

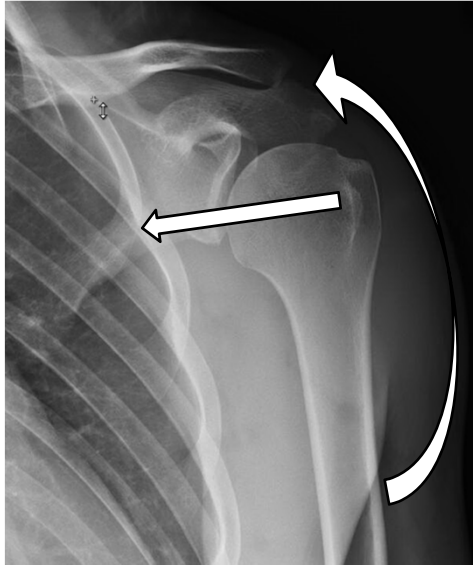
# **Evaluation and Management of Atraumatic Shoulder Pain**

**Andrew Neviasser, MD**  
Assistant Professor - Clinical  
Department of Orthopaedics  
The Ohio State University Wexner Medical Center

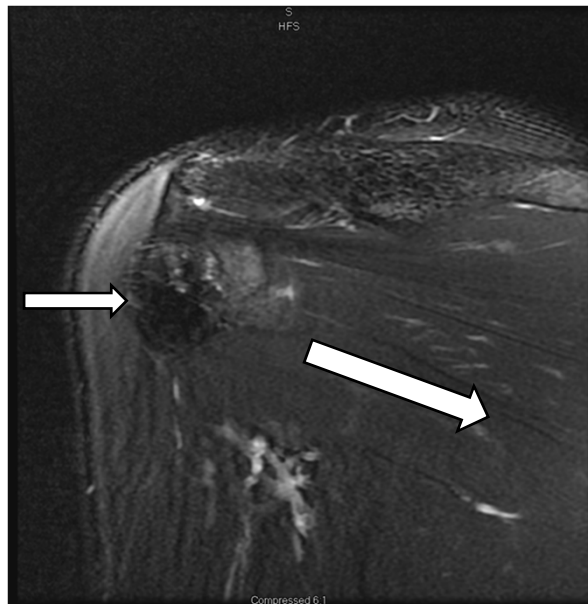
## **Outline**

- **Anatomy**
- **Biomechanics**
- **Differential Diagnosis**
  - **Pathology**
- **Evaluation (X rays!!)**
- **Treatment vs. Referral**

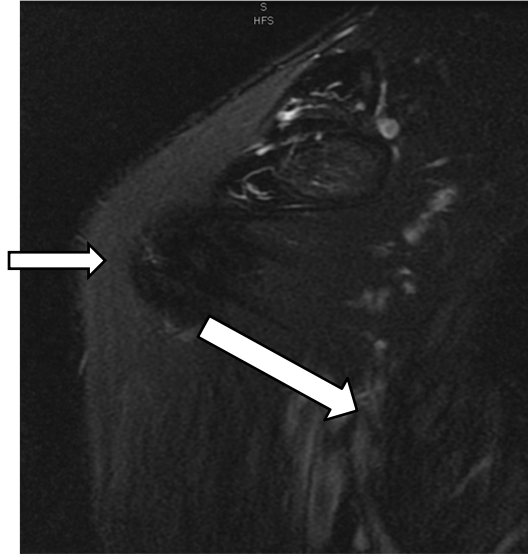
# Force Couples



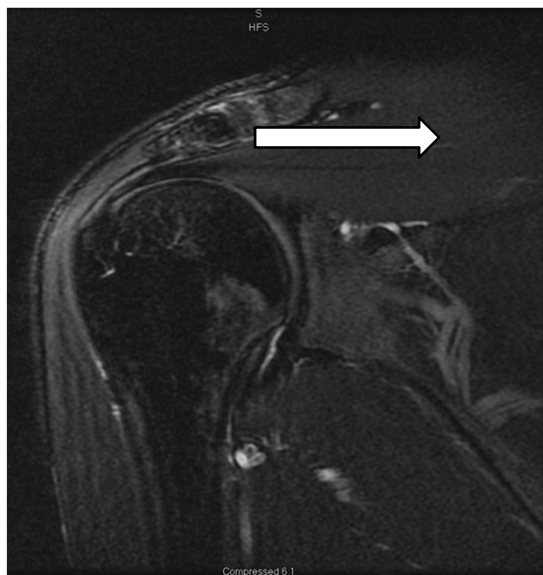
# Infraspinatus



# Subscapularis



# Supraspinatus



# **Differential Diagnosis**

- **Rotator Cuff Disease**
  - **Adhesive Capsulitis**
- **Glenohumeral Osteoarthritis**
  - **Calcific Tendinitis**

# **Evaluation**

- **History and Physical Exam**
- **Traumatic is different**
- **Always get X-rays**
- **MRI for pre surgical planning**

# Rotator Cuff Disease

- Shoulder Impingement
- Rotator Cuff Tendinosis
- Rotator Cuff Tendinitis
- Shoulder Bursitis
- Long Head of Biceps Tendinosis

**All are essentially the same process**

# Rotator Cuff Disease

- Degenerative process
- Increasing with Aging Population
- Not clearly an overuse problem



# Rotator Cuff Tears Prevalence

- **5-39% Cadaveric studies**
- **9% Postmortem (DePalma et al. ICS '50)**
- **18% by Arthrogram (Pettersson Act Scand '42)**
- **28% in age > 60 yrs. (Sher et al. JBJS '95)**
- **Over age 80 >50% (Tashjian 2015)**
  
- **MRI and Cadaveric studies support 10-40% of population >60 yo has cuff tear**

## Why?

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• <b>Intrinsic</b><ul style="list-style-type: none"><li>– Vascularity</li><li>– Internal strain</li><li>– Morphology</li><li>– Stiffness</li><li>– Genetics</li></ul></li></ul> | <ul style="list-style-type: none"><li>• <b>Extrinsic</b><ul style="list-style-type: none"><li>– Subacromial Impingement</li><li>– Internal Impingement</li><li>– Acromial shape</li><li>– Spurring</li><li>– Mechanics</li></ul></li></ul> |
|---|--|



## Genetic influences in the aetiology of tears of the rotator cuff

SIBLING RISK OF A FULL-THICKNESS TEAR

P. Harvie,  
S. J. Ostlere,  
J. Teh,  
E. G. McNally,  
K. Clipsham,  
B. J. Burston,  
T. C. B. Pollard,  
A. J. Carr

- **205 pts**
- **129 Siblings, 150 spouses**
- **Relative risk of symptomatic full-thickness tears in siblings versus controls was 4.65 (95% CI 2.42 to 8.63)**

## Prevalence Data

- **MRI and Cadaveric studies support 10-40% of population >60 yo has Cuff tear**
- **US Population 2010=308.4 million**
  - **Over Age 60 = 57 million**
- **Conservative Estimate (10%):**
  - **5.7 million cuff tears in USA**
- **BUT – only 270,000 rotator cuff surgeries are done each year....**
- **4.7% of People with Cuff Tears have Surgery...**

**If 95% of People with  
Rotator Cuff Tears are  
not having Surgery....**

## **Rotator Cuff Tears**

### **Physical Exam**

#### **Early**

- Usually full passive ROM
- Stiffness RARE! (9%)
- Pain with Elevation
- Loss of IR
- Night Pain
- Weakness is uncommon

#### **Later**

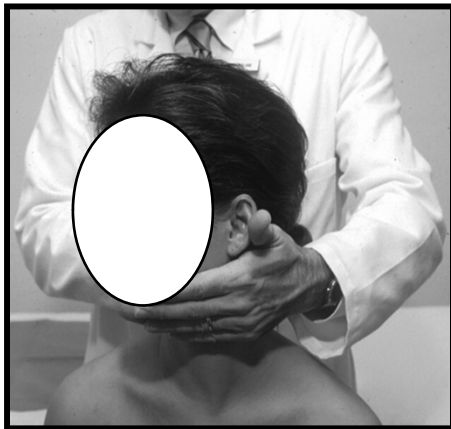
- Spinati atrophy
- Weakness of Elevation
- Weakness of ER (at side)
- Drop sign
- Lag sign
- Biceps rupture



## **Rotator Cuff Inspection for atrophy**



## **Physical Exam**



**Cervical Spine**



**AC Joint**

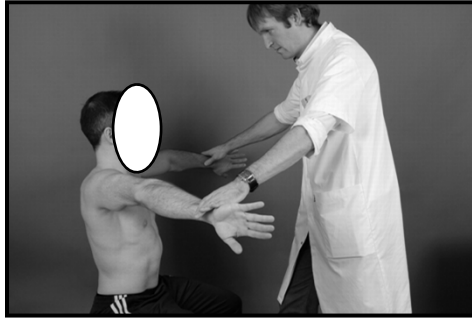
## Range of Motion



## Range of Motion



# Strength Testing



# Subscapularis Tests



**Lift-off**



**Belly Press**

# Impingement Signs

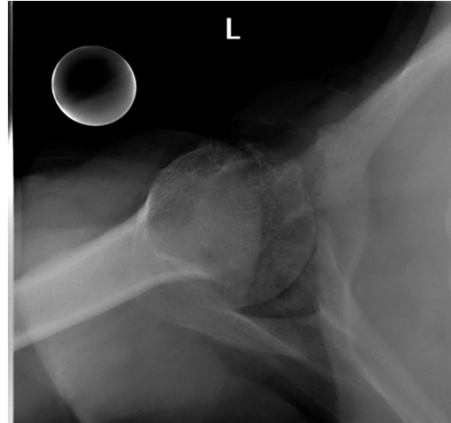


## Physical Exam – Rotator Cuff Tears

Test	Authors	LOE	N	Sens	Spec	PPV	NPV	+LR	-LR	Accuracy
Drop Arm Test	Park 2005		913	.349	.875	.650	.668	2.79	.744	.665
Jobe-Pain	Itoi 1999		143	.63	0.55	.31	.82	1.4	0.7	.57
Jobe-Pain	Kim2006		200	.939	.939	.462	.939	15.39	.065	.62
Jobe-Weakness	Itoi 1999		143	.77	0.68	.44	.90	2.4	0.3	.70
Jobe-Weakness	Kim 2006		200	.757	.709	.562	.855	2.60	.343	.725
Full Can-Pain	Itoi 1999		143	0.66	0.64	.37	.85	1.8	0.5	.64
Full Can-Pain	Kim 2006		200	.712	.679	.552	.827	2.218	.424	.69
Full Can-Weakness	Itoi 1999		143	0.77	0.74	.49	.91	3.0	0.3	.75
Full Can – Weakness	Kim 2006		200	.773	.679	.543	.858	2.408	.334	.71
Supraspinatus Test	Holtby 2004		50	.411	.697	.411	.697	1.37	0.84	.60
Neer	MacDonald 2000		85	0.833	0.508	.400	.886	1.693	0.329	.588
Neer	Park 2005		913	.593	.472	.413	.649	1.12	.862	.518
Hawkins	MacDonald 2000		85	0.875	0.426	.375	.897	1.524	0.293	.659
Hawkins	Park 2005		913	.687	.483	.452	.712	1.33	.648	.500
Painful Arc	Park 2005		913	.758	.618	.610	.764	1.98	0.391	.680
Rent test (palpation)	Wolf 2001		109	.957	.968	.957	.968	30.1	0.0	.963



**70 y/o Female 3 yrs of  
treatment for RCD  
4 injections, 1 full yr PT, 2  
MRI's**



**48 y/o M. Marine, weeping**

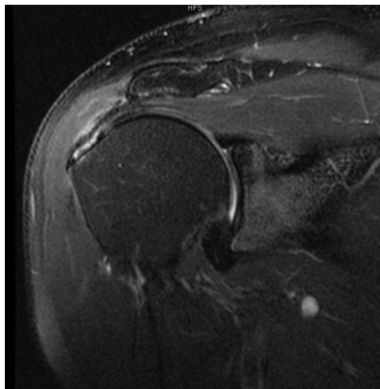


## Rotator Cuff Disease

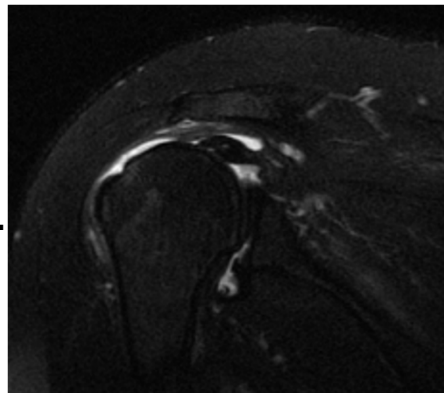
53 y/o with 2 months of pain



## MRI



VS.



“My rotator cuff is torn”

“My rotator cuff is torn”

### **A Prospective Evaluation of Survivorship of Asymptomatic Degenerative Rotator Cuff Tears**

Jay D. Keener, MD, Leesa M. Galatz, MD, Sharlene A. Teehey, MD, William D. Middleton, MD, Karen Steger-May, BA,  
Georgia Stobbs-Cucchi, RN, Rebecca Patton, MA, and Ken Yamaguchi, MD

*Investigation performed at the Shoulder and Elbow Service, Department of Orthopaedic Surgery, Washington University, St. Louis, Missouri*

- **228 pt f/u 5 yrs,**
- **49% Enlarged, Mean time 2.8 yrs**
- **46% Increased pain**
- **61% Full thickness, 44% PTT enlarged**

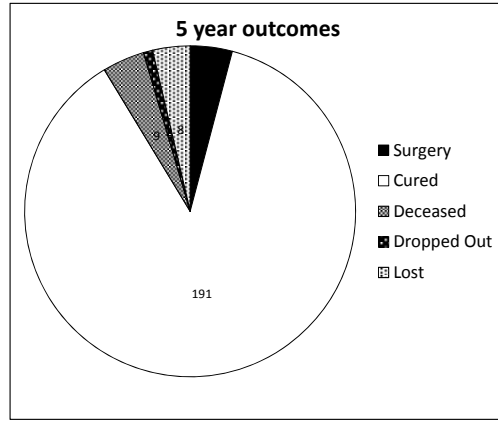
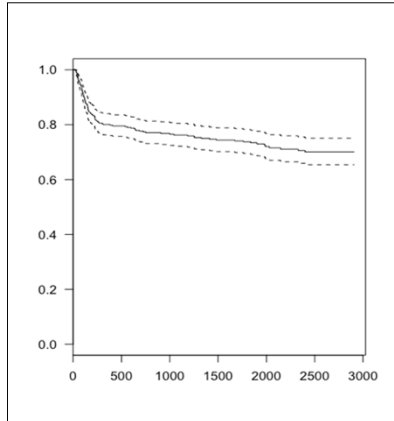
**Patients with symptomatic rotator  
cuffs may be at risk for size  
progression over time**

### **Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study**

the MOON Shoulder Group

- **452 pts with full thickness tears**
- **Standardized PT program**
- **Followed 2 yrs**
- **Less than 25% opted for surgery, most did so early 3-12wks**

## Effectiveness of Therapy 5 Year Outcomes



85% Follow up at 5 years  
3% died, 16% lost to follow up  
24% had Surgery  
Those that had Surgery Decided Early

## Features NOT Predictors of Surgery

### Patient Factors

- Age, sex, BMI
- Handedness
- Education, occupation
- Work-compensation status
- Comorbidities
- Pain level
- Duration of symptoms
- SANE score

### Structural Factors:

- Number of tendons torn
- Amount of retraction
- Forward elevation strength



## ***What are the Predictors of Failure of Non-operative Treatment?***

- ***Anatomic Severity of Tear- NO ASSOCIATION***
- ***Symptoms (pain, strength)– NO ASSOCIATION***
- ***Associations***
  - Higher Activity Level ( $p=0.011$ )
  - Not Smoking ( $p=0.023$ )
  - Younger Age ( $p=0.042$ )

## ***Predictors of Failure of Non-operative Treatment? Strongest Association***

- ***Low Patient Expectations Regarding Success with Therapy ( $p<0.0001$ )***
- ***If a patient thought PT would not be effective- it generally wasn't***
- ***If a patient thought PT would be effective-It was***

# **Operative versus Non-Operative Treatment for the Management of Full Thickness Rotator Cuff Tears: A Systematic Review & Meta-analysis**

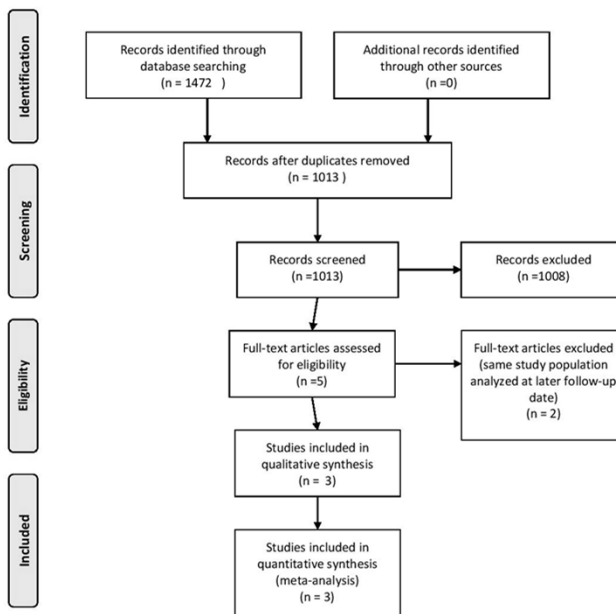
**Christine Piper MD, Alice Hughes MD, Yan Ma  
PhD, Haijun Wang PhD, Andrew Neviaser MD**

## **Purpose**

- **There has been recent trend toward surgery for atraumatic rotator cuff tears, however, no consensus exists on whether surgery is the optimal treatment.**
- **The aim of this study is to analyze the Level I and II research comparing operative versus non-operative management for atraumatic rotator cuff tears.**

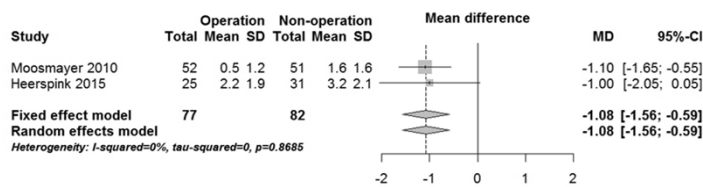
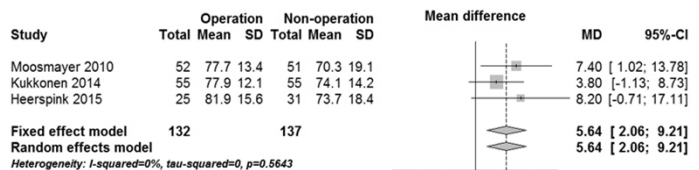
## Methods

- 258 patients w/ 1 yr follow-up
- Mean age: 59-64 years
- Clinical outcomes measures: Constant-Murley score and the Visual Analog Pain Scale



## Results

- Statistically significant differences in both Constant & VAS scores, favoring surgery after 1 year of follow up with a mean difference of 5.64 and 1.08 respectively.



## Conclusions

- There was a statistically significant improvement in outcomes for patients managed operatively compared to non-operatively.
- The difference in both Constant Score and VAS were small and do not meet the minimal difference considered clinically significant.

### Study Overview



ARTHROSCOPIC ROTATOR CUFF TRIAL

[ShoulderStudy.com](http://ShoulderStudy.com)

# Study Overview

<b>STUDY TITLE</b>	Operative versus Non-Operative Treatment for Atraumatic Rotator Cuff Tears: A Multicenter Randomized Controlled Pragmatic Trial
<b>SHORT TITLE</b>	Arthroscopic Rotator Cuff (ARC) Clinical Trial
<b>PRINCIPAL INVESTIGATOR</b>	Nitin Jain, MD, MSPH
<b>FUNDED BY</b>	Patient-Centered Outcomes Research Institute (PCORI)
<b>LENGTH</b>	5 years total (3 ½ years recruitment)
<b>RECRUITMENT TARGET</b>	700
<b>PARTICIPATING SITES</b>	12 (including Vanderbilt)

## Participating Sites

### COORDINATING CENTER & RECRUITING SITE:

VANDERBILT  UNIVERSITY  
MEDICAL CENTER

### RECRUITING SITES:

 Washington  
University in St. Louis

 THE OHIO STATE UNIVERSITY  
WEXNER MEDICAL CENTER

 *UI Sports Medicine*  
University of Iowa  
Hospitals and Clinics

 University of  
Kentucky

 Sports Medicine  
UNIVERSITY OF COLORADO

 Penn  
Medicine

 ORTHOPEDIC  
INSTITUTE

**UT Southwestern**  
Medical Center

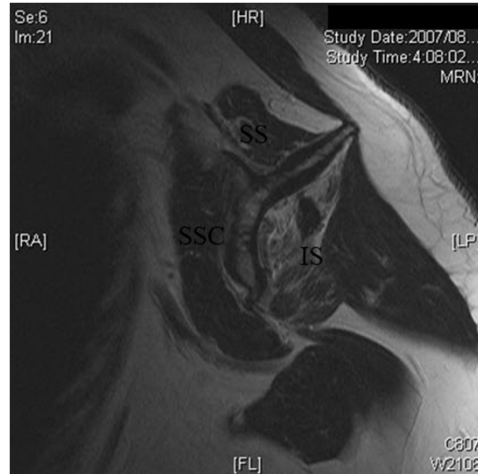
 KOC  
Knoxville Orthopaedic Clinic

**UCSF** Medical Center  
Orthopaedic Institute

 MICHIGAN MEDICINE

# Reasons to Operate

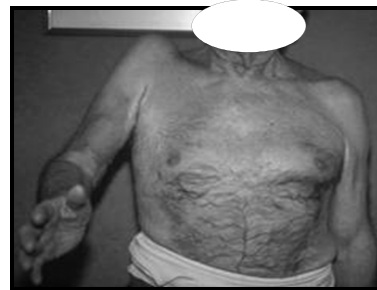
- Trauma
- Pain
- Function
- Progression
- Fatty Degeneration



# Rotator Cuff Summary

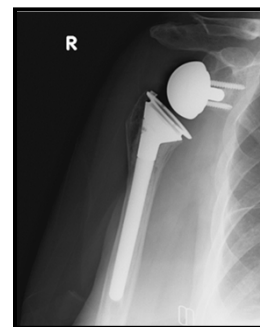
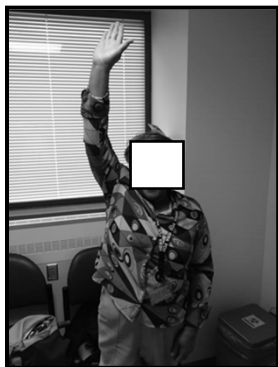
- Multifactorial in Origin
  - History, PE, X-Ray
    - Surgery for
      1. Traumatic tears
      2. Younger patients
      3. Larger tears
      4. Failure of Non Op

# Rotator Cuff Arthropathy



## Indications for Reverse

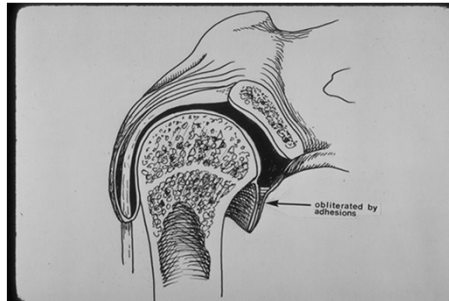
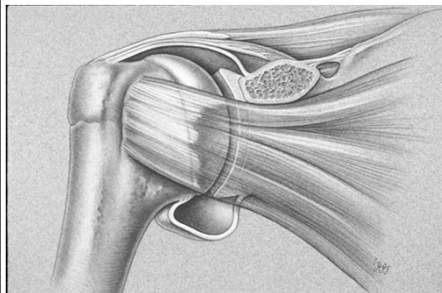
- RCA
- Massive Tears in Elderly
- Fractures
- Revision Arthroplasty
- Severe OA



# Adhesive Capsulitis

## Adhesive Capsulitis

- A painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule.
- Terminology is an issue





## **Demographics**

- **2-5% of population**
- **Females > males**
- **Between ages 40 and 60**
- **Non-dominant shoulder**
- **More common in diabetics (and more resistant to treatment)**

## **Keys to Diagnosis**

- **Early → Pain in all planes of motion**
- **Later → Mechanical restriction of passive ROM**
- **Easiest to feel as tethering of ER at the side**
- **X-Rays- Normal! (or osteopenia)**

## Keys to Diagnosis



## Stages

- **Stage I**    **Pre-adhesive**
- **Stage II**   **Acute adhesive synovitis**
- **Stage III**   **Maturation**
- **Stage IV**   **Chronic**

## **Physical Therapy - High-grade vs Low-grade**

- 100 patients
  - Sx >3mos, >50% loss PROM
- Randomized to:
  - HGPT-intensive mobilization at end-range positions
  - LGPT-passive mobilization within pain free zone
- Outcomes
  - ROM
  - Shoulder Rating Questionnaire
  - Shoulder Disability Questionnaire
- F/U 3,6,12 months
- Results
  - Both groups improved
  - HGMT significantly better for passive abduction (3, 12 months); external rotation (12 months)

Vermeulen HM Comparison of high-grade and low-grade mobilization techniques in the management of adhesive capsulitis of the shoulder: randomized controlled trial. Phys Ther 86(3):355-68, 2006.

## **Long-term Outcomes**

- Shaffer et al 1992,
- Retrospective review, brought patients back for examination
  - Average 7 years from diagnosis
  - 92 patients met criteria, 62 participated (67%)
  - 31 (50%) with mild pain and/or stiffness
  - 60% with evidence of restriction in at least 1 plane
  - 7 (11%) reported interference with function
  - No correlation between ROM and complaints

Shaffer B. Frozen shoulder. A long term follow up. JBJS 74A(5):738-46, 1992

# Arthroscopy

- **Prospective study of 73 patients (LOE 4)**  
**Arthroscopic Capsulotomy**
  - **Mean symptom duration- 19.7 months!!**
  - **Mean age 52, 57% females**
  - **70% of patients had aggravation of pain at 4.5 weeks, 37% required corticosteroid injection**
  - **12 month - changes in pain, function, and ROM maintained**
  - **11% had recurrence of pain or stiffness**

**Watson L. Frozen shoulder: a 12-month clinical outcome trial. J Shoulder Elbow Surg 9(1):16-22, 2000**

# Adhesive Capsulitis

- **When to refer?**
  - **Failure to improve after treatment of 4 months**
  - **Unsatisfied with function or level of pain after 8-12 months of physical therapy.**

# **Summary**

- 1. Rotator Cuff Disease**
- 2. Adhesive Capsulitis**
- 3. Glenohumeral Osteoarthritis**
- 4. Calcific Tendinitis**
- **History and Physical Exam**
  - **Traumatic is different**
  - **Always get X-rays**