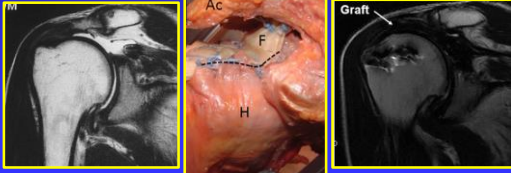


# Superior Capsular Reconstruction The Modern Frontier A New Surgical Technique

Current Solutions in Shoulder and Elbow Surgery  
February 7, 2016  
Tampa, FL

Kevin D. Plancher, MD, MS  
Clinical Professor  
Albert Einstein College of Medicine  
New York, NY



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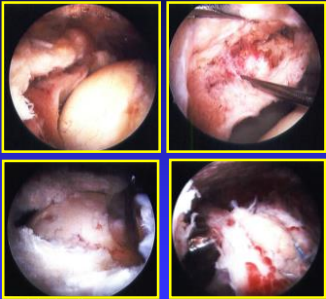
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## Superior Capsular Reconstruction Massive Rotator Cuff Tears

### Definition

- Complete Tear
  - Supraspinatus
  - Infraspinatus
  - ✓ Often
- Retraction
  - To the Glenoid
  - ✓ > 5 cm
- Possible Partial Tear
  - Teres Minor
  - Subscapularis



Becker S, Ek ET, Geber C. A comparative analysis of fatty infiltration and muscle atrophy in patients with chronic rotator cuff tears and supraspinator neurolysis. JSES. 2012; Nov(21(11):1837-46.  
Roshan K, Hadley S, Pham K, Calozzo V, Lee YO, Gupta R. Development of fatty atrophy after neurologic and chronic cuff repairs: an animal model of rotator cuff pathology. JBJS Am. 2010; Oct 6(94(10):2270-6.  
Liu X, Larson D, Natsuhara K, Maniaro G, Kim HT, Foley BT. A mouse model of massive rotator cuff tears. JBJS Am. 2012; Apr 6(94(7):e11.

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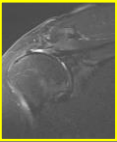

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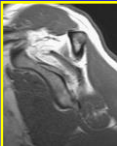


## Superior Capsular Reconstruction

### Massive Rotator Cuff Tears

Who Gets Surgery?

- **Indications**
  - ◆ Mechanism of Injury
    - Traumatic
  - ◆ Younger Patient
  - ◆ Night Pain
    - No Improvement After Initial Physical Therapy
  - ◆ Tear Progression
    - Re-Check MRI
- **Contraindications**
  - ◆ Smoking
  - ◆ Atrophy/Fatty Degeneration
    - Goutallier Classification
  - ◆ Advanced Age
  - ◆ Humeral Head Elevation

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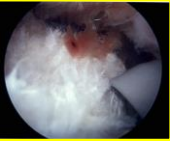

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## Superior Capsular Reconstruction

### Massive Rotator Cuff Tears

Re-Tears Are Common

- **Galatz**
  - ◆ Large/Massive Rotator Cuff Tears
    - **Arthroscopically Repaired**
      - 94% Failure Rate at 2 Years (2004)
      - Radiographic Signs of Progression at 10 Yrs
        - Proximal Humeral Migration
        - Cuff Tear Arthropathy (2013)
- **Miller (2011)-2 Year Follow UP**
  - ◆ **41% Re-Tear Rate**
    - Earlier Failure
      - 3 Months
        - 7 of 9 Re-Tears
      - 3-6 Months
        - 2 of 9 Re-Tears
      - 6-24 Months
        - No Re-Tears
    - ◆ **50% Functional Improvement on Western Ontario Rotator Cuff Index**
      - Despite Known Recurrent Re-Tear
      - 2 Year Follow Up

Galatz et al. The Outcomes and Risk Factors of Minimally Arthroscopically Repaired Large and Massive Rotator Cuff Tears. Orthopedics. 2004; 26(12):1414-1418.  
Miller et al. Effect of rotator cuff repair with capsular reconstruction on the arthroscopic repair of large and massive rotator cuff tears. AJSM. 2011; 38(12):2062-2070.

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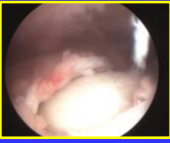
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## Superior Capsular Reconstruction

### Massive Rotator Cuff Tears

Why Does Tendon Fail To Heal Securely To Bone?

- **Number of Responding Cells**
  - ◆ Inadequate
- **Cellular and Mechanical Signals**
  - ◆ Inappropriate
- **Poor Vascularity**
- **Matrix Degradation and Synthesis**
  - ◆ Imbalance
- **Normal Tendon-Bone Interface**
  - ◆ Not Re-Established
- **Despite Best Efforts At Repair,**
  - ◆ "Healing" At The Rotator Cuff Insertion Results In:
    - Reactive Scar Formation
    - Absent Tissue Regeneration

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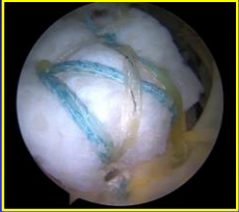
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## Superior Capsular Reconstruction Massive Rotator Cuff Tears Treatment Options

- Arthroscopic Debridement
- Arthroscopic Biceps Tenotomy
- Partial Rotator Cuff Repair
- Tendon Transfers
- Reverse Total Shoulder Arthroplasty
- **Superior Capsular Reconstruction**
  - ◆ Helps Reduce Superior Translation
  - ◆ Centers Humeral Head on Glenoid
  - ◆ Allows Remaining Rotator Cuff & Deltoid to Function Properly



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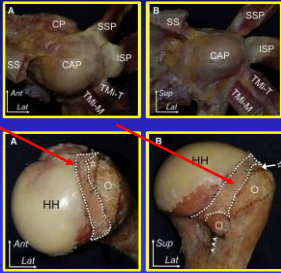
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## Superior Capsular Reconstruction Massive Rotator Cuff Tears Anatomy Superior Capsule

- Location
  - ◆ Inferior Surface of Supraspinatus and Infraspinatus Tendons
  - ◆ Attaches to 30-61% of the Greater Tuberosity!
  - ◆ Thickest Portion
    - ✓ Border Between The Infra-Spinatus and Teres Minor
      - Capsule Compensates for Lack of Muscular Attachments
  - ◆ Thinnest Portion
    - ✓ 11 mm Posterior to Anterior Margin of Greater Tuberosity
    - ✓ Very Close to Posterior Edge of the Supraspinatus Insertion
      - Possibly Contribute to Degenerative Rotator Cuff Tears



1. Nimura A, Kabo A, Yamaguchi K, Mochizuki T, Okawa A, Sugaya H, Akita K. The superior capsule of the shoulder joint complements the insertion of the rotator cuff. JSES. 2012;24(2):171-187.75.  
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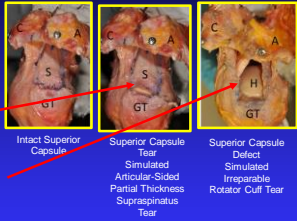
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## Superior Capsular Reconstruction Massive Rotator Cuff Tears Superior Capsule

- Biomechanical Function<sup>2</sup>
  - ◆ Passive Stability to GH Joint
    - ✓ Partial Tear
      - Increased Anterior & Inferior Translation
    - ✓ Massive Tear
      - Increased
        - GH Translation All Directions
        - Subacromial Contact Pressure
          - 30° ABD
          - External Rotation
          - Internal Rotation



1. Ishihara Y, Mihata T, Tambori M, Nguyen L, Park KJ, McGarry MH, Takai S, Lee TD. Role of the superior shoulder capsule in passive stability of the glenohumeral joint. JSES. 2014 May;23(5):942-8.  
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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Surgical Constructs

Fascia Lata, Doubled

ArthroFlex, 3.5 mm



Failure = 180 N



Failure = 550 N

Double Surgeon's Knot = 480 N

1 Courtesy Alan Hirahara, MD

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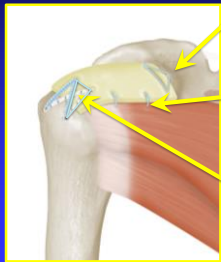
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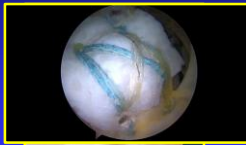
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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Surgical Technique - ArthroFlex



Medial Glenoid Fixation  
• PASTA Bridge Construct



Lateral Tuberosity Fixation  
• BioBridge Construct

Hirahara JM, Adams CR. Arthroscopic Superior Capsular Reconstruction for Treatment of Massive Irreparable Rotator Cuff Tears. Arthrosc Tech. 2015; 4(6): e637-e641.

Park H, Greenstein JA, Miller AJ. Arthroscopic Superior Capsular Reconstruction for Irreparable Rotator Cuff Tears. Arthroscopy Tech. 2015; 4(6): e751-e755. © Copyright 2016 Plancher Orthopaedics & Sports Medicine PLLC

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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Case

- 59 Year Old Female
  - Right Hand Dominant
  - 3 Previous Rotator Cuff Repairs
  - School Teacher
    - Can't Write on Board
- ROM
  - Full Passive ROM
  - Active Flexion 90°
- Strength
  - 3-/5
- Mild Chondromalacia



- Debridement / Partial Repair
- Revision RCR
- Lat Dorsi Transfer
- Bridging
- Reverse Arthroplasty

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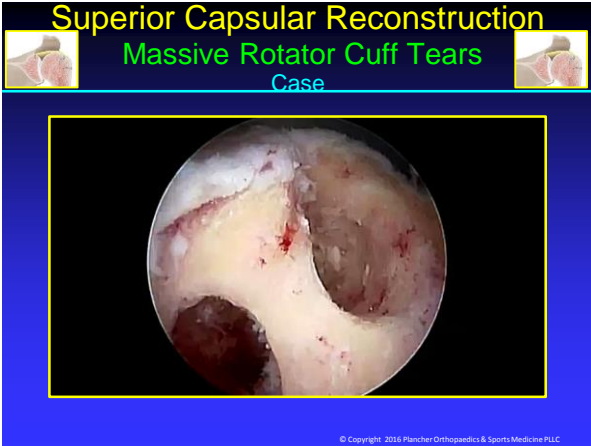
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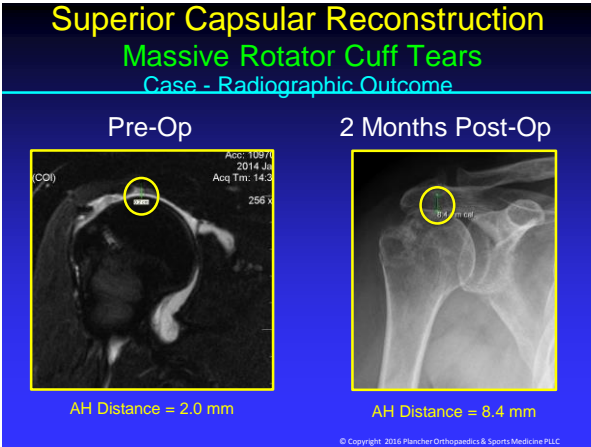
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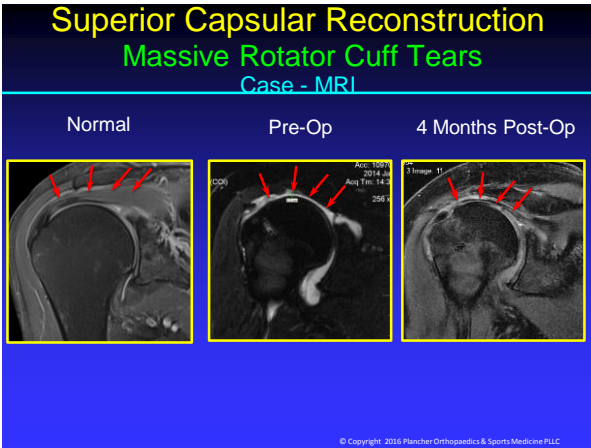
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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Case - Clinical Outcomes

## > 4 Months Post Op

- ◆ VAS
  - ✓ Pre 5
  - ✓ Post 1
- ◆ ASES
  - ✓ Pre 58
  - ✓ Post 88
- ◆ Forward Flexion
  - ✓ Pre 90
  - ✓ Post 160



2 Months Post Op

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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Case - Ultrasound

## 8 Months Post-Op



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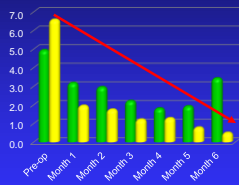
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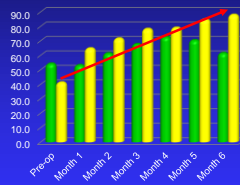
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# Superior Capsular Reconstruction Massive Rotator Cuff Tears Outcomes - Hirahara Unpublished

## Pain Scores



## ASES Scores



Massive RC Repair Group N = 13  
SCR Group N = 12

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Thank You!



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