
- Type II: medium - large tears (2-4 cm) (adequate tissue)
  - ✓ Abduct sling 6 weeks, Full AROM 8-12 weeks
- Type III: large - massive tear (4cm >) (poor tissue, retracted tissue, tenuous repairs)
  - ✓ Abduct sling 6 wks, Full ROM 12-16wks



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**Rehabilitation Following Cuff Repair**  
*Keys to Successful Outcomes*



**Surgeon**      **Patient**

**Physical Therapist**

*Communications Team Approach On Same Page*



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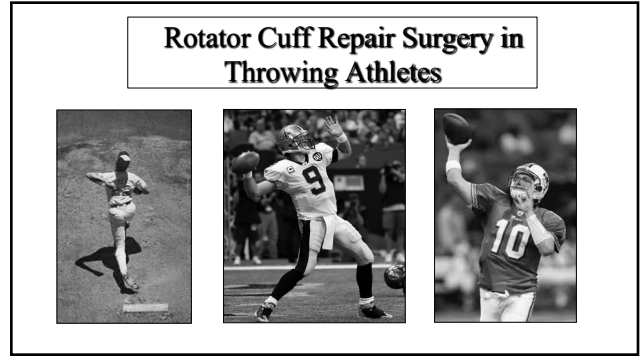
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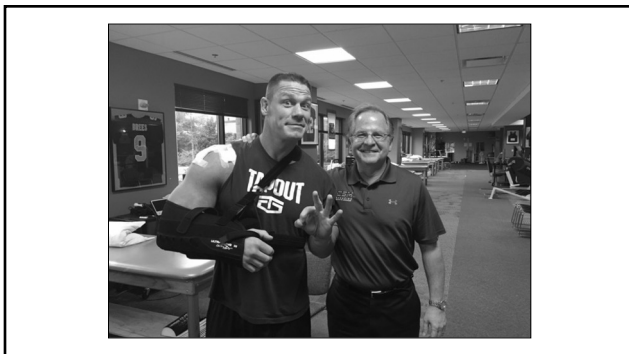
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



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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Rehabilitation Guidelines;*

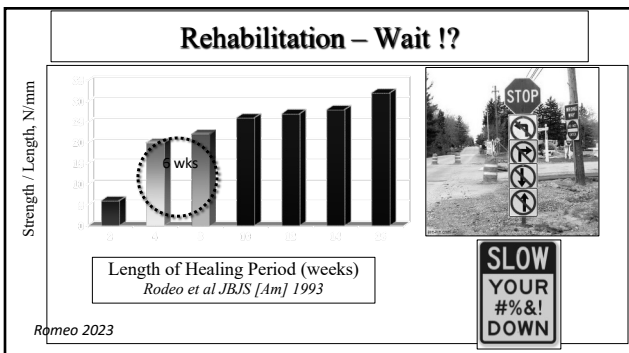
**#3 Why Slower May Be Better!**  
*"Tissue Healing Constrains"*

- ✓ Especially with poor tissue quality
- ✓ Older patients – higher failure rates
- ✓ Requires time for tendon to heal to bone
- ✓ Tendon to Bone Healing
- ✓ Adequate tissue healing is imperative to long term success of the repair
- ✓ Rx to promote tissue healing

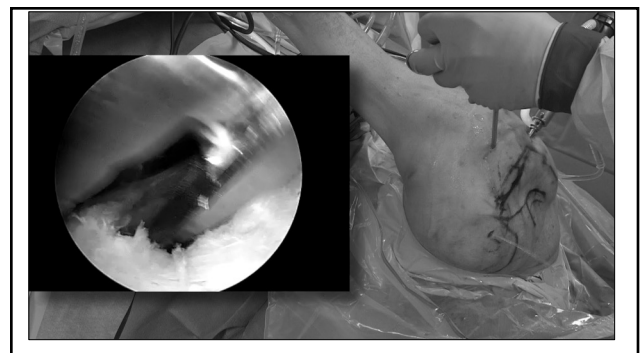



**Rehabilitation Program Must Match the Patient**

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### "Rotator Cuff Repair 101"

Gerber 1994

Ideal RCR will:

- ✓ Have high initial fixation strength
- ✓ Permit minimal gap formation
- ✓ Sustain mechanical stability

...until healing has occurred

**Tendon Falls Under 200N**

Single Row  
- UTS 2500-3000N  
- Small footprint  
- Gap formation

**Double Row**

Double Row  
- UTS 3000-3500N  
- Better footprint  
- Reduced "gap" formation

**TOE with Anchor**

TOE with Anchor  
- UTS 3000N  
- Best footprint  
- Least "gap" formation  
- Resistance to pull

**Anchor Pull Out 350N**

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### Improving Biology of Cuff Healing

Vented / Cannulated Anchors

Growth Factor Enhanced Plasma

61

### PRP Injection w/ Cuff Repair

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### Patient Interest

GOOGLE Sites 1/2024

**PRP - 149,000,000**

**STEM CELLS - 10,570,000,000**

63

### Biologic of Tendon Healing

- ✓ **Laser** – creates environment of healing
  - ✓ 700% increase in nitric oxide - vasodilation
- ✓ **Piezo wave shock-**
  - » Enhanced tendon to bone healing
  - Rodeo et al; JBJS 2014
- **Blood Flow Restriction:**
  - » Release of growth factors HGH
  - » TGIF-1

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### Rate of Tendon Healing

Lewis, et al, Biomed Sci Instrum '99

**Rate of Loading**

Week	Suture DT (N)	Suture Anchor (N)
0	0	0
3	~100	~100
6	~200	~200
9	~300	~300
12	~400	~400

**Stiffness**

Week	Suture DT (N/cm)	Suture Anchor (N/cm)
0	0	0
3	~100	~100
6	~200	~200
9	~300	~300
12	~400	~400

Progressive increase in strength / @ 12 weeks only 25% of normal tendon

✓ At 26 weeks, 85% of normal tendon strength



Romeo 2023

Arnoczky, et al, AJSM 1988  
Rodeo, et al, JBJS 1993  
St. Pierre, et al, JBJS 1995

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### Rehab Following Rotator Cuff Repair What Complicates the Rehab ?

- ✓ **Surgery Variables**
  - ✓ type of repair
  - ✓ tissue quality
  - ✓ amount of retraction
- ✓ **Patient Variables**
  - ✓ smokers, other health variables, compliance
- ✓ **Physical Therapy Factors**
- ✓ **Other Factors**
  - ✓ insurance, motivation, "S ideas" (stupid ideas)

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### Effect of Smoking on Rotator Cuff Repairs Mallon et al. JSES 2004

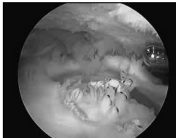

**Table I** Mean UCL SI scores before and after surgery comparing smokers and nonsmokers

Variable	Smokers	Nonsmokers
UCLA score		
Preoperative	15.92 ± 3.36	17.63 ± 4.15
Postoperative	22.01 ± 3.15	23.21 ± 3.76
Improvement*	9.12 ± 6.89	14.28 ± 5.59
Fair score	7.60 ± 1.22	6.53 ± 1.59
Preoperative	4.24 ± 2.83	3.12 ± 1.49
Postoperative	3.36 ± 2.62	5.55 ± 1.94

**Table II** Frequency of smokers and nonsmokers in each category based on scoring of UCLA assessment

Result	Frequency (%)	
	Smokers	Nonsmokers
Excellent	14 (14.7%)	65 (51.1%)
Good	19 (19.8%)	42 (33.3%)
Fair	38 (40.0%)	18 (14.3%)
Poor	27 (28.2%)	2 (1.6%)

\*Difference of postoperative and preoperative scores.  
 The Fisher exact test showed a significant difference for all categories between smokers and nonsmokers.

**84% vs 30%**

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### REHABILITATION FOLLOWING ROTATOR CUFF REPAIR Keys to Success

**#4 Precautions – Protection:**  
 "When in doubt go slow"

- ✓ PROM places strain on cuff repair
- ✓ Active muscle contraction places strain on cuff repair
- ✓ Active functional motions - strain
- ✓ Abduction braces/slings may help
- ✓ Multiple programs


**Use Sunscreen Protection!**

**Protect the Rotator Cuff Repair**



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### Arthroscopic Rotator Cuff Repair Rehabilitation Program



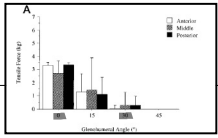
**Post-Operative Braces/Slings**

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### Rehabilitation Following Cuff Repair Shoulder Brace - Pillow

**Hatakeyama: AJSM '01**

- ✓ Rotator cuff strain less at 30° & 45°
- ✓ Sign. increase in strain from 30° to 15° & 15° to 0°






**30 degree Pillow brace – decreases cuff strain**

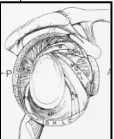
73

### PROM Progression

**PROM Progression Based on Progress & End Feel**

**30/45 deg abd → 90 deg abd → 0 deg**

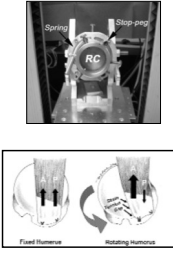


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**Park, Jun, El Attrache, Lee: AJSM '07**

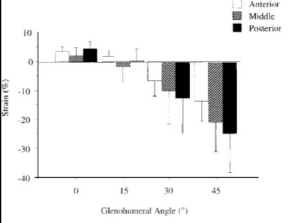
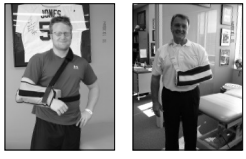
- Biomechanical effects of dynamic ER on rotator cuff repair
- 6 matched cadavers – single row fixation
- Cyclic loading with & without ER
- ✓ Anterior tendon gap formation was greater with end range ER (30° of ER)
- ✓ Strain on posterior tendon was less with ER



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**Rehabilitation Following Cuff Repair**  
**Shoulder Brace – Abduction Pillow**

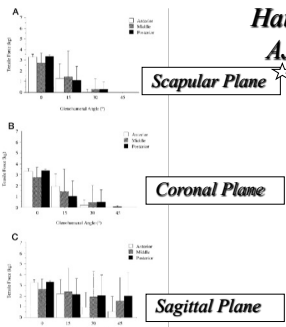
**Hatakeyama: AJSM '01**

30 degree Pillow brace – decreases cuff strain

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**Hatakeyama: AJSM '01**



**Scapular Plane**

**Coronal Plane**

**Sagittal Plane**

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**Which are safe exercises ??**



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**Dockery, Wright, LaStayo: Orthop '98**

- 10 healthy male volunteers
- Mean age 18 to 33 yrs of age
- Surface EMG applied to shldr
- 7 post-op rotator cuff exercises performed:
  - ✓ Pendulum
  - ✓ Pulley
  - ✓ Self assisted bar with opposite arm
  - ✓ Self-assisted ER/IR
  - ✓ PROM
  - ✓ PROM ER/IR
  - ✓ CPM device
- ✓ Only "passive" – CPM & PT PROM



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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
**ROM Guidelines**  
**AAROM & PROM Shoulder Flexion**



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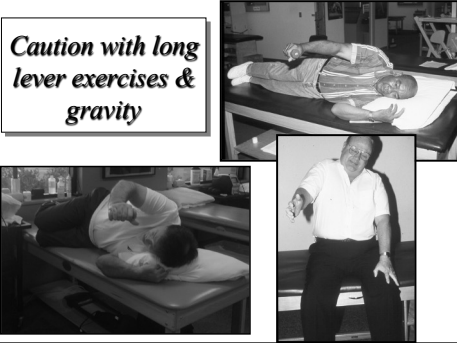
**Uhl et al: Phys Med & Rehab '10**

	<i>Supra</i>	<i>Infra</i>
• 12 different exercises:		
✓Supine PROM opposite arm:	1%	4%
✓Table slide	5%	2%
✓Wash cloth press up (AA)	3%	7%
✓Table towel slide (AA)	7%	4%
✓Step up with ball (Active)	21%	18%
✓Standing press-up	29%	14%



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**Caution with long lever exercises & gravity**



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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*ROM Guidelines*

**AAROM & PROM Shoulder Flexion**




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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Rehabilitation Guidelines;*


**#3 Rehabilitation Specifics: "Speed Limits in Rehabilitation"**

- ✓ Motion
- ✓ Posture
- ✓ Muscle
- ✓ Functional activities
- ✓ Precautions




**Rehabilitation Program Must Match the Patient**

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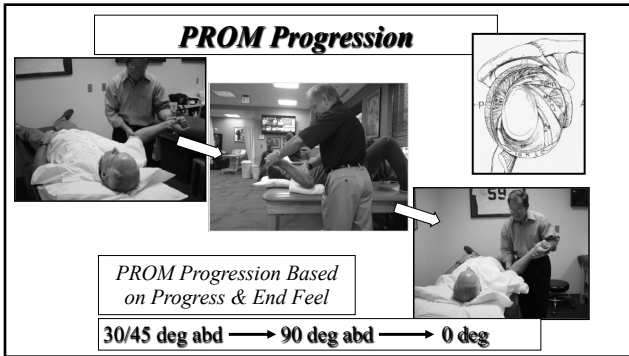
**9 mos post-op**

89



**24.5 mos post-op**

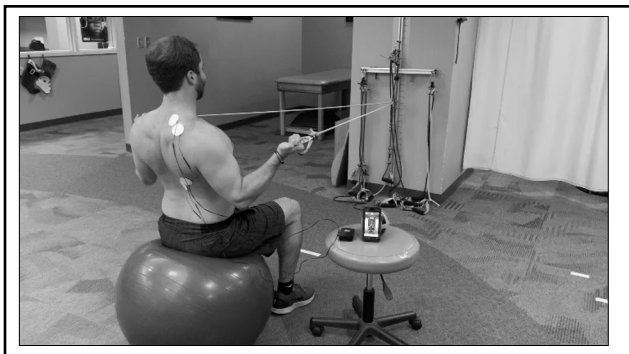
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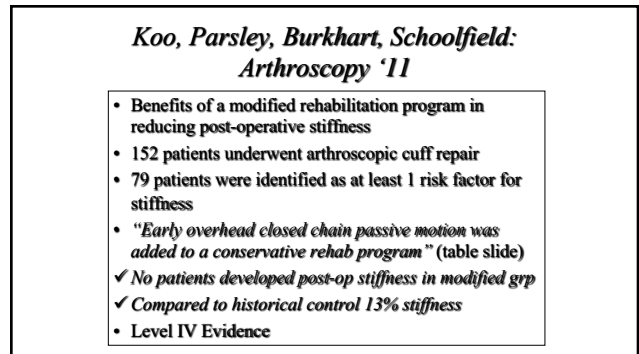
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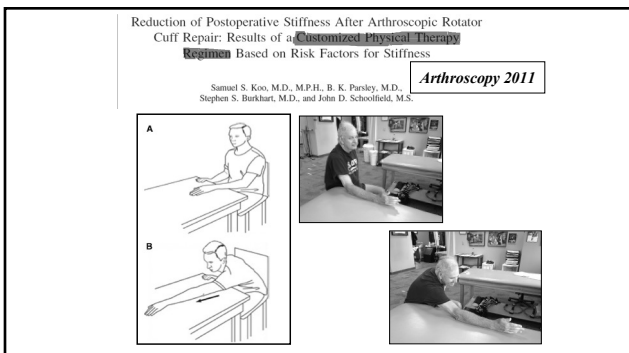
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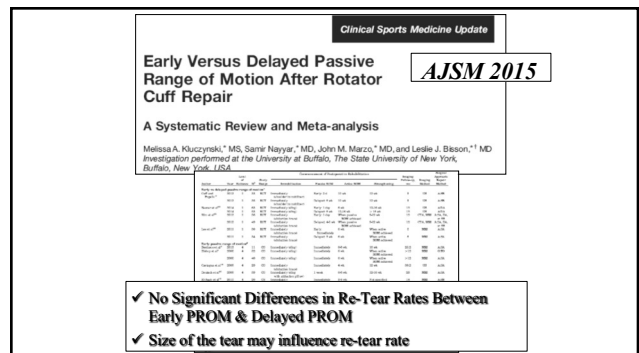
115



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**JSES '17**

**Does early motion lead to a higher failure rate or better outcomes after arthroscopic rotator cuff repair? A systematic review of overlapping meta-analyses**

Bryan H. Saltzman, MD, William A. Zuke, BA, Beatrice Co. BS, Randy Mascarenhas, ND, Nishi N. Verma, MD, Brian J. Cole, MD, MBA, Anthony A. Romeo, MD, Brian Forsythe, MD\*

*Abstract excerpt:* **Conclusion:** The current highest level of evidence suggests that early-motion rehabilitation after rotator cuff repair results in superior postoperative range of motion up to 1 year. Whereas early motion and delayed motion after cuff repair may lead to comparable functional outcomes and repair rates, concern exists that early motion may result in greater re-tear rates, particularly with larger tear sizes.

**Level of evidence:** Level IV, Systematic Review

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**Clinical Sports Medicine Update**

**Does Early Versus Delayed Active Range of Motion Affect Rotator Cuff Healing After Surgical Repair?**

**AJSM 2016**

**A Systematic Review and Meta-analysis**

Melissa A. Kluczynski,\* MS, Maureen M. Iseburg,\* BS, John M. Mauro,\* MD, and Leslie J. Blisson,\* MD

*Investigation performed at the University at Buffalo, The State University of New York, Buffalo, New York, USA*

Author (Year)	Level of Evidence	Sample Size	Study Design	Intervention	Comparison	Primary Outcome	Repair Rate (%)	Re-tear Rate (%)	Range of Motion (°)	Strength (N)	Quality Appraisal
Reider et al <sup>1</sup> (2012)	1	33	RCT	Immediate-active range	Standardized	Repair rate	9.4%	13.4%	14.5	3000	AHA
Chang et al <sup>2</sup> (2012)	1	30	CR	Immediate-active range	Standardized	Re-tear rate	12.4%	14.2%	15.1	1200	AHA
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✓ **Early Active Motion was associated with increased risk of structural defect in rotator cuff repairs**

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**Clinical Sports Medicine Update**

**Does Early Versus Delayed Active Range of Motion Affect Rotator Cuff Healing After Surgical Repair?**

**AJSM 2016**

**A Systematic Review and Meta-analysis**

Melissa A. Kluczynski,\* MS, Maureen M. Iseburg,\* BS, John M. Mauro,\* MD, and Leslie J. Blisson,\* MD

*Investigation performed at the University at Buffalo, The State University of New York, Buffalo, New York, USA*

Author (Year)	Level of Evidence	Sample Size	Study Design	Intervention	Comparison	Primary Outcome	Repair Rate (%)	Re-tear Rate (%)	Range of Motion (°)	Strength (N)	Quality Appraisal
Reider et al <sup>1</sup> (2012)	1	33	RCT	Immediate-active range	Standardized	Repair rate	9.4%	13.4%	14.5	3000	AHA
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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**

**Keys to Success**

**#6 Restore Balance in The Shoulder**

**"Balance is the key"**

**"When in doubt go slow"**

- ✓ Capsular balance – joint play
- ✓ Soft tissue balance
- ✓ ER/IR unilateral muscle ratios
- ✓ ER/Abd unilateral ratios
- ✓ Stable base – scapulae - Foundation

**Team Approach to Treatment - Individualize**

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**ER/IR Ratio**

**IR** **ER**

"I've got it, too, Omar... a strange feeling like we've just been going in circles."

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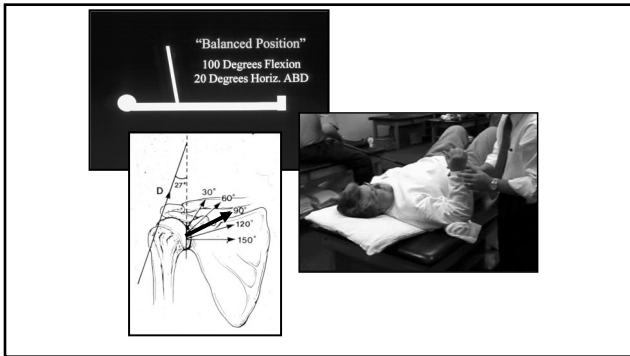
**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**

**Muscle Training Guidelines**

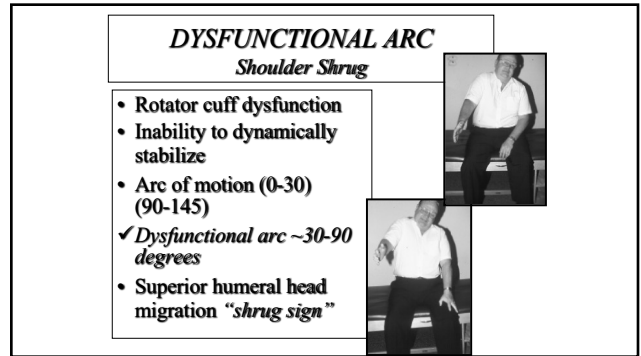
**Dynamic Stabilization Program**

- Emphasize ER strength
- ER/IR ratio: **(52% >)**
- ✓ This enables you to raise arm
- Rhythmic stabs
  - ✓ ER/IR drills
  - ✓ Flex/Ext drills
  - ✓ Progress to sidelying Flex RS

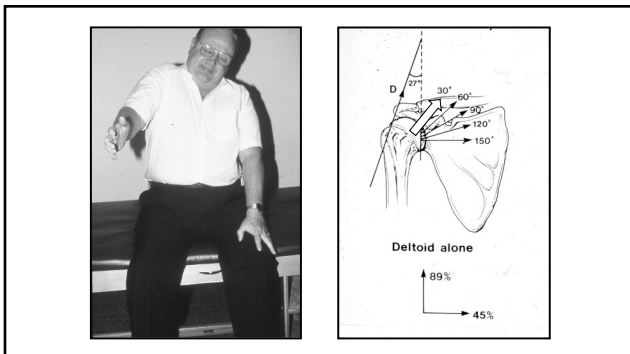
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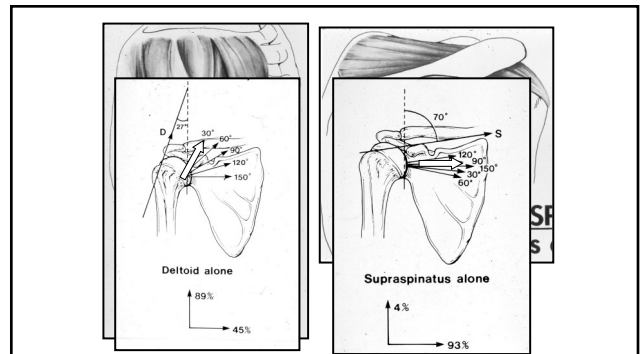
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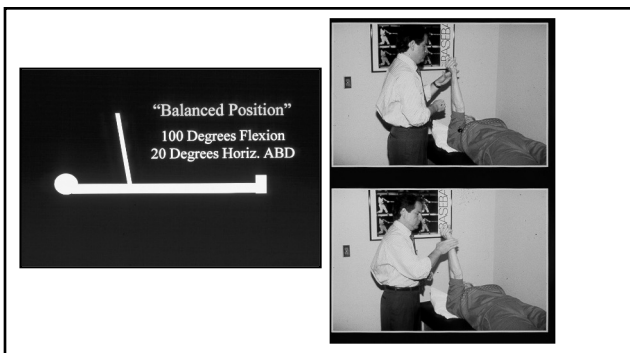
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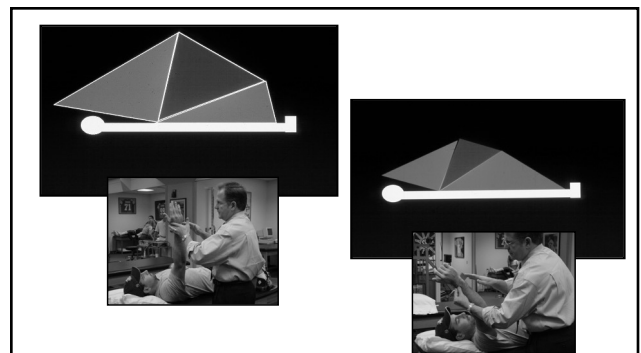
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**RHYTHMIC STABILIZATION**  
*Rotator Cuff Dysfunction*

- Supine  $\Rightarrow$  sidelying
- Isometric (RS)  $\Rightarrow$  isotonic
- Sidelying short arc isotonic 0-120/145°



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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Muscle Training Guidelines*

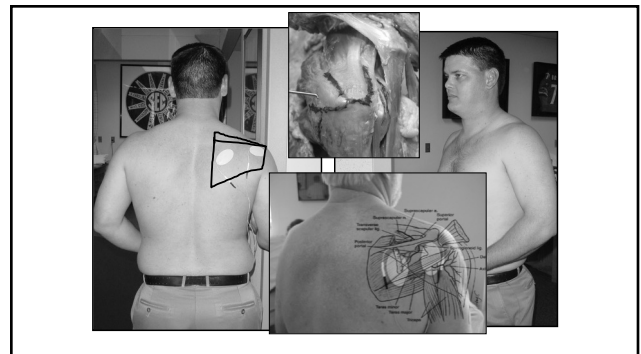


*Progress resistance 1 lb. per week*  
*Gradually load the repair site - stress/response*

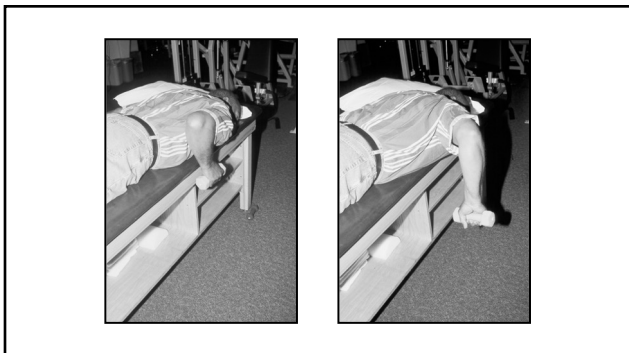
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### REHABILITATION FOLLOWING ROTATOR CUFF REPAIR

#### Muscle Training Guidelines

- ✓ *“light”* muscle re-education  
*To prevent muscular inhibition “muscle shutdown”*
- ✓ Isometrics – subpainful & submax
- ✓ Electrical Muscle Stim
- ✓ Rhythmic stabs ER/IR & F/E
- ✓ Scapular strengthening wk 2
- ✓ Tubing ER/IR wk 4
- ✓ Side-lying flexion wk 6

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### Aquatic Rehabilitation – Shoulder

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### REHABILITATION FOLLOWING ROTATOR CUFF REPAIR

#### Keys to Success

#7 **Gradual return to function**  
*“Sometimes slower is better”*

- ✓ Depends on functional demands
- ✓ Depends on who they are
- ✓ Depends on unique surgery factors
- ✓ Depends on numerous factors
  - ✓ life’s situation (care giver)
  - ✓ patient’s with physical limitations

**Team Approach to Treatment - Individualize**

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### REHABILITATION FOLLOWING ROTATOR CUFF REPAIR

#### Type II – Functional Activity Guidelines

- No heavy lifting for at least 6 months  
*Physician –will determine !!!!*
- May perform some restricted weight lifting activities close to body
- Sport activities (interval programs):
  - ✓ Golf week 14-16
  - ✓ Tennis week 22-26
  - ✓ Swimming week 24-26

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Winner of the 2010 O'Donoghue Award

### When Do Rotator Cuff Repairs Fail? **AJSM '11**

**Serial Ultrasound Examination After Arthroscopic Repair of Large and Massive Rotator Cuff Tears**

Bruce S. Miller<sup>1</sup> MD, MS, Scott K. Dierker<sup>1</sup> PA-C, MS, Robert R. Kohnen,<sup>1</sup> Theresa Kohnen,<sup>1</sup> Bryan Litwak<sup>1</sup> MD, Jon A. Jacobson,<sup>1</sup> Richard E. Hughes,<sup>1</sup> PhD, and James E. Carpenter<sup>1</sup> MD, Investigator performed at the Division of Sports Medicine, Department of Orthopaedic Surgery, University of Michigan, Ann Arbor, Michigan

Year No.	Reza Akbari Desjardis
1	13
2	38
3	44
4	50
5	45
6	74
7	178

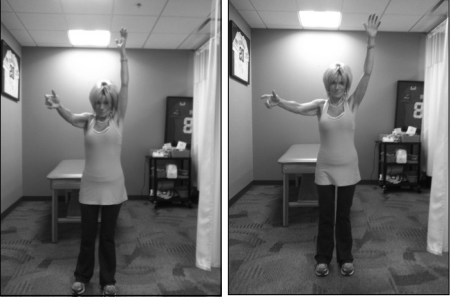
WBC: 5-tube series, which approach established algorithm in 20-year follow-up (p < .05)

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**Miller et al: AJSM '11**

- When do RTC repairs fail? Serial US exam after large RTC tears
- 22 patients with large or massive tears (>3 cm) standardized arthroscopic repair (mean age 62.7 yrs)
- Serial US performed at 2 days, 2wks, 6 wks, 3 mos, 6 mos & 1 yr
- \*4 weeks of immobilization, strengthening at 12 wks
- ✓ 9 of 22 (41%) demonstrated recurrent tears
- ✓ 6 re-tears (66%) occurred within 60 days
- ✓ 3 re-tears (33%) occurred after 178 days
- ✓ \*2/9 tears occurred during first 30 days (immob.) & 5 of 9 tears occurred within first 51 days

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**8 weeks post-op medium cuff chronic repair**

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**14 weeks post-op small cuff chronic repair**

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**8 weeks post-op massive cuff chronic repair**

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**8 weeks post-op massive cuff chronic repair**

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Meta-analysis

**Early Passive Motion Versus Immobilization After Arthroscopic Rotator Cuff Repair**

Jonathan C. Riboh, M.D., and Grant E. Garrigues, M.D.

months. External rotation is improved by 10° with EPMA at 31 yrs to be determined. Repair rates at a minimum of 1 year is **Level of Evidence: Level II, meta-analysis of Level II study**

**A** rthroscopic rotator cuff repair is a cost-effective intervention<sup>1</sup> with a documented ability to reduce pain and improve functional outcome scores, despite re-tear rates varying from 25% to 90% depending on tear size and repair technique.<sup>2-4</sup> Although stiffness is less common than after open repair,<sup>5</sup> it remains the most frequent complication of arthroscopic rotator cuff surgery.<sup>6</sup> Shoulder stiffness can be a source of pain, functional limitation, and frustration for patients.<sup>7</sup> Several risk factors for stiffness after arthroscopic rotator cuff repair have been identified,<sup>8,9</sup> including preoperative stiffness, Workers' Compensation insurance, age younger than 50 years, partial articular-sided tears, and

From the Division of Sports Medicine and Shoulder Surgery, Department of Orthopaedic Surgery, Duke University, Durham, North Carolina, U.S.A.

**Arthroscopy 2014**

**A** rthroscopic rotator cuff repair is a cost-effective intervention<sup>1</sup> with a documented ability to reduce pain and improve functional outcome scores, despite re-tear rates varying from 25% to 90% depending on tear size and repair technique.<sup>2-4</sup> Although stiffness is less common than after open repair,<sup>5</sup> it remains the most frequent complication of arthroscopic rotator cuff surgery.<sup>6</sup> Shoulder stiffness can be a source of pain, functional limitation, and frustration for patients.<sup>7</sup> Several risk factors for stiffness after arthroscopic rotator cuff repair have been identified,<sup>8,9</sup> including preoperative stiffness, Workers' Compensation insurance, age younger than 50 years, partial articular-sided tears, and coexisting adhesive capsulitis, calcific tendinitis, or labral pathology.  
The influence of early passive motion (EPM)—or sling immobilization—on postoperative stiffness is still a source of considerable debate. The question is of particular interest

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**Rehab Following Rotator Cuff Repair**  
*Motion*

- Approximately **5 -16%** of all patients will develop stiffness after rotator cuff repair

*Koo et al: Arthroscopy 2011*  
*Huberty et al: Arthroscopy 2009*  
*Chung et al: Arthroscopy 2013*  
*Harris et al: Orthopedics 2013*  
*Franceschi et al: Sports Med Arthroscopy '11*  
*Brislin et al: Arthroscopy 2007*

**Is this Acceptable to the Clinician ?**

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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Keys to Success*

**#8 Reflections – Outcome Data**  
 “Nothings ruins a good outcome like long term follow-up studies”

- ✓ Bring people back and assess them
- ✓ Make changes based on your outcome data
- ✓ It’s all about function & pain & longevity with a rotator cuff repair

**Evidence Based Treatment - Outcomes**

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**Wilk :Tech Shoulder & Elbow Surg '00**

- 22 patients, mini-open repair
- Average follow-up 40 months
- Average age 64.7 years (range 40-76)
- Size of tear:
  - » 1 small, 9 medium, 8 large, 4 massive

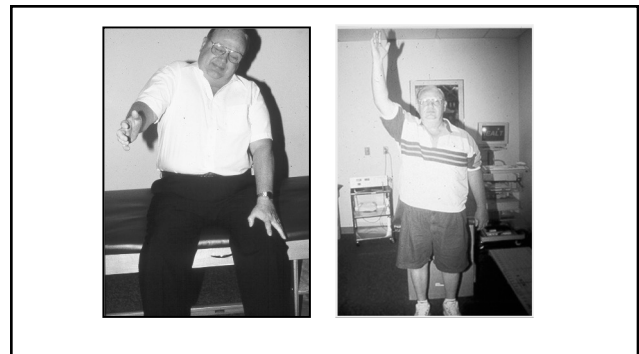
✓ **95%** excellent/good results (ASES)

✓ Average score (ASES)

- ✓ pre-op 30.7 vs. post-op 92
- ✓ ADLs pre-op 3.25 vs. post-op 18.8

✓ 4 patients received MRI – 1 failure (excellent result)

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**Irreparable Rotator Cuff Tears**  
*Rehab Guidelines – 6 Key Components*



- ✓ Re-establish acceptable PROM – reduce capsular tightness (especially inferior)
- ✓ Reduce pain – muscle inhibition
- ✓ Activate rotator cuff muscles without pain
- ✓ Establish unilateral muscle balance
  - ER/IR ratio 55%  $\geq$
  - ER/ABD ratio 53%  $\geq$
  - Levy et al: Arthroscopy '93, '96
- ✓ Posture & Scapular exercises
- ✓ Turn on & strengthen posterior cuff & scapular
  - » RS, isometrics, EMS, pool exercises, gravity eliminated exercises, scapular drills, etc...



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**Rehabilitation Following Cuff Repair**  
*“The Bottom Line”*



- ✓ Rehab must match the surgery
- ✓ Rehab must match the patient
- ✓ Small tears – move them (easy)
- ✓ Big tears, poor tissue, revisions – slow rehab down
- ✓ PROM is ok for most repairs
- ✓ AROM & strengthening needs to be delayed
- ✓ When in doubt – communicate or go slow *Team Approach!*

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**REHABILITATION FOLLOWING ROTATOR CUFF REPAIR**  
*Summary – Take Home Message*

- ✓ All rotator cuff repairs are not the same
- ✓ Rehabilitation program must vary based on specific criteria:
  - ✓ Size of the tear
  - ✓ Retraction of the tear
  - ✓ Tissue quality
  - ✓ Chronicity of the tear
  - ✓ patient variables
- ✓ Slower may be better in many cases

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